2020

REPRODUCTIVE HEALTH AND MIDWIFERY 1

[SEPTEMBER & MARCH 2020 CLASS]

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FUNDAMENTALS OF REPRODUCTIVE HEALTH

- ✓ The term "Reproductive Health "is most often equated with one aspect of women's lives; motherhood.
- ✓ Half of the world's 2.6 billion women are now 15 – 49 years of age. Without proper health care services, this group is highly vulnerable to problems related to sexual intercourse, pregnancy, contraceptive side effects, etc.

HISTORICAL BACKGROUND AND DEVELOPMENT OF REPRODUCTIVE HEALTH

Before 1978 Alma-Ata Conference

- ✓ There were Basic health services in clinics and health centers.

Primary health care declaration 1978

- ✓MCH services started with more emphasis on child survival
- ✓Family planning was the main focus for mothers.

Safe motherhood initiative in 1987

- ✓Emphasis on maternal health
- ✓Emphasison reduction of maternal mortality

International Conference on Population and Development (ICPD) held in Cairo in 1994

Reproductive health is defined as:

- ✓Emphasis on quality of services
- ✓Emphasis on availability and accessibility
- ✓Emphasis on social injustice

✓Emphasis on individuals woman's needs and rights

Millennium development goals and reproductive health in 2000

- MDGs are directly or indirectly related to health.
  ✓MDG 4, 5 and 6 are directly related to health, while MDG 1,2,3, and 7 are indirectly related to health

World Summit 2005, declared universal access to reproductive health

- "Sexual and reproductive health is fundamental to the social and economic development of communities and nations, and a key component of an equitable society."

HISTORICAL BACKGROUND OF REPRODUCTIVE

HEALTH POLICIES IN KENYA

- As early as 1965, when fertility control was a primary focus, the Government of Kenya (GoK) recognised population planning and family planning as part of the National Planning Strategies of Sessional Paper No. 10 of 1965.
- In 1967, the Family Planning Programme was established (GoK/MoH, 1998).
- If the population growth rate is higher than the economic growth rate, it creates a burden on available land, health facilities, educational resources and the job market.
- These factors often impact more on mothers and children, whose mortality and morbidity rates are high, mainly due to complications associated with pregnancy and childbirth and HIV/AIDS prevalence.
- In 1974, further evaluation of reproductive health services

established that the child health services were running parallel to those of family planning and antenatal care.

- This arrangement was viewed as inefficient. As a result, these services were integrated to offer a more consolidated package.
- Following this, the Maternal/Child Health Care and Family Planning (MCH/FP) Programme was established.
- In 1987, the Safe Motherhood Initiative (SMI) was launched at the Conference on Better Health for Women and Children, held in Nairobi, Kenya.
- The Government of Kenya endorsed the Plan of Action to reduce maternal mortality and morbidity rate, which was developed at that conference.

Policies, standards and guidelines

- As a response to the1994 ICPD in Cairo, the Kenya government developed and launched the Health Policy Framework Paper of 1994.
- This policy document provides the blueprint for strategies for the development and management of health services in this country.
- A notable policy document is the National Reproductive Health Strategic Plan of 1996,covering the period 1997 - 2010.
- This document guides the implementation of a comprehensive and integrated RH programme in Kenya for the next decade.
- In order to operationalise the 1997- 2010 Strategic Plan, the Ministry of Health (MoH), in collaboration with various

stakeholders, designed and launched a series of policy documents to spearhead the long term reform process.

- The MoH and its development partners have since used this policy document to review, revise and develop a series of guidelines related to reproductive health services.

National Policy and Guidelines in Reproductive Health

- Policy guidelines are written instructions that give directives with regard to the practices that should be followed in the provision of services to the consumer.

GoK Policy Guidelines for the Implementation of Reproductive Health Services

These guidelines aim to:

- Create awareness among leaders, communities and programme implementers of the need to promote high quality reproductive health services, in order to improve the well being of the people
- Make available quality and sustainable family planning services to all who need them, in order to reduce the unsatisfied needs for family planning.
- Reduce health and socioeconomic burdens due to STDs/HIV/AIDS and their implications or effects
- Enhance the health and well being of adolescents and youths
- Reduce the incidence of infertility and facilitate proper investigations and management of infertile individuals and couples
- Eliminate all forms of discrimination against women and

female children to enable them to exercise their sexual and RH rights and to promote their equal representation in all levels of political and public life.

- Enhance both men and women's health throughout their life cycle Provide quality and sustainable comprehensive RH services in all service delivery points (SDP's) and community levels.

The Implementation Plan for National Reproductive Health Strategy of 1998 Covering the Period 1999 - 2003

- The development of this national implementation plan represents Kenya's determination not only to operational-ise the reproductive health strategy but also to address the immediate causes and underlying factors that affect

the health status of the population.

- This policy document provides a list of RH plan components in order of priority.

Components of Reproductive Health

- Quality family planning services
- Promoting safe motherhood: prenatal, safe delivery and post natal care, including breast feeding;
- Prevention and treatment of infertility
- Prevention and management of complications of unsafe abortion;
- Safe abortion services, where not against the law;
- Treatment of reproductive tract infections, including sexually transmitted infections;
- Information and counseling on human sexuality, re-

sponsible parenthood and sexual and reproductive health;

- Active discouragement of harmful practices, such as female genital mutilation and violence related to sexuality and reproduction;
- Functional and accessible referral
- The approach recognizes the central importance of gender equality, men's participation and responsibility.

The National Reproductive Health Training Plan of 2000 Covering the Period 2000 - 2004

- This policy document addresses the weakness identified in relation to the various care providers at all levels of the care delivery system.
- The identified weaknesses included:

1. Inadequate clinical skills
2. Poor knowledge
3. Poor managerial skills
4. Poor communication and counselling skills

- The reproductive health training plan document focuses on the strengthening of pre-service and in-service training activities to facilitate the provision of integrated and comprehensive reproductive health services.

The GoK/UNICEF 2004 - 2008 Programme of Co-operation (Draft Strategy Paper), February 2003

- This document provides policy guidelines for provision of quality care and training.

International Conference on Population and

Development (ICPD) held in Cairo in 1994

Reproductive health is defined as:

- The 1994 ICPD called for a shift in development strategy away from vertical programmes to the provision of comprehensive and integrated reproductive health services.

Benefits of Integrated Health Services

- The provisions of more efficient and cost effective services since the same providers usually deliver services at the service delivery points.
- That no opportunity is missed for meeting patients reproductive health needs
- The creation of demand for and the development of actual and potential opportunities for provision of reproductive health services.

- Efficiency within the existing system so that key technical interventions can be provided up to the peripheral level
- The creation of efficient services, improved patient satisfaction and health seeking behaviour
- The removal of one significant barrier to care by guaranteeing services availability on all days of the week
- Provision of reproductive health services, defined for each level of the health care system, on all days, during the same visit, and where possible by the same provider

COMPONENTS OF THE REPRODUCTIVE HEALTH PLAN.

Implementation Plan for National Reproductive Health Strategy

- Safe motherhood and child survival initiatives.
- Family planning unsatisfied needs including male in-

volvement

- Management of STI/HIV/AIDS.
- Promotion of adolescent and youth health
- Gender and reproductive health rights including male involvement.
- Screening and management of cancer and other reproductive health issues.
- Prevention and appropriate management of infertility.
- Care of the elderly

Strategies Supporting the Implementation of Reproductive Health Services

- Human resource development and management.
- Integration of reproductive health services including training

- Identification, mobilisation and allocation of resources
- Operational research in reproductive health and monitoring and evaluation as well as supervision.

Family Planning

- Family planning helps save women and children's lives and preserves their health by preventing untimely and unwanted pregnancies and reducing women's exposure to the health risks of childbirth and abortion.

Management of STIs

- Reproductive health programmes can reduce levels of STIs, including HIV/AIDS, by providing information and counselling on critical issues such as sexuality, gender roles, power imbalances between women and men, gender

based violence and its link to HIV transmission.

- Service provision includes distributing female and male condoms, preventing, diagnosing and treating STIs, developing strategies for contact tracing and referring people infected with HIV for further services.

Gender Issues and Reproductive Health Rights

- Unequal power relations between men and women often limit women's control over sexual activity and their ability to protect themselves against unwanted pregnancy and sexually transmitted infections including HIV/AIDS.
- Adolescent girls are particularly vulnerable. For reproductive health services to be successful, they must address the dynamics of knowledge, power and decision making in

sexual relationships in the community.

Examples of Gender Inequalities

- You may have observed the following inequalities:
  - Inequalities in education
  - Inequalities in the labour force
  - Access to medical care
  - Law of succession
  - Cultural practices (such as female genital mutilation, polygamy and wife inheritance)

Gender Violence

- Abuse ranges from emotional abuse such as hurting another person's feelings; psychological violence such as threats to do bodily harm, physical abuse such as hitting

to cause pain or injury, and sexual abuse which includes rape, defilement and incest.

Sexual Abuse/Violence

- Sexual violence has been defined as: 'any sexual act, attempt to obtain a sexual act, unwanted sexual comments or advances, or acts to traffic women's sexuality, using coercion, threats of harm or physical force, by any person regardless of relationship to the victim, in any setting including but not limited to home and work' (National guidelines: Medical management of rape and sexual violence 2005).
- This form of violence renders the victim helpless, traumatised and debilitated.
- The majority of victims end up infected with STIs includ-

ing HIV/AIDS.

- The various forms of sexual abuse found in our society include:
  - Forced fondling
  - Touching and verbal remarks
  - Incest
  - Molestation
  - Forced prostitution
  - Oral/genital contact or fondling of genitals and breasts
  - Rape
  - Female genital mutilation

The female Adolescent

Factors make it difficult for the girl child to stand and excel.

Denial of Other Basic Rights

- Females in some societies have no right to:
  - Own land or to inherit property
  - Obtain access to credit
  - Earn income and promotion in their work
  - Have access to services that meet their sexual and reproductive health needs

Early Marriages

- Research has shown that early marriage exposes the girl child to early sexual activity, which in turn predisposes her to cancer of the cervix, obstetric complications and ill health.

Female Genital Mutilation (FGM)

The Potential Health Consequences of FGM

- Medical complications such as haemorrhage, pain, pelvic infection, and painful intercourse.
- Complications of childbirth such as obstructed labour due to scarring of tissues. In some communities the husband must give consent before an episiotomy can be performed.
- FGM also predisposes girls to early marriage since after the initiation they are considered mature and can get married.

Adolescent/Youth Sexual and Reproductive Health

- Recognise the importance of health education and give services to meet the needs of adolescents both in and out of

- school.
- Integrated sex education and services for young people should include family planning information and counselling on gender relations, sexually transmitted diseases and
- HIV/AIDS, sexual abuse and reproductive health rights
- Ensure that health care programmes and providers attitudes allow adolescents access to RH services and information
- Support efforts to eradicate female genital mutilation and other harmful practices, including sexual abuse, trafficking of adolescents for forced labour, marriage and commercial sex
- Socialise and motivate boys and young men to show respect and responsibility in sexual behaviour (MoH 1996)

Prevention and Management of Infertility

- The main goal in prevention and management of infertility is to reduce the incidence of infertility and facilitate proper investigation and management of infertile individuals and couples.
- The main objectives have been set as follows:
  - ✓Advocate for recognition of infertility as a public health issue and its management an integral component of reproductive health services.
  - ✓Reduce prevalence of secondary infertility
  - ✓Reduce the prevalence of curable STIs.
  - ✓Effectively manage at least 80% of curable cases of STI presenting in health facilities (WHO/AFRO)
  - ✓Increase access to effective postpartum and post-

abortion care services

- ✓ Increase access to improved investigation and management of infertility.
- ✓Increase access to training in improving management of infertility.

ADOLESCENT AND YOUTH HEALTH

- Yet young people have special needs and requirements.
- Adolescents are a particularly vulnerable group due to the fact that they are known to have:
  - ✓Inadequate level of knowledge about human sexuality.
  - ✓Inadequate or poor information on quality reproductive health services.
  - ✓High risk sexual behaviours.

✓Discriminatory social practices

Emotional and Psychological Changes Resulting From Adolescence

- Changing relationships with parents, which may involve the adolescent pulling away and becoming more independent
- Changing relationships with friends.
- Adolescents often imitate the values and behaviours of friends rather than those of parents and other adults.
- Peers are an important influence but they care more about what their friends think of them
- The relationship with the opposite sex increases as they learn how to cope with romantic and sexual feelings
- Personal feelings are also affected and there is a need to

accept themselves as an independent individual

- Values and behaviours are affected.
- Adolescents may attempt to behave more as adults, resolving problems in a responsible manner and making decisions bearing in mind the possible consequences
- Increased interest in everyday recreational activities
- Increase in mood swings as they seek attention and want to belong and be appreciated

Reproductive Health Needs Amongst Adolescents

- Information on sexuality and reproductive health
- Access to family planning services and provision of effective methods.
- Prenatal and post abortion care, irrespective of the age or

marital status

- Safe delivery, preferably in a hospital with facilities for all eventualities
- Treatment of unsafe abortions, which should be discouraged, but in the event of any occurrence, post abortion care should be given to save lives
- Diagnosis and treatment of sexuallytransmitted diseases
- Protection from sexual abuse. Cases of sexual offenders should be reported to the authorities so that appropriate action can be taken
- Culturally appropriate guidance and counselling and or mental health services
- Education in negotiating skills to help them make informed choices and accept the consequences of their actions

In order to help the adolescent/youth enjoy good reproductive health, there is also a need to do the following:

- Develop a comprehensive reproductive health package to address youth/adolescent issues through the provision of counselling and user friendly clinics
- Promote responsible and healthy RH and sexual behaviour of the youth through counselling and guidance
- Sensitise leaders, programme managers, service providers, teachers, the community, adolescents and youths themselves, on the reproductive health needs and rights of adolescents and youths.

Reproductive Health Indicators for Global Monitoring

- There are seventeen reproductive health indicators developed by the United Nation Population Fund (UNFPA).

1. ***Total fertility rate***: Total number of children a woman would have by the end of her reproductive period, if she experienced the currently prevailing age-specific fertility rates throughout her childbearing life.
2. ***Contraceptive prevalence*** (any method): Percentage of women of reproductive age who are using (or whose partner is using) a contraceptive method at a particular point in time.
3. ***Maternal mortality ratio***: The number of maternal deaths per 100 000 live births from causes associated with pregnancy and child birth.
4. ***Antenatal care coverage***: Percentage of women attended, at least once during pregnancy, by skilled health personnel for reasons relating to pregnancy.

5. *Births attended by skilled health personnel*: Percentage of births attended by skilled health personnel. This doesn't include births attended by traditional birth attendants

6. *Availability of basic essential obstetric care*: Essential obstetric care includes, Parenteral antibiotics, Parenteral oxytocic drugs, Parenteral sedatives for eclampsia, Manual removal of placenta, Manual removal of retained products, Assisted vaginal delivery. These services can be given at a health center level.

7. *Availability of comprehensive essential obstetric care*: Number of facilities with functioning comprehensive essential obstetric care per 500 000 population. It incorporates obstetric surgery, anesthesia and blood transfusion facilities.

8. *Perinatal mortality rate:* *Number of perinatal deaths* (deaths occurring during late pregnancy, during childbirth and up to seven completed days of life) per 1000 total births.

Total birth means live birth plus IUFD born after fetus reached stage of viability.

9. *Low birth weight prevalence*: Percentage of live births that weigh less than 2500 g.

10. *Positive syphilis serology prevalence in pregnant women*: Percentage of pregnant women (15–24) attending antenatal clinics, whose blood has been screened for syphilis, with positive serology for syphilis.

11. ***Prevalence of anaemia in women: Percentage of women of reproductive age (15–49)*** screened for haemoglobin levels with levels below 110 g/l for pregnant women

and below 120 g/l for non- pregnant women.

12. ***Percentage of obstetric and gynaecological admissions owing to abortion***: Percentage of all cases admitted to service delivery points providing in-patient obstetric and gynaecological services, which are due to abortion (spontaneous and induced, but excluding planned termination of pregnancy)

13. ***Reported prevalence of women with FGM***: Percentage of women interviewed in a community survey, reporting to have undergone FGM.

14. ***Prevalence of infertility in women***: Percentage of women of reproductive age (15–49) at risk of pregnancy (not pregnant, sexually active, non- contraception and non-lactating) who report trying for a pregnancy for two years or more.

15. ***Reported incidence of urethritis in men***: Percentage of men (15–49) interviewed in a community survey, reporting at least one episode of urethritis in the last 12 months.

16. ***HIV prevalence in pregnant women: Percentage of pregnant women*** (15–24) attending antenatal clinics, whose blood has been screened for HIV, who are sero-positive for HIV.

MATERNAL AND NEW BORN HEALTH

- Sixty to eighty percent of maternal deaths are due to:
  - ✓obstetric hemorrhage,
  - ✓obstructed labor,
  - ✓obstetric sepsis,
  - ✓hypertensive disorders of pregnancy, and
  - ✓complications of unsafe abortion.

THE SAFE MOTHERHOOD INITIATIVE

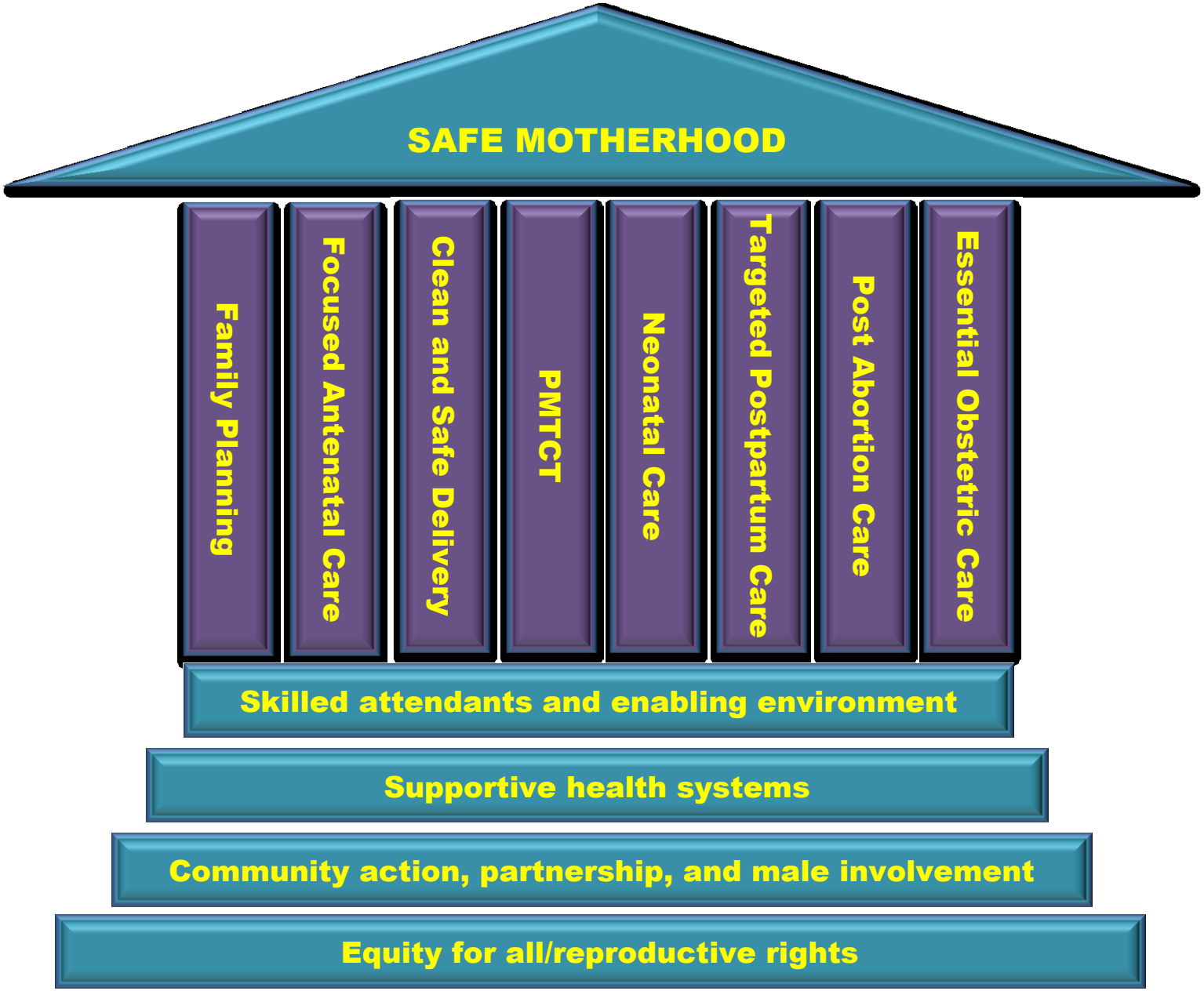
- In 1987 the World Bank, in collaboration with WHO and UNFPA, sponsored a conference on safe motherhood in Nairobi, Kenya to help raise global awareness about the impact of maternal mortality and morbidity.
- The conference launched the Safe Motherhood Initiative (SMI), which issued an international call to action to reduce maternal mortality and morbidity by one half by the year 2000.
- The strategies adopted to make motherhood safe vary among countries and include:

- *Providing family planning services.*
- *Providing post abortion care.*
- *Promoting antenatal care.*
- *Ensuring skilled assistance during childbirth*

- *Improving essential obstetric care.*
- *Addressing the reproductive health needs of adolescents.*

The Key Components of Safe Motherhood

- Focused antenatal care which research suggests lowers the rate of maternal morbidity and mortality
- Safe and clean delivery so that all women deliver under some type of supervised care, where referral systems are established to provide emergency treatment for life threatening complications of delivery
- Postnatal care that contributes to a woman's ability to enjoy sexual relations without pain and have safe pregnancy and delivery in future
- Safe, humane and cost-effective postabortion care


SAFE MOTHERHOOD
Family Planning
Focused Antenatal Care
Clean and Safe Delivery
PMTCT
Neonatal Care
Targeted Postpartum Care
Post Abortion Care
Essential Obstetric Care
Skilled attendants and enabling environment
Supportive health systems
Community action, partnership, and male involvement
Equity for all/reproductive rights

Essential Services for Safe Motherhood

Safe motherhood can be achieved by providing high- quality maternal health services to all women.

Essential Services include:

- Community education on safe motherhood
- Prenatal care and counseling, including the promotion of maternal nutrition
- Skilled assistance during childbirth
- Care for obstetric complications, including emergencies
- Postpartum care
- Post-abortion care and, where abortion is not against the law, safe services for the termination of pregnancy
- Family planning counseling, information and services
- Reproductive health education and services for adoles-

cents

- Essential Obstetric Care

Essential obstetric care is of two types basic essential obstetric care and comprehensive essential obstetric care.

1. ***Basic essential obstetric care*** (also called basic emergency obstetric care) at the health centre level should include at least:
   - Parentral antibiotics
   - Parentral oxytoxic drugs
   - Parentral sedatives for eclampsia
   - Manual removal of placenta
   - Removal of retained products
   - Assisted vaginal delivery

2. ***Comprehensive essential obstetric services*** at sub county hospital (first referral level) should include all of the above, plus:
   - Obstetric Surgery
   - Anesthesia
   - Blood transfusion

Elements Of Quality, Of Care In. Maternal And Newborn Health in kenya

Objective1

A) Improve data management for decision making and utilisation in health planning.

Strengthen monitoring and evaluation system for Maternal and Newborn Health

1. Strengthen MNH data management and utilisation at all

levels

2. Strengthen operations research in Maternal and Newborn Health

3. Promote the documentation, dissemination and utilisation of evidence-based practices

Objective2

B) To increase the availability, accessibility, acceptability, and utilization of skilled attendance during pregnancy, childbirth and the post-partum period at all levels of the health care delivery system

Strengthening national, county and sub county capacity for health planning and management of MNH care.

1. Strengthen capacity of the national, county and sub county managers, in health planning, management and

facilitative supervision.

2. Strengthen joint programming between MNH and related programmes to maximise resources.
3. Incorporate rights based approach and gender mainstreaming to advance MNH within planning processes at all levels

C). Improving availability of, access to, and utilization of quality Maternal and Newborn Health Care, including adolescents, youth, people with disabilities, and other vulnerable groups

1. Increase skilled care at community level during pregnancy, childbirth, postpartum and the newborn period.
2. Enhance the capacity of health facilities to provide Essential Maternal and Newborn Care
3. Strengthen human resources for Maternal and Newborn

Health Strengthen the integration of HIV/AIDS information and services into Maternal and Newborn Health services at all levels of health care.

4. Institutionalize quality of care approaches.

5. Scale up efficient healthcare financing mechanisms for Maternal and Newborn Health

6. Increase access to Maternal and Newborn Health information and services with special emphasis on adolescents, youth, and other vulnerable groups

D). Reduce unmet need through expanding access to good quality family planning options for sexually active men, women, adolescents and persons with disabilities.

1. Increase access to postpartum family planning.

Advocate contraceptive commodity security.

2. Promote participation of communities and the private sector in provision of FP services.
3. Strengthen integration of FP and HIV services.

E). Strengthening the referral system.

1. Lobby for a strengthened transport and referral system.
2. Establish community-based mechanisms to promote timely referral.
3. Strengthen communication between different levels of care by use of modern technologies

***F).* Advocating for increased commitment and resources for MNH and FP services**

1. Strengthen resource mobilisation for Maternal and New-born Health.
2. Advocate for incorporation of MNH requirements in all National Policy and Strategy documents

G). Fostering partnerships

1. Coordinate MNH stakeholders at national, provincial, district and community level
2. Strengthen and sustain Public Private Partnerships for MNH
3. To strengthen the capacity of individuals, families, communities, social networks to improve maternal and newborn health

H). Strengthening community based maternal and newborn care approaches

1. Promoting the household hospital continuum of care.
2. Operationalize the MNH aspects in line with the National Community Strategy principles.
3. Strengthening knowledge and awareness of communities on MNH services including family planning

4. Support community based initiatives that promote MNH.
5. Monitoring and Evaluation of Maternal and Newborn Health
6. Monitoring and evaluation remains a key challenge of MNH programmes.

BEYOND ZERO INITIATIVE

Context

- Beyond Zero is an Initiative of Her Excellency Margaret Kenyatta, the First Lady of the Republic of Kenya. Launched on 24th January 2014.
- The mission was to provide high level leadership in reducing maternal, child and new born deaths as well as ending new HIV infections amongst children.

Objectives

- To increase awareness and promote a sense of urgency amongst leaders on the need to rapidly scale up high impact interventions to cancer, HIV control, maternal and child health;
- To sensitize and advocate for national and county leadership to progressively allocate sufficient resources for HIV, cancer, maternal and child health programs;
- To mobilize the support and participation of men in HIV control, maternal and child health services including early screening for reproductive health cancers;
- To inspire and promote a culture of accountability for results amongst leaders on their commitment towards meeting HIV, cancer, maternal and child health targets.
- Promoting water, sanitation and hygiene interventions for

disease prevention

- Enhancing diagnostics for quality health and wellness e.g. Mobile Laboratory, & Ultrasound machines
- Increasing access to service delivery through medical equipment

Contributing to strengthening primary health care systems

- Broadening health care coverage, additional Beyond Zero Mobile Clinics
- Tackling malaria, distribution of insecticide treated nets
- Increasing access and improving quality, Beyond Zero Model Facility.
- Improving access to quality eye care, ***e.g.*** *Boresha Macho Campaign*.

The New Strategic Framework 2018-2022

- The Framework is anchored on the principle of leaving no one behind and adopts a life- cycle approach targeting pregnant women and newborns, infants and children, adolescents and young people, men, and older persons.

This Framework focuses on:

- Promoting access to quality maternal and neonatal healthcare services;
- Advocating for repair and reintegration of women living with obstetric fistulae;
- Promoting good nutrition for all children;
- Advocating for social inclusion of children living with disability for their equal access to health and education ser-

vices;

- Championing country validation for the pre-elimination of mother-to-child transmission of HIV by 2021;
- Promoting a cross-sectorial response to reduce multiple risks to HIV infections among adolescents.
- Mobilizing the engagement of men in HIV and reproductive health;
- Influencing investments for decentralized services for breast and cervical cancer prevention, treatment and management;
- Advocating for access to comprehensive health care and social protection.

Advocacy for better health outcomes

- The collective advocacy efforts through Beyond Zero have

resulted to longer-term sustainability of investments in maternal and child- care by Counties as well as continued improvement in health outcomes

The Framework aims by 2022 to have

- Certified Centers of Excellence for maternal and child health care with County Governments in place
- All pregnant mothers mobilized into the Linda Mama cards with County Governments.
- All counties on track with their eMTCT targets.
- A peer to peer program for young people in place.
- Beyond Zero specialized mobile clinics conducting medical safaris.
- Mobilized resources for added medical equipment and supplies for health facilities around the country.

- Provided scholarships for health care workers continuous training in the country.
- Lend a voice to the:
  - ✓Prevention, management and re- integration of women with obstetric fistulae;
  - ✓Promotion of good nutrition for all children;
  - ✓Social inclusion of children living with a disability for equal access to health and education;
  - ✓Promotion of primary prevention, early detection and management of cervical and breast cancer;
  - ✓Critical role of men as partners in promotion of women's and children's health;
  - ✓Promotion of access to age sensitive universal coverage of comprehensive health care for older persons aged 60 and above.

NORMAL MIDWIFERY

ANATOMY AND PHYSIOLOGY OF THE REPRODUCTIVE SYSTEM

Female External Genitalia

Organs

The female external genitalia (the vulva) include the Mons pubis, labia majora, labia minora, clitoris, vestibule, the greater vestibular glands (Bartholin's glands) and bulbs of the vestibule.

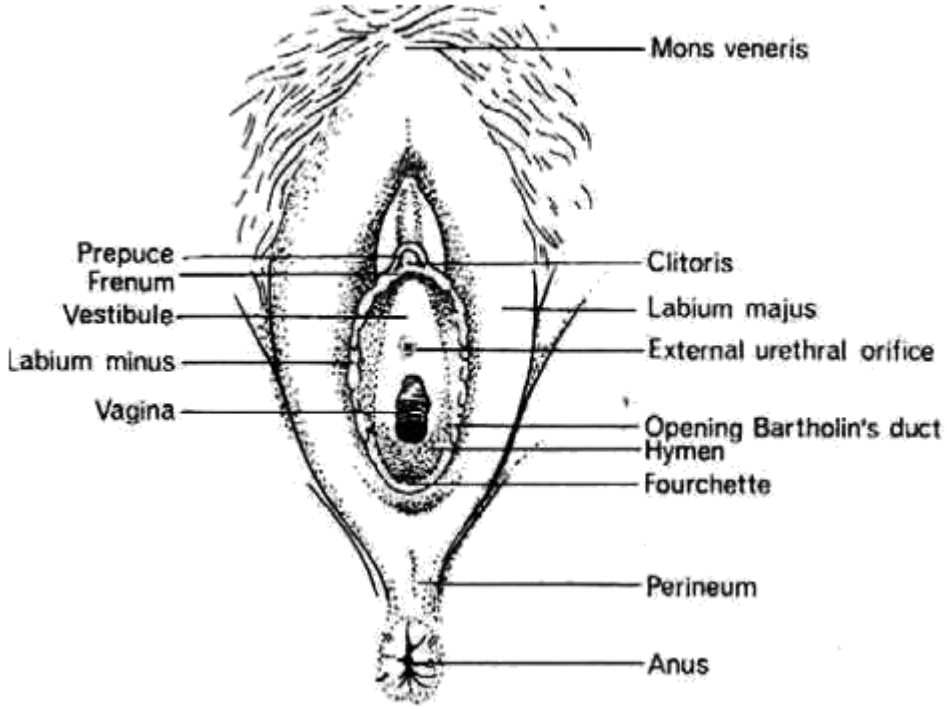
- The Mons pubis is a rounded pad of fat lying anterior to the symphysis pubis. It is covered with pubic hair from the time of puberty.
- The labia majora ('greater lips') are two folds of fat and

areolar tissue which are covered with skin and pubic hair on the outer surface and have a pink, smooth inner surface.

- The labia minora ('lesser lips') are two small subcutaneous folds, devoid of fat, that lie between the labia majora.
  - ✓ The prepuce is a retractable piece of skin which surrounds and protects the clitoris.
  - ✓ The lower layer passes below the clitoris to form with its fellow the frenulum of the clitoris.
- The clitoris is a small rudimentary sexual organ corresponding to the male penis. The visible knob-like portion is located near the anterior junction of the labia minora, above the opening of the urethra and vagina.
- The vestibule is the area enclosed by the labia minora in which the openings of the urethra and the vagina are sit-

uated.

- The urethral orifice lies 2.5 cm posterior to the clitoris and immediately in front of the vaginal orifice.
- The vaginal orifice, also known as the introitus of the vagina, occupies the posterior two-thirds of the vestibule.
- The orifice is partially closed by the hymen, a thin membrane that tears during sexual intercourse.
- The greater vestibular glands (Bartholin's glands) are two small glands that open on either side of the vaginal orifice and lie in the posterior part of the labia majora. They secrete mucus, which lubricates the vaginal opening.
- The bulbs of the vestibule are two elongated erectile masses flanking the vaginal orifice.



Female external genitalia

Blood supply

- The blood supply comes from the internal and the external pudendal arteries. The blood drains through corre-

sponding veins.

Lymphatic drainage

- Lymphatic drainage is mainly via the inguinal glands.

Innervation

- The nerve supply is derived from branches of the pudendal nerve.

THE PERINEUM

- The perineum corresponds to the outlet of the pelvis and is somewhat lozenge-shaped.
- Anteriorly, it is bound by the ***pubic arch,*** posteriorly by the ***cocyx,*** and laterally by the ***ischiopubic rami, ischial tuberosities*** and ***sacrotuberous*** ligaments.
- The perineum can be divided into two triangular parts by

drawing an arbitrary line transversely between the ischial tuberosities.

- The anterior triangle, which contains the external uro-genital organs, is known as the **uro-genital triangle** and the posterior triangle, which contains the termination of the anal canal, is known as the **anal triangle.**

The urogenital triangle

The urogenital triangle has been divided into two Compart-ments:

- ✓**superficial** and **deep perineal spaces**,separated by the perineal membrane.
- ✓The levator ani muscles are attached to the cranial sur-face of the perineal membrane.

Superficial muscles of the perineum

They include the following:

- **The superficial transverse perineal muscle**
  - ✓Is a narrow slip of a muscle that arises from the inner and forepart of the ischial tuberosity and is inserted into the central tendinous part of the perineal body.
- **Bulbospongiosus muscle**
  - ✓The bulbospongiosus (previously known as bulbocavernosus) muscle runs on either side of the vaginal orifice, covering the lateral aspects of the vestibular bulb anteriorly and the Bartholin's gland posteriorly .
  - ✓Anteriorly, its fibres pass forward on either side of the vagina and insert into the corpora cavernosa

❖ **Ischiocavernosus muscle**

✓It arises from the inner surface of the **ischial tuberosity,** behind the **crus clitoridis**, from the surface of the crus and from the adjacent portions of the ischial ramus.

Innervation

The nerve supply is derived from branches of the *pudendal nerve*.

The anal triangle

- This area includes the anal canal, the anal sphincters and the ischioanal fossae.

Anal canal

- The anal canal is attached posteriorly to the coccyx by the *anococcygeal ligament*,(a midline fibro muscular structure

that runs between the posterior aspect of the EAS and the coccyx).

- The anal canal is surrounded by an inner epithelial lining. a vascular *subepithelium*, the *internal anal sphincter* (1AS), the *External anal sphincter* (EAS) and *fibromuscular* supporting tissue.

Anal Sphincter Complex

a) External anal sphincter

✓The EAS is made up of striated muscle and appears red colour (similar to raw red meat).As the EAS is normally under tonic contraction, it tends to retract when completely torn.

b) Internal anal sphincter

✓The IAS is a thickened continuation of the circular

smooth muscle of the bowel and ends with a well-defined rounded edge 6-8 mm above the anal margin at the junction of the superhicial and subcutaneous part of the EAS.

c) The longitudinal layer and the conjoint longitudinal coat

✓The longitudinal layer is situated between the EAS and IAS and consists of a fibromuscular layer, the conjoint longitudinal coat and the intersphincteric space with its connective tissue components

Innervation of the anal sphincter complex

The nerve supply is derived from branches of the pudendal nerve.

Vascular supply

✓The anorectum receives its major blood supply from the superior haemorrhoidal (terminal branch of the inferior

mesenteric artery) and inferior haemorrhoidal (branch of the pudendal artery) arteries, and to a lesser degree, from the middle haemorrhoidal artery (branch of the internal iliac), forming a wide intramural network of collaterals.

- ✓The venous drainage of the upper anal canal mucosa, IAS and conjoint longitudinal coat passes via the terminal branches of the superior rectal vein into the inferior mesenteric vein.
- ✓The lower anal canal and the EAS drain via the inferior rectal branch of the pudendal vein into the internal iliac vein.

Lymphatic drainage

- ✓Above the upper anal canal, the IAS and the conjoint longitudinal coat drain into the inferior mesenteric and internal iliac nodes.

- ✓Lymphatic drainage below the dentate line,which consists of the lower anal canal epithelium and the EAS, proceeds to the external inguinal lymph nodes

The ischioanal fossa

- ✓It extends around the anal canal and is bound anteriorly by the perineal membrane, superiorly by the fascia of the levator ani muscle and medially by the EAS complex at the level of the anal canal.

The Perineal Body

- ✓The perineal body is the central point between the urogenital and the anal triangles of the perineum.
- ✓Within the perineal body there are interlacing muscle fibres from the bulbospongiosus, superficial trans-verse

perineal and EAS muscles.

The Pelvic Floor

- The pelvic floor consists mainly of the symmetrically paired levator ani muscle (LAM) which is a broad muscular sheet attached to the internal surface of the true pelvis.
- The muscles of the levator ani differ from most other skeletal muscles in that they:
  - ✓ maintain constant tone, except during voiding, defaecation and the Valsalva manoeuvre
  - ✓ have the ability to contract quickly at the time of acute stress (such as a cough or sneeze) to maintain continence
  - ✓ Distend considerably during parturition to allow the

passage of the term infant and then contract after birth to resume normal functioning.

Innervation of the levator ani

- The levator ani is supplied on its superior surface by the-sacral nerve roots (S2-S4) and on its inferior surface by the perineal branch of the pudendal nerve.

Vascular supply

- The levator ani is supplied by branches of the inferiorgluteal artery, the inferior vesical artery and the pudendal artery.

The Pudendal Nerve

- The pudendal nerve is a mixed motor and sensory nerve and derives its fibres from the ventral branches of the second, third and fourth sacral nerves and leaves the pelvis

through the lower part of the greater sciatic foramen.

THE PELVIS

Knowledge of anatomy of a normal female pelvis is key to midwifery and obstetrics practice, as one of the ways to estimate a woman's progress in labour is by assessing the relationship of the fetus to certain bony landmarks of the pelvis.

The Pelvic Girdle

The pelvic girdle is a basin-shaped cavity and consists of

- ✓**two innominate bones (hip bones)**, **the sacrum and the coccyx.** It is not capable of independent movement except during childbirth as it provides the skeletal

framework of the birth canal.

Function

- ✓ It provides passage through which the fetus must pass during childbirth.
- ✓ It contains and protects the bladder, rectum and internal reproductive organs.
- ✓In addition it provides an attachment for trunk and limb muscles.

Innominate bones

- ✓Each innominate bone or hip bone is made up of three bones that have fused together: the ilium, the ischium and the pubis .
- ✓On its lateral aspect is a large, cup shaped acetabulum articulating with the femoral head.
- ✓The ilium has an upper and lower part. The smaller low-

er part forms part of the acetabulum and the upper part is the large flared-out part.

- ✓When the hand is placed on the hip, it rests on the iliac crest, which is the upper border.
- ✓A bony prominence felt in front of the iliac crest is known as the anterior superior iliac spine.
- ✓There are two similar points at the other end of the iliac crest, namely the posterior superior and the posterior inferior iliac spines.
- ✓The internal concave anterior surface of the ilium is known as the iliac fossa.
- ✓The ischium is the inferoposterior part of the innominate bone and consists of a body and a ramus.
- ✓Above it forms part of the acetabulum.
- ✓Below its ramus ascends anteromedially at an acute an-

gle to meet the descending pubic, then crosses the ischial spine and re-enters the pelvis through the lesser sciatic foramen.

The sacrum

✓ It is a wedge shaped bone consisting of five fused vertebrae and forms the posterior wall of the pelvic cavity as a wedge between the innominate bones.

Pelvic Joints

There are **four pelvic joints**: one symphysis pubis, two sacroiliac joints and one **sacrococcygeal joint**.

❖ **The symphysis pubis** is the midline cartilaginous joint uniting the rami of the left and right pubic bones.

- **The sacroiliac joints** are strong, weight-bearing synovial Joints with irregular elevations and depressions that produce interlocking of the bones.
  - ✓They join the sacrum to the ilium and as a result connect the spine to the pelvis.
  - ✓The joints allow a limited backward and forward movement of the tip and **promontory of the sacrum**, sometimes known as 'nodding of the sacrum.

- **The sacrococcygeal joint** is formed where the base of the coccyx articulates with the tip of the sacrum. It permits the coccyx to be deflected backwards during the birth of the fetal head.

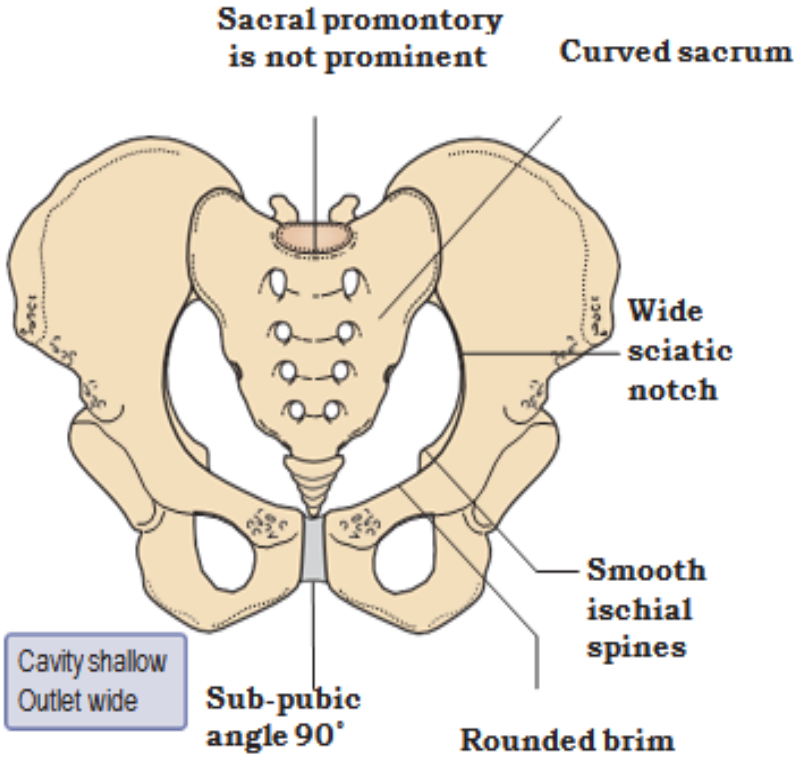
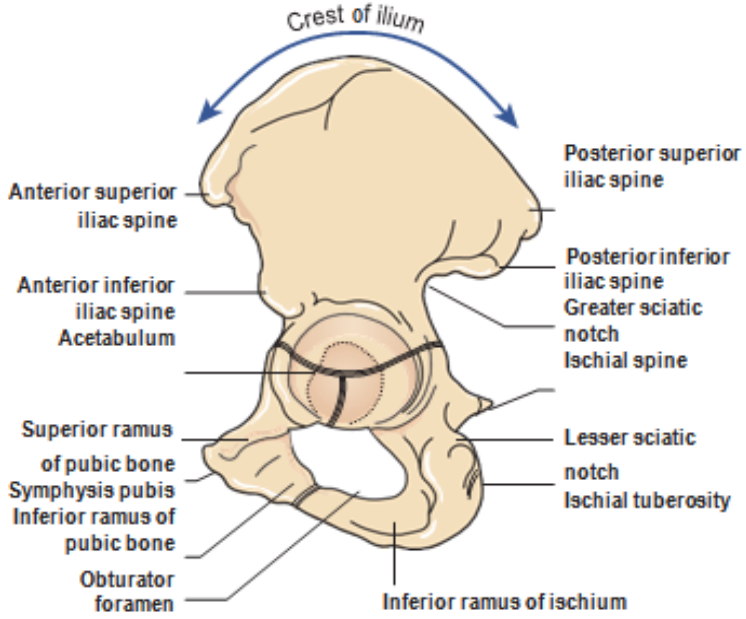


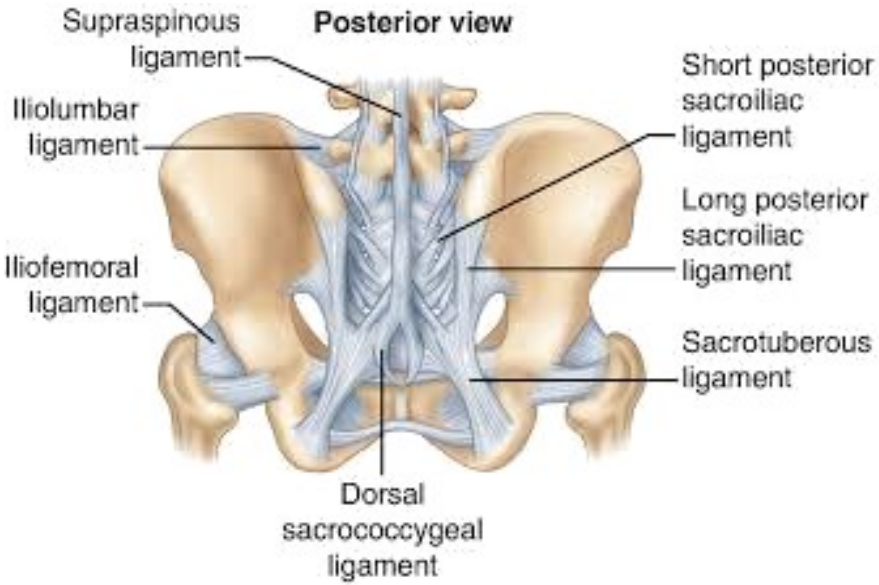
Fig. 3.19 **Normal female pelvis (gynaecoid).**

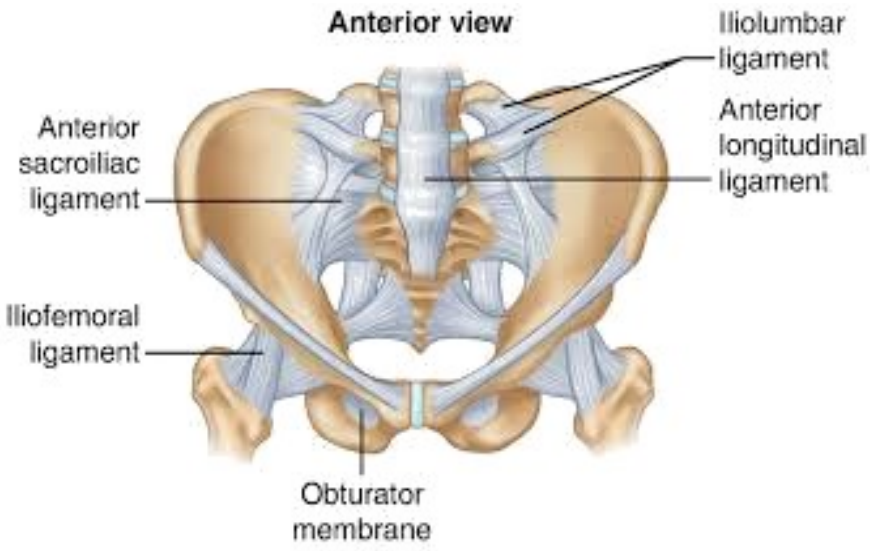


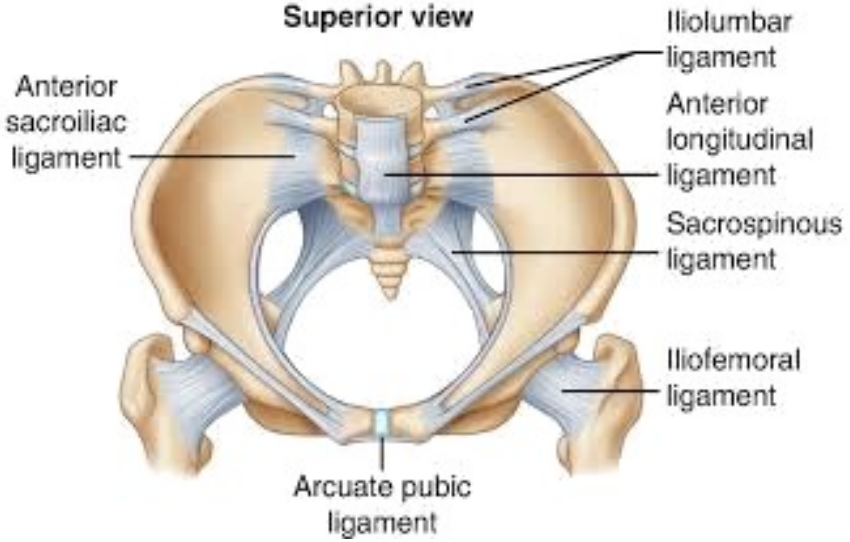
Lateral view of the innominate bone showing important landmarks.

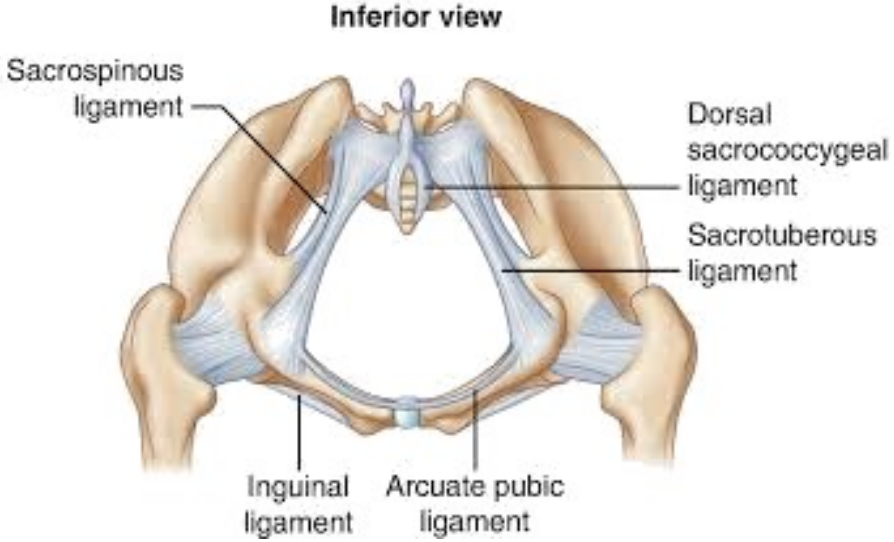
Pelvic Ligaments

- The pelvic joints are held together by very strong ligaments that are designed not to allow movement.
- The ligaments connecting the bones of the pelvis with each other can be divided into four groups:
  - ✓**The sacroiliac ligaments** - those connecting the sacrum and ilium.
  - ✓**The sacrotuberous ligaments and the sacrospinous ligaments** are those passing between the sacrum and ischium.
  - ✓**The sacrococcygeal ligaments -** those uniting the sacrum and coccyx.
  - ✓**The inter-pubic ligaments** - those between the two pubic bones .


Posterior view
Supraspinous ligament
Iliolumbar ligament
Iliofemoral ligament
Short posterior sacroiliac ligament
Long posterior sacroiliac ligament
Sacrotuberous ligament
Dorsal sacrococcygeal ligament


Anterior view
Iliolumbar ligament
Anterior sacroiliac ligament
Anterior longitudinal ligament
Iliofemoral ligament
Obturator membrane


Superior view
Iliolumbar ligament
Anterior sacroiliac ligament
Anterior longitudinal ligament
Sacrospinous ligament
Iliofemoral ligament
Arcuate pubic ligament


Inferior view
Sacrospinous ligament
Dorsal sacrococcygeal ligament
Sacrotuberous ligament
Inguinal ligament
Arcuate pubic ligament

The Pelvis In Relation To Pregnancy And Childbirth

The true pelvis

- The true pelvis is the bony canal through which the fetus must pass during birth.

The false pelvis

- It is bounded posteriorly by the lumbar vertebrae and laterally by the iliac fossae, and in front by the lower portion of the anterior abdominal wall.
- The false pelvis has no significance in midwifery.

THE TRUE PELVIS

- It is divided into a brim, a cavity and an outlet.

The pelvic brim

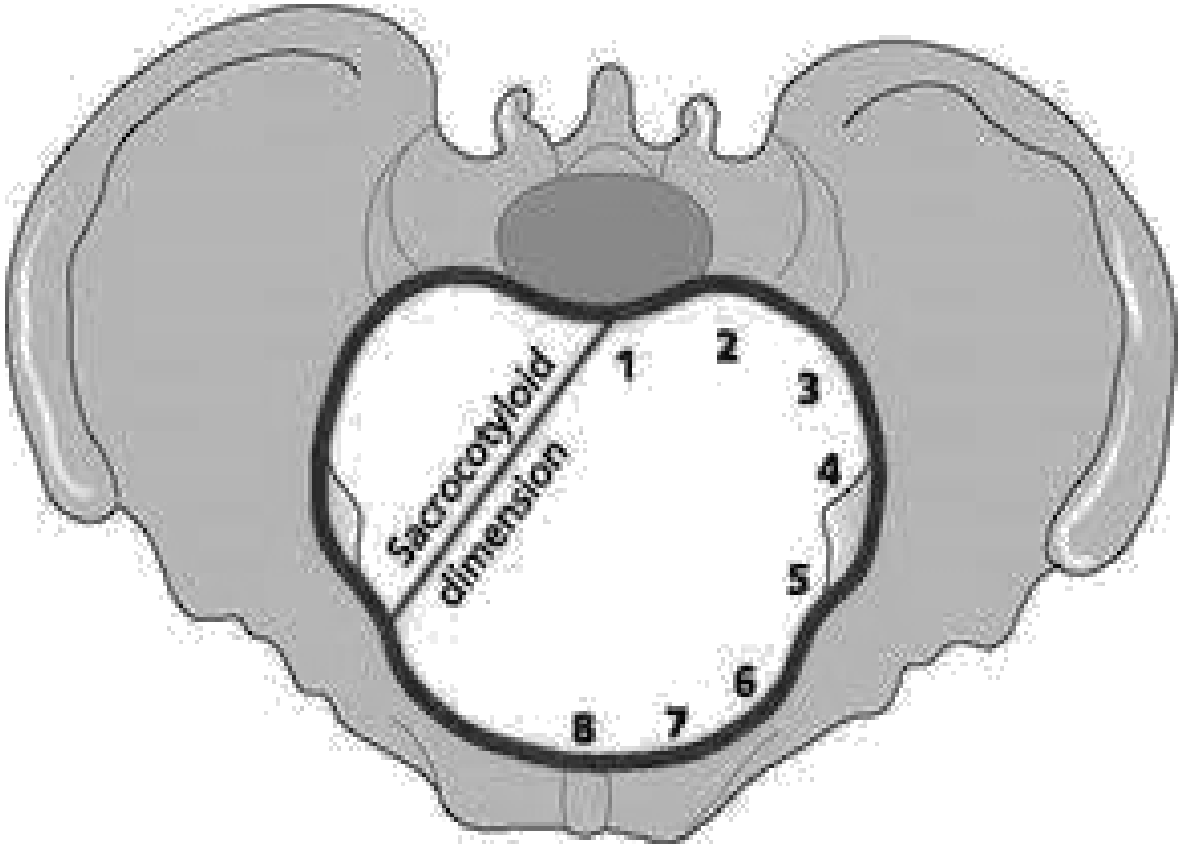
- The superior circumference forms the brim of the true pelvis, the included space being called the inlet.
- The brim is round except where the sacral promontory projects into it.
- Midwives need to be familiar with the fixed points on the pelvic brim that are known as its landmarks. Commencing posteriorly, these are
  - ✓sacral promontory (1)
  - ✓sacral ala or wing (2)
  - ✓sacroiliac joint (3)
  - ✓iliopectineal line, which is the edge formed at the inward aspect of the ilium (4)
  - ✓iliopectineal eminence, which is a roughened area formed where the superior ramus of the pubic bone

meets the ilium (5)

✓superior ramus of the pubic bone (6)

✓upper inner border of the body of the pubic bone (7)

✓upper inner border of the symphysis pubis (8).



The pelvic cavity

- The cavity of the true pelvis extends from the brim superiorly to the outlet inferiorly.
- The anterior wall is formed by the pubic bones and symphysis pubis and its depth is 4 cm.
- The posterior wall is formed by the curve of the sacrum, which is 12 cm in length.
- Its lateral walls are the sides of the pelvis, which are mainly covered by the obturator internus muscle.
- The cavity contains the pelvic colon, rectum, bladder and some of the reproductive organs.
- The rectum is placed posteriorly, in the curve of the sacrum and coccyx; the bladder is anterior behind the symphysis pubis.

The pelvic outlet

- The lower circumference of the true pelvis is very irregular; the space enclosed by it is called the outlet.

Two outlets are described:

The anatomical and the obstetrical.

❖ **The anatomical outlet** is formed by the lower borders of each of the bones together with the sacrotuberous ligament.

❖ **The obstetrical outlet** is of greater practical significance because it includes the narrow pelvic strait through which the fetus must pass.

✓ The narrow pelvic strait lies between the sacrococcygeal joint, the two ischial spines and the lower border of the symphysis pubis.

✓ The obstetrical outlet is the space between the narrow

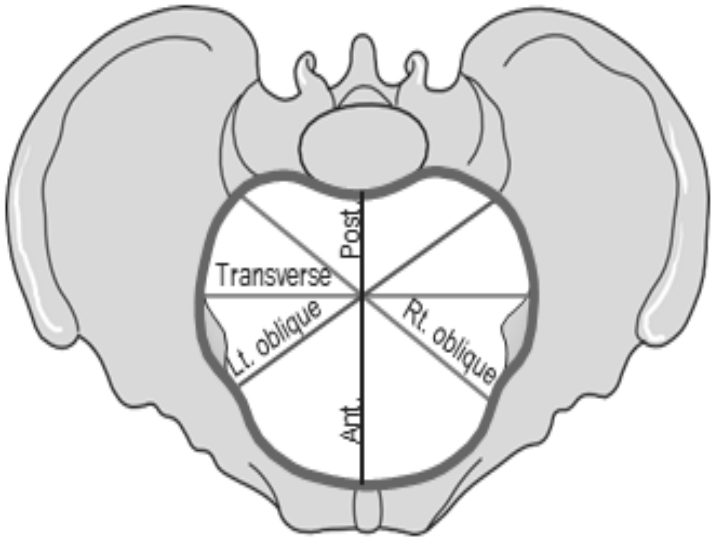
pelvic strait and the anatomical outlet.

✓This outlet is diamond shaped.

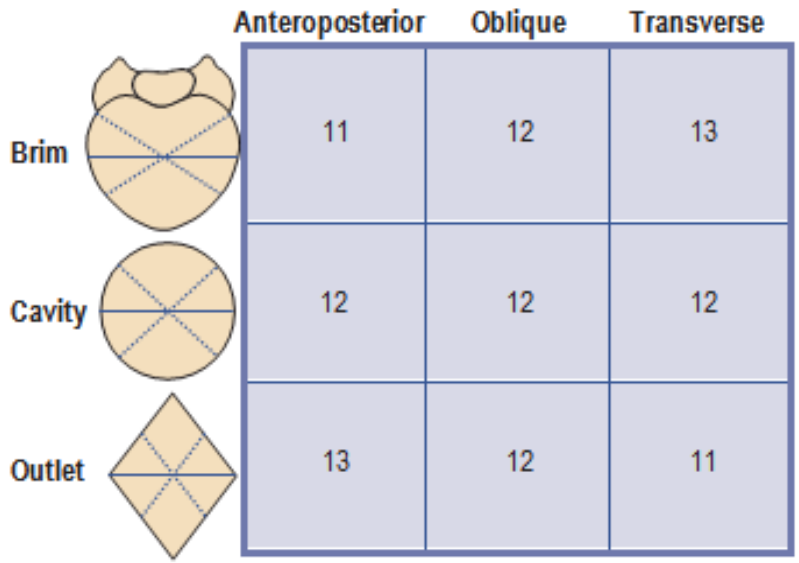
PELVIC DIAMETERS

Diameters Of The Pelvic Inlet (Brim)

- The brim has four principal diameters: the anteroposterior diameter, the transverse diameter and the two oblique diameters.



View of pelvic brim showing diameters.



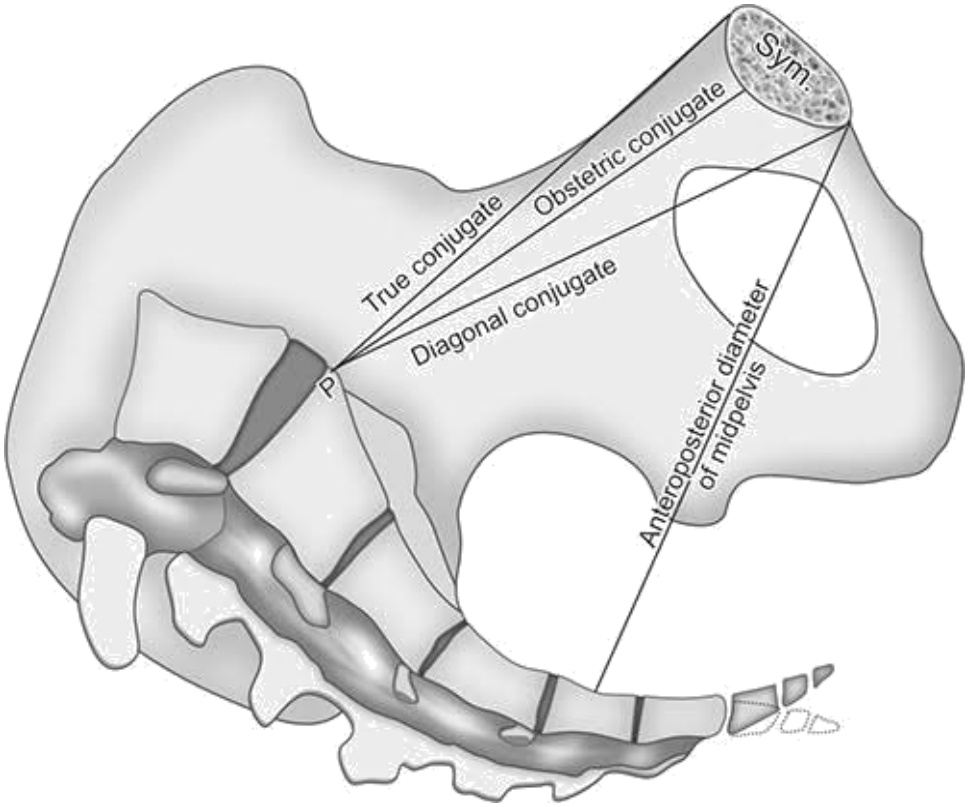
	Anteroposterior	Oblique	Transverse
Brim	11	12	13
Cavity	12	12	12
Outlet	13	12	11

Measurements of the pelvic canal in centimetres.

a) The Anteroposterior or Conjugate Diameter

- Extends from the midpoint of the sacral promontory to the upper border of the symphysis pubis.
- There are 3 conjugate diameters that can be measured:
  - **The anatomical conjugate**, which averages 12 cm, is measured from the sacral promontory to the uppermost point of the symphysis pubis.
  - **The obstetrical conjugate**, which averages 11 cm, is measured from the sacral promontory to the posteriór border of the upper surface of the symphysis pubis.
  - **The diagonal conjugate** is measured anteroposteriorly from the lower border of the symphysis to the sa-

cral promontory.



b) The Transverse Diameter

- It is constructed at right-angles to the obstetric conjugate

and extends across the greatest width of the brim; its average measurement is about 13 cm.

c) Oblique Diameters

- Extends from the iliopectineal eminence of one side to the sacroiliac articulation of the opposite side; its average measurement is about 12 cm.
- Each takes its name from the sacroiliac joint from which it arises, so the left oblique diameter arises from the left sacroiliac joint and the right oblique from the right sacroiliac joint.
- Another dimension, **the sacrocotyloid** passes from the sacral promontory to the iliopectineal eminence on each side and measures 9-9.5 cm.

Diameters of the Cavity

- The cavity is circular in shape and although it is not possible to measure its diameters exactly, they are all considered to be 12 cm .

Diameters of the Outlet

The outlet, which is diamond-shaped, has three diameters:

- **The anteroposterior diameter**, the oblique diameter and the transverse diameter .
- **The anteroposterior diameter** extends from the lower border of the symphysis pubis to the sacrococcygeal joint. It measures 13 cm; as the cocyx may be deflected backwards during labour, this diameter indicates

the space available during birth.

- **The oblique diameter**, although there are no fixed points, is said to be between the obturator foramen and the sacrospinous ligament. The measurement is taken as being 12 cm.
- **The transverse diameter** extends between the two ischial spines and measures 10-11 cm. It is the narrow-est diameter in the pelvis.

TYPES OF PELVIS

1. The gynaecoid pelvis

This is the best type for childbearing as it has:

- ✓A rounded brim,
- ✓Generous forepelvis,

- ✓Straight side walls,
- ✓A shallow cavity with a well-curved sacrum and
- ✓A sub-pubic arch of 90

2. The android pelvis

The android pelvis is so called because it resembles the male pelvis.

- ✓Its brim is heart-shaped,
- ✓It has a narrow fore pelvis
- ✓Its transverse diameter is situated towards the back.
- ✓The side walls converge, making it funnel-shaped,
- ✓Has a deep cavity and a straight sacrum.
- ✓The ischial spines are prominent
- ✓The sciátic notch is narrow.
- ✓The sub-pubic angle is less than 90°.

- ✓It is found in short and heavily built women, who have a tendency to be hirsute.
- ✓ It has a heart-shaped brim

NB : *Its cavity may hinder progress in labour. This type of pelvis is the least suited to childbearing.*

3. The anthropoid pelvis

- ✓The anthropoid pelvis has a long, oval brim in which the anteroposterior diameter is longer than the transverse diameter.
- ✓The side walls diverge and the sacrum is long and deeply concave.
- ✓The ischial spines are not prominent and the sciatic notch and the sub-pubic angle are very wide.
- ✓Women with this type of pelvis tend to be tall, with nar-

row shoulders.

✓Labour does not usually present any difficulties, but a direct occipitoanterior or direct occipitoposterior position is often a feature and the position.

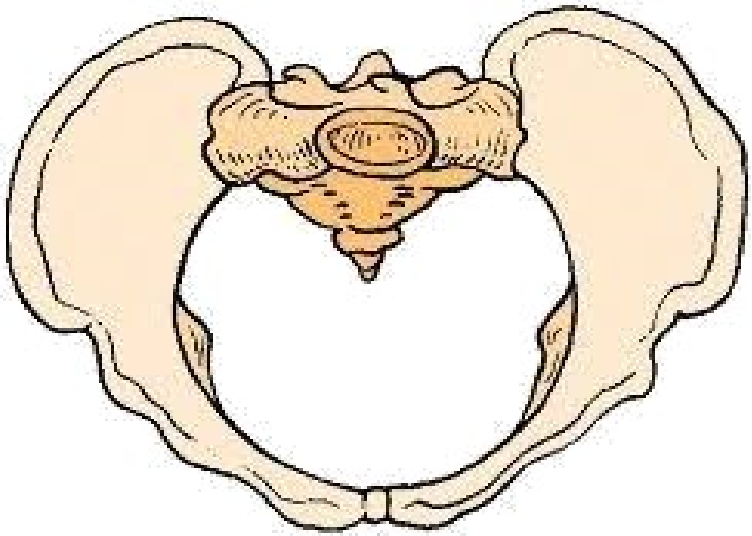
4. The platypelloid pelvis

✓The platypelloid (flat) pelvis has a kidney-shaped brim in which the anteroposterior diameter is reduced and the transverse diameter increased.

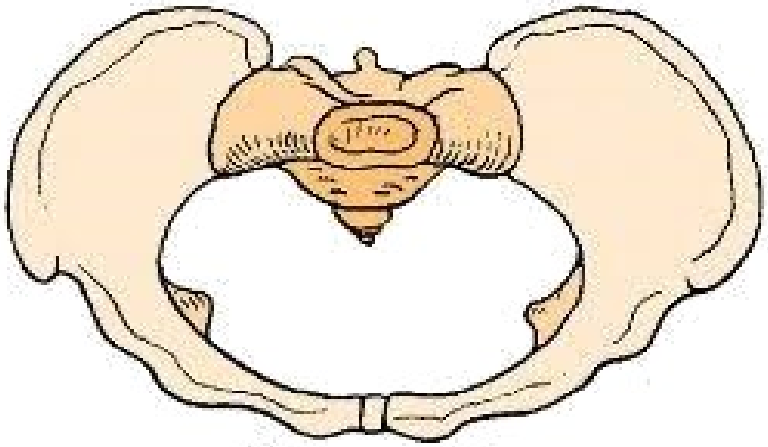
✓The sacrum is flat and the cavity shallow.

✓The ischial spines are blunt, and the sciatic notch and the sub-pubic angle are both wide.

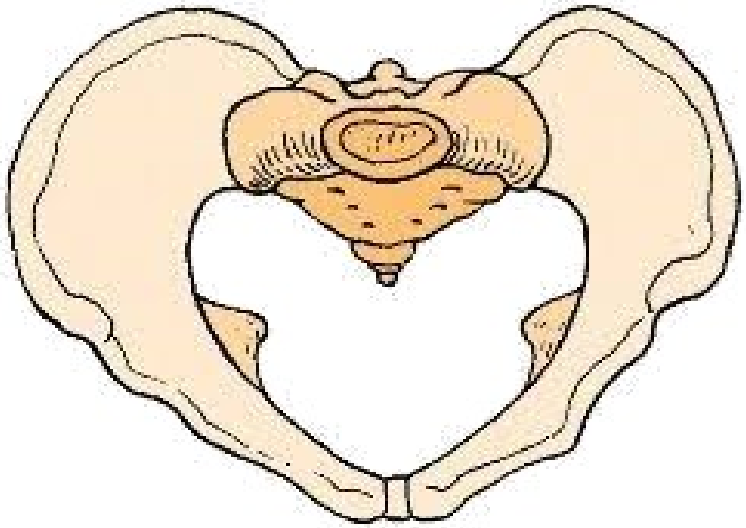
✓ The head must engage with the sagittal suture in the transverse diameter, but usually descends through the cavity without difficulty.



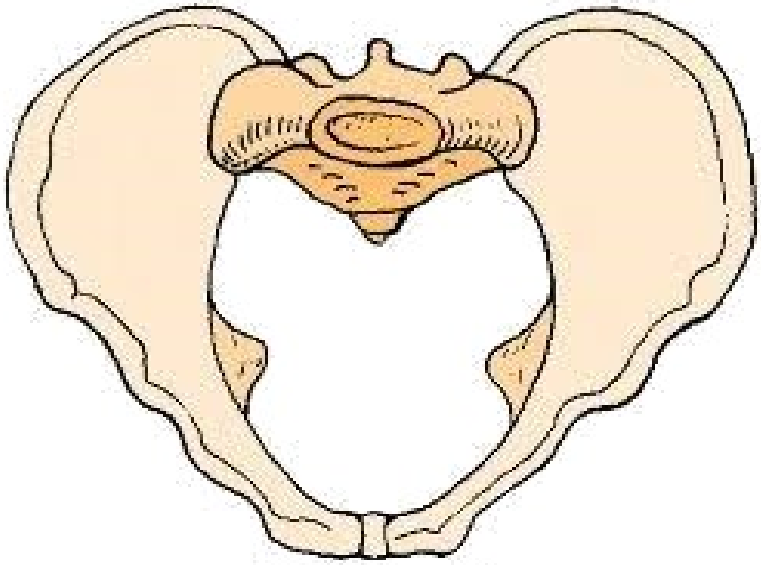
Gynecoid



Platypelloid



Android



Anthropoid

Features of the four types of pelvis				
Features	Gynaecoid	Android	Anthropoid	Platypelloid
Brim	Rounded	Heart-shaped	Long oval	Kidney-shaped
Forepelvis	Generous	Narrow	Narrowed	Wide
Side walls	Straight	Convergent	Divergent	Divergent
Ischial spines	Blunt	Prominent	Blunt	Blunt
Sciatic notch	Rounded	Narrow	Wide	Wide
Sub-pubic angle	90°	<90°	>90°	>90°
Incidence	50%	20%	25% (50% in non-Caucasian)	5%

Other Pelvic Variations

✓High assimilation pelvis occurs when the 5th lumbar vertebra is fused to the sacrum and the angle of inclination of the pelvic brim is increased. Engagement of the head is difficult but, once achieved, labour progresses normally.

✓Deformed pelvis may result from a developmental anomaly, dietary deficiency, injury or disease.

THE FEMALE REPRODUCTIVE SYSTEM

THE VAGINA

The vagina is a hollow, distensible fibro muscular tube that extends from the vestibule to the cervix. It is approximately 10 cm in length and 2.5 cm in diameter

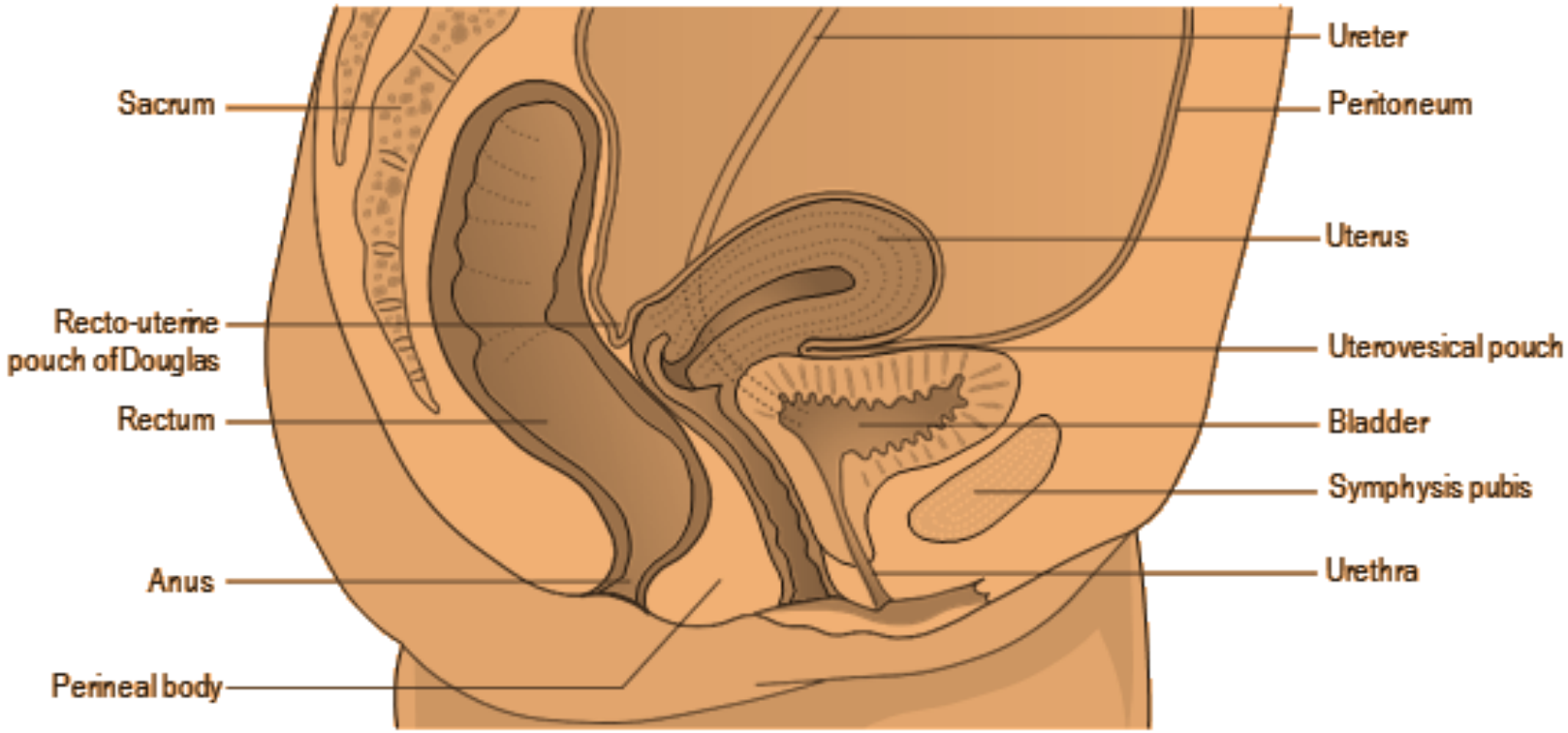
Function

The vagina allows the escape of the menstrual fluids, Sexual intercourse and provides an exit for the fetus during bi

rth.

Relations

- ✓**Anterior to the vagina** lie the bladder and the urethra,,which are closely connected to the anterior vaginal wall.
- ✓**Posterior to the vagina** lie the pouch of Douglas, the rectum and the perineal body, which separates thevagina from the anal canal.
- ✓**Laterally** on the upper two-thirds are the pelvic fascia and the ureters.
- ✓**Superior** to the vagina lies the uterus.
- ✓**Inferior** to the vagin a lies the external genitalia.



Sagittal section of the female pelvis.

Structure

✓The posterior wall of the vagina is 10 cm long whereas

the anterior wall is only 7.5 cm in length; this is because the cervix projects into its upper part.

✓At a right-angle upper end of the vagina is known as the vault where the cervix projects into it, the vault forms recess that is described as four arches or fornices.

Layers

▪ The vaginal wall is composed of three layers:

mucosa, muscle and fascia.

✓The **mucosa** is the most superficial layer and consists of stratified, squamous non-keratinized epithelium, thrown in transverse folds called rugae. These allow the vaginal walls to stretch during intercourse and childbirth.

✓The **muscle** layer is divided into a weak inner coat of circular fibres and a stronger outer coat of longitudinal

fibres.

✓**Pelvic fascia** surrounds the vagina and adjacent pelvic organs and allows for their independent expansion and contraction.

- The vaginal fluid is strongly acid (pH 4.5) due to the presence of lactic acid formed by the action of Doderlein's bacilli on glycogen found in the squamous epithelium of the lining.
- The acid deters the growth of pathogenic bacteria.

Blood supply

- The blood supply comes from branches of the internal iliac artery and includes the vaginal artery and a descending branch of the uterine artery. The blood drains through corresponding veins.

Lymphatic drainage

- Lymphatic drainage is via the inguinal, the internal iliac and the sacral glands.

Nerve supply

- The nerve supply is derived from the pelvic plexus. The vaginal nerves follow the vaginal arteries to supply the vaginal walls and the erectile tissue of the vulva.

THE UTERUS

- The uterus is a hollow, pear-shaped muscular organ located in the true pelvis between the bladder and the rectum.

Function

- The main function of the uterus is to nourish the developing fetus prior to birth. It prepares for pregnancy each month and following pregnancy expels the products of Conception.

Relations

✓**Anterior** to the uterus lie the uterovesical pouch and the bladder.

✓**Posterior** to the uterus are the recto-uterine pouch of Douglas and the rectum.

✓**Lateral** to the uterus are the broad ligaments, the uterine tubes and the ovaries.

✓**Superior** to the uterus lie the intestines.

✓**Inferior** to the uterus is the vagina.

Supports

The uterus is supported by the pelvic floor and maintained in position by several ligaments, of which those at the level of the cervix are the most important.

✓The **transverse cervical ligaments** fan out from the sides of the cervix to the side walls of the pelvis.

✓The **uterosacral ligaments** pass backwards from the cervix to the sacrum.

✓The **pubocervical ligaments** pass forwards from the cervix, under the bladder, to the pubic bones.

✓**The broad ligaments** are formed from the folds of peritoneum, which are draped over the uterine tubes.

✓**The round ligaments** have little value as a support but

tend to maintain the anteverted position of the uterus.

- ✓**The ovarian ligaments** begin at the cornua of the uterus but behind the uterine tubes and pass down between the folds of the broad ligament to the Ovaries.

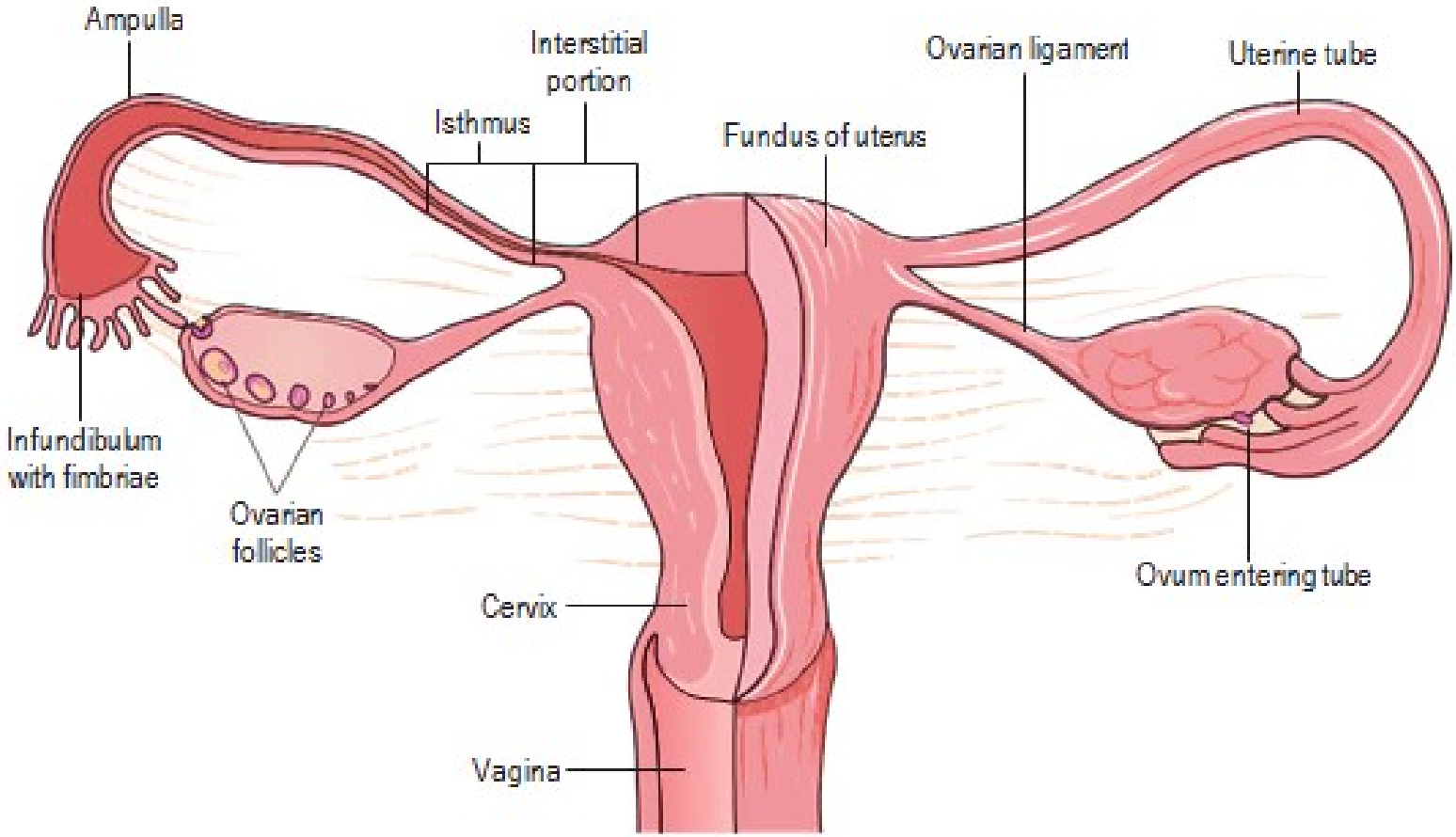
Structure

The non-pregnant uterus is 7.5 cm long 5 cm wide and 2.5 cm in depth, each wall being 1.25 cm thick. The cervix forms the lower third of the uterus and measures 2.5 cm in each direction. The uterus consists of the following parts:

- ✓The **cornua** are the upper outer angles of the uterus where the uterine tubes join.
- ✓The **fundus** is the domed upper wall between the insertions of the uterine tubes.

- ✓The **body** or corpus makes up the upper two-thirds of the uterus and is the greater part.
- ✓The **cavity** is a potential space between the anterior and posterior walls. It is triangular in shape, the base of the triangle being uppermost.
- ✓The **isthmus** is a narrow area between the cavity and the cervix, which is 7 mm long.
- ✓The **internal os** (mouth) is the narrow opening between the isthmus and the cervix.
- ✓**The external os** is a small round opening at the lower end of the cervix. After childbirth, it becomes a transverse slit.
- ✓The cervical canal lies between these two ostia and is a continuation of the uterine cavity. This canal is shaped like a spindle, narrow at each end and widerin the mid-

dle.



The uterine tubes in section. Note the ovum entering the fimbriated end of one tube.

Layers

The uterus has three layers: the endometrium, the **myometrium** and the **perimetrium.**

- ✓**The myometrium**, the middle muscle layer, is by far the thickest.
- ✓**The endometrium** forms a lining of ciliated epithelium (mucous membrane) on a base of connective tissue or-stroma. In the uterine cavity, this endometrium is constantly changing in thickness throughout the menstrual cycle .

▪ The basal layer does not alter, but provides the foundation from which the upper layers regenerate.

- ✓**The myometrium** is thick in the upper part of the uterus and is sparser in the isthmus and cervix. Its fi-

bres run in all directions and interlace to surround the blood vessels and lymphatics that pass to and from the endometrium.

- The outer layer is formed of longitudinal fibres that are continuous with those of the uterine tube, the uterine ligaments and the vagina.
  - ✓**The cervix**, the muscle fibres are embedded in collagen fibres, which enable it to stretch in labour.
  - ✓**The perimetrium** is a double serous membrane, an extension of the peritoneum, which is draped over the fundus and the anterior surface of the uterus to the level of the internal os.

Blood supply

- ✓The **uterine artery arrives** at the level of the cervix and

is a branch of the internal iliac artery.

✓The **ovarian artery** is a branch of the abdominal aorta, leaving near the renal artery. It supplies the ovary and uterine tube before joining the uterine artery. The blood drains through corresponding veins .

Lymphatic drainage

- Lymph is drained from the uterine body to the internal iliac glands and from the cervical area to many other pelvic lymph glands.

Nerve supply

- The nerve supply is mainly from the autonomic nervous system, sympathetic and parasympathetic, via the inferior hypogastric or pelvic plexus.

THE FALLOPIAN TUBES

- The uterine tubes, also known as fallopian tubes, oviducts and salpinges, are two very fine tubes leading from the ovaries into the uterus.

Function

- ✓The uterine tube propels the ovum towards the uterus receives the spermatozoa as they travel upwards and provides a site for fertilization.
- ✓It supplies the fertilized ovum with nutrition during its continued journey to the uterus.

Position

- The uterine tubes extend laterally from the cornua of the uterus towards the side walls of the pelvis.

Relations

- ✓Anterior, posterior and superior to the uterine tubes are the peritoneal cavity and the intestines.
- ✓Lateral to the uterine tubes are the side walls of the pelvis.
- ✓Inferior to the uterine tubes lie the broad ligaments and the ovaries.
- ✓Medial to the two uterine tubes lies the uterus.

Support

- The uterine tubes are held in place by their attachment to the uterus.

- The peritoneum folds over them, draping down below as the broad ligaments and extending at the sides to form the infundibulopelvic ligaments.

Structure

- Each tube is 10 cm long. The lumen of the tube provides an open pathway from the outside to the peritoneal cavity.

The uterine tube has four portions.

- ✓The ***interstitial portion*** is 1.25 cm long and lies within the wall of the uterus. Its lumen is 1 mm wide.
- ✓The ***isthmus*** is another narrow part that extends for 2.5 cm from the uterus.
- ✓The ***ampulla*** is the wider portion, where fertilization usually occurs. It is 5 cm long.

- ✓The ***infundibulum*** is the funnel-shaped fringed end that is composed of many processes known as ***fimbriae***.
- ✓One ***fimbria*** is elongated to form the Ovarian fimbria, which is attached to the ovary. Layers . The lining of the uterine tubes is a mucous membrane or ciliated cubical epithelium.
- ✓In this lining are ***gobletcells*** that produce a secretion containing glycogen to nourish the oocyte.
- ✓Beneath the lining is a layer of vascular connective tissue.

***The muscle coat consists of two layers*:**

- ✓An inner circular layer and an outer longitudinal layer, both of smooth muscle.
- ✓The peristaltic movement of the uterine tube is due to

the action of these muscles.

✓The tube is covered with peritoneum but the infundibulum passes through it to open into the peritoneal cavity.

Blood supply

- The blood supply is via the uterine and ovarian arteries, returning by the corresponding veins.

Lymphatic drainage

- Lymph is drained to the lumbar glands. Nerve supply

Nerve Supply

- The nerve supply is from the ovarian plexus.

THE OVARIES

- The ovaries are components of the female reproductive system and the endocrine system.

Function

✓The ovaries produce oocytes and the hormones, oestrogen and progesterone.

Position

✓The ovaries are attached to the back of the broad ligaments within the peritoneal cavity.

Relations

✓Anterior to the ovaries are the broad ligaments.

✓Posterior to the ovaries are the intestines.

- ✓Lateral to the ovaries are the infundibulopelvic ligaments and the side walls of the pelvis.
- ✓Superior to the ovaries lie the uterine tubes.
- ✓Medial to the ovaries lie the ovarian ligaments and the uterus.

Supports

- ✓The ovary is attached to the broad ligament but is supported from above by the ovarian ligament medially and the infundibulopelvic ligament laterally.

Structure

- ✓The ovary is composed of a medulla and cortex, covered with germinal epithelium.
- ✓The medulla is the supporting framework, which is

made of fibrous tissue; the ovarian blood vessels, lymphatics and nerves travel through it.

- ✓The hilum where these vessels enter lies just where the ovary is attached to the broad ligament and this area is called the mesovarium
- ✓The cortex is the functioning part of the ovary. It contains the ovarian follicles in different stages of development, surrounded by stroma.
- ✓The outer layer is formed of fibrous tissue known as the tunica albuginea.

Blood supply

- Blood is supplied to the ovaries from the ovarian arteries and drains via the ovarian veins.

Lymphatic drainage

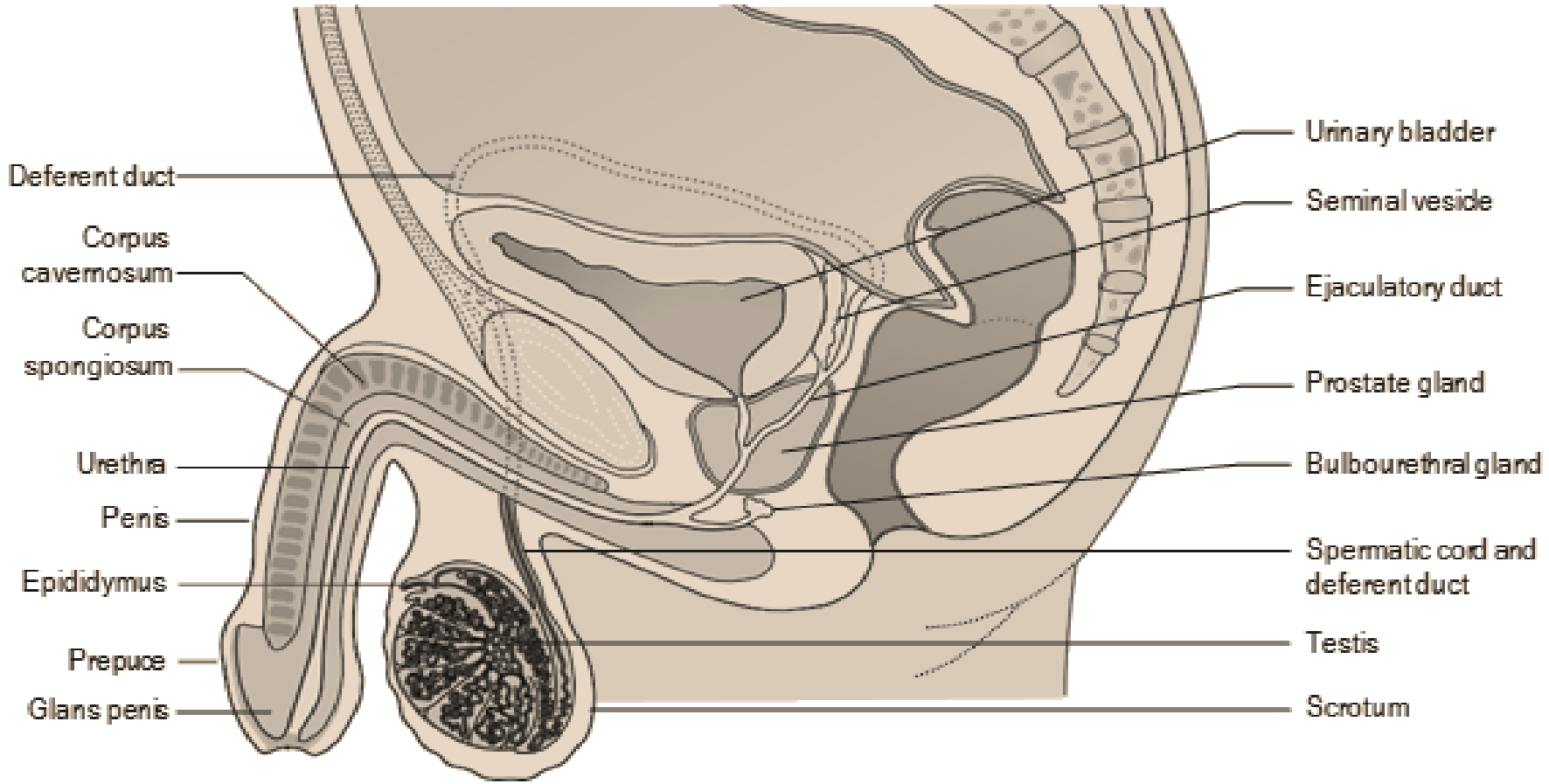
- Lymphatic drainage is to the lumbar glands.

Nerve supply

- The nerve supply is from the ovarian plexus.

THE MALE REPRODUCTIVE SYSTEM

- The male organs produce and transfer sperm to the female for fertilization.
- The organs are the scrotum, testis, rete and epididymis, ductus deferens, seminal vesicles prostate gland, bulbourethral glands and penis with the urethra.


Deferent duct
Corpus cavernosum
Corpus spongiosum
Urethra
Penis
Epididymus
Prepuce
Glans penis
Urinary bladder
Seminal vesicle
Ejaculatory duct
Prostate gland
Bulbourethral gland
Spermatic cord and deferent duct
Testis
Scrotum

The scrotum

- The scrotum is a thin-walled, soft, muscular pouch located below the symphysis pubis, between the upper parts of the thighs behind the penis.

Function

- The scrotum forms a pouch in which the testes are suspended outside the body, keeping them at a temperature slightly lower than that of the rest of the body

The testes

- They are both reproductive system and the endocrine system. Each testis weighs about 25 g.

Function

✓The testes produce and store spermatozoa, and are the

body's main source of the male hormone testosterone. Testosterone is responsible for the development of secondary sex characteristics.

Structure

✓Each testis is an oval structure about 5 cm long and 3 cm in diameter. Layers

There are three layers to the testis:

✓The tunica vasculosa is an inner layer of connective tissuecontaining a fine network of capillaries.

✓The tunica albuginea is a fibrous covering ingrowths ofwhich divide the testis into 200-300 lobules.

✓The tunica vaginalis is the outer layer, which is made of peritoneum brought down with the descending testis when it migrated from the lumbar region in fetal life.

The duct system within the testes is highly intricate: The seminiferous ('seed-carrying) tubules are where spermatogenesis, or production of sperm, takes place.

- ✓Between the tubules are interstitial cells that secretetestosterone.
- ✓The tubules join to form a system of channels that lead to the epididymis.
- ✓The epididymis is a comma-shaped, coiled tube that lies on the superior surface and travels down the posterior aspect to the lower pole of the testis, where it leads in too the deferent duct or vas deferens.
- ✓ The spermatic cord

▪ The spermatic cord is the name given to the cord-like structure consisting of the vas deferens and its accompanying arteries, veins, nerves and lymphatic vessels.

Function

- The function of the deferent duct is to carry the sperm to the ejaculatory duct.

Position

- ✓The cord passes upwards through the inguinal canal, where the different structures diverge.
- ✓The deferent duct then continues upwards over the symphysis pubis and arches backwards beside the bladder.
- ✓Behind the bladder, it merges with the duct from the seminal vesicle and passes through the prostate gland as the ejaculatory duct to join the urethra.

Blood supply

- The testicular artery, a branch of the abdominal aorta, supplies the testes, scrotum and attachments.

Lymphatic drainage

- Lymphatic drainage is to the lymph nodes round the aorta.

Nerve supply

- The nerve supply to the spermatic cord is from the 10th and 11th thoracic nerves.

Function

- The function of the seminal vesicles is production of a viscous secretion to keep the sperm alive and motile. This secretion ultimately becomnes semen.

Position

✓The seminal vesicles are situated posterior to the bladder and superior to the prostate gland

Structure

✓The seminal vesicles are 5 cm long and pyramid-shaped. They are composed of columnar epithelium, muscle tissue and fibrous tissue.

The ejaculatory ducts

✓These small muscular ducts carry the spermatozoa and the seminal fluid to the urethra.

The prostate gland

✓The prostate is an exocrine gland of the male reproductive system.

Function

- The prostate gland produces a thin lubricating fluid that enters the urethra through ducts.

Position

- The prostate gland surrounds the urethra at the base of the bladder, lying between the rectum and the symphysis pubis.

Structure

- The prostate gland measures 4 x3 x2 cm. It is composed of columnar epithelium, a muscle layer and an outer fi-

brous layer.

The bulbourethral glands

- The bulbourethral glands are two very small glands, which produce yet another lubricating fluid that passes into the urethra just below the prostate gland.

The Penis

- The penis is the male reproductive organ and additionally Serves as the external male organ of urination.

Functions

- The penis carries the urethra, which is a passage for both urine and semen. It deposit the semen near the woman's cervix.

Position

- The root of the penis lies in the perineum, from where it passes forward below the symphysis pubis.
- The lower two thirds are outside the body in front of the scrotum.

Structure

The penis has three columns of erectile tissue:

- ✓The corpora cavernosa are two lateral columns that lie one on either side in front of the urethra.
- ✓The corpus spongiosum is the posterior column that contains the urethra.
- ✓The tip is expanded to form the glans penis.
- ✓The lower two-thirds of the penis are covered in skin.
- ✓The penis is extremely vascular and during an erection

the blood spaces fill and become distended.

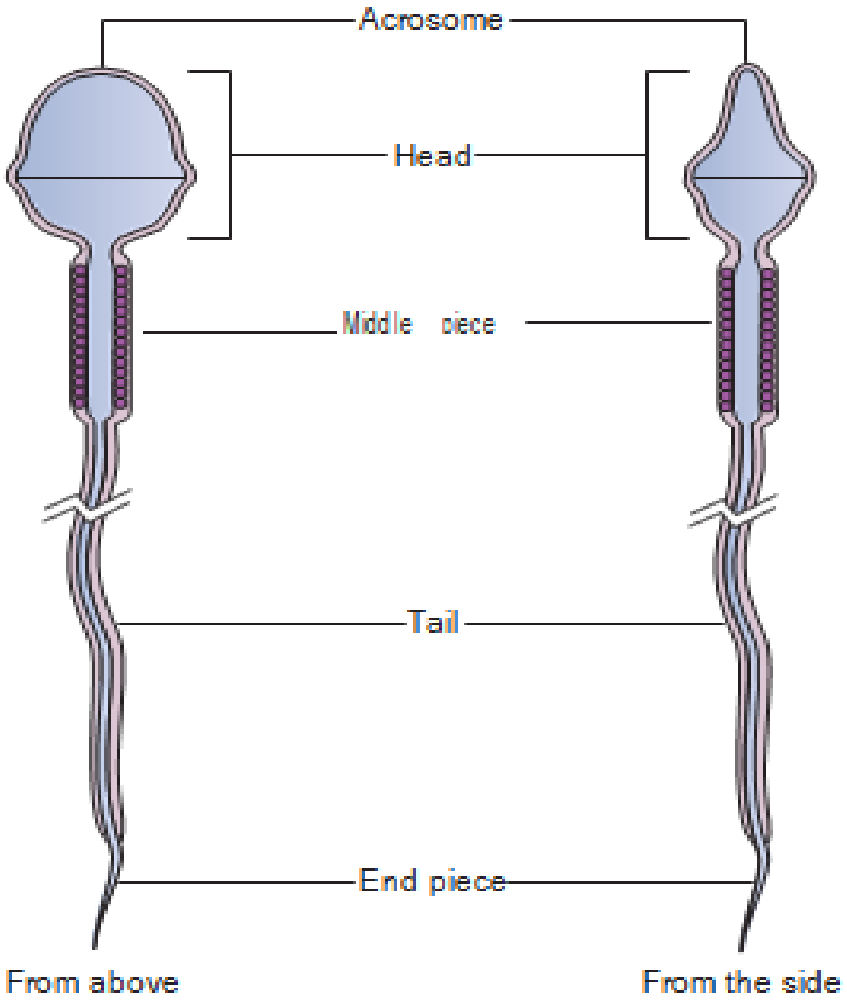
The male hormones

- ✓The **hypothalamus** produces **the gonadotropin releasing** factor.
- ✓This stimulates the posterior pituitary gland to produce **follicle stimulating** hormone (FSH) and luteinizing hormone.(LH)
- ✓ FSH acts on seminiferous tubes to bring about sperm production whereas LH acts on interstitial cells to produce testosterone.

Formation of spermatozoa

- Takes place in the seminiferous tubules under the influence of FSH and testosterone.

- The mature sperm is store in the epididymis and the deferent duct before ejaculation.



THE FEMALE URINARY SYSTEM

- The kidneys are excretory glands with both endocrine and exocrine functions.
- A typical adult kidney is a bean-shaped reddish-brown organ. Each kidney is about 10 cm long, 6.5 cm wide, 3 cm thick and weighs about 100 g.
- Although similar in shape, the left kidney is a longer and more slender organ than the right kidney

Position and relations

- The kidneys are situated in the posterior part of the abdominal cavity, one on either side of the vertebral column between the eleventh thoracic vertebra (T11) and the third lumbar vertebra (L3).

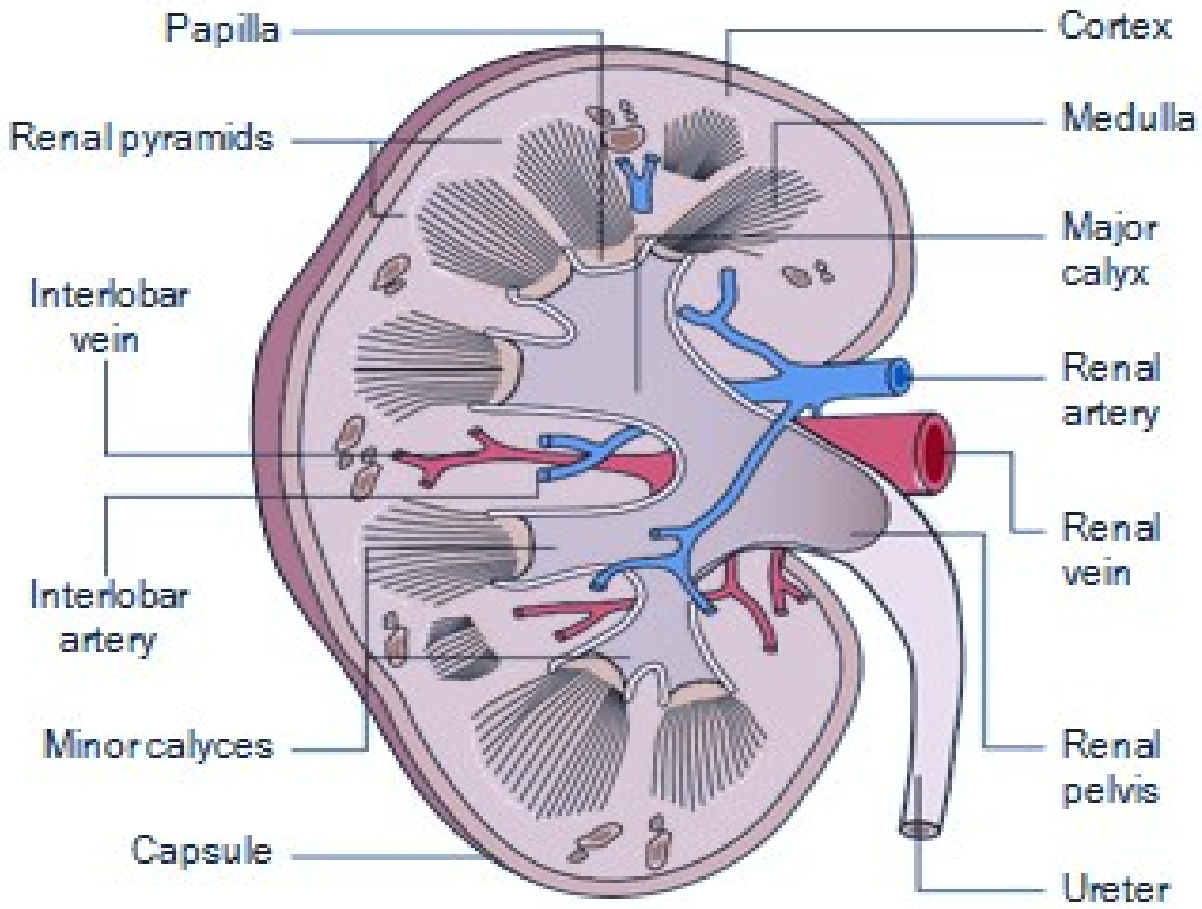
- The right kidney is slightly lower than the left kidney owing to its relationship to the liver.
- Posteriorly, the kidneys are related to rib 12 and the diaphragm, psoas major, quadratus lumborum and transversus abdominis muscles.
- Anteriorly, the right kidney is related to the liver, duodenum, ascending colon and small intestine. The left kidney is related to the spleen, stomach, pancreas, descending colon and small intestine.
- Adrenal (suprarenal) glands are situated in the upper pole of the kidneys

Structure

- Each kidney has a smooth surface covered by a tough fibrous capsule.

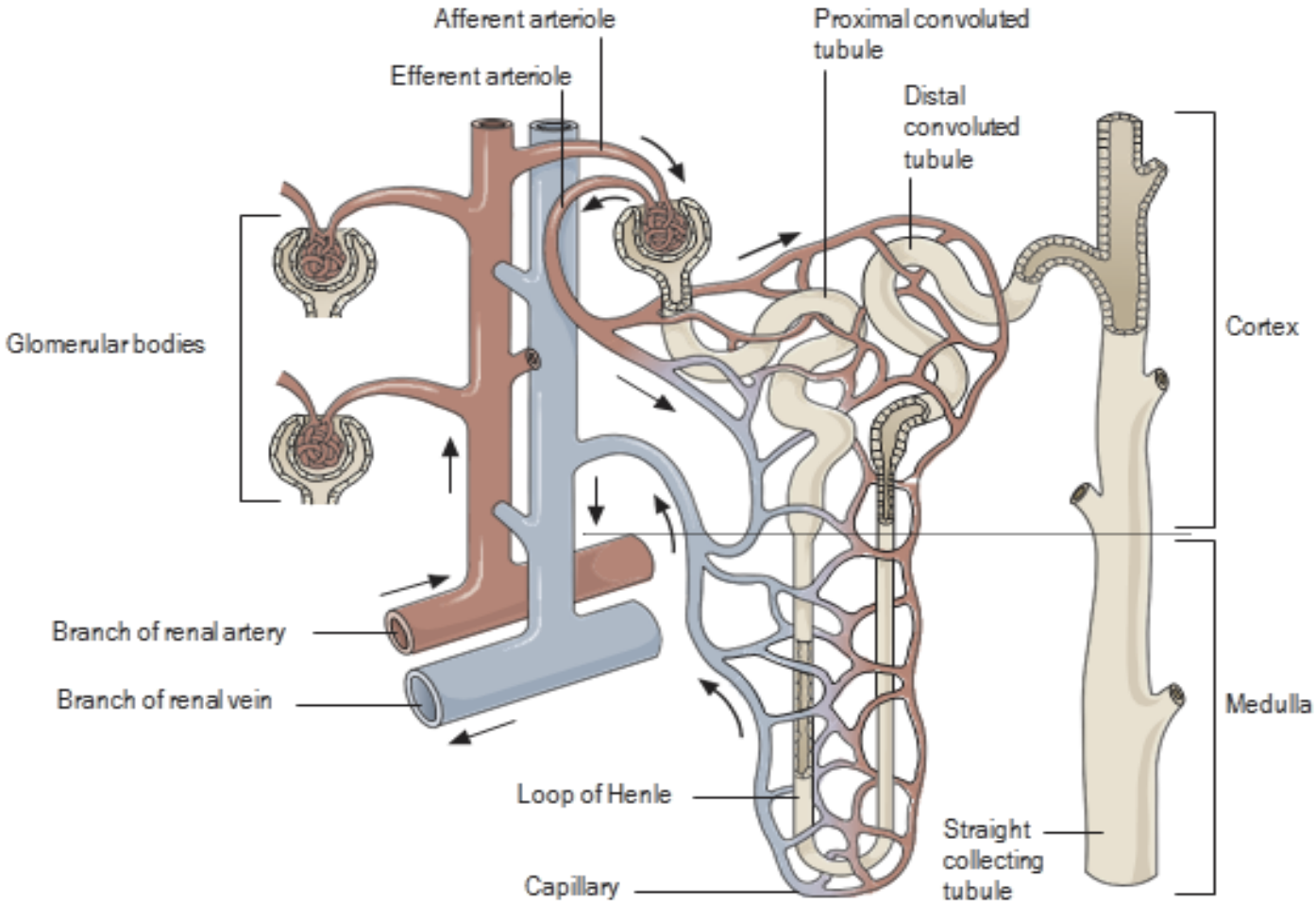
- The hilum is the point of entry for the renal artery and renal nerves, and the point of exit for the renal vein and the ureter.
- The renal medulla lies below the renal cortex and consists of between 8 and 18 distinct cone-shaped structures called medullary or renal pyramids.
- The base of each pyramid is broad and faces the cortex, while the pointed apex (papilla) projects into a minor calyx.
- Several minor calyces open into each of two or three major calyces, which then open into the renal pelvis.
- The renal pelvis is a flat funnel-shaped tube that is continuous with the ureter.
- Urine produced by the kidney flows continuously from the renal pelvis into the ureter and then into the bladder for

storage .



Longitudinal section of the kidney.

The nephron



A NEPHRON.

Parts of the nephron

a. Bowman's capsule containing the glomerulus (renal corpuscle)

b. The proximal convoluted tubule

c. The loop of Henle

d. The distal convoluted tubule and

e. The collecting duct .

- Blood enters the renal corpuscle by way of the afferent arteriole which delivers blood to the glomerulus, and leave by way of the efferent arteriole.
- The pressure within the glomerulus is increased because the afferent arteriole has a wider bore than the efferent arteriole and this forces the filtrate out of the capillaries into the capsule.
- At this stage any substance with a small molecular size

will be filtered out.

- The proximal convoluted tubule initially winds and twists through the cortex, then forms a straight loop of Henle that dips into the medulla, rising up into the cortex again to wind and turn as the distal convoluted tubule.
- The distal convoluted tubule returns to pass alongside granular cells of the afferent arteriole and this part of the tubule is called the macula densa.
- The granular cells secrete renin whereas the macula densa cells monitor the sodium chloride concentration of fluid.

Blood supply

- Each kidney receives blood through the renal artery, which originates from the lateral surface of the descend-

ing abdominal aorta near the level of the superior mesenteric artery.

- The artery enters at the renal hilum, transmitting numerous branches into the cortex to form the glomerulus for each nephron.
- Blood is collected up and returned via the renal vein.

Lymphatic drainage

- Lymph drains into large lymphatic ducts that emerge from the hilum and lead to the aortic lymph glands.

Nerve supply

- The kidneys are innervated by renal nerves. A renal nerve enters each kidney at the hilum and follows tributaries of renal arteries to reach individual nephrons.

Endocrine activity

- The kidney secretes two hormones: **renin** and *erythropoietin*.
- *Renin* is produced in the afferent arteriole and is secreted when the blood supply to the kidneys is reduced and in response to lowered sodium levels.
- It acts on angiotensinogen, which is present in the blood, to form angiotensin, which raises blood pressure and encourages sodium reabsorption.
- *Erythropoietin* is produsedin response to low oxygen levels .
- It stimulate an increase in the production of red blood cells from the bone marrow.

URINE

- Urine is usually acid and contains no glucose or ketones,
- It should not carry blood cells or bacteria.
- The amber colour is due to the bile pigment urobilin and the colour varies depending on the concentration.
- The volume and final concentration of urea and solutes depend on fluid intake

Urine Production

The production of urine takes place in three stages: filtration, selective reabsorption and secretion.

Filtration

- It occurs through the semipermeable walls of the glomerulus and glomerular capsule.

- Fluids and solutes are forced through the membrane by hydrostatic pressure.
- Water and small molecules such as glucose, amino acids and vitamins escape through the filter as the filtrate and enter the nephron, whereas blood cells, plasma proteins and other large molecules are usually retained in the blood.

Selective reabsorption

- Some substances, such as amino acids and glucose, are completely reabsorbed and are not normally present in urine.
- The reabsorption of other substances is under the regulation of several hormones.
- Water balance is mainly regulated by the antidiuretic

hormone (ADH) produced by the posterior pituitary gland.

- The action of ADH is to increase permeability of the renal tubular cells.
- More water is reabsorbed, resulting in reduced volume and more concentrated urine.
- When the body has sufficient fluid intake the production of ADH is inhibited and urine increases in volume and is more dilute.
- Minerals are selected according to the body's needs.
- Calcitonin increases calcium excretion
- Parathyroid hormone enhances reabsorption of calcium from the renal tubules.
- The reabsorption of sodium is controlled by aldosterone, which is produced in the cortex of the suprarenal gland.
- The interaction of aldosterone and ADH maintains water

and sodium balance.

Secretion

- Secreted substances into the urine include hydrogen ions, ammonia, creati- nine, drugs and toxins.

THE URETERS

- The ureters are hollow muscular tubes.

Function

- The ureters transport urine from the kidneys to the blad- der by waves of peristalsis.

Structure

- Each ureter is about 0.3 cm in diameter and 25–30 cm long, running from the renal hilum to the posterior wall of the bladder.
- The ureters penetrate the posterior wall of the urinary bladder without entering the peritoneal cavity.

Layers

- The ureters are composed of three layers: an inner lining, a middle muscular layer and an outer coat.
- *The inner* lining comprises of transitional epithelium arranged in longitudinal folds. This type of epithe- lium consists of several layers of pear-shaped cells and makes an elastic and waterproof inner coat.
- *The middle* muscular layer is made up of longitudinal and circular bands of smooth muscle.

- *The outer* coat comprises of fibrous connective tissue that is continuous with the fibrous capsule of the kidney.

Blood supply

- The blood supply to the upper part of the ureter is similar to that of the kidney.
- In its pelvic portion, it derives blood from the common iliac and internal iliac arteries and from the uterine and vesical arteries, according to its proximity to the different organs.
- Venous return is along corresponding veins.

Lymphatic drainage

Lymph drains into the internal, external and common iliac nodes.

Nerve supply

The nerve supply is from the renal, aortic, superior and inferior hypogastric plexuses.

THE BLADDER

- The bladder is a distensible, hollow, muscular, pelvic organ that functions as a temporary reservoir for the storage of urine until it is convenient for it to be voided.

Position, shape and size

- The empty bladder lies in the pelvic cavity.
- However, as it fills with urine it rises up out of the pelvic cavity becoming an abdominal organ and more globular in shape.
- It can be palpated above the symphysis pubis when full.

- During labour the bladder is an abdominal organ, as it is displaced by the fetus as it descends into the pelvic cavity.

Relationship

- Anterior to the bladder is the symphysis pubis.
- Posterior to the bladder is the cervix and ureters.
- Laterally are the lateral ligaments of the bladder and the side walls of the pelvis.
- Superiorly lie the intestines and peritoneal cavity. In the non-pregnant female the anteverted, ante-flexed uterus lies partially over the bladder.
- Inferior to the bladder is the urethra and the muscular diaphragm of the pelvic floor'

Supports

There are five ligaments attached to the bladder

- A fibrous band called the urachus extends from the apex of the bladder to the umbilicus.
- Two lateral ligaments extend from the bladder to the side walls of the pelvis.
- Two pubovesical ligaments attach from the bladder neck anteriorly to the symphysis pubis .

Structure

- The lining of the bladder, like that of the ureter, is formed of transitional epithelium, which helps to allow the distension of the bladder without losing its water-holding effect.
- Is thrown into folds (rugae), which flatten out as the bladder expands and fills.

- The mucous membrane lining lies on a submucous layer of areolar tissue that carries blood vessels, lymph vessels and nerves.
- The epithelium over the trigone is smooth and firmly attached to the underlying muscle.
- The musculature of the bladder consists chiefly of the large detrusor muscle whose function is to expel urine.
- This muscle has three coats of smooth muscle: an inner longitudinal, a middle circular and an outer longitudinal layer.
- Around the neck of the bladder, the circular muscle is thickened to form the internal urethral sphincter.
- The general elasticity of the numerous muscle fibres around the bladder neck tends to keep the urethra closed.
- The urethral dilator muscle lies in the ventral part of the

bladder neck and the walls of the urethra and it is thought to be of significance in overcoming urethral resistance to micturition .

- The outer layer of the bladder is formed of visceral pelvic fascia, except on its superior surface, which is covered with peritoneum.

Blood supply

- Blood supply is from the superior and inferior vesical arteries and drainage is by the corresponding veins.

Lymphatic drainage

- Lymph drains into the internal iliac and the obturator nodes.

Nerve supply

- The nerve supply is parasympathetic and sympathetic.
- The stimulation of sympathetic nerves causes the internal urethral sphincter to contract and the detrusor muscle to relax, whereas the parasympathetic nerve fibres cause the sphincter to relax and the bladder to empty.

THE URETHRA

- In the female the urethra is a narrow tube, about 4 cm.
- It passes from the internal meatus of the bladder to the vestibule of the vulva, where it opens exter- nally as the urethral meatus.
- The internal sphincter surrounds the urethra as it leaves the bladder.
- As the urethra passes between the levator ani muscles it

is enclosed by bands of striated muscle known as the membranous sphincter of the urethra, which is under voluntary control.

Structure

- The upper half is lined with transitional epithelium whereas the lower half is lined with squamous epithelium.
- The lumen is normally closed unless urine is passing down it or a catheter is in situ.
- The submucous coat of the urethra is composed of epithelium, which lies on a bed of vascular connective tissue.
- The musculature of the urethra is arranged as an inner longitudinal layer, continuous with the inner muscle fibres of the bladder, and an external circular layer. The inner muscle fibres help to open the internal urethral

sphincter during micturition.

- The outer layer of the urethra is continuous with the outer layer of the vagina and is formed of connective tissue.
- At the lower end of the urethra, voluntary, striated muscle fibres form the so-called membranous sphincter of the urethra. This is not a true sphincter but it gives some voluntary control to the woman when she desires to resist the urge to void urine.
- The powerful levator ani muscles, which pass on either side of the uterus, also assist in con- trolling continence of urine.

Blood supply

- The blood to the urethra is circulated by the inferior vesical and pudendal arteries and veins.

Lymphatic drainage

- Lymph drains through the internal iliac glands.

Nerve supply

- The internal urethral sphincter is supplied by sympathetic and parasympathetic nerves but the membranous sphincter is supplied by the pudendal nerve and is under voluntary control.

MICTURATION

- As the bladder fills with urine, stretch receptors in the wall of the urinary bladder are stimulated which then relay para-sympathetic sensory nerve impulses to the brain

generating awareness of fluid pressure in the bladder.

- This usually occurs when the bladder contains approximately 200–300 ml of urine. The urge to micturate can be voluntarily resisted and postponed until a suitable time.
- If the urge to micturate is not voluntarily resisted then the bladder will empty of urine by the muscle wall contracting, the internal sphincter opening by the action of Bell's muscles and voluntary relaxation of the external sphincter.
- This is assisted by the increased pressure in the pelvic cavity as the diaphragm is lowered and the abdominal muscles contract.
- During pregnancy large amounts of urine are produced due to an increase in glomerular filtration as this helps to eliminate the additional wastes created by maternal and

fetal metabolism. In labour, the urethra becomes elongated as the bladder is drawn up into the abdomen.

THE FEMALE BREAST

- The female breasts, also known as the mammary glands, are accessory organs of reproduction.

Location

- One breast is situated on each side of the sternum and extends between the levels of the second and sixth rib.
- The breasts lie in the superficial fascia of the chest wall over the pectoralis major muscle, and are stabilized by suspensory ligaments.
- Shape Each breast is a hemispherical swelling and has a

tail of tissue extending towards the axilla (the axillary tail of spence).

- Size The size varies with each individual and with the stage of development as well as with age.

Structure

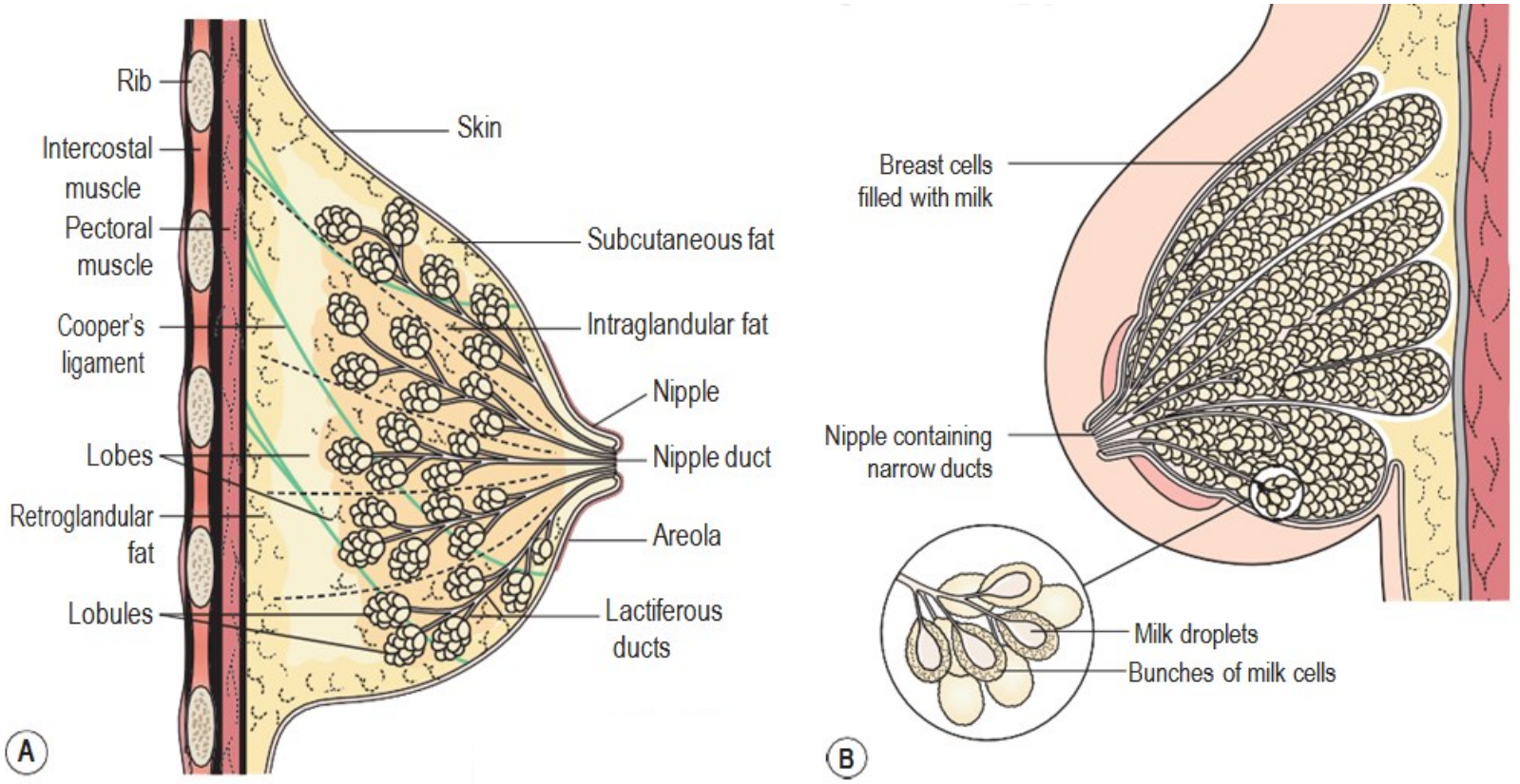
- The axillary tail is the breast tissue extending towards the axilla.
- **The areoa** is a circular area of loose, pigmented skin about 2.4 cm in diameter the centre of each breast.
- It is a pale pink colour in a fair- skinned woman, darker in a brunett, the colour deepening with pregnancy.
- Within the area of the areola lie approximately 20 sebaceous glands. In pregnancy these enlarge and are known as montgeomery's tubercles.

- **The nipple** lies in the centre of the areola at the level of the fourth rib. Aprotuberance about 6mm in length, composed of pigmented erectile tissue
- .The surface of the nipple is perforarted by small orifices which are the openings of the lactiferous ducts. It is covered with epithelium.

Microscopic structure

- The breast is composed largely of glandular tissue, but also of some fatty tissue, and is covered with skin.
- This glandular tissue is divided into about 18 lobes which are completely separated by bands of fibrous tissue.
- The internal structure is said to be resemble as the segments of a halved grape fruit.

- Each lobe is a self-contained working unit and is composed of the following structures.
- ***Alveoli***: Containing the milk- secreting cells.
- Each *alveolus* is lined by millk-secreting cells, the acini, which extract from the mammary blood supply the factors essential for milk formation.
- Around each alveolus lie *myoepithelial cells*. When these cells are stimulated by oxytocin they contract releasing milk into the lactifierous duct.
- ***Lactifierous tubules***: small ducts which connect the alveoli.
- ***Lactifierous duct***: a central duct into which the tubules run.
- ***Amplulla***: the widened-out portion of the duct where milk is stored. The ampullae lie under the areola.



Blood supply

- Blood is supplied to the breast by the internal mammary,

the external mammary and the upper intercostals arteries.

- Venous drainage is through corresponding vessles into the internal mammary and axillary veins.

Lymphatic drainage

- This is largely into the axillary glands, with some dranage in to the portal fissure of the liver and mediastinal glands. The lymphatic vessels of each breast communicate with one another.

Nerve supply

- The function of the breast is largely controlled by hormone activity but the skin is supplied by breanches of the thoracic nerves.

- There is also some sympathetic nerve supply, especially around the areola and nipple.

THE OVARIAN CYCLE

- It is the name given to the physiological changes that occur in the ovaries essential for the preparation and release of an oocyte.
- The ovarian cycle consists of three phases, all of which are under the control of hormones.

The follicular phase

- The ***Primordial germ cells*** differentiate into ***oogonia*** in the ovaries during fetal life.

- These diploid stem cells divide mitotically and proliferate into ***germ cells***.
- Most of the germ cells degenerate, however some develop further into ***primary oocytes***, and enter the prophase of meiosis I cell division.
- Meiotic arrest occurs and the process does not continue until after puberty.
- Whilst in this arrested prophase stage of meiosis I the primary oocyte is surrounded by follicular cells and is hence known as the ***primordial follicle.***
- Following puberty **FSH** and **LH** further stimulate the development of *primordial follicles* into *primary* and *secondary follicles* and subsequently into large preovulatory or ***Graafian follicles*** .
- Low levels of oestrogen and progesterone stimulate the

hypothalamus to produce Gonadotrophin release hormone (**GnRH)**.

- This releasing hormone causes the production of **FSH** and **LH** by the anterior pituitary gland.
- **FSH c**ontrols the growth and maturity of the Graafian follicles.
- The *Graafian follicles* begin to secrete *oestrogen*, which comprises *oestradiol*, *oestrone* and *oestriol*.
- The dominant follicle forms a bulge near the surface of the ovary, and soon becomes competent to ovulate.

Ovulation

- High ***oestrogen*** levels cause a sudden increase in ***LH*** around day 12–13 of a 28 day cycle.

- ***LH*** matures the oocyte and weakens the wall of the follicle and causes ovulation to occur on day 14.

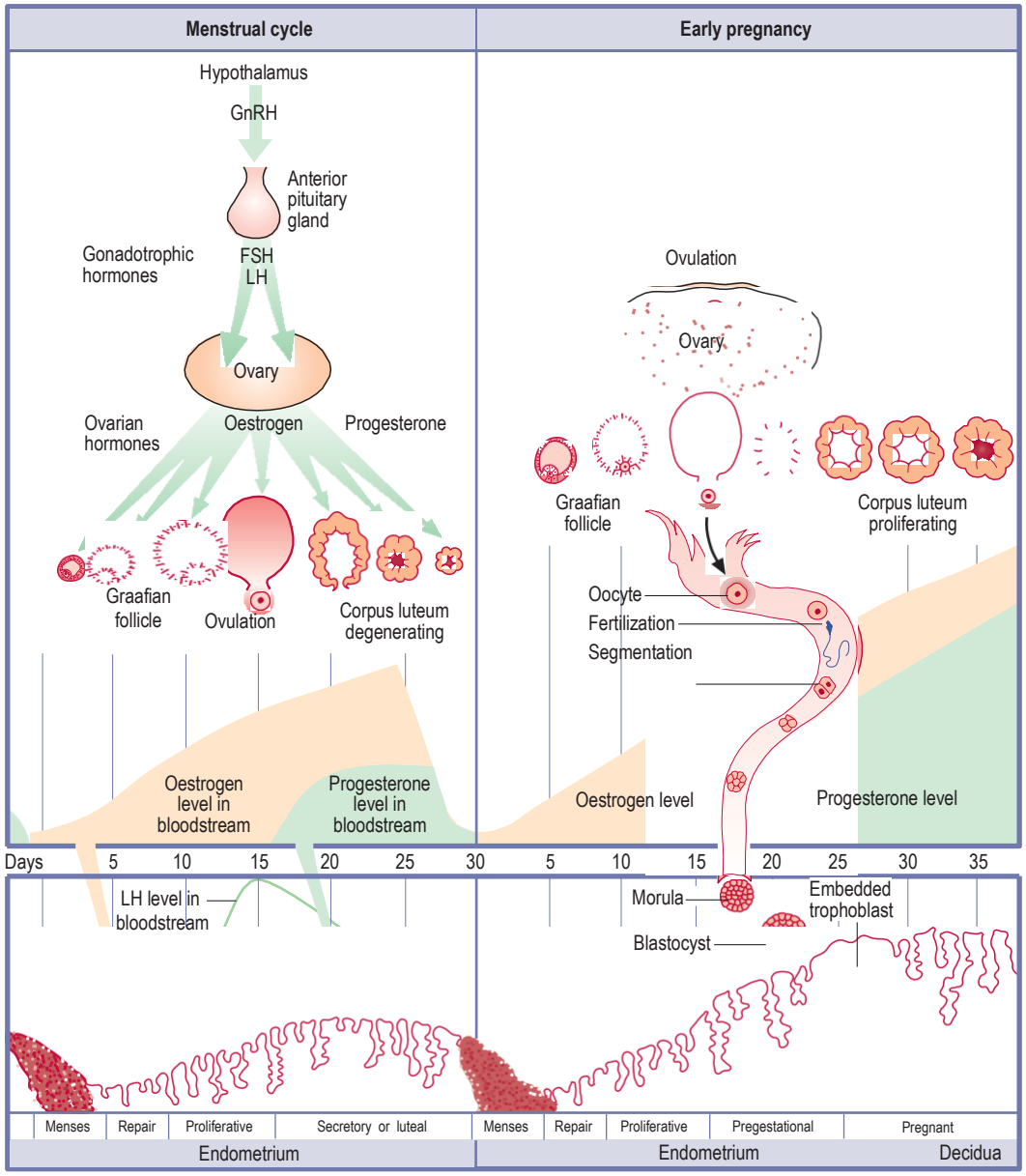
NB

Ovulation is the process whereby the dominant Graafian follicle ruptures and discharges the secondary oocyte into the pelvic cavity.

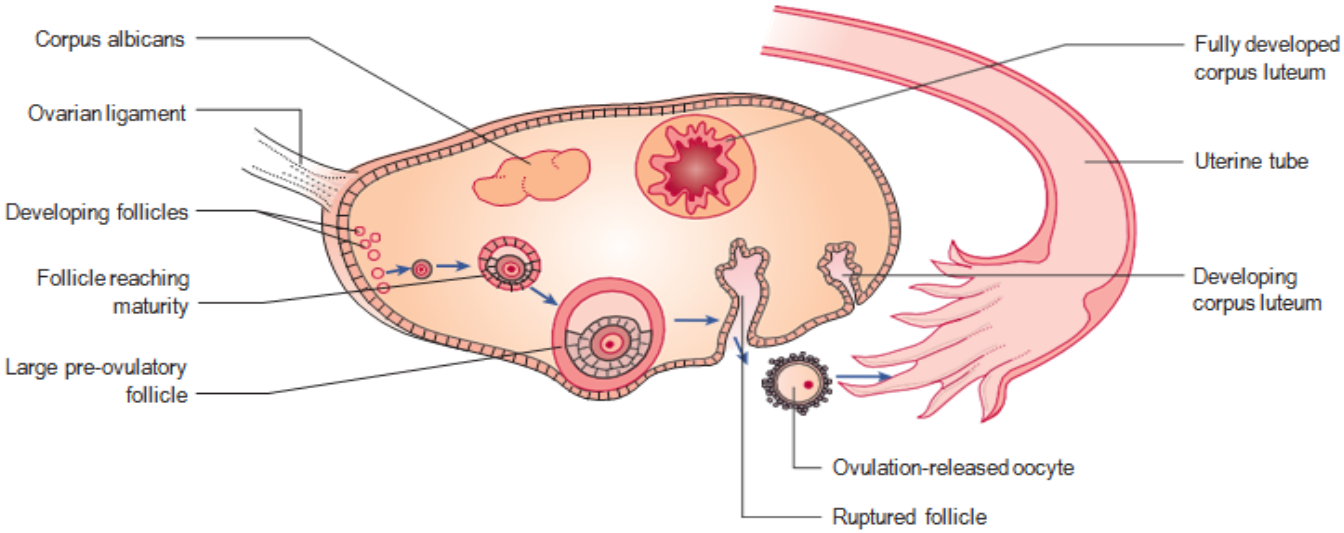
- Fimbrae guide it into the uterine tube where it awaits fertilization.
- During the time of ovulation, meiotic cell division resumes and the diploid oocyte become haploid.
- Following ovulation the fertilized or unfertilized oocyte travels to the uterus.

The luteal phase

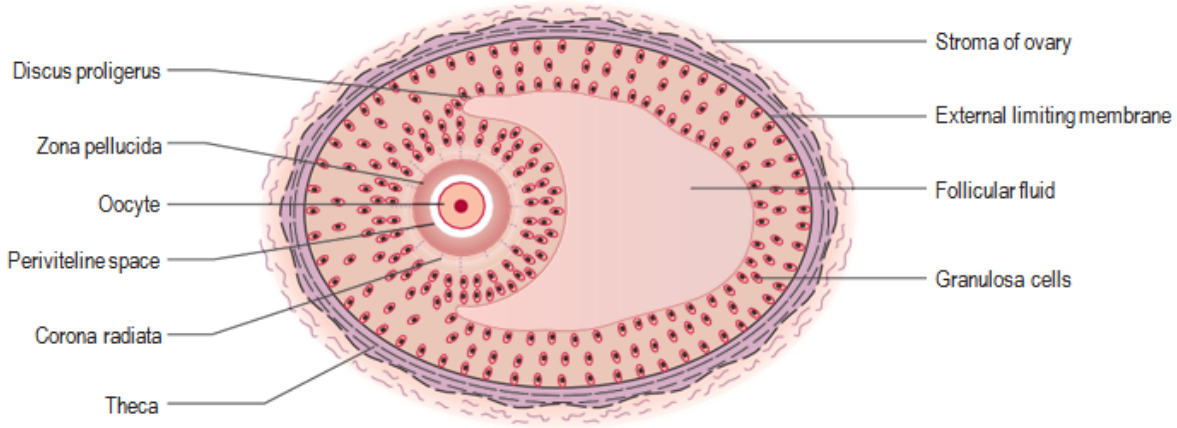
- After *Graafian follicle* ruptured and released the oocyte into the pelvic cavity the remaining cells of the rapture follicle proliferate and form a yellow irregular structure known as the ***corpus luteum.***
- The corpus luteum produces oestrogen, relaxin, inhibin and progesterone for approximately 2 weeks, to develop the endometrium of the uterus, which awaits the fertilized oocyte.
- The corpus luteum continues its role until the placenta is adequately developed to take over.
- In the absence of fertilization the corpus luteum degenerates and becomes the corpus albicans (white body), and progesterone, oestrogen, relaxin and inhibin levels decrease.



THE FEMALE REPRODUCTIVE CYCLE.



The cycle of a Graafian follicle in the ovary.



A ripe Graafian follicle.

THE MENSTRUAL CYCLE/ENDOMETRIAL CYCLE

- It is the name given to the physiological changes that occur in the endometrial layer of the uterus, and which are essential to receive the fertilized oocyte.
- It consists of three phases.

The menstrual phase

- This phase is often referred to as menstruation, bleeding, menses, or a period.
- Reducing levels of oestrogen and progesterone stimulate *prostaglandin release* that causes the spiral arteries of the endometrium to go into spasm, stopping the blood supply to it, and the endometrium dies (necrosis).
- The endometrium is shed down to the basal layer along

with blood from the capillaries, the unferti- lized oocyte tissue fluid, mucus and epithelial cells.

- The average blood loss during menstruation is ***50–150 ml.***

The proliferative phase

- There is the formation of a new layer of endometrium in the uterus, referred to as the proliferative endometrium.
- During the first few days of this phase the endometrium is reforming, (regenerative phase).
- At the completion of this phase the endometrium consists of three layers.
  - *The basal layer* lies immediately above the myometrium and is approximately 1 mm thick.
  - *The functional layer*, which contains tubular glands, is

approximately 2.5 mm thick, and lies on top of the basal layer.

- *The layer of cuboidal ciliated* epithelium covers the functional layer.

The secretory phase

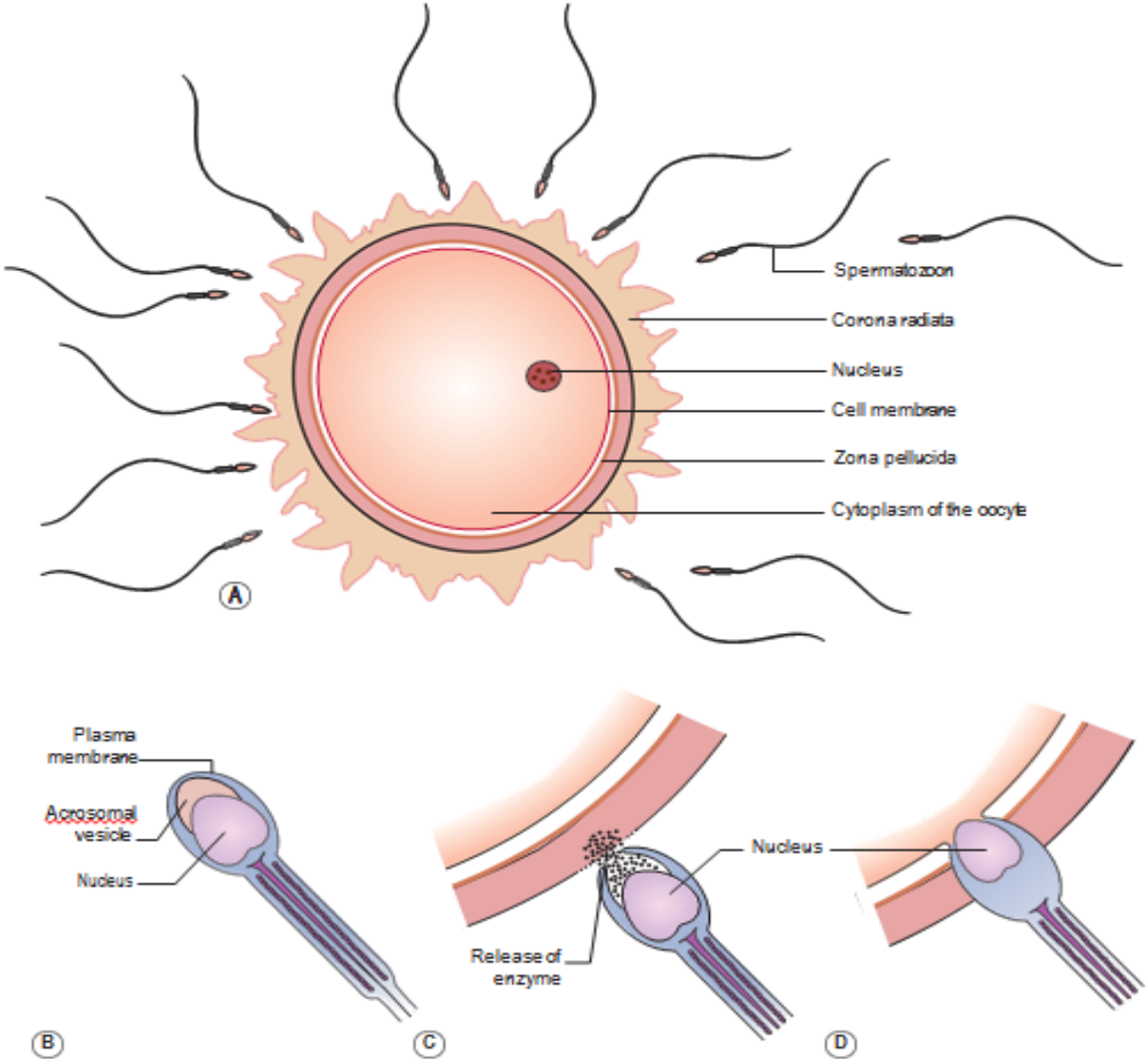
- It is under the influence of progesterone and oestrogen secreted by the corpus luteum.
- The functional layer of the endometrium thickens to approximately 3.5 mm and becomes spongy in appearance because the glands are more tortuous.
- The blood supply to the area is increased and the glands produce nutritive secretions such as glycogen.
- These conditions last for approximately 7 days, awaiting the fertilized oocyte.

NORMAL PREGNANCY

FERTILIZATION AND EARLY EMBRONIC DEVELOPMENT

Fertilization

- Human fertilization, known as conception, is the fusion of genetic material from the haploid sperm cell and the secondary oocyte (now haploid), to form the zygote.
- It occurs in the ampulla of the uterine tube.
- Approximately 200 sperm will ultimately reach the oocyte. Sperm swim from the vagina and through the cervical canal using their whip-like tails (flagella).


Spermatozoon
Corona radiata
Nucleus
Cell membrane
Zona pellucida
Cytoplasm of the oocyte
A
Plasma membrane
Acrosomal vesicle
Nucleus
B
Release of enzyme
C
Nucleus
D

Once inside the uterine tubes, the sperm undergo a process known as ***capacitation***.

- The ***zona pellucida*** of the oocyte produces chemicals that attract capacitated sperm only.
- The acrosomal layer of the capacitated sperm becomes re-active and releases the enzyme hyaluronidase known as the acrosome reaction, which disperses the corona radiata (the outermost layer of the oocyte) allowing access to the zona pellucida.
- The first sperm that reaches the zona pellucida penetrates it.
- Upon penetration the oocyte releases corticol granules; (cortical reaction).
- This makes it impossibie for penetratin of other sperms.
- The plasma membranes of the sperm and oocyte fuse.

- The tail and mitochondria of the sperm degenerate as the sperm penetrates the oocyte.
- The male and female pronuclei fuse to form a new nucleus that is a combination of the genetic material from both the sperm and oocyte, referred to as a diploid cell.
- Subsequent division occurs by mitosis where the chromosomes divide to give each new cell a full set.

Sex determination

- Females carry two similar sex chromosomes, XX; males carry two dissimilar sex chromosomes, XY. Each sperm will carry either an X or a Y chromosome, whereas the oocyte always carries an X chromosome.
- If the oocyte is fertilized by an X-carrying sperm a female

is conceived, if by a Y-carrying one, a male.

DEVELOPMENT OF THE ZYGOTE

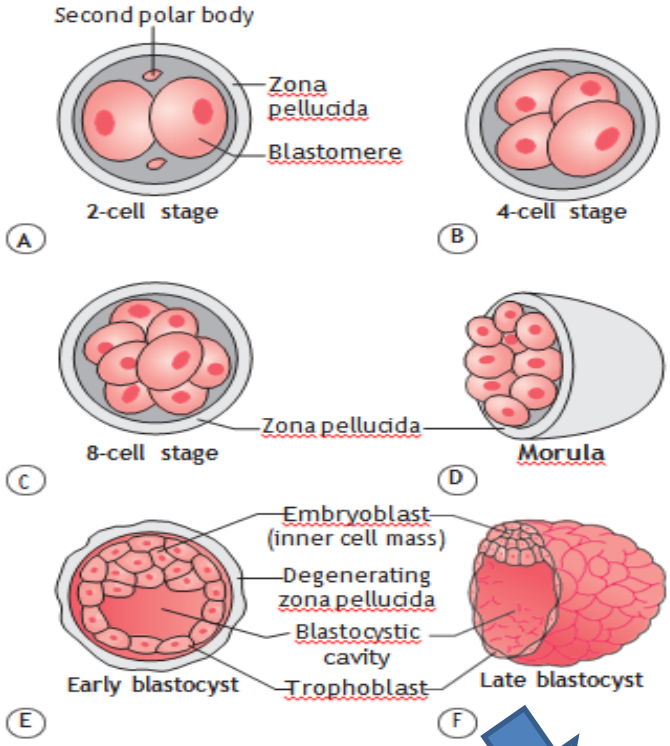
- It can be divided into three periods.
  - **a)** Pre-embryonic period, includes the implantation of the zygote into the endometrium;
  - **b)** Weeks 2–8 are known as the embryonic period;
  - **c)** Weeks 8 to birth are known as the fetal period.

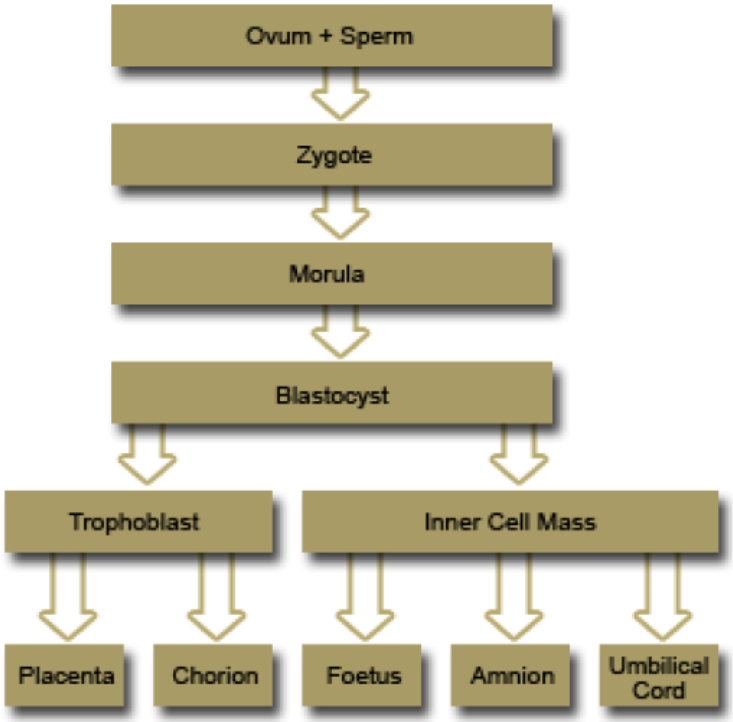
The pre-embryonic period

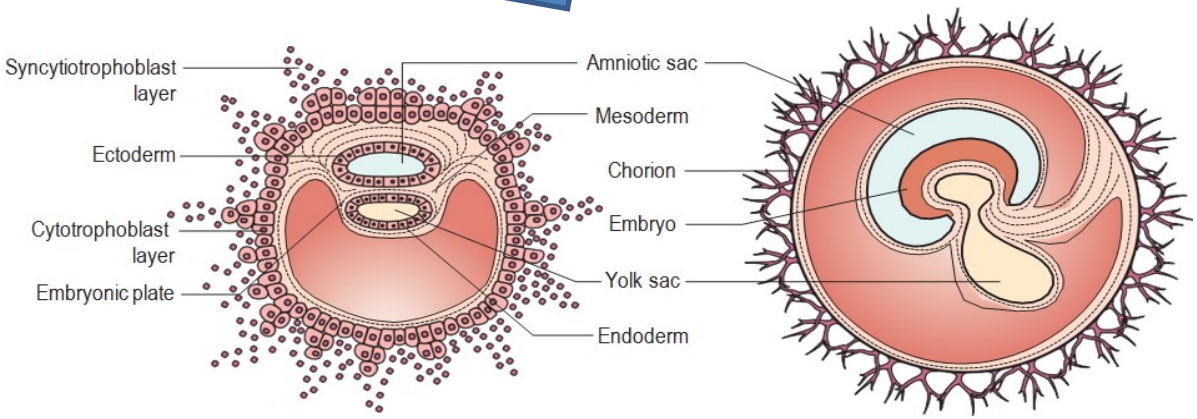
- During the first week the zygote travels along the uterine tube towards the uterus.
- At this stage a strong membrane called the **zona pelluci-**

da surrounds the zygote.

- During the travel the zygote undergoes mitotic division forming ***blastomeres.***
- It divides into two cells at 1 day, then four at 2 days, eight by 2.5 days, and 16 by 3 days, to become ***morula***.
- Next, the outermost cells secret fluid into the morula and a fluid-filled cavity or ***blastocele*** appears in the morula.
- This results in the formation of the ***blastula*** or ***blastocyst***.
- It digests its way out of the zona pellucida once it enters the uterine cavity.
- The **blastocyst** consist of an inner cell mass called ***embryoblast***, and an outer cell mass called ***trophoblast.***







Blastocyst 13 days

Blastocyst 18 days

The Trophoblast

- The ***trophoblast*** becomes the placenta and chorion, while the ***embryoblast*** becomes the embryo, amnion and umbilical.
- During week 2, the trophoblast differsentiates into two layers:
- the outer ***syncytio-trophoblast*** and the inner ***cytotrophoblast***
- The syncytiotrophoblast cells also produce ***human chorionic gonadotrophin (HCG).***
- The endometrium during pregnancy is called ***desidua***.
- The syncytiotrophoblast layer invades the decidua by forming finger-like projections called villi.
- The villi begin to branch, and contain blood vessels of the

developing embryo, thus allowing gaseous exchange between the mother and embryo.

- The cells of the embryoblast differentiate into two types of cells:
  - **a)** ***the epiblast*** (closest to the trophoblasts) and
  - **b)** ***the hypo-blast*** (closest to the blastocyst cavity)
- The ectoderm forms tissues that covers most surfaces of the body:
  - **a)** The epidermis layer of the skin,
  - **b)** Hair and nails.
  - **c)** The nervous system.
- The mesoderm forms the:
  - **a)** muscle,
  - **b)** skeleton,
  - **c)** dermis of skin,

d) connective tissue,

e) the urogenital glands, blood vessels, blood and lymph cells.

- The endoderm forms the
  a) Epithelial lining of the digestive,
  b) Respiratory and urinary systems,
- The *epiblast* separates from the *trophoblast* and forms the floor of a cavity, known as the amniotic cavity.
- The cavity is filled with fluid (amniotic fluid).
- At about 16 days mesodermal cells form a hollow tube in the midline called the notochordal process;
- The notochord, develop into the vertebral bodies and intervertebral discs .
- Endodermic tissue forms the allantois, this extends to the connecting stalk around which the umbilical cord lat-

er forms.

- Growth of blood vessels is induced, connecting separately to vessels of the embryo and placenta.
- Within a few days of fertilization, the trophoblasts begin to produce human chorionic gonadotrophin (HCG), ensuring that the endometrium will be receptive to the implanting embryo.

The Desidua (The Endometrium in Pregnancy)

Layers

- ***The decidua capsularis*** covers the developing embryo separating it from the uterine cavity.
- ***The decidua vera*** (otherwise known as the decidua pari-

etalis) lines the remainder of the uterine

- Uterine glands secrete nutrients such as glycogen, to maintain the developing conceptus until the intraplacental blood flow is fully developed.

IMPLANTATION

Implantation involves two stages: prelacunar and lacunar.

Prelacunar stage

- Seven days post conception the blastocyst makes contact with the decidua and the process of placentation begins.
- Chemical mediators, prostaglandins and proteolytic enzymes are released by both the decidua and the tropho-

blasts and maternal connective tissue is invaded.

- Nearby maternal blood vessels ensure there is optimum blood flow to the placenta.
- At this stage the cytotrophoblasts form a double layer and further differentiate into various types of syncytiotrophoblasts.

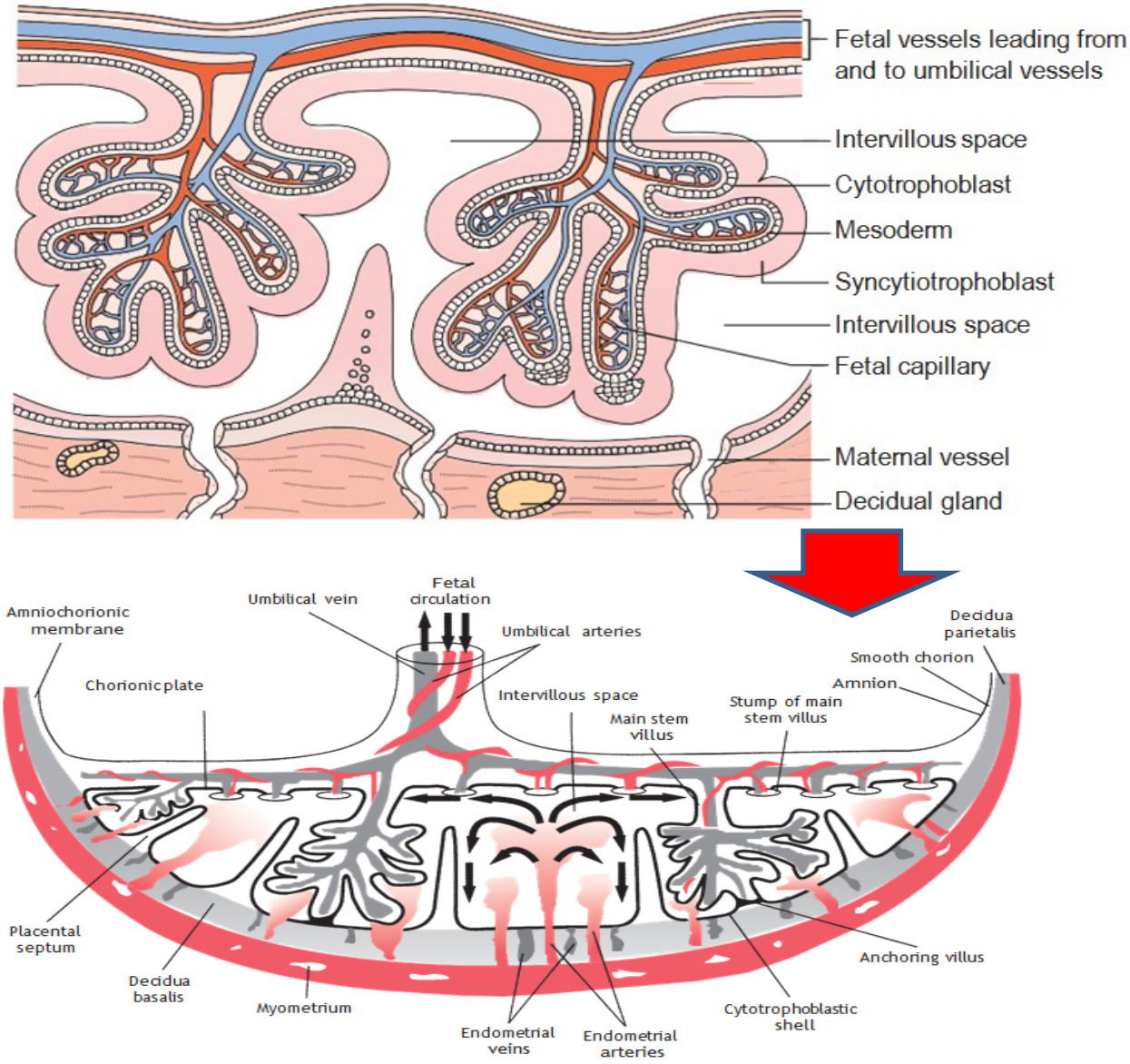
Lacunar stage

- Increasing numbers of syncytiotrophoblasts surround the blastocyst and small lakes form within these cells known as lacunae, which will become the intervillous spaces between the villi and will be bathed in blood as maternal spiral arteries are eroded some 10–12 weeks following conception.

- Prior to this the embryo is nourished from uterine glands.

The Chorionic Villous Tree

- Chorionic villi are finger-like projections of chorion surrounded by cytotrophoblastic and syncytiotrophoblastic layers.
- Each chorionic villus is a branching structure like a tree arising from one stem. Its centre consists of mesoderm and fetal blood vessels, as well as branches of the umbilical artery and vein.
- These are covered by a single layer of cytotrophoblast cells and the external layer of the villus is the syncytiotrophoblast.


Fetal vessels leading from and to umbilical vessels
Intervillous space
Cytotrophoblast
Mesoderm
Syncytiotrophoblast
Intervillous space
Fetal capillary
Maternal vessel
Decidual gland
Amniochorionic membrane
Umbilical vein
Fetal circulation
Umbilical arteries
Decidua parietalis
Smooth chorion
Amnion
Chorionic plate
Intervillous space
Stump of main stem villus
Main stem villus
Placental septum
Decidua basalis
Myometrium
Endometrial veins
Endometrial arteries
Cytotrophoblastic shell
Anchoring villus

THE PLACENTA AT TERM

- At term the placenta is discoid in shape, about 20 cm in diameter and 2.5 cm thick at its centre and weighing approximately 470 g, which is directly proportional to the weight of the fetus.
- The maternal surface of the placenta (i.e. the basal plate) is dark red in colour due to maternal blood and partial separation of the basal decidua .
- The surface is arranged in up to 40 cotyledons (lobes), which are separated by sulci (furrows).
- The cotyledons are made up of lobules, each of which contains a single villus with its branches.
- The fetal surface of the placenta (i.e. the chorionic plate) has a shiny appearance due to the amnion covering it.
- Branches of the umbilical vein and arteries are visible,

spreading out from the insertion of the umbilical cord, which is normally in the centre.

- The amnion can be peeled off the surface of the chorion as far back as the umbilical cord, whereas the chorion, being derived from the same trophoblastic layer as the placenta, cannot be separated from it.

Functions

- It can be determined by the pneumonic SERPENT

a) Storage

- The placenta metabolizes glucose, stores it in the form of glycogen and reconverts it to glucose as required. It can also store iron and the fat-soluble vitamins.

b) Endocrine

- Both types of trophoblasts produce steroidal hormones (oestrogens and progesterone) and protein hormones eg. HCG and Human placental lactogen (hPL) necessary for pregnancy.

c) Respiration

- Gaseous exchange to and from the fetus occurs as a re sult of diffusion.
- Transfer of gases is assisted by a slight maternal respiratory alkalosis in pregnancy. The fetal haemoglobin also has a high affinity for oxygen.

d) Protection

- The placenta provides a limited barrier to infection. Few bacteria can penetrate with the exception of the treponema of syphilis and the tubercle bacillus.
- However, many types of virus can penetrate the placental

barrier, such as human immunodeficiency virus (HIV), hepatitis strains, Parvo virus B19, human cytomegalovirus (CMV) and rubella.

- In addition to this, some parasitic and protozoal diseases, such as malaria and toxoplasmosis, will cross the placenta.
- The placenta filters substances of a high molecular weight therefore some drugs and medicines may transfer to the fetus.

e) Excretion

- The main substance excreted from the fetus is carbon dioxide.
- Bilirubin will also be excreted as red blood cells are replaced relatively frequently.

f) Nutrition

- These nutrients are actively transferred from the maternal to the fetal blood through the walls of the villi.
- Water, vitamins and minerals also pass to the fetus. Fats and fat-soluble vitamins (A, D and E) cross the placenta only with difficulty and mainly in the later stages of pregnancy.

g) Transfer of substances

Substances transfer to and from the fetus by a variety of transport mechanisms, as stated below:

- Simple diffusion of gases and lipid soluble substances.
- Water pores transfer water-soluble substances as a result of osmotic and potentially hydrostatic forces.
- Facilitated diffusion of glucose using carrier proteins.
- Active transport against concentration gradients of ions, calcium (Ca) and phosphorus (P).

- Endocytosis (pinocytosis) of macromolecules.

Placental Circulation

- Maternal blood is discharged into the intervillous space by spiral arteries in the decidua basalis after 10–12 weeks of gestation.
- The blood flows slowly around the villi, eventually returning to the endometrial veins and the maternal circulation.
- Fetal blood, which is low in oxygen, is pumped by the fetal heart towards the placenta along the umbilical arteries and transported along their branches to the capillaries of the chorionic villi where exchange of nutrients takes place between the mother and fetus.
- Having yielded carbon dioxide and waste products and absorbed oxygen and nutrients, the blood is returned to

the fetus via the umbilical vein .

THE MEMBRANES

- The chorioamnion membrane is composed of two membranes:
- the amnion and the chorion.

The amnion

- It is a tough, smooth and translucent membrane, continuous with the outer surface of the umbilical cord which moves over the chorion aided by mucous.
- The amnion contains amniotic fluid, which it produces in small quantities as well as prostaglandin E2 (PGE2) which plays a role in the initiation of labour.

The chorion

- Is the outer membrane that is continuous with the edge of the placenta, is composed of mesenchyme, cytotrophoblasts and vessels from the extended spiral arteries of the decidua basalis.
- It is a rough, thick, fibrous, opaque membrane which lines the decidua vera during pregnancy, although loosely attached.

Amniotic fluid

- Amniotic fluid is a clear alkaline and slightly yellowish liquid contained within the amniotic sac.
- It is derived essentially from the maternal circulation across the placental membranes and exuded from the fetal surface.

- The fetus contributes to the amniotic fluid through metabolism in small quantities of urine and fluid from its lungs.
- This fluid is returned to the fetus by intramembranous Umbilical vein flow across the amnion into the fetal vessels and through the mechanism of the fetus swallowing.

Functions of the amniotic fluid

✓Amniotic fluid distends the amniotic sac allowing for the growth and free movement of the fetus and permitting symmetrical musculoskeletal development.

✓It equalizes pressure and protects the fetus from jarring and injury.

✓ The fluid maintains a constant intrauterine temperature, protecting the fetus from heat loss and providing it with

small quantities of nutrients.

✓ In labour, as long as the membranes remain intact the amniotic fluid protects the placenta and umbilical cord from the pressure of uterine contractions.

✓It also aids effacement of the cervix and dilatation of the uterine os, particularly where the presenting part is poorly applied.

Constituents of the amniotic fluid

✓Amniotic fluid consists of 99% water with the remaining 1% being dissolved solid matter including food substances and waste products.

✓In addition, the fetus sheds skin cells, vernix caseosa and lanugo into the fluid.

✓Abnormal constituents of the liquor, such as meconium in

the case of fetal compromise, may give valuable diagnostic information about the condition of the fetus. Research has found that amniotic fluid is a plentiful

Volume of amniotic fluid

✓During pregnancy, amniotic fluid increases in volume as the fetus grows: from 20 ml at 10 weeks to approximately 500 ml at term.

The umbilical cord (funis)

- It originates from the duct that forms between the amniotic sac and the yolk sac, which transmits the umbilical blood vessels.

Functions

- The umbilical cord transports oxygen and nutrients to the developing fetus, and removes waste products

Structure

- The umbilical cord contains two arteries and one vein, which are continuous with the blood vessels in the chorionic villi of the placenta.
- The blood vessels are enclosed and protected by Wharton's jelly, a gelatinous substance.
- The whole cord is covered in a layer of amnion that is continuous with that covering the placenta.

Measurements

- The cord is approximately 1–2 cm in diameter and 50 cm in length.

- This length is sufficient to allow for the birth of the baby without applying any traction to the placenta.
- A cord is considered short when it measures <40 cm.
- Disadvantages of a very long cord are that it may become wrapped round the neck or body of the fetus or become knotted.
- Either event could result in occlusion of the blood ves- sels, especially during labour.
- True knots should always be noted on examination of the cord, but they must be distinguished from false knots, which are lumps of Whar- ton's jelly on the side of the cord and do not have any physiological significance.

Anatomical Variations Of The Placenta And Cord

A succenturiate lobe of placenta

- is the most significant of the variations in conformation of the placenta.
- A small extra lobe is present that is separate from the main placenta, and joined to it by blood vessels that run through the membranes to connect it .
- The danger is that this small lobe may be retained in utero after the placenta is expelled, and if it is not removed, it may lead to hemorrhage and infection.
- An extra lobe can be identified by a hole in the membranes with vessels running to it.

Circumvallate placenta

- In a circumvallate placenta, an opaque ring is seen on the fetal surface of the placenta.

- It is formed by a doubling back of the fetal membrane onto the fetal surface of the placenta and may result in the membranes leaving the placenta nearer the centre instead of at the edge as usual .
- This placental variation is associated with placental abruptio and intrauterine growth restriction (IUGR).

Bipartite placenta

- In a bipartite placenta, there are two complete and separate lobes where the main cord bifurcates to supply both parts.

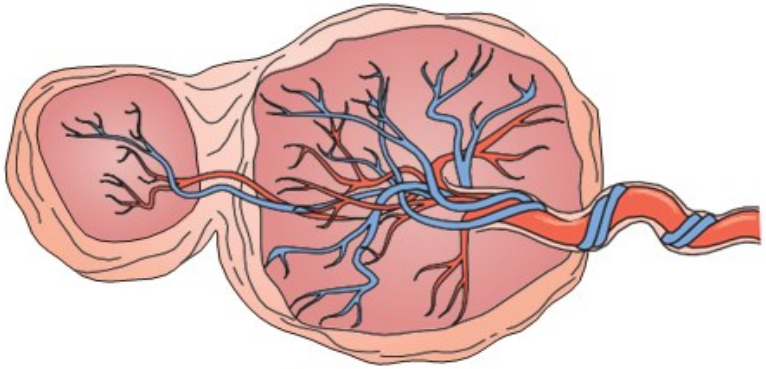
Tripartite placenta

- A tripartite placenta is similar to a bipartite placenta but it has three distinct parts.

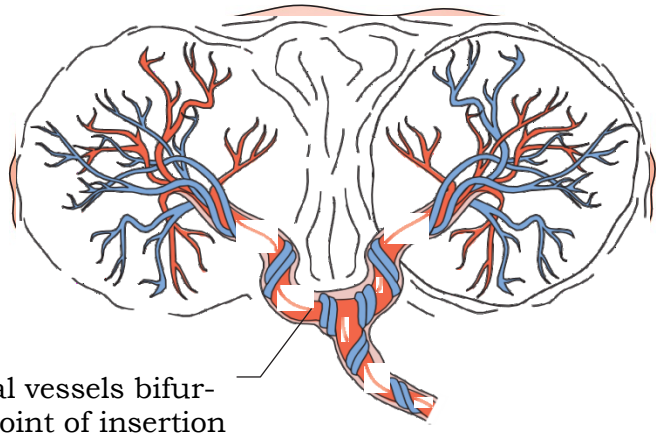
- In a battledore insertion of the cord, the cord is attached at the very edge of the placenta, and where the attachment is fragile it may cause significant problems with active management of the third stage of labour.

Velamentous

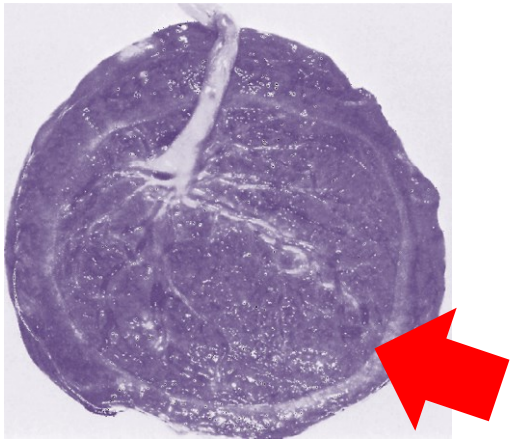
- A velamentous insertion of the cord, occurs when the cord is inserted into the membranes some distance from the edge of the placenta.
- The umbilical vessels run through the membranes from the cord to the placenta.
- If the placenta is normally situated, no harm will result to the fetus, but the cord is likely to become detached upon applying traction during active management of the third stage of labour.



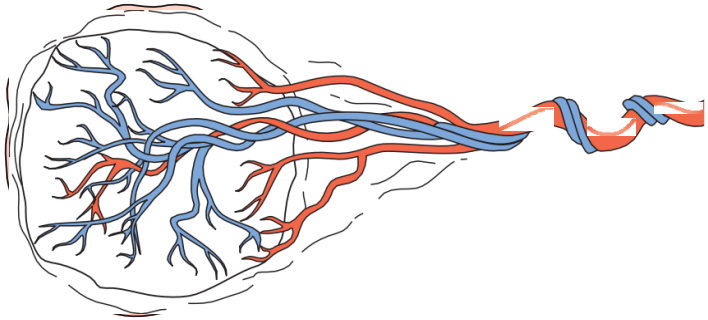
Succenturiate lobe of placenta.



The umbilical vessels bifurcate at the point of insertion of the cord



Circumvallate placenta



Velamentous insertion of the cord

THE FETUS ; GROWTH AND DEVELOPMENT

Fetal Growth and Maturation

- From the 9th week of pregnancy, fetal growth is rapid. Tissues grow by cell proliferation, cell enlargement and accretion of extracellular material.

The cardiovascular system

- The cardiovascular system is the first system to function in the embryo.
- The heart and vascular system commences development in the 3rd week, and by the 4th week a primitive heart is visible and is beginning to function, beating at around 22 days.
- Blood is pumped around the vessels from the 4th week, by which time three major vascular systems have developed.

Arteries

- *Vitelline arteries* link the aorta with the yolk sac which subsequently supplies the gut and other arteries in the neck and thorax. (see image below)

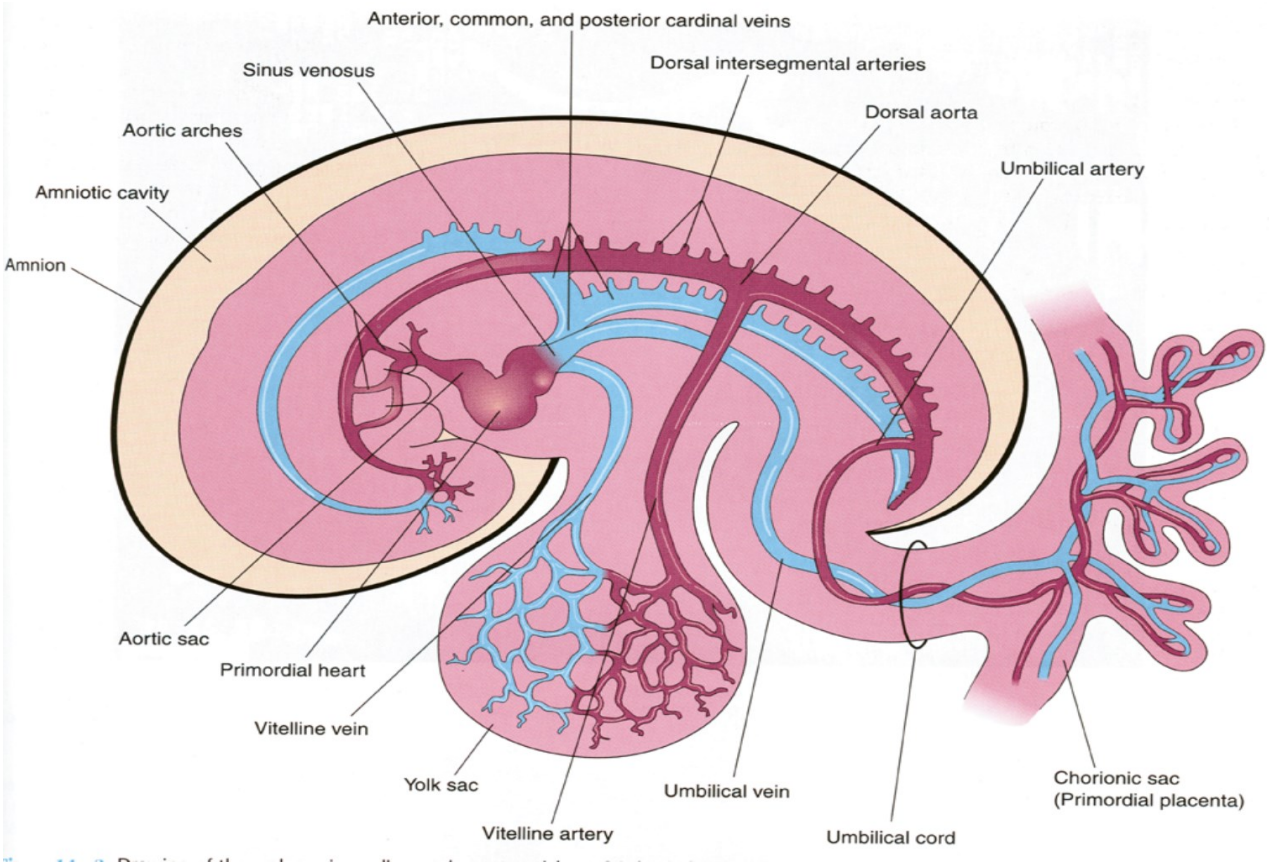
- Mid gestation they are remodeled to form three main arteries which supply the gastrointestinal tract.
- Umbilical arteries deliver deoxygenated blood to the placenta.

Veins

- The embryo has three major venous systems draining into the tubular-shaped heart: vitelline, umbilical and cardinal.
- The *vitelline* veins return poorly oxygenated blood from the gut and yolk sac.
- *Umbilical* veins form in the body stalk. The right umbilical vein anastomoses with the ductus venosus shunting oxygenated placental blood into the inferior vena cava leaving the left umbilical vein to continue carrying oxygenated

blood from the placenta to the embryo.

- Between 5–7 weeks of pregnancy, the foramen ovale is formed.
- The *cardinal* veins drain the head, neck and body wall into the heart.



Red blood cells

- Red blood cells, known as *erythrocytes*, which are produced from 'blood islands' in the extra embryonic mesoderm lining the yolk sac and liver, contain fetal haemoglobin.
- Fetal haemoglobin (HbF) has a much greater affinity for oxygen and is found in greater concentrations (18–20 g/dl at term) in the blood than adult haemoglobin (HbA), thus enhancing the transfer of oxygen across the placental site.

The Respiratory System

- The development of the respiratory system begins in the 3rd week.
- The lungs originate from a 'lung bud' growing out of the

foregut, which repeatedly subdivides to form the branching structure of the bronchial tree.

- By36 weeks of pregnancy, respiratory bronchioles have a capillary network and culminate in terminal sacs (*alveoli*).
- The development of type II alveolar cells commences around 20 weeks of fetal life.
- These cells are necessary for the production of *surfactant*, a lipoprotein that reduces the surface tension in the alveoli and assists gaseous exchange.

The Digestive System

- The primitive gut develops from the endodermal layer of the yolk sac in the 4th week of fetal life.
- The liver, gallbladder and pancreas bud form the gut tube around the 4th to 5th week of fetal life.

- Towards the end of pregnancy, iron stores are laid down in the liver and the liver cells produce bile from the 12th week By the 5th week, the *foregut* (oesophagus, stomach and duodenum) is visible.
- The *midgut* (small intestine, caecum and vermiform appendix, ascending colon and transverse colon) undertakes much of its development in the 6th week, while *the hindgut* (rectum and anal canal) completes its development in the 7th week of fetal life.
- Around 12 weeks, the digestive tract is well formed and the lumen is patent.
- Most digestive juices are present before birth and act on the swallowed substances to form *meconium.*
- Insulin is secreted from 10 weeks of fetal life and glucagon from 15 weeks, both of which rise steadily with in-

creasing fetal age.

The Urogenital System

- The kidneys develop from the 4th week of fetal life and produce small amounts of urine between the 6th and 10th week.
- They become more functional around the 15th week when more urine is produced.
- The urine forms much of the amniotic fluid and production increases with fetal maturity.
- The sex of the embryo is determined at fertilization: either two X chromosomes (in the female) or one X and one Y chromosome (in the male) are inherited.
- The gonads develop from the 5th week from the intermediate mesoderm.

The Endocrine System

- The adrenal glands develop from mesoderm and neural crest cells from the 6th week of fetal life, and grow to 10–20 times larger than the adult adrenals.
- They produce the precursors for placental formation of oestriols and influence maturation of the lungs, liver and epithelium of the digestive tract.
- The pituitary gland develops and takes on its characteristic shape from between the 9th and 17th week of fetal life.
- The fetal pituitary produces gonadotrophins, i.e. luteinizing hormone (LH) and follicle stimulating hormone (FSH) from weeks 13–14, and human growth hormone (hGH) is present by weeks 19–20.

The Nervous System

- The brain begins to develop from around day 19 and three structures are visible: *forebrain*, *midbrain* and *hindbrain*.
- By the 5th week, there is differentiation between the major regions, namely the thalamus and the hypothalamus.
- The eye is completely formed by 20 weeks but the eyelids are fused until around 24 weeks.
- The development of the inner ear, which contains the structures for hearing and balance, commences early in embryological life but is not complete until around 25 weeks.

Integumentary, Skeletal And Muscular Systems

- The epidermis develops from a single layer of ectoderm to which other layers are added.

- By the end of 4 weeks, a thin outer layer of flattened cells covers the embryo.
- Brown adipose tissue (BAT) develops from 18 weeks' gestation; this plays an important part in thermoregulation after birth.
- From 18 weeks, the fetus is covered with a white, creamy sub- stance called *vernix caseosa*, which protects the skin from the amniotic fluid and from any friction against itself.
- Hair begins to develop between the 9th and 12th week.
- By 20 weeks the fetus is covered with a fine downy hair called *lanugo*; at the same time the hair on the head and eyebrows begin to form.
- Lanugo is shed from 36 weeks and by term, there is little left.

- Fingernails develop from about 10 weeks but the toenails do not form until about 18 weeks.
- The skull develops during the 4th week from the mesenchyme surrounding the developing brain.
- It consists of two major parts: the *neurocranium*, which forms the bones of the skull, and the *viscerocranium*, which forms the bones of the face.

DEVELOPMENTAL SUMMARY

EMBRYO

0–4 weeks

- Conversion of bilaminar disc into trilaminar disc
- Some body systems laid down in primitive form
- Primitive central nervous system forms (*neurulation*)

- Primitive heart develops and begins to beat
- Covered with a layer of skin
- Limb buds form
- Optic vessels develop
- Gender determined

4–8 week

- Very rapid cell division
- More body systems laid down in primitive form and to develop
- Spinal nerves begin to develop
- Blood is pumped around the vessels
- Lower respiratory system begins to develop
- Kidneys begin to develop
- Skeletal ossification begins developing

- Head and facial features develop
- Early movements
- Embryo visible on ultrasound from 6 weeks

FETUS

8–12 weeks

- Rapid weight gain
- Eyelids meet and fuse
- Urine passed
- Swallowing begins
- Distinguishing features of external genitalia appear
- Fingernails develop
- Some primitive reflexes present

12–16 weeks.

- Rapid skeletal development – visible on X-ray
- Lanugo appears
- Meconium present in gut
- Nasal septum and palate fuse
- Eternal genitalia fully differentiate into male or female
- Fetus capable of sucking thumb

16–20 weeks

- Constant weight gain
- 'Quickening' – mother feels fetal movements
- Fetal heart heard on auscultation
- Vernix caseosa appears
- Skin cells begin to be renewed
- Brown adipose tissue (BAT) forms

20–24 weeks

- Most organs functioning well
- Eyes complete
- Periods of sleep and activity
- Ear apparatus developing
- Responds to sound
- Skin red and wrinkled
- Surfactant secreted in the lungs from week 20 continue to develop

24–28 weeks

- Legally viable and survival may be expected if born
- Eyelids open
- Respiratory movements

28–32 weeks

- Begins to store fat and iron
- Testes descend into scrotum
- Lanugo disappears from face
- Skin becomes paler and less wrinkled

32–36 weeks

- Weight gain 25 g/day
- Increased fat makes the body more rounded
- Lanugo disappears from body
- Hair on fetal head lengthens
- Nails reach tips of fingers and toes
- Ear cartilage soft
- Plantar creases visible.
- Rapid skeletal development – visible on X-ray

36 weeks to birth

- Birth is expected
- Body round and plump
- Skull formed but soft and pliable

THE FETAL SKULL

- The fetal head is large in relation to the fetal body compared with the adult.
- Additionally, it is large in comparison with the maternal pelvis and is the largest part of the fetal body to be born.

Divisions of the fetal skull

The skull is divided into the *vault*, the *base* and the *face*

The bones of the vault

- The bones of the vault are laid down in membrane.
- They harden from the centre outwards in a process known as *ossification.*
- Ossification is incomplete at birth, leaving small gaps between the bones, known as the *sutures* and *fontanelles.*
- The bones of the vault consist of:
  - ✓**The *occipital bone***, which lies at the back of the head. Part of it contributes to the base of the skull as it contains the *foramen magnum*, which protects the spinal cord as it leaves the skull. The ossification centre is the *occipital protuberance.*
  - ✓The two ***parietal bones***, which lie on either side of the skull. The ossification centre of each of these bones is

called the *parietal eminence.*

- ✓The two ***frontal bones,*** which form the forehead or *sinciput*. The ossification centre of each bone is the *frontal eminence.*
- ✓The upper part of the ***temporal bone*** on both sides of the head forms part of the vault.

Sutures

The *sutures* are the cranial joints formed where two bones meet.

- ✓The ***lambdoidal suture*** separates the occipital bone from the two parietal bones.
- ✓The ***sagittal suture*** lies between the two parietal bones.

- ✓The ***coronal suture*** separates the frontal bones from the parietal bones, passing from one temple to the other.
- ✓The ***frontal suture*** runs between the two halves of the frontal bone. Whereas the frontal suture becomes obliterated in time, the other sutures eventually become fixed joints.

Fontanelles

- Where two or more sutures meet, a *fontanelle* is formed.
- The sutures and fontanelles permit a degree of overlapping of the skull bones during labour, which is known as *moulding.*
  - ✓The ***posterior fontanelle*** or ***lambda*** (shaped like the Greek letter lambda λ) is situated at the junction of the

lambdoidal and sagittal sutures. It is small, triangular in shape and can be recognized vaginally because a suture leaves from each of the three angles.

✓The ***anterior fontanelle*** or ***bregma*** is found at the junction of the sagittal, coronal and frontal sutures. It is broad, kite-shaped ◆ and recognizable vaginally because a suture leaves from each of the four corners. It measures 3–4 cm long and 1.5–2 cm wide and normally closes by 18 months of age.

✓ Pulsations of cerebral vessels can be felt through this fontanelle.

Regions and landmarks of the fetal skull

- The skull is further separated into regions, and within these there are important landmarks as shown in.

- These landmarks are useful to the midwife when undertaking a vaginal examination as they help ascertain the position of the fetal head.

❖ The ***occiput region*** lies between the foramen magnum and the posterior fontanelle.

❖ The part below the *occipital* ***protuberance*** (landmark) is known as the *sub-occipital region.*

❖ The ***vertex region*** is bounded by the posterior fontanelle, the two parietal eminences and the anterior fontanelle.

❖ The face extends from the orbital ridges and the root of the nose to the junction of the *chin* or ***mentum*** (landmark) and the neck.

❖ The point between the eyebrows is known as the ***glabella.***

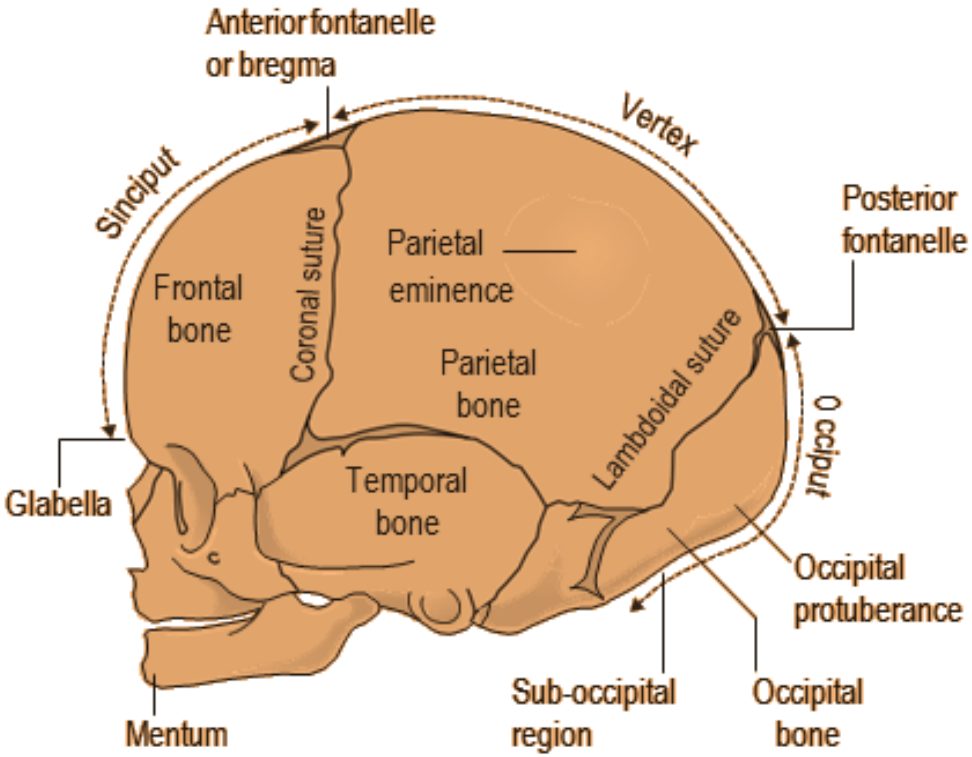


Fig. 7.9 Fetal skull showing regions and landmarks of clinical importance.

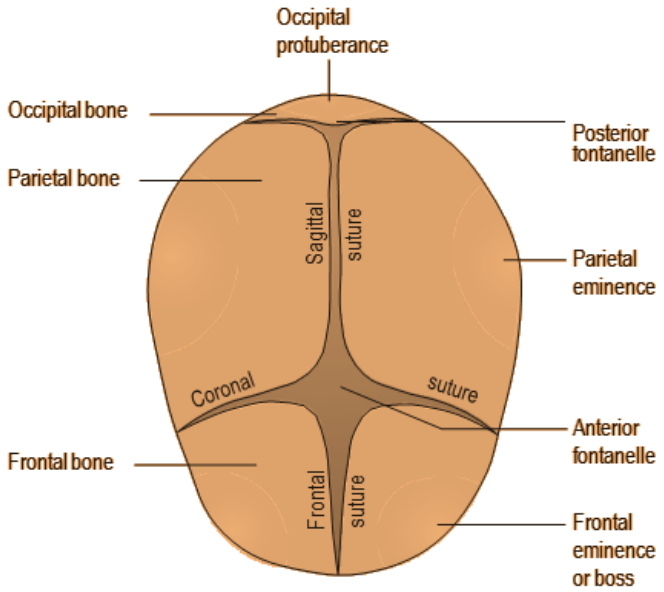


Fig. 7.8 View of fetal head from above (head partly flexed), showing bones, sutures and fontanelles.

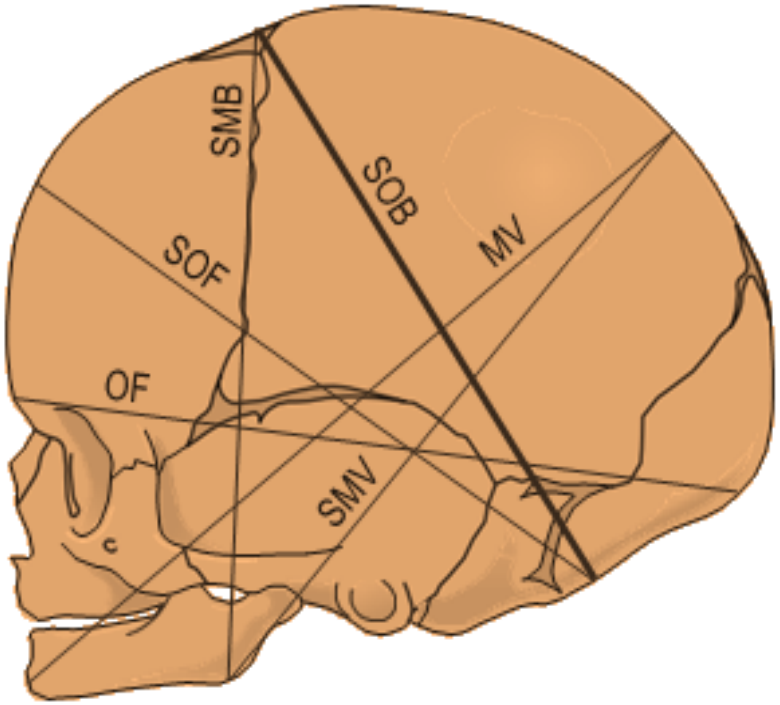
Diameters of the fetal skull

- Knowledge of the diameters of the skull alongside the diameters of the pelvis allows the midwife to determine the relationship between the fetal head and the mother's pelvis.
- ***There are six longitudinal diameters.***

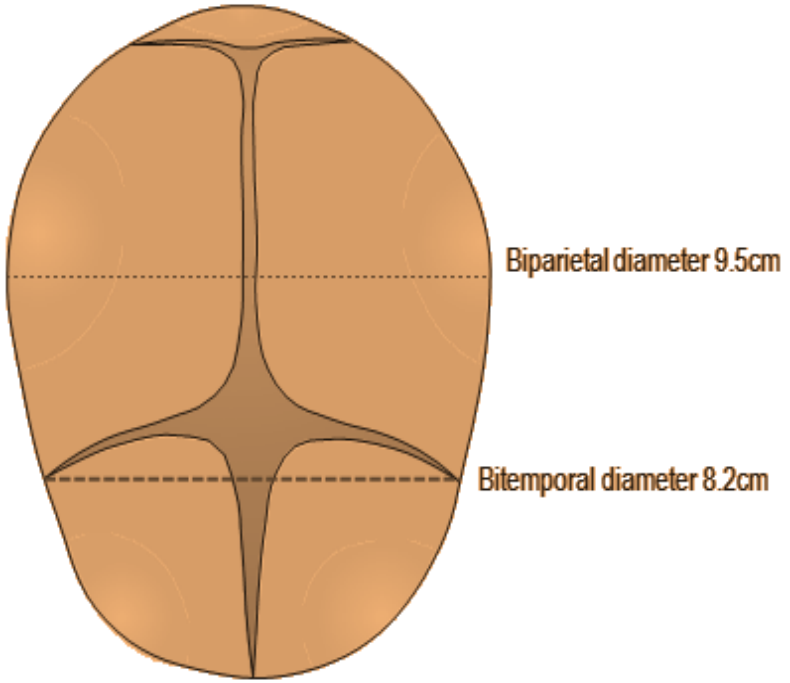
  - The ***sub-occipitobregmatic*** (SOB) diameter (9.5 cm) measured from below the occipital protuberance to the centre of the anterior fontanelle or bregma.
  - The ***sub-occipitofrontal*** (SOF) diameter (10 cm) measured from below the occipital protuberance to the centre of the frontal suture.
  - The ***occipitofrontal*** (OF) diameter (11.5 cm) meas-

ured from the occipital protuberance to the glabella.

- The ***mentovertical*** (MV) diameter (13.5 cm) measured from the point of the chin to the highest point on the vertex.
- The ***sub-mentovertical*** (SMV) diameter (11.5 cm) measured from the point where the chin joins the neck to the highest point on the vertex
- The ***sub-mentobregmatic*** (SMB) diameter (9.5 cm) measured from the point where the chin joins the neck to the centre of the bregma (anterior fontanelle).
- The ***biparietal diameter*** (9.5 cm) – the diameter between the two parietal eminences.
- The ***bitemporal diameter*** (8.2 cm) – the diameter between the two furthest points of the coronal suture at the temples.



Longitudinal diameters of the fetal skull.



Transverse diameters of the fetal skull.

Diameters of the fetal trunk

❖ ***Bisacromial diameter 12 cm***

This is the distance between the acromion processes on the two shoulder blades and is the dimension that needs to pass through the maternal pelvis for the shoulders to be born.

❖ ***Bitrochanteric diameter 10 cm***

This is measured between the greater trochanters of the femurs and is the presenting diameter in breech presentation.

PRESENTING DIAMETERS

- The presenting diameters of the head are those that are at right-angles to the curve of Carus of the maternal pelvis.

- There are always two: *a longitudinal diameter and a transverse diameter*.

Attitude

- The term ***attitude*** is used to describe the degree of flexion or extension of the fetal head on the neck.
- The attitude of the head determines which diameters will present in labour and therefore influences the outcome.

1. **Vertex presentation**.
   - When the head is well flexed the sub-occipitobregmatic diameter (9.5 cm) and the biparietal diameter (9.5 cm) present.
   - As these two diameters are the same length the presenting area is circular, which is the most favourable shape

for dilating the cervix and birth of the head.

- The diameter that distends the vaginal orifice is the sub-occipitofrontal diameter (10 cm).

NB

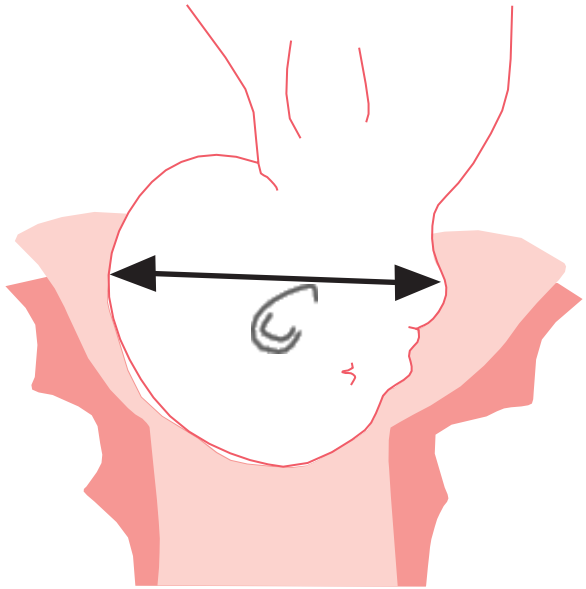
- When the head is deflexed, the presenting diameters are the occipitofrontal (11.5 cm) and the biparietal (9.5 cm).
- This situation often arises when the occiput is in a posterior position.

- If it remains so, the diameter distending the vaginal orifice will be the occipitofrontal (11.5 cm).

2. Face presentation.

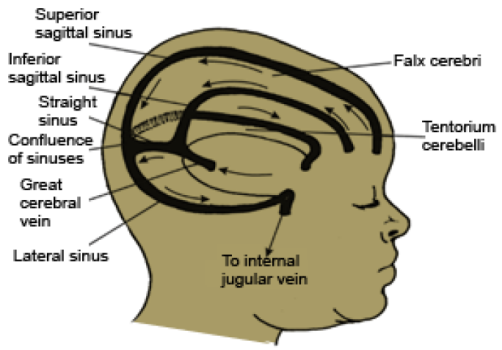
- When the head is completely extended the presenting diameters are the sub- mentobregmatic (9.5 cm) and the bitemporal(8.2 cm).
- The sub-mentovertical diameter (11.5 cm) will distend the vaginal orifice.

3. **Brow presentation**.
   - When the head is partially extended, the mentovertical diameter (13.5 cm) and the bitemporal diameter (8.2 cm) present.
   - If this presentation persists, vaginal birth is unlikely.



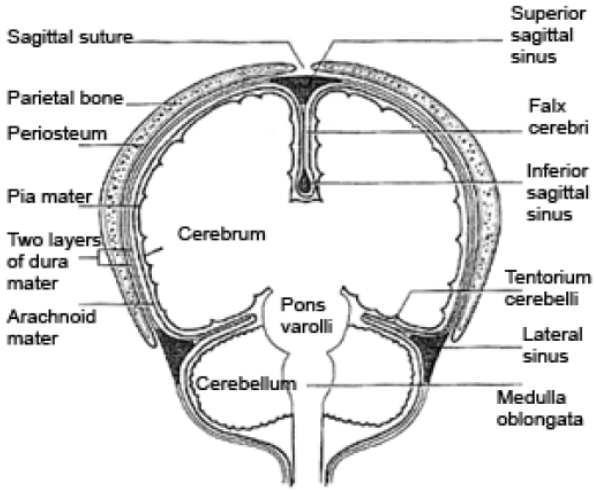
Moulding

- The term *moulding* is used to describe the change in shape of the fetal head that takes place during its passage through the birth canal.
- Alteration in shape is possible because the bones of the vault allow a slight degree of bending and the skull bones are able to override at the sutures.
- This overriding allows a considerable reduction in the size of the presenting diameters.
- Additionally, moulding is a protective mechanism and prevents the fetal brain from being compressed as long as it is not excessive, too rapid or in an unfavourable direction.



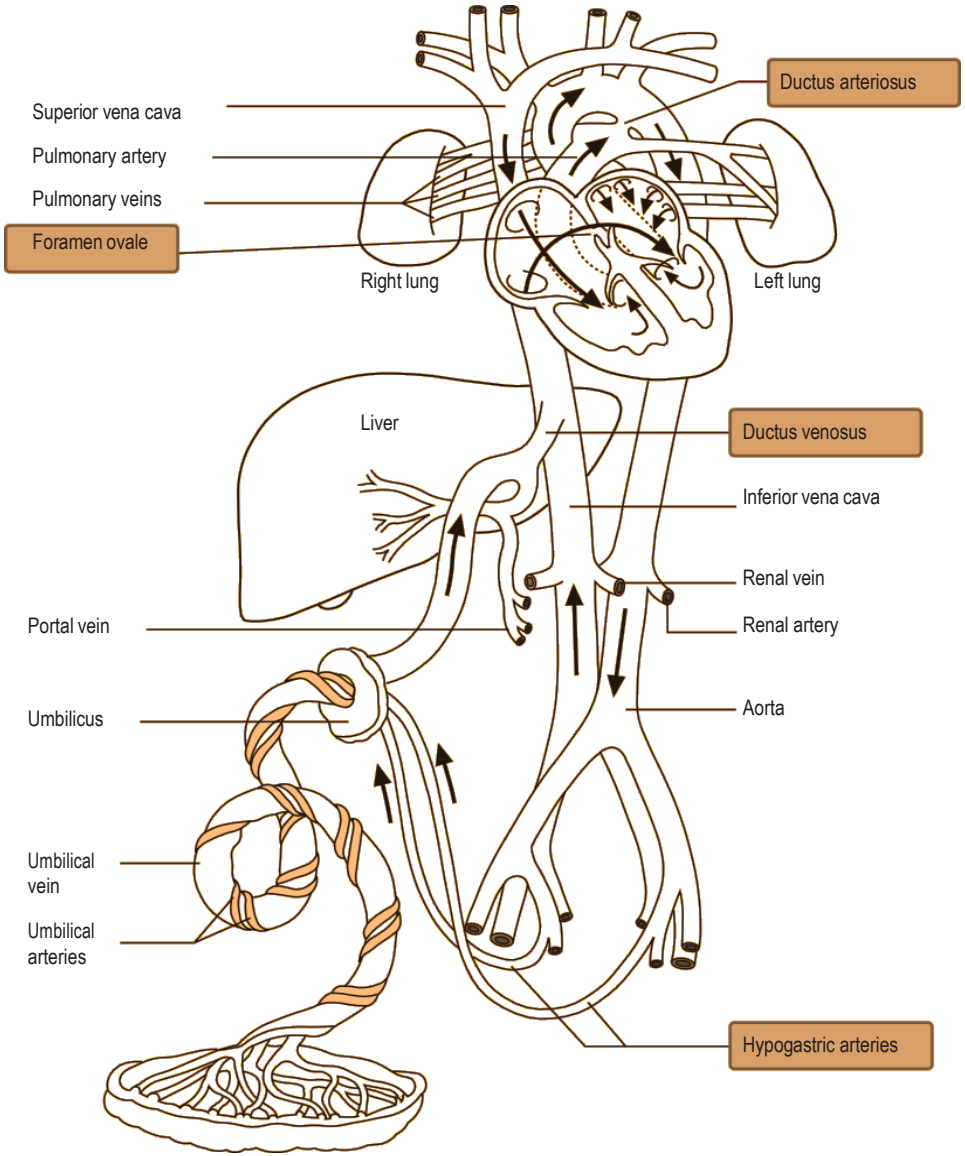
The structures that may be damaged as a result of abnormal moulding include:

- The intracranial membranes and sinuses, most importantly, the associated folds of the dura mater and the venous sinuses.
- The falx cerebri, which is a fold of membrane that dips down between the two cerebral hemispheres and runs beneath the frontal and sagittal sutures, from the root of the nose to the internal occipital protuberance.
- The tentorium cerebelli, which is a horizontal fold of dura mater that lies in the posterior part of the skull at right angles to the far cerebri.
- It is situated between the falx cerebrum and the cerebellum.
- The membranes contain large veins or sinuses, which drain blood from the brain.



The Figure shows the coronal section through the foetal head to show intracranial membranes and venous sinuses.

THE FETAL CIRCULATION



- There are several temporary structures inaddition to the placenta itself and the umblical cord and these enable the fetal circulation to take place while allowing for the changes at birth.

The Umbilical vein

- Leads from the umblical cord to the underside of the liver and carries blood rich in oxygen and nutrients. It has a branch which joins the portal vein and supplies the liver.

The ductus vensous (from a vein to a vein)

- connects the umblica vein to the inferior venacava. At this point the blood mixes with deoxygenated blood returning from the lower parts of the body.
- Thus the blood throughout the body is at best partially

oxygenated.

The foramen ovale (oval opening)

- Is a temporary opening between the atria which allows the majority of blood entering from the inferior vencava to pass across into the left atrium.
- The reason for this diversion is that the blood does not need to pass through the lungs since it is already oxygenated.

The ductus arteriosus (from an artery to an artery)

- leads from the bifuraction of the pulmonary artery to the descending aorta, entering it just beyond the point where the subclavian and carotid arteries leave.

The hypogastric arteries

- Branch off from the internal iliac arteries and become umbilical arteries when they enter the umblical cord.
- They return blood to the placenta. This is the only vessel in the fetus which carries unmixed blood.

The Systematic flow

- Oxygenated blood from the placenta travels to the fetus in the umbilical vein.
- The umbilical vein divides into two branches – one that supplies the portal vein in the liver, the other anastomosing with the ductus venosus and joining the inferior vena cava
- Most of the oxygenated blood that enters the right atrium passes across the foramen ovale to the left atrium, which

mixes with a very small amount of blood returning from the lungs from where it passes into the left ventricle via the bicuspid valve, and then the aorta.

- The head and upper extremities receive approximately 50% of this blood via the coronary and carotid arteries, and the subclavian arteries respectively.
- The rest of the blood travels down the descending aorta, mixing with deoxygenated blood from the right ventricle via the ductus arteriosus.
- Deoxygenated blood collected from the head and upper parts of the body returns to the right atrium via the superior vena cava.
- Blood that has entered the right atrium from the superior vena cava enters at a different angle to the blood that enters from the inferior vena cava and heads towards the fo-

ramen ovale.

- Hence there are two distinct blood flows entering the right atrium.
- Most of the lesser oxygenated blood entering the right atrium from the superior vena cava passes behind the flow of highly oxygenated blood going to the left atrium and enters the right ventricle via the tricuspid valve.
- There is a small amount of blood mixing where the two blood flows meet in the atrium.
- From the right ventricle a little blood travels to the lungs in the pulmonary artery, for their development.
- Most blood, however, passes from the pulmonary artery through the ductus arteriosus into the descending aorta.
- This blood, although low in oxygen and nutrients, is sufficient to supply the lower body of the fetus. It is also by

this means that deoxygenated blood travels back to the placenta via the internal iliac arteries, which lead into the hypogastric arteries, and ultimately into the umbilical arteries.

ADAPTATION TO EXTRAUTERINE LIFE

- At birth, there is a dramatic alteration to the fetal circulation and an almost immediate change occurs.
- The cessation of umbilical blood flow causes a cessation of flow in the ductus venosus and a fall in pressure in the right atrium.
- As the baby takes its first breath, blood is drawn along the pulmonary system via the pulmonary artery and as a consequence, pressure increases in the left atrium due to the increased blood supply returning to it via the pulmo-

nary veins.

- The alteration of pressures between the two atria causes a mechanical closure of the foramen ovale.
- In addition, As the baby takes its first breath, the lungs inflate, and there is a rapid fall in pulmonary vascular resistance of approximately 80%, a slight reverse flow of oxygenated aortic blood along the ductus arteriosus and a rise in the oxygen tension.
- This causes the smooth muscle in the walls of the ductus arteriosus to contract and constrict.

As these structural changes become permanent, the following fetal structures arise:

- ❖The umbilical vein becomes the *ligamentum teres.*
- ❖The ductus venosus becomes the *ligamentum venosum.*

- ❖The ductus arteriosus becomes the *ligamentum arteriosum.*
- ❖The foramen ovale becomes the *fossa ovalis.*
- ❖The hypogastric arteries become the *obliterated hypogastric arteries* except for the first few centimetres, which remain open and are know as the *superior vesical arteries*.

Adaptation to extrauterine life also involves:

- Maintenance of a nutritional state through the establishment of breastfeeding.
- Elimination of waste via the kidneys and gastrointestinal system.
- Establishment of the portal and liver circulation.
- Temperature control.

- Communication developed through parent–baby interactions

DIAGNOSIS OF PREGNANCY

- The main symptoms and signs during the first trimester include:
  - ✓Amenorrhoea
  - ✓Enlargement and tenderness of the breasts
  - ✓Nausea
  - ✓Excessive salivation (ptyalism)
  - ✓Frequency of micturition due to the pressure of the gravid uterus on the urinary bladder
  - ✓Constitutional symptoms (that is, tiredness, weakness and sometimes depression)

- As previously mentioned, a pregnant woman often experiences tiredness, general weakness and sometimes depression.

Enlargement of the Breasts

- The nipple and the areola increase in size. Small nodules, known as Montgomery's tubercles, develop around the nipple. The areola darkens.

The Cervix

Chadwick's sign

- The cervix, vagina, vulva and vaginal mucous membranes become darker or blue in colour at 8 weeks' gestation.
- It is caused by the greatly increased blood supply to the

pelvic organs. It is also known as ***Jacquemier's sign***.

- While this sign indicates pregnancy, it does not necessarily indicate viability.

Hegar's (or Goodell's) sign

- When you perform a bimanual vaginal examination with two fingers inserted in the anterior fornix of the vagina, and the other hand placed behind the uterus abdominally, the fingers of both hands almost meet because of the softness of the isthmus.
- *Hegar's sign* is most marked between the 6th and 12th week of pregnancy. There is also an increased pulsation felt in the lateral fornices, which is known as Osiander's sign. The uterus is slightly enlarged.

Osiander's sign

- Stronger pulsations can be felt in the lateral vaginal fornix due to increased blood supply from the enlarged uterine artery.
- This may also occur in the non-pregnant woman due to fibroids and pelvic inflammation.

Quickening

- This is when a mother feels the first movements. Primigravidae recognise these movements at about the 20th week, and the multipara at about the 16th week.

Uterus Enlargement

- This occurs around the 12th week. You should be able to feel the enlarged uterus abdominally just above the sym-

physis pubis.

- The fundus reaches the level of the umbilicus at about the 22nd week, and the xiphisternum by the 36th week.

Missing A Period

- Missing a period Women who are aware of their bodies might begin to suspect that they are pregnant within the first few days of pregnancy but for most, the first sign is missing a period.

Foetal Identification

- You should be able to feel the foetal parts, for example, the head, from the 24th week onwards. You might be able to feel foetal movements while palpating the fundus.

- Foetal heart sounds can be heard around the 24th week. The rate varies from 120 to 160 beats per minute.

Investigations

Pregnancy Test

- This depends on the Human **Chorionic Gonadotrophins (HCG)** secreted in the mother's urine. It is more likely to be certain when the urine is concentrated, that is, a fresh, clean, early morning specimen.
- With a sensitive test, HCG can be detected in maternal plasma or urine by eight to nine days after ovulation.

The Ultrasound

- This is a scanner, which enables you to see the foetus

and its cardiac activity, particularly if performed by the 6th week of pregnancy.

X - ray Method

- By the 16th week, if an x-ray is performed, it will show foetal bones.
- This is an undesirable method of diagnosing pregnancy because in early or mid-pregnancy, the foetus is very susceptible to the adverse effects of radiation.

PHYSIOLOGICAL CHANGES IN THE REPRO-DUCTIVE SYSTEM.

THE UTERUS

- The uterus plays a remarkable role in pregnancy by stretching and expanding to accommodate and nurture the growing fetus

Perimetrium

- The perimetrium is a thin layer of peritoneum composed of connective tissue that comprises collagen and elastin fibres.
- During pregnancy, the peritoneal sac is greatly distorted as the uterus enlarges and rises out of the pelvis, drawing up the two folds of broad ligament on either side.

Myometrium

- Myometrial development in pregnancy begins with an early *proliferative phase* activated by oestrogen and other

hormones, resulting in a rapid increase in myocytes (*hyperplasia*).

- This is followed by a *synthetic phase* when myocytes increase in size (*hypertrophy*).

Increases in weight and size of the uterus during pregnancy			
	NULLIPAROUS	**PAROUS**	**AT TERM**
Weight of uterus (g)	**44**	**80–110**	**1100**
Size of uterus (cm)	**6–8 × 5 × 2.5**	**9–10**	**40 × 22.5 × 20**

- Progesterone's relaxing effect blocks the myometrial response to oxytocin.
- The changing oestrogen and progesterone concentration

within the uterus causes an increase in the expression of calcium and potassium channels which dampens electrical activity .

- The fragmented bursts of irregular, poorly coordinated, low electrical activity that takes place over several minutes are known as *Braxton Hicks contractions*.
- They are painless, non-rhythmic uterine contractions that are easily palpated from about 12 weeks' gestation and are unpredictable, sporadic and of variable intensity.

Endometrium (decidua)

- If implantation occurs the endometrial cells undergo a transformation known as the *decidual reaction* which extends into the junctional zone and forms the ***decidua of pregnancy***.

- The primary function of *decidualization* is to provide nutrition and an immunologically privileged site for the early embryo.
- During decidualization Spindle-shaped endometrial stromal cells become round and produce hormones, growth factors and cytokines.
- Uterine glands and arteries become coiled and the recognizable pattern of three distinct layers can be identified: a *superficial compact layer, an intermediate spongy layer and a thin basal layer* In early pregnancy
- With increasing trophoblast invasion the tips of the spiral arteries are enormously dilated, particularly beneath the implantation site, often reaching a four-fold increase of 2–3 mm in diameter.

Changes In Uterine Shape And Size

12th week of pregnancy

- For the first few weeks of pregnancy the uterus maintains its original pear shape but as pregnancy advances the corpus and fundus become globular and by 12 weeks it is almost spherical.
- Thereafter it increases in length more rapidly than in width and becomes ovoid in shape.
- By the end of the 12th week it can usually be palpated just above the symphysis pubis.
- Between 12 and 16 weeks' gestation, the fundus becomes dome-shaped.
- When the uterus enlarges it comes into contact with the anterior abdominal wall and the bladder is displaced su-

periorly 20th week of pregnancy.

- By the 20th week of pregnancy the uterine fundus is at the level of the umbilicus.
- The uterus is an ovoid shape and the round ligaments appear to be inserted slightly above the middle of the uterus and the uterine tubes elongate.

30th week of pregnancy

- The enlarging uterus displaces the intestines laterally and superiorly.
- The caecum and appendix, which have been progressively rising upwards from 12 weeks, now reach the iliac crest.
- In the supine position the uterus falls back to rest on the vertebral column, the in- ferior vena cava and aorta .

36th week of pregnancy

- By the end of the 36th week the enlarged uterus almost fills the abdominal cavity.
- The fundus is at the tip of the xiphoid cartilage which is pushed forward and continues to rise almost to the liver.
- The diaphragm is raised by about 4 cm and the antero-posterior diameter of the thoracic cavity increases The transverse colon, stomach and spleen are crowded into the vault of the abdominal cavity and the small intestines lie above, behind and to the sides of the uterus.

38th week of pregnancy

- The uterus becomes more rounded with a decrease in fundal height although this is influenced by the lie of the fetus.

- Tension on the uterine tubes and broad ligaments increase.

Uterine divisions

- The muscular upper uterine segment of the uterus grows faster in the first seven months of pregnancy while the lower uterine segment grows more rapidly towards the end of pregnancy.
- With the development of the lower uterine segment a transverse depression or ridge forms at its junction with the thickened upper uterine segment. This ridge becomes the ***physiological retraction ring*** during the second stage of physiological labour.
- Descent of the fetal head into the pelvic inlet causes a change in shape of the abdomen and is accompanied by

the feeling of the *baby dropping* known as ***lightening***.

- The woman may feel a sense of relief as the rib cage expands more easily, enabling her to breathe more deeply and to tolerate more substantial meals.

The cervix

- The initial *softening phase* of the cervix, which is dependent on progesterone, begins at conception and continues until approximately 32 weeks.
- This softening in early pregnancy became known as ***Hegar's sign.***
- The cervix becomes thin, more elastic and pliable.
- Increased blood flow to the cervix results in a bluish-purple coloration known as ***Goodell's sign.***
- The glands of the cervix undergo such marked hypertro-

phy and hyperplasia that by the end of pregnancy they occupy half of the entire cervical mass.

- The endocervical mucosal cells produce copious amounts of a tenacious mucus which creates an antibacterial plug in the cervix.
- Taking up or ***effacement*** of the cervix is the shortening of the cervical canal from about 2 cm in length to a circular orifice with paper-thin edges.

The vagina

- Increased blood flow to the vagina results in a bluish-purple coloration of the vagina known as ***Chadwick's sign***.
- The mucosa thickens, the connective tissue loosens and the smooth muscle cells hypertrophy.

- The increased volume of vaginal secretions due to high levels of oestrogen results in a thick, white discharge known as ***leucorrhoea.***
- The dominant vaginal flora is the *Lactobacillus acidophilus* (Doderlein's bacillus).
- During pregnancy the higher levels of oestrogen favour an increase in the activity and proliferation of the lactobacilli, a byproduct of which is lactic acid which leads to the increased vaginal acidity of pregnancy (pH varying from 3.5 to 6).
- This is particularly important in protecting women from genital tract infection in pregnancy which may lead to perinatal complications.

CHANGES IN THE CARDIOVASCULAR SYSTEM

The complex adaptations are necessary to:

1. Meet evolving maternal changes in physiological function
2. Promote the growth and development of the uteroplacental–fetal unit.
3. Compensate for blood loss at the end of labour.

COMPONENT	KEY CHANGE IN PREGNANCY
The heart	**Increases in size** **Shifted upwards and to left**
Arteries	**Dramatic systemic and pulmonary vasodilatation to increase blood flow**
Capillaries	**Increased permeability**
Veins	**Vasodilatation and impeded venous return in lower extremities**
Blood	**Haemodilution** **Increased capacity for clot formation**

Anatomical changes in the heart and blood vessels

- The heart is enlarged by chamber dilatation and a degree of myocardial hypertrophy in early pregnancy leading to a 10–15% increase in ventricular wall muscle.
- The enlarging uterus raises the diaphragm, and the heart is correspondingly displaced upward and to the left to produce a slight anterior rotation of the heart on its long axis.
- Within 5 weeks of conception changes in maternal blood vessels are evident, including an increase in aortic size and venous blood volume.
- These anatomical changes and complex physiological changes together with widespread peripheral vasodilatation result in the high flow, low resistance blood low with marked haemodilution .

- This is a characteristic of a healthy pregnancy.

Blood volume

- The increase in total blood volume (TBV) is essential to:
  - ✓Meet the demands of the enlarged uterus with a significantly hypertrophied vascular system and provide extra blood flow for placental perfusion
  - ✓Supply extra metabolic needs of the fetus
  - ✓Protect the woman (and fetus) against the harmful effects of impaired venous return
  - ✓Provide extra perfusion of maternal organs
  - ✓Counterbalance the effects of increased arterial and venous capacity
  - ✓Safeguard against adverse effects of excessive maternal blood loss at birth.

- There is a marked increase in all components of the RAAS leading to increased fluid and electrolyte retention.
- Oestrogen reduces the transcapillary escape rate of albumin, which promotes intravascular protein retention and shifts extracellular fluid volume distribution while lowering the osmotic threshold for antidiuretic hormone (ADH) release.

Cardiac output

- The profound increase in cardiac output (30–50%) ensures blood flow to the brain and coronary arteries is main- tained, while distribution to other organs is modified as pregnancy advances.
- Increased cardiac output is due to increases in stroke volume and heart rate.

- Increases in stroke volume facilitate second trimester increases in cardiac output, augmented by plasma volume expansion.
- The stroke volume increases by 10% during the first half of pregnancy, reaching a peak at 20 weeks that is maintained until term.

Blood pressure and vascular resistance

- While cardiac output is raised, arterial blood pressure is reduced by 10% in pregnancy.
- The decrease in systemic vascular resistance accounts for this, particularly in the peripheral vessels.
- Early pregnancy is associated with a marked decrease in diastolic blood pressure but minimal reduction in systolic pressure.

- With reduced peripheral vascular resistance the systolic blood pressure decreases an average of 5–10 mmHg below baseline levels and the diastolic pressure reduces 10–15 mmHg by 24 weeks' gestation.
- Thereafter blood pressure gradually rises, returning to the pre-pregnant levels at term.

Regional blood flow

- Pulmonary blood flow increases secondary to the increase in cardiac output, further facilitated by reduced pulmonary vascular resistance.
- Blood flow in the lower limbs decelerates in late pregnancy by compression of the iliac veins and inferior vena cava by the enlarging uterus and the hydrodynamic effects of increased venous return from the uterus.

- Reduced venous return and increased venous pressure in the legs contributes to the increased distensibility and pressure in the veins of the legs, vulva, rectum and pelvis, leading to dependent oedema, varicose veins of the legs, vulva and anus.

Haematological changes

- In parallel with the 30–45% increase in maternal blood volume, plasma volume increases by 50% (1250–1600 ml) over the course of the pregnancy, followed by a relatively smaller increase in red blood cell volume.
- Red cell mass (the total volume of red cells in circulation) increases during pregnancy by approximately 18% in response to increased levels of erythropoietin stimulated by maternal hormones (prolactin, progesterone, human pla-

cental lactogen and oestrogen) and oxygen requirements of maternal and placental tissue.

- The increased production of red blood cells, the marked increase in plasma volume causes dilution of many circulating factors.
- As a result the red cell count, haematocrit and haemoglobin concentration all decrease, resulting in *apparent anaemia*, characteristic of a healthy pregnancy.

Iron metabolism

- Iron requirements increase significantly in pregnancy, with estimates for the total iron requirements of pregnancy ranging from 500 to 1150 mg.
- About 500 mg are required to increase the maternal red blood cell mass, 300 mg are transported to the fetus,

while the remaining 200 mg are utilized in compensating for insensible loss in skin, stool and urine.

Key physiological changes in the cardiovascular system in pregnancy				
Parameter .	**Adaptation**	**Magnitude**	**Non-pregnant (average value)**	**Timing of peak/ average peak value**
Oxygen consumption	**Increase**	**20–30%**	**180 ml/min**	**Term**
Total body water	**Increase**	**6–8 l**		**Term**
Plasma volume	**Increase**	**45–50%**	**2600 ml**	**32–34 weeks; 3850 ml**
Red cell mass	**Increase**	**20–30%**	**1400 ml**	**Term 1650 ml**
Total blood volume	**Increase**	**30–50%**	**4000 ml**	**32 weeks; 5500 ml**
Cardiac output	**Increase**	**30–50%**	**4.9 l/min**	**28 weeks; 7 l/min**
Stroke volume	**Increase**			**20 weeks**
Heart rate	**Increase**	**10–20 bpm**	**75 bpm**	**Trimester 1; 90 bpm**
Systemic vascular resistance	**Decrease**	**21%**	**–**	**Trimester 2**
Pulmonary vascular resistance	**Decrease**	**35%**	**–**	**34 weeks**
Diastolic blood pressure	**Decrease, returning to normal by term**	**10–15 mmHg**	**–**	**24 weeks**
Systolic blood pressure	**Minimal, no decrease**	**5–10 mmHg**	**–**	**24 weeks**
Serum colloid osmotic pressure	**Decrease**	**10–15%**	**–**	**14 weeks**

Plasma protein

- Haemodilution leads to a decrease in total serum protein content within the first trimester which remains reduced throughout pregnancy.
- Albumin is important as a carrier protein for hormones, drugs, free fatty acids and unconjugated bilirubin, and its influence in decreasing colloid osmotic pressure.
- A 10–15% fall in colloid osmotic pressure allows water to move from the plasma into the cells or out of vessels, and plays a part in the increased fragility of red blood cells and oedema of the lower limbs .

Clotting factors

- The increased tendency to clot is caused by increases in clotting factors and fibrinogen accompanied by reduced

plasma fibrinolytic activity and an increase in circulating fibrin degradation products in the plasma.

- Due to these changes pregnant women have an increased risk for thromboembolic disease.
- From 12 weeks' gestation there is a 50% increase in synthesis of plasma fibrinogen concentration (Factor I) rising to 200% pre-pregnancy levels at term.
- This is critical for the prevention of haemorrhage at the time of placental separation.
- Coagulation factors VII, VIII and X increase in pregnancy, while factors II (*prothrombin*) and V remain constant or show a slight fall.
- Both the prothrombin time (normal 10–14 secs) and the partial thromboplastin time (normal 35–45 secs) are slightly shortened as pregnancy advances.

White blood cells (leucocytes) and immune function

- The total white cell count rises from 8 weeks' gestation and reaches a peak at 30 weeks.
- This is mainly because of the increase in numbers of neutrophil polymorphonuclear leucocytes, monocytes and granulocytes, the latter two producing a far more active and efficient phagocytosis function.
- This enhances the blood's phagocytic and bactericidal properties.
- Numbers of eosinophils, basophils, monocytes, lymphocytes and circulating T cells and B cells remain relatively constant.
- Lymphocyte function is depressed, and natural killer cytokine activity is reduced regulated by progesterone, par-

ticularly in the latter stages of pregnancy.

- Chemotaxis is suppressed resulting in a delayed response to some infections. There is decreased resistance to viral infections such as herpes, influenza, rubella, hepatitis, poliomyelitis and malaria.

CHANGES IN THE RESPIRATORY SYSTEM

- From early pregnancy, the overall shape of the chest alters as the anteroposterior and transverse diameters increase by about 2 cm resulting in a 5–7 cm expansion of the chest circumference.
- The lower ribs flare outwards prior to any mechanical pressure from the growing uterus.
- Inspiratory and expiratory maximum pressures appear to

remain stable throughout pregnancy.

- Progesterone also facilitates bronchial and tracheal smooth muscle relaxation, thereby reducing airway resistance.
- This improves air flow and explains why the health of women with existing respiratory problems rarely deteriorates in pregnancy.
- Expansion of the rib cage causes the *tidal volume* to increase by 30–40% gradually rising from approximately 8 weeks' gestation to term.
- The *minute volume* that facilitates gas exchange is increased by 30–40%, from 7.5–10.5 l/min, and minute oxygen uptake increases appreciably as pregnancy advances.
- The enhanced tidal volume contributes to an increase in

inspiratory capacity while *vital capacity* is unchanged. As a result, the *functional residual capacity* is decreased by 20%.

Blood gases

- Arterial oxygen partial pressure (PaO_2) is slightly increased from non-pregnant values (98–100 mmHg) to pregnant values of (101–104 mmHg).
- In addition, the *hyperventilation of pregnancy* causes a 15–20% decrease in maternal arterial carbon dioxide partial pressure ($PaCO_2$) from an average of 35–40 mmHg in the non-pregnant woman to 30 mmHg or lower in late pregnancy.

CHANGES IN THE CENTRAL NERVOUS SYSTEM

- Oestrogen and progesterone readily enter the brain to act on nerve cells changing the balance between inhibition and stimulation.
- Other pregnancy hormones, such as relaxin, prolactin and lactogen, also have an impact.
- A pregnant woman's sleep pattern can be affected by both mechanical and hormonal influences.
- These include nocturia, dyspnoea, nasal congestion, stress and anxiety as well as muscular aches and pains, leg cramps and fetal activity

CHANGES IN THE URINARY SYSTEM

- Systemic vasodilatation in the first trimester and an increase in blood volume and cardiac output results in a massive vasodilatation of the renal circulation that in-

creases the renal plasma flow (RPF).

- In a healthy pregnancy the kidneys lengthen by up to 1.5 cm and kidney volume increases by as much as 30%.
- Dilatation of the renal pelvis and ureters (*hydronephrosis of pregnancy*) with reduced peristalsis starts as early as 7 weeks' gestation, peaks at between 22 and 26 weeks and by the third trimes- ter is marked in approximately 90% of women.
- It is due to relaxation of the smooth muscle of the urinary collecting system under the influence of progesterone.
- Dilated ureters with reduced peristalsis and mechanical obstruction by the enlarged uterus all contribute to urinary stasis leading to the increased risk of urinary tract infection in pregnancy.
- Other factors that increase the potential for colonization

and susceptibility for ascending infection are alkaline urine, increased bladder volume, reduced detrusor tone, vesico-ureteric reflux and dysfunctional ureteric valves.

- Glucose excretion in the urine which increases in pregnancy due to the increased glomerular filtration rate (GFR) also provides an excellent medium for bacterial proliferation.
- After 12 weeks' gestation the bladder trigone is elevated causing thickening of the posterior margin due to the increased uterine size, hyperaemia of all pelvic organs and hyperplasia of the bladder muscle and connective tissues.
- The trigone becomes deeper and wider as pregnancy progresses leading to reduced bladder capacity.
- Due to the changes in glomerular permeability and altered tubular reabsorption proteinuria is common in pregnan-

cy, with increases of 300 mg per day being considered normal.

- Urinary calcium excretion is also two to three times higher in pregnancy even though tubular reabsorption is enhanced.
- By day an increased urinary output leads to frequency and urgency of micturition affecting 81% of women by the third trimester.

CHANGES IN THE GASTROINTESTINAL SYSTEM

- Influenced by oestrogen and progesterone the gums become highly vascularized, oedematous, have less resistance to infection and are more easily irritated.
- Bleeding and tender gums are com- monly reported by

women in pregnancy and can be a sign of periodontal disease.

- Minor trauma or inflammation occurring in the presence of bacterial plaque can lead to gingivitis.
- ***Ptyalism*** is the excessive production of saliva throughout pregnancy.
- Its cause is unknown but progesterone and/or hCG may be responsible for the increased viscosity which reduces with advancing gestation.
- Gastric acid is also thought to affect the volume of saliva.
- Upper gastrointestinal symptoms complicate the majority of pregnancies, with most women complaining of either heartburn, nausea and vomiting of pregnancy or both.
- Nausea and vomiting of pregnancy is experienced by 70–85%.

- Nausea and vomiting is associated with enlarged placental size with increased amounts of hCG that occurs in the female fetus, multiple pregnancy or hydatidiform mole.
- The angle of the gastro-oesophageal junction is altered and the lower oesophageal sphincter is displaced into the negative pressure of the intrathoracic cavity.
- These mechanical changes, along with the relaxing effects of progesterone which reduces gastrointestinal transit, all contribute to the reflux of gastric contents into the lower oesophagus leading to heartburn.
- ***Pica*** is the persistent craving and compulsive consumption of substances such as ice, clay, soap, coal or starch.
- It has been reported to be as high as 74% in Kenya but as low as 0.02% in Denmark.
- Progesterone combined with the pressure of the gravid

uterus on the rectosigmoid colon decreases motility of the small intestine and colon and increases transit time in the second and third trimesters.

- This leads to frequent complaints of bloating and abdominal distension, constipation and haemorrhoids.
- The gall bladder enlarges in pregnancy and emptying is slower due to reduced motility.
- This promotes bile stasis and increased concentrated bile content which can predispose to physiological cholestasis and pruritis.
- The large residual volume of bile is more saturated with cholesterol resulting in the retention of cholesterol crystals and increased risk of gallstone formation, particularly in the multigravida.

CHANGES IN METABOLISM

- The BMR increases during pregnancy because of the increased mass of metabolically active tissues as well as new tissue synthesis which leads to increased oxygen consumption, increased cardiac output and expansion of blood volume.
- The changes in carbohydrate metabolism are the most dramatic of all.
- The production of glucose from carbohydrate in the maternal diet increases while glucose intolerance restricts its uptake to guarantee sufficient availability of glucose for the fetus as its primary source of energy for cellular metabolism.
- Normally the maternal blood glucose is 10–20% higher

than fetal blood glucose.

- This gradient, along with resistance to the glucose-lowering effects of insulin, favours transfer of a continuous, uninterrupted supply of glucose to the fetus through the placenta by diffusion.
- During early pregnancy increased levels of oestrogen and progesterone promote pancreatic beta cell hyperplasia causing a rapid increase in insulin production.
- This lowers plasma glucose by moving it into cells and by inhibiting hepatic glucose release, but also reduces plasma amino acids and free fatty acids. These adjustments result in a sparing of glucose for the fetus.
- In late pregnancy when the rate of weight gain reduces, maternal energy metabolism shifts from carbohydrate to lipid oxidation, thus further sparing glucose for the fetus

to ensure a continuous supply of fuel when its needs are greatest.

- Amino acids are required by both woman and fetus for energy and growth.
- By 20 weeks the mean serum albumin in healthy pregnant women decreases from 46 to 38 g/l.
- By 36 weeks calcium absorption doubles to support maternal and fetal bone mineralization with the fetus accumulating 250–350 mg of calcium per day.

MATERNAL WEIGHT

- The fetus accounts for approximately 27% of the increase in weight, the placenta, amniotic fluid and uterus 20%, the breasts 3%, blood volume and extravascular fluid

23%, and maternal fat stores 27%.

- Most weight is gained in the second and third trimesters at rates of 0.45 kg and 0.40 kg per week respectively compared with 1.6 kg throughout the first trimester.
- Women with a BMI of *less than 18.5* should gain 12.5–18 kg; healthy women who have a BMI *between 18.5 and 24.9* should gain 11.5–16 kg during pregnancy; those with a BMI *between 25.9 and 29.9* should gain 7–11.5 kg and women with a BMI *over 30* should gain only 5–9 kg

MUSCULOSKELETAL CHANGES

- An increased concentration of relaxin increases pelvic laxity and may be responsible for loosening pelvic ligaments and increasing instability, causing some degree of discom-

fort for the woman .

- The increase in weight and the anterior shift in the centre of gravity lead to biomechanical changes and the characteristic *waddling g*ait of pregnancy.
- Progesterone and oestrogen change the structure of connective tissue and increase mobility of joint capsules and spinal segment as well as pelvic joint structure in preparation for birth .
- There is decreased neuromuscular control and coordination, decreased abdominal strength, increased spinal lordosis and changes in mechanical loading and joint kinetics.
- All of these influence postural control and may be related to the increased risk of falling.
- Because of the many changes in load and body mechan-

ics many women experience low back pain.

SKIN CHANGES

- Almost all women note some degree of skin darkening as one of the earliest signs of pregnancy.
- While the exact physiology remains unclear, it is generally attributed to an increase in melanocyte stimulating hormone, progesterone and oestrogen serum levels.
- Hyperpigmentation is more marked in dark-skinned women, being pronounced in areas that are normally pigmented, e.g. areola, genitalia and umbilicus.
- Stimulated by oestrogen, the growing period for hairs is increased in pregnancy so the woman reaches the end of pregnancy with many over-aged hairs.

- The ***linea alba*** is a line that lies over the midline of the rectus muscles from the umbilicus to the symphysis pubis.
- Hyperpigmentation causes it to darken resulting in the ***linea nigra***.
- Pigmentation of the face affects up to 50–70% of pregnant women and is known as ***chloasma*** or ***melasma,*** or ***mask of pregnancy***.
- It is caused by melanin deposition into epidermal or dermal macro- phages, further exacerbated by sun exposure.
- As maternal size increases in pregnancy, stretching occurs in the collagen layer of the skin, particularly over the breasts, abdomen and thighs.
- In some women, this results in ***striae gravidarum*** caused by thin tears occurring in the dermal collagen.

- These appear as red stripes chang- ing to glistening, silvery white lines approximately 6 months postpartum.
- *Pruritus* in pregnancy is characterized by intense itching either with or without a rash.
- It occurs in up to 20% of pregnancies with numerous poten- tial differential diagnoses, including infection, eczema, or related to drug therapy.

CHANGES IN THE ENDOCRINE SYSTEM

Placental hormones

- *Human chorionic gonadotrophin* (***hCG***) produced by the placental syncytiotrophoblast and cytotrophoblast cells and by the pituitary gland is a hormone with multiple functions during pregnancy.

- It can be detected in maternal serum from the 8th day after ovulation so is useful as a diagnostic marker for pregnancy.
- The unique role of this hormone is to rescue the corpus luteum from involution so that it can continue to produce progesterone which in turn maintains the decidua.
- *Relaxin* is produced by the corpus luteum and contributes to the process of decidualization and to the vasodila- tation of healthy pregnancy.
- *Human placental lactogen* (***hPL***) is secreted into the maternal circulation by the syncytiotrophoblast and can be detected in the maternal circulation as early as 6 weeks' gestation with concentrations increasing up to 30-fold throughout pregnancy.
- Oestrogen concentrations greatly increase during preg-

nancy, reaching levels 3–8 times higher than those observed in the non-pregnant woman. Oestradiol concentrations peak at around 6–7 weeks' gestation when the production and secretion shifts from the corpus luteum to the placenta.

- *Oestrogen* increases uterine blood flow and facilitates placental oxygenation and nutrition to the fetus.
- *Progesterone* is a pro-gestational hormone. It is the key hormone in the initial stages of pregnancy and is essential for creating a suitable endometrial environment for implantation and maintenance of the pregnancy.

The pituitary gland and its hormones

- The maternal pituitary gland enlarges during pregnancy due to hypertrophy and hyperplasia of the lactotrophs

(*prolactin-secreting cells*) under the influence of oestrogen.

- As a result, prolactin levels increase. Corticotrophin-releasinghormones rise several hundred-fold by term.
- *Adrenocorticotrophic hormone* (ACTH) and cortisol levels rise progressively throughout pregnancy, with a further increase in labour.
- Maternal serum levels of *leuteinizing hormone* (LH) increase rapidly in the first trimester to a maximum of 3 IU/l and then decline slowly until birth.
- *Prolactin* is produced by the anterior lobe of the pituitary gland and by amniotic fluid. It stimulates mammary growth and development and lactation.
- The posterior pituitary gland produces two hormones: *vasopressin* and *oxytocin*. However, *vasopressin* does not play a significant role in pregnancy.

- *Oxytocin* levels are low during pregnancy but increase in labour, its function being to act on the myometrium to increase the length, strength and frequency of contractions.

Thyroid function

- The function of the thyroid gland is to produce sufficient thyroid hormones necessary to meet the demands of peripheral tissues.
- Maintaining euthyroidism during pregnancy is essential for the growth and development of the fetus.
- In the first trimester the fetus depends solely on thyroid hormones and iodine from the mother, such that subtle changes in thyroid function can have detrimental effects on the fetus.
- The steep rise in hCG levels during the first trimester may

result in an increased production of thyroid hor- mones and thus decreased *thyroid stimulating hormone* (TSH) levels.

- Higher levels of oestrogen lead to an increase in the levels *of thyroxine- binding globulin* (TBG) which causes a 50% increase in total thyroxine.
- Total *thyroxine* (T4) and total *triiodothyronine* (T3) concentrations increase sharply in early pregnancy and plateau early in the second trimester at concentrations 30–100% greater than pre-pregnancy values.

Adrenal glands

- Adrenal metabolism changes significantly, with adrenal steroid levels increasing throughout pregnancy.
- *Adreno-corticotrophichormone*

(ACTH) levels escalate dramatically, with the initial peak at 11 weeks, a significant rise after 16–20 weeks and a final surge during labour.

- *Renin and angiotensin* levels rise leading to elevated levels of *angiotensin II* and aldosterone and plasma *aldosterone* levels increase 5 to 20 times during pregnancy, with a plateau at 38 weeks.
- *Aldosterone* secretion continues to respond to physiological stimuli such as posture and varies according to salt intake.
- The increase in aldosterone promotes sodium retention in the distal renal tubules.
- *Cortisol* produced by the decidua acts in combination with hCG and progesterone secreted by the conceptus to suppress maternal immune response.

MINOR DISORDERS OF PREGNANCY

- Minor disorders are only disorders that occur during pregnancy and are not life threatening.

1. Nausea and vomiting

- This presents between 4 and 12 weeks gestation. Hormonal influences are listed as the most likely causes. It is usually occurs in the morning but can occur any time during the day, aggravated by smelling of food.

Management:

- ✓Reassure the mother.
- ✓Advice to small frequent meals (dry meals).
- ✓Reduce fatty and fried containing foods.

✓Have enough rest.

2. Heart burn

- Is a burning sensation in the mid chest region. Progesterone relaxes the cardiac sphincter of the stomach and allows reflex of gastric contents into esophagus.
- Heart burn is most troublesome at 30-40 weeks gestation because at this stage is under pressure from the growing uterus.

Management:

✓Small and frequent meal, sleeping with more pillows than usual to avoid laying flat on bed.

✓For persistence/sever case/ prescribe antacids.

3. Pica

- This is the term used when mother craves certain foods of unnatural substances such as coal, soil…etc.
- The cause is unknown but hormones and changes in metabolism are blamed.

Management:

- Seek medical advice if the substance craved is potentially harmful to the unborn baby.

4. Constipation

- Progestrone causes relaxation and decreased peristaltic activity of the gut, which is also displaced by the growing uterus.

Management:

✓Increase the intake of water, fresh fruit, vegetables and ruphages in the diet.

✓Exercise is helpful especially walking.

5. Backache

- The hormones sometime soften the segments to such a degree that some support is needed.

Management:

✓Advice the mother to sleep on firm bed.

✓Advice support mechanisms of the back.

6. Fainting

- In early pregnancy fainting may be due to the vasodilation occuring under the influence of progesterone before there has been a compensatory increase in blood volume.
- The weight of the uterine contents presses on the inferior venacava and slows the return of blood to the heart.

Management:

- ✓Avoid long period of standing
- ✓Sit or lie down when she feels slight dizziness
- ✓She would be wise not to lie on her back except during abdominal examination.

7. Varicositis

- Progesterone relaxes the smooth muscles of the veins and result in sluggish circulation.
- The valves of the dilated veins become insufficent and varicositis result. It occurs in legs, anus (hemorrhoids) and vulva.

Management:

- ✓Exerciseing the calf muscles by rising on the toes
- ✓Elevate the leg and rest on the table

✓Support tighs and legs
✓Avoid constipation and advise adequate fluid intake.
✓Sanitary pad give support for vulva varicositis

FOCUSED ANTENATAL CARE

Definition

Focused Antenatal Care is:

- Goal oriented care that is client centered, timely, friendly, simple, beneficial and safe to pregnant women.

Background to Focused ANC

- Focused Antenatal Care is one of the interventions and one of the Safe Motherhood Pillars.

Goal of Focused ANC

- The goal of focused antenatal care is to provide timely and appropriate care to women during pregnancy to reduce the maternal morbidity and mortality as well as achieving a good outcome for the baby.

Aims of Focused ANC

- ❖ Early detection of existing diseases and treatment or referral.
- ❖ Promotion of health and to maintain well being of mother and baby physically, mentally and socially.
- ❖ Development of Individualized Birth Plan (IBP) and complication readiness plan.
- ❖ Prevention of diseases and early detection and management of complications during pregnancy, labor/delivery

and postpartum through identification of danger signs and symptoms.

Key principles of antenatal care by the midwife

- ❖ Developing a trusting relationship with the woman.
- ❖ Providing a holistic approach to the woman's care that meets her individual need.
- ❖ Making a comprehensive assessment of the woman's health and social status, accessing all relevant sources of information.
- ❖ Promoting an awareness of the public health issues for the woman and her family.
- ❖ Exchanging information with the woman and her family, enabling them to make informed choices about pregnancy and birth.

- Being an advocate for the woman and her family during her pregnancy, supporting her right to choose care appropriate for her own needs and those of her family.
- Identifying potential risk factors and taking the appropriate measures to minimize them.
- Timely sharing of information with relevant agencies and professionals.
- Accurate, contemporaneous documentation of assessments, plans, care and evaluation.
- Recognizing complications of pregnancy and appropriately referring women to the obstetric team or relevant health professionals or other organizations.
- Preparing the woman and her family to meet the challenges of labour and birth, and facilitating the development of a birth plan.

- ❖ Facilitating the woman to make an informed choice about methods of infant feeding and giving appropriate and sensitive advice to support her decision.
- ❖ Offering parenthood education within a planned programme or on an individual basis.

Characteristics of an effective ANC

- Well organized and prepared health facility.
- Care from a skilled and well motivated healthcare service provider.
- Preparation for birth and potential complications.
- Focused content of routine antenatal visits based on the mother's needs.
- Promoting health through provision of Tetanus Toxoid (TT), iron and folic acid supplementation, IPTp, ITNs and

positive self care practices such as essential nutrition actions, avoiding tobacco, alcohol and drug abuse, safe sex, etc.

- Counseling, detection and treatment of diseases including: HIV/AIDS, syphilis (and other STIs), tuberculosis, malaria, anaemia, hypertension and diabetes.
- Early detection and management of complications and prompt referral to the next level of care.
- Promote linkages among providers/facilities, communities and families to ensure continuity of care.
- Ultimately provides woman-friendly care.

Woman-Friendly Care

- Clean and attractive facility, providing kind and supportive care

- Explain what is happening to the woman and family after each evaluation.
- Praises the woman/family for her/their efforts
- Helps the woman feel cool when she is too hot or warm when it is cold
- Empowers woman and her family to become active participants in the care. The provider:
    i. Involves family, partner or other support person in the care
    ii. Includes relevant and feasible advice
    iii. Speaks in a language that the client understands
- Considers rights of the woman:
    - ♦ Respects beliefs, culture and traditions, permits cultural practices that are not harmful
    - ♦ Recognizes the right to be informed about her health

and what to expect during visit

- ♦ Obtains informed consent prior to exams and procedures
- ♦ Assures privacy and confidentiality.
- ♦ Considers emotional, psychological and social well-being of the woman

Elements of Focused ANC

- ❖ Early detection and diagnosis of disease/abnormality
- ❖ Counseling on health promotion
- ❖ Individual Birth Plan (IBP) and complications preparedness
- ❖ Danger signs and symptoms in the mother and new born

- Focused ANC visits, referral and follow-up of ANC client
- Prevention of Mother to Child Transmission (PMTCT) of HIV
- Management of clients' records

Element 1: Early Detection and Diagnosis of Disease and Abnormalities

Assessment of an ANC client

- Quick check
- History taking
- Physical examination
- Laboratory investigation
- Decision making.

Note: *The above steps lead one to make diagno-*

sis/understanding what the woman requires for the visit.

Activities to be done during the ANC

Quick Check

General appearance, gait, and asking general screening questions

History taking

- ✓ Personal information
- ✓ Medical history- Medication, allergies, HIV status
- ✓ Surgical history
- ✓ Obstetrics and gynecological history
- ✓ Family and social history
- ✓ Immunization

✓ Ownership and use of an ITN

Physical examination

- General appearance,
- Blood Pressure
- Weight, height
- Pulse and Respiratory rates
- Head to toe assessment
  - Conjunctiva
  - Lymph nodes
  - Breast examination
  - Fundal height
  - Foetal lie
  - Foetal presentation
  - Foetal heart sound

- Other masses

- Genital inspection
  - Female Genital Mutilation
  - Sores, swelling, discharge
  - PV Bleeding

Laboratory investigations /Antenatal profile.

- Urinalysis /Urine test for albumin and sugars
- Hb
- Blood grouping and Rhesus factor
- VDRL/RPR for syphilis screening
- HIV testing - CD4 count if indicated (+ve cases).
- Blood examination for malaria parasites where indicated.

Decision Making

- *Interprets information from client's history, physical examination and laboratory investigations and deciding on the care to be given*

- **Quick Check** is performed by health care service provider to identify clients/pregnant women who need immediate attention through:
  - Observation as a woman enters ANC clinic/room.
  - General appearance – facial expression, pallor, sweating, shivering, difficult breathing etc.
  - Gait (how the woman is walking)
  - Asking general screening questions to identify danger signs and symptoms such as severe headache, PV bleeding, leaking, dizziness, fever, etc.

Note: *In case of any problem stabilize, treat and/or refer the*

client immediately.

THE INITIAL ASSESSMENT

(BOOKING VISIT)

- The purpose of this visit is to initiate the development of a trusting relationship that facilitates the positive engagement of the woman with the maternity service; this is the most important element of antenatal care.

Personal information

- Important details such as date of birth, address and current occupation are written down For example, it may be a recommendation that women who are 40 years of age or more are offered induction of labour at term Social cir-

cumstances.

- It is useful to explore the woman's response to the pregnancy. Some women may be overwhelmed by having to care for a new baby along with other children, they may be isolated or living in poverty.
- The woman may be a teenager, and experiencing conflict with her parents, social stigma and accommodation concerns.

Menstrual history and expected date of birth

- An accurate menstrual history helps determine the expected date of birth (EDB), enables the midwife to predict a birth date and subsequently calculate gestational age
- The EDB is calculated by adding 9 calendar months and 7 days to the date of the first day of the woman's last menstrual period (known as Naegele's Rule). This method as-

sumes that:

- ❖ The woman takes regular note of regularity and length of time between periods;
- ❖ Conception occurred 14 days after the first day of the last period; this is true only if the woman has a regular 28-day cycle;
- ❖ The last period of bleeding was true menstruation; implantation of the ovum may cause slight bleeding;
- ❖ Breakthrough bleeding and ovulation can be affected by the contraceptive pill thus impacting on the accuracy of a last menstrual period (lmp).

- The duration of pregnancy based on Naegele's rule is 280 days.
- However, if the woman has a 35-day cycle then 7 days

should be added; if her cycle is less than 28 days then the appropriate number of days is subtracted.

- A definitive EDB will be given when the woman attends for her 'dating' ultrasound scan at around 12 weeks of pregnancy.

Gravidity and Parity

- Gravidity is the total number of pregnancies, regardless of outcome.
- Parity is the total number of pregnancies carried over the threshold of viability (24+0 in the UK).
- The diagnosis of pregnancy is made on the basis of symptoms, signs and investigations of pregnancy.
- These can be conveniently divided into those of the first,

second and third trimester.

EXAMPLES [MACLEOD'S 2005, P.212]:

- **Patient is currently pregnant; had two previous deliveries P2+0 = G3**
- **Patient is not pregnant, had one previous delivery = G1 P1**
- **Patient is currently pregnant, had one previous delivery and one previous miscarriage P1+1 = G3 (the +1 refers to a pregnancy not carried to 24+0).**
- **Patient is not currently pregnant, had a live birth and a stillbirth (death of fetus after24+0) = G2 P2**
- **Patient is not pregnant, had a twin pregnancy resulting in two live births = G1P1**

Obstetric history

- Previous childbearing history is important in considering the possible outcome of the current pregnancy and also in relation to how the woman feels about the future.
- In order to give a summary of a woman's childbearing history, the descriptive terms gravida and para are used. '***Gravid'*** means 'pregnant', ***gravida*** means 'a pregnant woman', and a subsequent number indicates the number of times she has been pregnant regardless of outcome.
- ***'Para'*** means 'having given birth'; a woman's ***parity*** refers to the number of times that she has given birth to a child, live or stillborn, excluding termination of pregnancy.
- A ***grande multigravida*** is a woman who has been pregnant five times or more, irrespective of outcome. A grande

multipara is a woman who has given birth five times or more.

Previous childbearing experiences

- A sympathetic non-judgemental approach is required to elicit information and encourage the woman to talk freely about her experiences of previous births, miscarriages or terminations.
- Repeated spontaneous fetal loss may indicate such conditions as genetic abnormality, hormonal imbalance or incompetent cervix If there is a history of unexplained stillbirth, the woman should be referred for obstetric antenatal care .

Medical and surgical history

- During pregnancy both the mother and the fetus may be affected by a medical condition, For example:
  - ✓ Women with a history of thrombosis are at greater risk of recurrence during pregnancy, more when over 30 years; have a Body Mass Index (BMI) over 25; have prolonged bed rest; a family history of venous thromboembolism (VTE); have a caesarean birth or travel by air Hypertensive disorders encompass gestational
  - ✓ hypertension (pre-eclampsia and eclampsia) and chronic/essential hypertension. Other conditions, including asthma, epilepsy,
  - ✓ infections and psychiatric disorders may require medication, which may adversely affect fetal development. Previous surgery should be documented as it may

- ✓ highlight previous problems with anaesthesia or other conditions or complications of relevance. The woman should be asked if she is taking any medication, either prescribed or over the counter.

Family history

- ✓ Genetic disease in the baby is more likely to occur if the biological parents are close relatives such as first cousins. Where it has been identified that a couple are first cousins, genetic counselling should be offered.
- ✓ Diabetes, although not inherited, leads to a predisposition in other family members, particularly if they become pregnant or obese.
- ✓ Hypertension also has a familial component and multiple pregnancy has a higher incidence in certain families.

Lifestyle

Healthy eating

- ✓ All women should be provided with information about healthy eating, and vitamin D supplementation (10 micrograms per day) is suggested for all women during pregnancy and breastfeeding to maintain bone and teeth health.
- ✓ The midwife should advise the woman about eating a balanced diet during pregnancy and not 'eating for two' .

Exercise

- Usual aerobic or strength conditioning exercise should be continued.
- Any activity that can cause trauma or physical injury to

the woman or fetus should be avoided.

Smoking

- Smoking in pregnancy is associated with birth defects and a range of conditions that compromise the infant's health and wellbeing including: low birth weight, intellectual impairment, respiratory dysfunction, Sudden Infant Death Syndrome and premature birth.

Alcohol and drug misuse

- It is recommended that pregnant women abstain from alcohol during the first trimester and drink no more than one to two UK units once or twice a week thereafter.
- The midwife also needs to ask prospective parents if they take illicit drugs, regardless of their social status.

- The effects of excessive maternal alcohol on the fetus are marked, particularly in the 1st trimester when fetal alcohol syndrome can develop.
- This syndrome consists of restricted growth, facial abnormalities, central nervous system problems, behavioural and learning difficulties and is entirely preventable .

PHYSICAL EXAMINATION

Weight

- Women with a BMI in the obese range are more at risk of complications of pregnancy.
- These may include gestational diabetes, pregnancy-induced hypertension (PIH) and shoulder dystocia.
- Overweight or under-weight women should be carefully

monitored, have additional care from an obstetrician, and be offered appropriate support, including nutritional counselling within the mul-tiprofessional team.

Blood pressure

- Blood pressure is taken in order to ascertain normality and provide a baseline reading for comparison throughout pregnancy.

Urinalysis

- At the first visit the woman should be offered screening to exclude asymptomatic bacteriuria.
- Because the condition is asymptomatic the woman is un-aware of disease; treatment could reduce the risk of pye-lonephritis and preterm labour.

- Urinalysis is performed at every visit to exclude proteinuria which may be a symptom of pre-eclampsia.

Blood tests

- Blood tests offered at the initial assessment include the following. *ABO blood group and Rhesus (Rh)* factor It is important to identify the blood group, RhD status and red cell antibodies in pregnant women, so haemo- lytic disease of the newborn (HDN) can be prevented and preparations made for blood transfusion if it becomes necessary.
- All *Rh-negative* women will be offered two doses of prophylactic anti-D 500 International Units (IU) at 28 and 34 weeks' gestation or a single dose of 1500 IU at 28–30 weeks' gestation.
- All Rh-negative women will be offered two doses of

prophylactic anti-D 500 International Units (IU) at 28 and 34 weeks' gestation or a single dose of 1500 IU at 28–30 weeks' gestation.

Full blood count

- This is taken to observe the woman's general blood condition, and includes haemoglobin (Hb) estimations.
- If the mean cell volume (MCV) is found to be low on the full blood count result, serum ferritin levels are also taken in order to assess the adequacy of iron stores.
- Maximum absorption of iron in meat or green leafy vegetables will be achieved by consuming vitamin C at the same time and avoiding caffeine.

Other screening tests

Venereal disease research laboratory (VDRL) test

- This is performed for syphilis. Not all positive results indicate active syphilis; early testing will allow a woman to be treated in order to prevent infection of the fetus

HIV antibodies

- Routine screening to detect HIV infection should be offered in pregnancy as treatment in preg- nancy is beneficial in reducing vertical transmission to the fetus.

Rubella immune status

- Women who are not immune must be advised to avoid contact with anyone with the disease.

Haemoglobinopathies

- All women should be offered screening for sickle cell disease or thalassaemias early in pregnancy.

Hepatitis B

- Screening is offered in pregnancy so that infected women can be offered postnatal intervention to reduce the risk of mother-to-baby transmission.

Screening for fetal anomaly

- The midwife will also explain to the woman the current options regarding fetal anomaly screening and provide her with written information to enable her to make an informed choice.

THE MIDWIFE'S EXAMINATION

- The midwife's general examination of the woman should be holistic and encompass the woman's physical, social and psychological wellbeing.

Oedema

- This should not be evident during the initial assessment but may occur as the pregnancy progresses.
- Physiological oedema occurs after rising in the morning and worsens during the day; it is often associated with daily activities or hot weather.
- Pitting oedema in the lower limbs can be identified by applying gentle fingertip pressure over the tibial bone: a depression will remain when the finger is removed.

- If oedema reaches the knees, affects the face or is increasing in the fingers it may be indicative of hypertension of pregnancy if other markers are also present.

Varicosities

- These are more likely to occur during pregnancy and are a predisposing cause of deep vein thrombosis.
- The woman should be asked if she has any pain in her legs.
- Reddened areas on the calf may be due to varicosities, phlebitis or deep vein thrombosis.
- Referral should be made to medical colleagues as appropriate

Abdominal examination

- Abdominal examination is carried out from 24 weeks' gestation to establish and affirm that fetal growth is con- sistent with gestational age during the pregnancy.
- The specific aims are to:
  - ✓observe the signs of pregnancy
  - ✓assess fetal size and growth
  - ✓auscultate the fetal heart when indicated
  - ✓locate fetal parts
  - ✓detect any deviation from normal.

Preparation

- *The woman should be asked to empty her bladder before making herself comfortable on the couch. A full bladder will make the examination uncomfortable; this can also make the measurement of fundal height less accurate.*

Inspection

- The uterus is first assessed by observation. The shape of the uterus is longer than it is broad when the lie of the fetus is longitudinal, as occurs in the majority of cases.
- If the lie of the fetus is transverse, the uterus is low and broad.
- *The multiparous uterus may lack the snug ovoid shape of the primigravid uterus. If the fetus is in an occip- itoposterior position a saucer-like depression may be seen at or below the umbilicus.*

Skin changes

- linea nigra may be seen; this is a normal dark line of pigmentation running longitudinally in the centre of the ab-

domen below and sometimes above the umbilicus.

- Scars may indicate previous obstetric or abdominal surgery or self-harm.

Palpation

- Arms and hands should be relaxed and the pads, not the tips, of the fingers used with delicate precision.
- The hands are moved smoothly over the abdomen to avoid causing contractions.

Measuring fundal height

- In order to determine the height of the fundus the midwife places her hand just below the xiphisternum.
- Pressing gently, she moves her hand down the abdomen until she feels the curved upper border of the fundus

From 25 weeks of pregnancy, the midwife should commence serial symphysis fundal height (SFH) measurements.

- She uses a tape measure (with the centimetres facing the mother's abdomen) held at the fundus and extended down to the symphysis pubis, to take a single measurement.
- If the uterus is unduly big the fetus maybe large or it may indicate multiple pregnancy or polyhydramnios. When the uterus is smaller than expected the LMP date may be incorrect, or the fetus may be small for gestational age (SGA).

Fundal palpation

- This determines the presence of the breech or the head in the fundus.

- This information will help to diagnose the lie and presentation of the fetus. Talking through the palpation with the woman, making eye contact with her during the procedure, the midwife lays both hands on the sides of the fundus, fingers held close together and curving round the upper border of the uterus.
- Gentle yet deliberate pressure is applied using the palmar surfaces of the fingers to determine the soft consistency and indefinite outline that denotes the breech.
- With a gliding movement the finger- tips are separated slightly in order to grasp the fetal mass, which may be in the centre or deflected to one side, to assess its size and mobility.
- The breech cannot be moved independently of the body but the head can.

- The head is much more distinctive in outline than the breech, being hard and round; it can be balloted (moved from one hand to the other) between the fingertips of the two hands because of the free movement of the neck.

Lateral palpation

- This is used to locate the fetal back in order to determine position.
- The hands are placed on either side of the uterus at the level of the umbilicus.
- Gentle pressure is applied with alternate hands in order to detect which side of the uterus offers the greater resistance.
- More detailed information is obtained by feeling along the length of each side with the fingers.

- This can be done by sliding the hands down the abdomen while feeling the sides of the uterus alternately.
- Some midwives prefer to steady the uterus with one hand, and using a rotary movement of the opposite hand, to map out the back as a continuous smooth resistant mass from the breech down to the neck; on the other side the same movement reveals the limbs as small parts that slip about under the examining fingers.
- *Walking' the fingertips of both hands over the abdomen from one side to the other is another method of locating the fetal back*

Pelvic palpation

- Pelvic palpation will identify the pole of the fetus in the pelvis; it should not cause discomfort to the woman. the

size, flexion and mobility of the head, but undue pressure must not be applied.

Engagement

- Engagement is said to have occurred when the widest presenting transverse diameter of the fetal head has passed through the brim of the pelvis.
- In cephalic presentations this is the biparietal diameter and in breech presentations the bitrochanteric diameter.
- Engagement of the fetal head is usually measured in fifths palpable above the pelvic brim.
- When the vertex presents and the head is engaged the following will be evident on clinical examination: only two- to three-fifths of the fetal head is palpable above the pelvic brim.

- If the head is not engaged, the findings are as follows:
  - ☐ More than half of the head is palpable above the brim
  - ☐ The head may be high and freely movable (ballotable) or partly settled in the pelvic brim and consequently immobile.

Presentation

- Presentation refers to the part of the fetus that lies at the pelvic brim or in the lower pole of the uterus.
- Presentations can be vertex, breech, shoulder, face or brow.
- Vertex, face and brow are all head or cephalic presentations.
- When the head is flexed the vertex presents; when it is

fully extended the face presents; and when it is partially extended the brow presents

Auscultation

- The stethoscope is placed on the mother's abdomen, at right-angles to it over the fetal back.
- The ear must be in close, firm contact with the stethoscope but the hand should not touch it while listening because then extraneous sounds are produced.
- The midwife should count the beats per minute, which should be in the range of 110–160.
- The midwife should take the woman's pulse at the same time as listening to the fetal heart to enable her to distinguish between the two.

The lie

- The lie of the fetus is the relationship between the long axis of the fetus and the long axis of the uterus.
- In the majority of cases the lie is longitudinal due to the ovoid shape of the uterus; the remainder are oblique or transverse.
- Oblique lie, when the fetus lies diagonally across the long axis of the uterus, must be distinguished from obliquity of the uterus.

Attitude

- Attitude is the relationship of the fetal head and limbs to its trunk.
- The attitude should be one of flexion.
- The fetus is curled up with chin on chest, arms and legs

flexed, forming a snug, compact mass, which utilizes the space in the uterine cavity most effectively.

- If the fetal head is flexed the smallest diameters will present and, with efficient uterine action, labour will be most effective.

Denominator

- The denominator is the name of the part of the presentation, which is used when referring to fetal position.
- Each presentation has a different denominator and these are as follows:
    - ❖In the vertex presentation it is the occiput
    - ❖In the breech presentation it is the sacrum
    - ❖In the face presentation it is the mentum.
- Although the shoulder presentation is said to have the

acromion process as its denominator, in practice the dorsum is used to describe the position. In the brow presentation no denominator is used.

Position

- The position is the relationship between the denominator of the presentation and six points on the pelvic brim.
- In addition, the denominator may be found in the midline either anteriorly or posteriorly, especially late in labour.
- This position is often transient and is described as direct anterior or direct posterior.

Positions in a vertex presentation

- **Left occipitoanterior (LOA)** The occiput points to the left iliopectineal eminence; the sagittal suture is in the right oblique diameter of the pelvis.
- **Right occipitoanterior (ROA)** The occiput points to the right iliopectineal eminence; the sagittal suture is in the left oblique diameter of the pelvis.
- **Left occipitolateral (LOL)** The occiput points to the left iliopectineal line midway between the iliopectineal eminence and the sacroiliac joint; the sagittal suture is in the transverse diameter of the pelvis.
- **Right occipitolateral (ROL)** The occiput points to the right iliopectineal line midway between the iliopectineal eminence and the sacroiliac joint;
- the sagittal suture is in the transverse diameter of the pelvis.
- **Left occipitoposterior (LOP)** The occiput points to the left sacroiliac joint; the sagittal suture is in the left oblique diameter of the pelvis.
- **Right occipitoposterior (ROP)** The occiput points to the right sacroiliac joint; the sagittal suture is in the right oblique diameter of the pelvis.
- **Direct occipitoanterior (DOA)** The occiput points to the symphysis pubis; the sagittal suture is in the anteroposterior diameter of the pelvis.
- **Direct occipitoposterior (DOP)** The occiput points to the sacrum; the sagittal suture is in the anteroposterior diameter of the pelvis.

In breech and face presentations the positions are described in a similar wayusing the appropriate denominator.

Indicators of fetal wellbeing

These include:

- ❖ increasing uterine size compatible with the gestational age of the fetus;
- ❖ fetal movements that follow a regular pattern from the time when they are first felt;
- ❖ fetal heart rate that is regular and variable with a rate between 110 and 160 beats/minute.

Antenatal Laboratory Investigations

Haemoglobin

- Blood grouping and Rh factor
- RPR for syphilis screening

- Urinalysis for sugar and albumen
- HIV screening (after counseling)
- Blood Smear (BS) or Rapid Diagnostic Test (RDT) for malaria if she has history of fever.

ELEMENT 2: Counseling and Health Promotion in ANC

- Counseling targets both the pregnant woman and her partner during the ANC visits. It aims at assisting them in developing the individual birth plan and complication preparedness.
- Advise on health promotion aspects such as nutrition, use of ITN, personal hygiene, etc.
- Effective counseling follows the GATHER steps reinforced by CARE skills.

Health Promotion

Areas of health promotion include:

- Diet, Nutrition and use of minerals and vitamins supplementation Personal hygiene including clothing
- Danger signs in pregnancy
- Individual Birth Plan and complication preparedness Use of medicines and immunization
- Protection from malaria (use IPTp, ITNs and other protective measures) Family Planning
- Breastfeeding
- Avoiding harmful habits.
- Prevention from STIs/HIV (safer sex)

Diet and Nutrition

Essential nutrition actions by a pregnant woman in-

clude:

- Increased food intake during pregnancy – encourage eating 3 meals and a snack/bite in between meals every day.
- Take diversified diet i.e. meals containing protein, carbohydrates, vitamins, fats, water, minerals including iodized salt.
- Reduce energy expenditure by reducing workload and encouraging resting.
- Provide iron/folic acid supplements daily.
- Monitor weight gain throughout pregnancy, women should gain at least one kg. per month in the second and third trimesters.
- Take SP for IPTp and use ITN for malaria prevention. Take mebendazole/albendazole tablets for deworming.

Diet

- Advise the mother on a balanced diet that includes proteins, high calorie content, fruits and vegetables for preventing anaemia and ensuring proper growth of the foetus.
- Encourage the pregnant woman three meals and a snack to increase energy to take every day.
- Encourage the pregnant woman to have a diversified diet based on locally available foods.
- Encourage regular taking of iron and folic acid tablets daily throughout pregnancy and post partum period.
- Take tablets between meals or before going to bed with little water or juice to avoid possible nausea and vomiting.

- Counsel on compliance and side effects of iron.
- Avoid drinking tea and coffee while taking iron because these drinks contain iron absorption inhibitors. Tea or coffee should be taken at least one hour apart after taking the tablets or meal.
- Encourage the pregnant woman to take Vitamin C rich foods such as oranges, guava, pawpaw, baobab fruits etc. to enhance absorption of iron.
- Avoid overcooking vegetables. Use iodized salt only.
- Avoid eating non-food substances such as clay, ashes, charcoal etc. Encourage women to take sweet energy drinks when in labour.

Note: *The advice needs to be realistic, based on the foods that are available locally.*

Rest and Activity

- Encourage the mother to rest (nap in the afternoon). Avoid overworking and exhaustion.
- Encourage the mother to carry on with light household work and light exercises such as walking.
- Avoid lying on back and right side to prevent compression of inferior venacava which may lead to supine hypotension. Instead the mother should be encouraged to lie on left side with legs slightly elevated.

Personal Hygiene and Clothing

- Good personal hygiene prevents infections
- Encourage the mother to wear clean comfortable clothing and flat shoes. High shoes may lead to back pain
- Encourage pregnant mothers to live in a clean environ-

ment

- Encourage the mother to wash her body and carry out oral hygiene daily.

Use of Medicine and Immunization in Pregnancy

Encourage pregnant women to speak out about their pregnancy status whenever they are seeking other healthcare services.

- Medicines are generally discouraged particularly during the first trimester unless advised by a service provider.
- Routine medicines and vaccine prescribed during pregnancy will include folic acid, iron, SP, mebendazole/albendazole tablets and tetanus toxoid.
- Some medicines are not recommended during the first trimester, e.g. SP, Artemether Lumefantrine (ALu), Met-

ronidazole (flagyl) and warfarin.

Some commonly used medicines that should not be used during pregnancy and breastfeeding include:

i. ***Tetracycline***: Cause abnormalities of lens/cornea, skeletal and muscular growth and tooth development.
ii. ***Doxycycline:*** Risk of cosmetic staining of primary teeth is undetermined, excreted into breast milk.
iii. ***Primaquine:*** Harmful to newborns who are relatively Glucose-6 Phosphatase Dehydrogenase (G6PD) deficient
iv. ***Halafantrine:*** No conclusive studies in pregnant women, has been shown to cause unwanted effects including death of the fetus in animals.
v. ***Ciprofloxacin:*** Not recommend during the first trimester due to possibility of congenital malformations including spina bifida, limb defects, hypospadia, inguinal

hernia, eye/ear defects, heart and skeleton defects and teeth discoloration.

vi. ***Dapsone***: Increases the risk of fetal abnormalities if administered during all trimesters.

Harmful Habits During Pregnancy

- Advise the pregnant women to refrain from smoking, drugs, alcohol and herbal medicines as may cause bad effects on pregnancy.
- Advise the pregnant women to avoid eating non-nutritive substances (PICA)
- Advise pregnant women on dangers of female genital mutilation
- Advise pregnant women on safer sex especially use of condom.

Breastfeeding

- Early and exclusive breastfeeding is beneficial for mother and baby therefore the mother needs to be prepared psychologically and physically. Benefits of breastfeeding to the mother and infant:
- Breast milk is the best for the baby because it contains adequate water and nutrients that the baby requires.
- First yellowish milk (colostrum) protects the baby from diseases and it is rich in Vitamin A and antibodies
- Is cost-effective/affordable Promotes mother-baby bonding
- Successful breastfeeding depends on diversified diet and increased food intake (three meals and two snacks/bites), adequate fluid intake and rest.

- Health care providers should provide support to mothers for early initiation (within 1 hour after delivery) and proper positioning and attachment during breastfeeding.
- Emphasize on exclusive breastfeeding up to 6 months of age and add complimentary feeding while continuing breastfeeding up to 2 years and beyond.
- Breastfeeding on demand stimulates adequate production of breast milk and prevents breast engorgement.
- Advise the mother to breastfeed from one breast until it is empty before offering the other so that the baby gets both fore milk (high content of water) and hind milk (rich in fat and nutrients).
- For HIV + Mothers counsel on infant feeding options; exclusive breast feeding or replacement guided by AFASS as per guideline.

Family Planning

- Birth spacing 3 to 5 years apart is recommended for better health of both mother and child.
- Advise women to use family planning methods which include modern and natural.
- Safe methods for postpartum/lactating mothers are those methods which will not interfere with breastfeeding such as LAM.
- HIV positive mothers should be advised to use effective family planning methods that provide dual protection, that is prevention of pregnancy and STIs including HIV/AIDS (use of condoms).

Prevention from STIs/HIV (safer sex)

- Educate the pregnant woman on HIV including other STIs (e.g., syphilis,gonorrhea, chlamydia) and their effects to woman, her partner and unborn baby.
- Advice the woman on safer sex which include:
  - ✓ Abstinence or
  - ✓ Being faithful to one partner or
  - ✓ Condom use consistently and correctly.

ELEMENT 3: Individual Birth Plan (IBP) and Complications Preparedness

- Each pregnant woman must be assisted to develop an Individual Birth Plan (IBP) as part of birth preparedness because the complications can not be predicted. The plan includes:

  ✓Reminding the woman on her EDD Identifying place of

birth.

- ✓Identifying someone to take care of her family in her absence.
- ✓Preparing essential items necessary for a clean birth and warmth for both mother and baby such as khangas or vitenge.
- ✓Identify at least two blood donors.
- ✓Preparing transport or funds and any other available resources in case of emergency during labour.
- ✓Identifying decision making family member to accompany the pregnant woman to the health facility.
- ✓Helping the pregnant woman to recognize the importance of delivering in a health facility.

ELEMENT 4: Session 1.2.4 Danger Signs and symptoms

in the mother and the newborn

Danger Signs and symptoms during Pregnancy

A danger sign is a feature experienced by the woman that indicates a life threatening condition in pregnancy that requires immediate action.

- If any of these signs are noted, the pregnant woman must report to the health facility immediately:-
- Lethargy, fatigue, breathlessness that could indicate severe anaemia or a haemoglobin of less than 8.5gm/dl or 60%
- Vaginal bleeding during pregnancy
- Severe headache and/or blurred vision which could indicate imminent eclampsia
- Loss of consciousness or convulsions Severe oedema

(hands or face) Severe abdominal pain.

- Leaking of amniotic fluid from the vagina Foul-smelling vaginal discharge
- Fever, chills, vomiting which could indicate malaria Foetal malpresentation after 36 weeks
- Decreased or absent foetal movement
- Contractions before 37 completed weeks (premature labour).

Danger signs and symptoms during the postpartum period

- Blood pressure of 140/90 mmHg or more OR a systolic blood pressure rise of 30 mmHg or diastolic pressure rise of 15mmHg or more from the baseline blood pressure

- Severe headache/blurred vision/fits (convulsions) Abnormal vaginal bleeding
- Placenta not delivered within one hour after delivery Difficulty breathing
- Fever
- Severe pain in abdomen or around vagina Breast or nipple pain; unable to breastfeed Foul vaginal discharge.

Note: *The woman should go to the health facility immediately if she has any of these signs*

Danger Signs and symptoms in the Newborn

- Difficult breathing
- Pitched cry and irritability. Difficult feeding (unable to suckle)

- Fits (convulsions) or loss of consciousness Blueness of lips, tongue or hands
- Hot to touch (hyperthermia) or cold to touch (hypothermia)
- Unable to pass urine and stool or both within 24 hours after delivery Low birth weight including prematurity.
- Bleeding from the cord

Element 5: Focused ANC Visits and referral

Focused ANC Visits

It is recommends that each pregnant woman should make four antenatal clinic visits during her pregnancy, the first visit within the first trimester and three visits after quickening.

It is recommended that:

- Women with normal pregnancy should receive at least 4 thorough, comprehensive, individualized antenatal visits, spread out during the entire pregnancy.
- Pregnant women with complications need more visits depending on individual condition.
- Early referral to appropriate level of care whenever a complication is detected should take place.

The minimum recommended number of ANC visits is four:

1st visit: before 16 weeks of gestation

2nd visit: from 20 to 24 weeks of gestation

3rd visit: from 28 to 32 weeks of gestation

4th visit: from 36 to 40 weeks of gestation

Note:

- *All pregnant women attending ANC should be given services accordingly depending on the gestational age of the pregnancy.*
- *If a pregnant woman comes outside the scheduled visits she* ***SHOULD NOT BE TURNED AWAY,*** *but should be given the necessary services.*
- *Next appointment will depend on her condition and gestational age.*
- *A pregnant woman who has reached 36 weeks should be encouraged to come on a weekly basis thereafter, or whenever she has concerns or complications.*

1st ANC Visit

During the first antenatal visit, the following services

should be offered:

- History taking - Detecting that the woman is pregnant and detecting diseases, other complications
- Beginning to develop the individualized birth plan and complication preparedness.
- Immunizations - Tetanus Toxoid (TT) vaccine according to schedule Counseling and testing for HIV status, syphilis, haemoglobin and other laboratory investigations
- Advice on the importance of using ITNs and give the ITN voucher. Screening, detecting and treating or referring conditions such as anaemia, syphilis and malaria.
- Give Iron and Folic acid tablets to cover up to the next visit to all pregnant women regardless of Hb status and explaining how to take and manage side effects
- Advise on dietary diversification i.e. meals containing pro-

tein, carbohydrates, vitamins, fats, minerals and water.

- Give single dose of Mebendazole/Albendazole (DOT) if the pregnancy is more than 12 weeks.
- Advise on essential diet and nutrition, personal hygiene, clothing, family planning and prevention of STIs and HIV/AIDS etc.

2nd and 3rd ANC Visits

During the second and third antenatal visit, the following services should be offered:

- Services provided during the first visit.
- SP as Intermittent Preventive Treatment (IPTp) given as DOT
- 1st dose after quickening - after **16 weeks** (2nd trimester) and

- 2nd dose to be given during the 3rd trimester. The second dose should not be given less than 4 weeks from the first dose.
- Give single dose of Mebendazole/Albendazole (DOT) after 1st trimester (if not given during the first visit)
- Confirm featal heart sounds.
- Detect, treat and manage any abnormalities such as multiple gestation, pre- eclampsia and anaemia.
- Confirm lie of the foetus.
- Remind about Individual Birth Plan and danger signs.

4th ANC Visit

- Services provided during the first visit.
- Confirm whether the pregnant woman has received all services which should be provided in previous visits.

- Confirm lie and presentation of the fetus. In case of any mal-presentation take appropriate action.
- Detect, manage and refer any abnormalities such as multiple gestation, pre- eclampsia and anaemia.
- Remind the pregnant woman about the Individual Birth Plan, danger signs and complication preparedness.

Referral and Follow-up of ANC Client

- Referral and follow-up should be given to pregnant women with complications. Preparation for referral include:
  - ✓Equipment, drugs and supplies for emergency Transport preparations
  - ✓Skilled service provider
  - ✓Family and community at large
- Pregnant woman who needs referral include:

- ✓Those with danger signs and symptoms or
- ✓Those with previous caesarean section
- ✓Those who have had neonatal death.
- ✓Those who are Rhesus factor negative (Rh-)
- ✓Those who get their first pregnancy after thirty five years of age. Those who had delivered more than five times.
- ✓Those with abnormality of pelvic

ELEMENT 6: Mother to Child Transmission (MTCT) of HIV

Without intervention MTCT is about 40% divided as follows: 10% during pregnancy 20% labour and delivery 10% during breastfeeding.

Factors increasing chances of MTCT of HIV Maternal Factors

1) Viral

High viral load e.g. in mothers with recent HIV infection or advanced disease/AIDS hence the use of ARV Prophylax-is/Treatment reduce viral load.

2) Immuno Suppression

Compromised immunological status such as when AIDS disease is advanced, leads to higher transmission rates.

3) Nutrition

Deficiency in micronutrients such as zinc and vitamin A is associated with increased transmission.

4) Clinical Status

AIDS and other chronic conditions such as diabetis or other underlying chronic infections

5) **Behavioural** -
   - ✓e.g. smoking,
   - ✓drug abuse and
   - ✓unprotected sex.

6) **Obstetrical**
   - ´Prolonged rupture of membranes (more than four
   - hours) Placenta abruption with live baby
   - ✓Mode of delivery e.g. instrumental delivery like vacuum due to possible trauma
   - ✓Episiotomy at which, blood increases exposure of the newborn to the HIV.

7) **Infant Factors**
   - ▪ **Prematurity**:
   - ✓Due to fragile skin
   - ✓Gastro intestinal tract ulceration.

✓Undeveloped immune status of the new born

- **Twin delivery** – First twin is more at risk in cases of vaginal delivery.

8) Breastfeeding factors

- **Mixed feeding** – Giving other feeds e.g. water, juice, porridge, artificial milk etc. while breast- feeding.
- **Prolonged breastfeeding** for more than 6 months
- **Breast conditions**:

✓infections such as mastitis

✓cracked nipples

- **High viral load in breast milk.**

Elements of Prevention of Mother To Child Transmission (PMTCT) of HIV:

There are four elements to prevent the transmission of HIV

from mother to child:

PMTCT Element One

Primary prevention of HIV infection among women of childbearing age and their partners

1. ***Behaviour modification to reduce risk:***
   - ✓Abstinence
   - ✓Be faithful
   - ✓Condom use - consistently and correctly
   - ✓Discourage practices that increase risk of transmission, e.g. female genital mutilation, wife inheritance, etc
2. ***Use of sterile instruments for invasive procedures***
   - ✓Improved access to condoms
   - ✓Prevention, early diagnosis and proper treatment of

STIs.

PMTCT Element Two

Prevention of unintended pregnancies among women infected with HIV

- ✓Access to counselling and testing for women and their partners
- ✓Effective family planning that provides dual protection of both pregnancy and HIV
- ✓Access to safe and effective contraception including post-exposure contraception in case of rape (emergency contraception)

PMTCT Element Three

Prevention of HIV transmission from HIV infected preg-

nant mothers to their infantss

For women who are already infected and pregnant, PMTCT programmes offer a range of services and interventions that reduce the risk of MTCT:

Antenatal care:

- ✓Offer HIV counselling and testing to all pregnant mothers with same day results
- ✓History and physical examination with emphasis on identification of opportunistic infections and clinical staging of HIV infection
- ✓The use of prophylactic ARVs to reduce MTCT
- ✓Counselling and support for infant feeding options.

Modified obstetric care

- ✓Avoid
- ✓Artificial Rupture of Membranes (ARM) Routine episiot-

omy

- ✓Vacuum, forceps delivery unless necessary Routine suction for newborn
- ✓Use of ARVs during labour and for the newborn.

Providing Infant feeding options to HIV positive mother/couple

- ✓Exclusive breastfeeding for 6 months and abrupt weaning
- ✓Modified breastfeeding

Early cessation of breastfeeding before 6 months Heated expressed breast milk

- ✓Exclusive Replacement feeding for 6 months if Affordable, Feasible, Accessible, Sustainable and Safe (AFASS) applies.

- Commercial infant formula Home modified animal's milk.

PMTCT Element Four

Provision of treatment, care and support to women infected with HIV and their partners, infants and families

- ✓Linkages between RCH services and community based programs for follow- up and on going health care
- ✓Linkage to health programmes for special needs such as malaria, STIs, TB, care and treatment of HIV and AIDS
- ✓Shared responsibility to build community teams.

Expected Performance Standard:

The health provider **manages HIV positive woman** according to the PMTCT national guidelines.

ELEMENT 7: Management of clients' records Learning Objectives

Rationale for accurate record keeping

- ✓Planning clients' care, enabling continuity of care over time
- ✓Facilitating communication among health care workers at different levels and with community/clients
- ✓Managing health services and making decisions at health facilities, district, regional and at national levels
- ✓Measuring service uptake, provision of evidence-based practices by providers, and the health status of women and babies.

NORMAL LABOUR

Definition

- Labour, may be described as the process by which the fetus, placenta and membranes are expelled through the birth canal;

The onset of spontaneous physiological labour

- High levels of oestrogens cause uterine muscle fibres to display oxytocic receptors and form gap junctions with each other.
- Oestrogen also stimulates the placenta to release prostaglandins that induce a production of enzymes that will digest collagen in the cervix, helping it to soften.
- Uterine activity may also result from mechanical stimula-

tion of the uterus and cervix.

- The presence of the following signs and symptoms will give evidence that the mother is in labour:
  - ✓Contractions of the uterus, which are increasingly strong, painful and regular
  - ✓The cervix is taken up into the lower uterine segment causing dilatation of the cervix
  - ✓There is a mucoid blood stained discharge, which is called show
  - ✓Sometimes there is rupture of membranes with drainage of liquor amnii (amniotic fluid)

The Contrast Between True Labour and False Labour

FACTORS	TRUE LABOUR	FALSE LABOUR
Contractions	Regularly spaced	Irregularly spaced
Interval between contractions	Gradually shortens	Remains long
Intensity of contractions	Gradually increases	Stays the same
Location of pain	Back and abdomen	Mostly lower abdomen
Effect of analgesics	Donot abolish the pain	Often Abolish the pain
Cervical changes	Progressive effacement and dilatation	No changes

Pre-Labour or Premonitory Signs of Labour

- This is the period two to three weeks prior to the onset of labour when a number of changes take place.

Lightening

- Two to three weeks before labour, the lower uterine segment expands allowing the foetal head to sink deep.
- The descent of the head and the body of the baby gives space to the lungs, heart and stomach, which enables these organs to function easily.
- The symphysis pubis widens and the pelvic floor softens and becomes more relaxed, allowing further descent of the uterus into the pelvis.

Frequency of Micturition

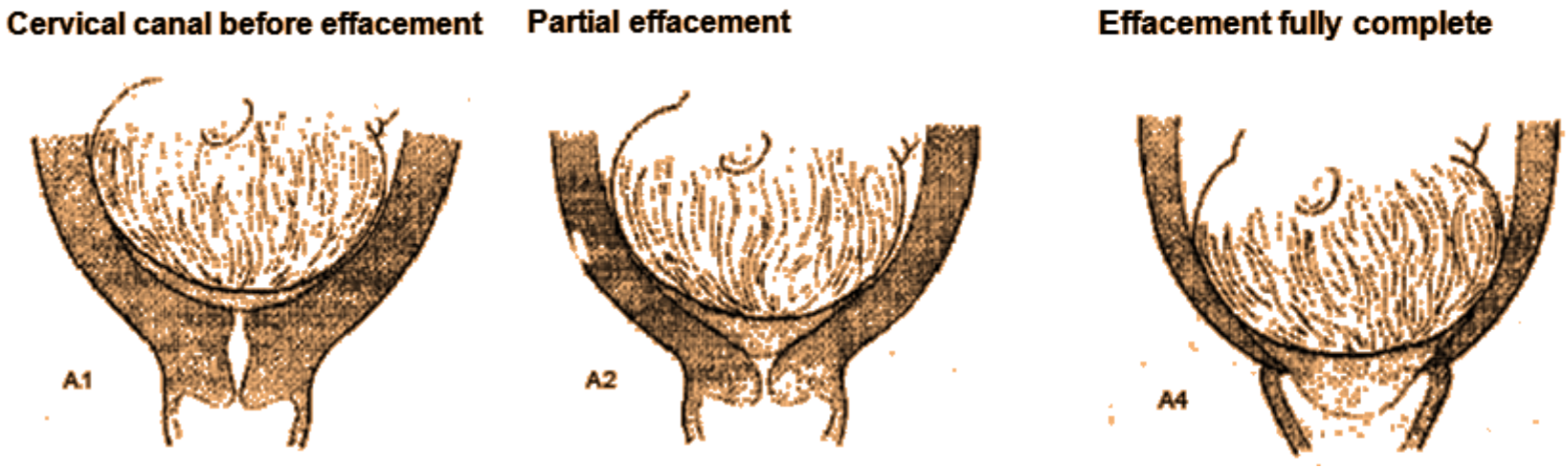
- The descent of the foetal head increases pressure within

the pelvis. This limits the capacity of the bladder, which can cause irritation.

- The laxity of the pelvic floor muscles gives rise to poor sphincter control causing a degree of stress incontinence.

Taking up of Cervix

- The cervix is taken up gradually and merges into the lower uterine segment. Shortening of cervix is looked for when labour needs to be induced.



Contractions

- The contractions of the uterus are coordinated by two pacemakers in the region of the cornua.

Recognition of the onset of labour

Latent phase of labour

- The latent phase of labour is prior to the active phase stage of labour and may last 6–8 hours.
- In primigravidae when the cervix dilates from 0 cm to 4 cm dilated.
- The cervical canal shortens from 3 cm long to <0.5 cm in length during this time.

Active phase of labour

- The active phase within the first stage of labour is the time when the cervix usually undergoes more rapid dilatation.
- This begins when the cervix is at least 4 cm dilated and, in the presence of rhythmic contractions, progressively dilates to 10 cm or full dilatation.

Transitional phase of labour

- The transitional phase of the first stage of labour is from dilated or until expulsive contractions associated second stage of labour are felt by the woman.

Physiology of the first stage Of labour

Duration

- Greatest part of labour is taken up by the first stage and it is common to expect *the active phase* to be completed within 6–12 hours
- A cervical dilatation rate of 0.5 cm per hour, has now been considered as being within the parameters of *normal* labour. Cervical effacement
- Effacement refers to the inclusion (taking up) of the cervical canal into the lower uterine segment. Effacement may occur late in pregnancy, or it may not take place until labour begins.
- Cervical dilatation Dilatation of the cervix is the process of enlargement of the os from a tightly closed aperture to an opening large enough to permit passage of the fetus.

Uterine action

Fundal dominance

- Each uterine contraction commences in the fundus near one of the cornua and spreads across and downwards.
- The contraction lasts longest in the fundus, where it is also most intense, but the peak is reached simultaneously over the whole uterus and the contraction fades from all parts together.

Polarity

- During each uterine contraction, the two uterine poles act harmoniously.
- The upper pole contracts strongly and retracts to expel the fetus; the lower pole contracts slightly and dilates to allow expulsion to take place.

Contraction and retraction

- During labour the contraction does not pass off entirely, as muscle fibres retain some of the shortening of contraction instead of becoming completely relaxed.This is termed ***retraction.***

Intensity and resting tone

- The contractions usually occur with rhythmic regularity and the intervals between them where the muscle relaxes (resting tone) gradually lessen while the length and strength gradually intensifies through the latent phase and into the active phase of the first stage of labour.

Formation of upper and lower uterine segments

- By the end of pregnancy, the body of the uterus is described as having divided into two segments. The upper uterine segment, having been formed from the body of the fundus, is mainly concerned with contraction and retraction, and is thick and muscular.
- The lower segment is prepared for distension and dilatation.

The retraction ring

- A ridge develops between the upper and lower uterine segments, known as the retraction ring.

Show

- As a result of the dilatation of the cervix, the operculum, which formed the cervical plug during pregnancy, is re-

leased.

- The woman may observe a bloodstained mucoid discharge a few hours before, or within a few hours after, labour commences.

Mechanical Factors

1. Formation of the forewaters and hindwaters

- The well-flexed fetal head fits snugly into the cervix and cuts off the amniotic fluid in front of the head from that which surrounds the body, forming two separate pools of fluid.

2. General fluid pressure

- While the membranes remain intact, the pressure of the

uterine contractions is exerted on the amniotic fluid and, as fluid is not compressible, the pressure is equalized throughout the uterus and over the fetal body, known as general fluid pressure(.

3. Rupture of the membranes

- Time for the membranes to rupture spontaneously is at the end of the first stage of labour, after the cervix becomes fully dilated and no longer supports the bag of forewaters.

4. Fetal axis pressure

- During each contraction, the uterus rises forward and the force of the fundal contraction is transmitted to the upper pole of the fetus, down the long axis of the fetus and ap-

plied by the presenting part to the cervix.

RECOGNITION OF THE FIRST STAGE OF LABOUR

- In active labour, contractions exhibit a pattern of rhythm and regularity, usually increasing in length, strength and frequency as time goes on.
- When the woman first feels contractions she may be aware only of backache, but if she places a hand on her abdomen she may perceive simultaneous hardening of the uterus.

FACTORS THAT INFLUENCE THE PROGRESS IN LABOUR

Power

- The stronger the contraction in a well prepared mother, the better the outcome of labour.

Passage

- The size, shape and resistance of the birth canal including the bony pelvis, cervix, vagina and pelvic floor may speed up or slow down the process of delivery.
- A gynaecoid pelvis and a fully dilated cervix speed up the process.

Passenger

- This refers to the size, lie and presentation of the foetus,

as well as the placenta and membranes.

- For the foetus, a vertex presentation makes labour shorter as the presenting part fits well on the cervical Os and stimulates the cervix to dilate faster.

MANAGEMENT OF NORMAL LABOUR

The Midwife's Initial Physical Examination Of The Woman

- The initial examination should include a discussion with the woman about when labour commenced, whether the membranes have ruptured and the frequency and strength of the contractions.

Past history

Particular of relevance at the onset of a woman's labour are:

- ✓ the contents of the birth plan
- ✓ her parity and age
- ✓ the gestational age and outcomes of previous labours
- ✓ the weights and condition of previous babies
- ✓ her blood results including grouping, Rhesus factor and haemoglobin
- ✓ her attendance at any specialist clinics
- ✓ evidence of any known problems: social or physical.

Consent

- Verbal consent should be obtained and recorded in the notes.

General assessment

- Basic observations, including *pulse rate, temperature and blood pressure*, are assessed and recorded. The woman's hands and feet are usually examined for signs of oedema.
- Slight swelling of the feet and ankles is physiological, but pretibial oedema or puffiness of the fingers or face is not.
- A detailed *abdominal examination* including symphysis fundal height and optimum position for auscultation of the fetal heart, as described in, should be undertaken and recorded.
- The abdominal examination may be repeated at intervals in order to assess descent of the presenting part, whether it be cephalic or breech.
- The fetal heart rate should be auscultated for a minimum of *1 minute* immediately after a contraction using a Pinard stethoscope and the rate should be recorded as an aver-

age, in a single figure.

- A *vaginal examination* (VE) may also be undertaken to help confirm the onset of labour and determine the extent of cervical effacement and dilatation

Records

- Records should be comprehensive but concise and consist of the woman's observations, her physical, psychological and sociological state, and any problem that arises as well as the midwife's response and any subsequent interventions.
- A midwife must ensure all records are stored securely and should not destroy or arrange for their destruction.
- The partogram or partograph The charts are usually designed to allow for recordings at 15-minute intervals and

include:

- ✓fetal heart rate
- ✓maternal temperature, pulse and blood pressure
- ✓frequency and strength of contractions every 10 minutes
- ✓descent of the presenting part
- ✓cervical effacement and dilatation
- ✓colour of amniotic fluid
- ✓degree of caput succedaneum/moulding
- ✓fluid balance
- ✓urine analysis
- ✓drugs administered.

SUBSEQUENT CARE IN THE FIRST STAGE OF LABOUR

Assessing progress

- The midwife should be vigilant in
  - ✓observing for changes in the woman's breathing, behaviour, noises, movements and posture alongside changes in the nature of contractions.

Abdominal examination

- An abdominal examination should be repeated by the midwife at intervals throughout labour in order to assess the length, strength and frequency of contractions and the descent of the presenting part.
- Palpation is of benefit prior to undertaking a vaginal examination, as the findings will assist the midwife to be accurate when defining the position and station of the head/breech.

Contractions

- The frequency, length and strength of the contractions should be noted and recorded on the partogram, usually at 30 minute intervals.
- The uterus should always feel softer between contractions and failure to relax is evidence of hypertonicity. The contraction rate is usually assessed by counting the number of contractions in 10 minutes, over a 20-minute period.

Vaginal examination

- The woman's bladder should be empty as the presenting part may be displaced by a full bladder as well as being very uncomfortable for the woman.

Indications for vaginal examination

There should be valid reasons to undertake a VE in labour, which are to:

- ✓ make a positive identification of the presentation
- ✓ determine whether the head is engaged in case of doubt
- ✓ ascertain whether the forewaters have ruptured, or to rupture them artificially
- ✓ exclude cord prolapse after rupture of the forewaters, especially if there is an ill-fitting presenting part or there are fetal heart rate changes
- ✓ assess progress or slow labour
- ✓ confirm full dilatation of the cervix.
- ✓ confirm the axis of the fetus and presentation of the second twin in a multiple pregnancy in order to rupture the second amniotic sac, if necessary.

Vaginal Examination Observation And Findings

- *Labia Varicosities/oedema/warts/other lesions*
- *Perineum Scars from previous tears/episiotomies*
- *Vaginal orifice Discharge/liquor/'show'/bleeding*
- *Liquor Clear/bloodstained/offensive smell (indicating infection)/meconium staining*
- *Rectum Loaded rectum may be felt on vaginal examination (can impede descent of presenting part)*

cervix

- *Position of cervix: cetral/posterior/anterior/lateral*
- *Consistency: hard, soft.*
- *Application to the presenting part: loose/well applied*

- *Effacement: length of canal: may be effaced but closed in a primigravida*
- *Dilatation: Approximate assessment 10 cm equates to full dilatation or when no cervix can be felt (ensure no lips of cervix remain*

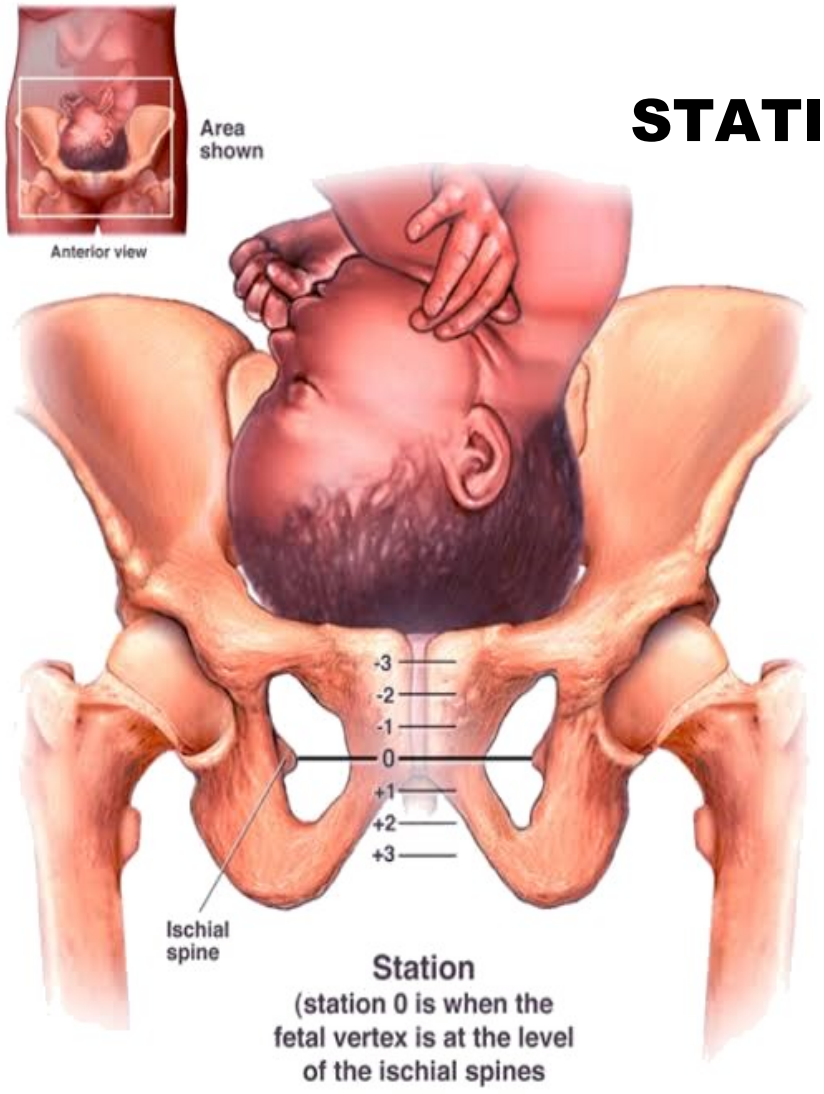
Membranes

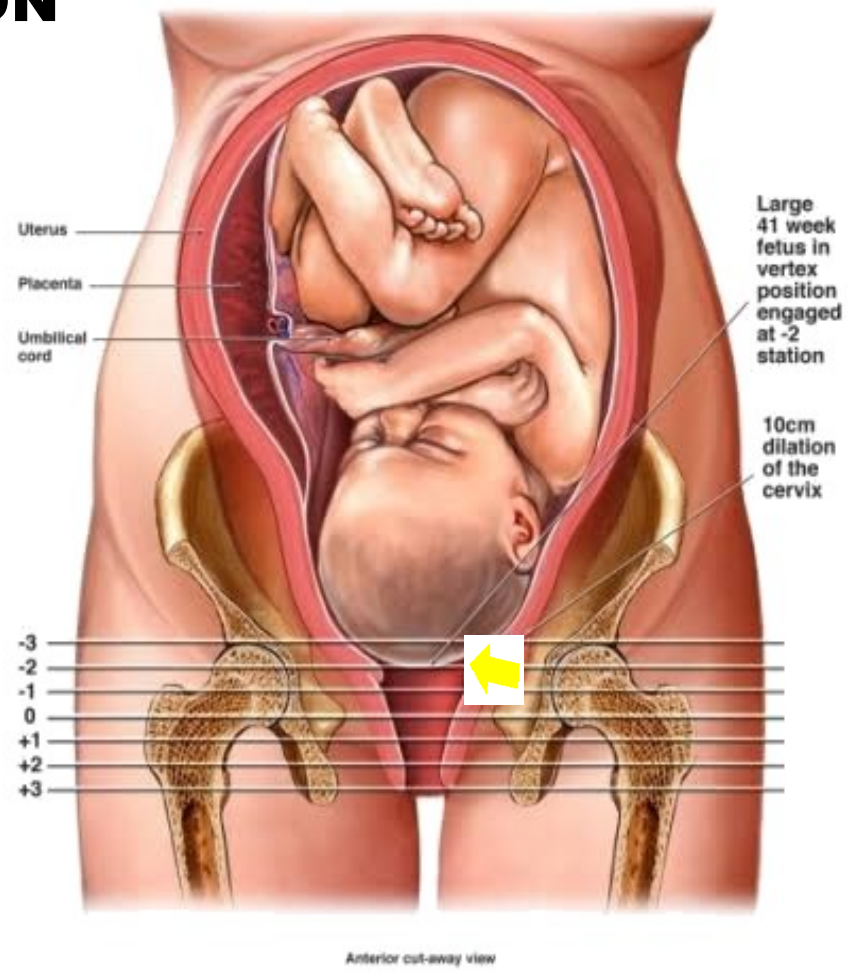
- *Membranes Intact/ bulging/ ruptured*
- *Colour of liquor: clear/ bloodstained (liquor/ 'show')/ meconium*
- *Following rupture of membranes, midwife needs to check that the cord has not prolapsed, listen to the fetal heart through contraction*
- *Hindwaters may leak whilst forewaters remain intact*

Presenting part

- *Presenting part (PP): Identification: cephalic/breech/footling/knee/compound*
- *Presence of caput succedaneum /moulding/meconium (breech),*
- *Sagittal suture: left or right oblique or transverse should rotate to anteroposterior diameter of the maternal pelvis .*
- *The **station or level** of the presenting part is the level to which the presenting part has descended in the pelvis.*
- *If the presenting part is at the brim then it is at station -5. As the head descends down in to the cavity of the pelvis it decreases from -5, -4, -3, -2, -1.*
- *By the time it is at the ischial spines, it is said to be at 'zero station'. It reappears from the pelvic outlet into the perineum, which is classified as +1, +2, +3, and +4. By the time it*

is seen at the perineum it is at station +5.





Fontanelle

- *If well flexed the small triangular posterior fontanelle is felt: it has three sutures leaving it.The anterior fontanelle is diamond-shaped, has a membrane and four sutures leaving it Landmarks of the fontanelles give information about the location of the fetal occiput Breech presentation:*

The sacrum

- *The sacrum is the diagnostic point in respect of its position with the maternal pelvis and the ischial spines.*

The Pelvis

- *Next check for moulding or caput succedaneum.*

What is moulding?

- *During labour the bones of the foetal skull tend to overlap at the sutures so that the head can easily pass through the birth canal.*
- *During a vaginal examination check for moulding by:*
  - ✓ *In cephalic presentation, run the finger on the head feeling for the sutures*
  - ✓ *Judge the degree of moulding by feeling the amount of overlapping of skull bones*
  - ✓ *Check for caput*
- *The pelvis is assessed to check if it is adequate (see unit two). The following factors should be checked:*
  - ✓ *Is it roomy?*
  - ✓ *Are the sidewalls well spaced?*
  - ✓ *Can you touch the promontory of the sacrum easily?*

- ✓ *Is the pubic arch wide enough?*
- ✓ *After checking for moulding, direct the fingers behind the head and make an effort to reach the sacro-promontory. The palm of the hand should be facing upwards. Promontory of the sacrum should not be reached.*
- ✓ *With the palm facing downwards run the two fingers down along the hollow of the sacrum and determine the shape. The hollow of the sacrum should be curved.*
- ✓ *The two fingers are then moved to where the ischial spines are located on either side of the pelvis. Run the finger along this area to determine whether or not the ischial spines are unduly prominent. Or else you can stretch your fingers to see if the spines are prominent. The ischial spines should not be prominent.*

- ✓ *As you move the fingers with the palm facing upward, on reaching the pubic arch check if it can accommodate two fingers. The apex usually should accommodate two fingers.*

- ***Check the subpubic angle*** *- Make a fist facing downwards then place the fist between the ischial tuberosities.*

Assessing the wellbeing of the woman

Maternal Observations

Pulse rate

- A tachycardia indicate pain or anxiety and is also associated with pyrexia, exhaustion and shock. The pulse rate should be recorded hourly.

- If the rate increases to >100 bpm it may be indicative of anxiety, pain, infection, ketosis or haemorrhage.

Temperature

- A rise in temperature can be indicative of infection or dehydration.
- The temperature should be recorded 4-hourly and additionally when there is a clinical indication.

Blood pressure

- Hypotension may be caused by the woman being in the supine position, by shock or as a result of vasodilation associated with epidural anaesthesia.
- Hypertension is an indicator of pre-eclampsia and in cases where a woman has pre-eclampsia or essential hyper-

tension during pregnancy, labour may further elevate the blood pressure.

- Blood pressure should be measured every 4 hours

Fluid balance and urinalysis

- If an intravenous infusion is in progress, the fluids administered must be recorded accurately. Urine passed during labour should be tested for ketones and protein.

Bath or shower

- Immersion in a warm bath or birthing pool can be an effective form of pain relief for labouring women that facilitates increased mobility with no increased incidence of adverse outcome for the woman or fetus

Position and mobility

- There are physical benefits if the woman maintains an upright position, including a shorter labour and a reduction in the need for analgesia, fewer episiotomies and fewer abnormal fetal heart rate pattern.
- The midwife should be proactive in encouraging the woman to remain active and to change her position.

Nutrition in labour

- In established labour a woman requires a calorie intake of 121 kcal/hour and that 47 kcal/ hr is required to prevent ketosis.

Bladder care

- Bladder should be emptied at least 4-hourly or more fre-

quently if it is palpable abdominally. A full bladder may increase pain, reduce efficiency of uterine contractions and delay descent of the presenting part.

- If the bladder is incompletely emptied or the woman is unable to void for some hours, it may become necessary to introduce a catheter into the bladder. It is generally recommended that an '*in-out*' catheter is used.

Medicine records

- As well as being entered on the partogram, doses of drugs are recorded on the prescription sheet, in the summary of labour and, in the case of controlled drugs, in the Controlled Drugs Register.

ASSESSING THE WELLBEING OF THE FETUS

Intermittent auscultation

- Intermittent auscultation involves listening to the fetal heart rate at intervals using a Pinard stethoscope or a hand-held Doppler.
- The normal fetal heart will have a rate of 110–160 bpm and there should be no audible decelerations.
- Intermittent auscultations to be performed in the active first stage of labour at least every 15 minutes for a full minute immediately following a contraction.

Continuous electronic fetal monitoring

- Continuous electronic fetal monitoring (EFM) is recommended for any labour where there are risks to fetal well-being, including the use of oxytocin and epidural analge-

sia.

WOMEN'S CONTROL OF PAIN DURING LABOUR

The physiology of pain

Pain stimulus and pain sensation

- The discomfort or pain of labour is caused by the descent of the fetal head further into the pelvis.
- It is also caused by pressure on the cervix and the stretching of the vaginal walls and pelvic floor muscles, as descent of the presenting part occurs.

Physiological responses to pain in labour

- Pain of labour is associated with an increased respiratory rate.

- This may cause a decrease in the $PaCO_2$ level, with a corresponding increase in the pH and a subsequent fall in the fetal $PaCO_2$ occur

Non-pharmacological methods for pain control in labour

1. **Aromatherapy**
   - Aromatherapy is the use of essential oils for a range of purposes, for example to induce relaxation, reduction of pain or nausea and vomiting.
   - These oils may be massaged into the skin, inhaled through diffusers or oil burners, or used in conjunction with hydrotherapy.

2. **Homeopathy**

- Homeopathy uses small doses of natural medicines to stimulate the body's own physiological response to heal itself .
- Homeopathic remedies are prepared from plant extracts and from minerals. Aconite may be used to relieve fear and anxiety and Kali Carbonate to alleviate back pain during labour.

3. Hydrotherapy

- Immersion in water during labour as a means of analgesia has been used for many years. Effectiveness of hydrotherapy is due to heat- relieving muscle spasm, and therefore pain, and hydrokinesis eliminates the effects of gravity and also the discomfort and strain on the pelvis.

4. Music therapy

- Many types of music are available for relaxation, some of which are specifically for childbirth.

5. Transcutaneous electrical nerve stimulation (TENS)

- TENS stimulates the production of natural endorphins and enkephalins and blocks incoming pain stimuli.
- It consists of a small device that **distributes** low intensity electrical charges across the skin which is thought to prevent pain signals from the uterus, vagina and cervix arriving at the brain.
- The body's own pain relievers, the endorphins, are then released.

Pharmacological methods for pain control

1. **Inhalation analgesia**
   - A premixed gas made up of 50% nitrous oxide (N_2O) and 50% oxygen (O_2) administered via the Entonox apparatus is the most commonly used inhalation analgesia in labour.
   - Nitrous oxide (also known as laughing gas), like many other forms of analgesia, acts by limiting the neuronal and synaptic transmission within the central nervous system

2. **Opiate drugs**
   - The action of these drugs lies in their ability to bind with receptor sites which are mainly found in the substantia gelatinosa of the dorsal horn of the spinal cord.

- Commonly used **Opiate** for pain relief in labour are:

✓pethidine (meperidine in the USA)
✓diamorphine
✓meptazinol (Meptid

3. Pethidine

- It is usually administered intra- muscularly in doses of 50–150 mg, depending on the woman's size, and takes about 20 minutes to have an effect.

4. Diamorphine

- Diamorphine has been found to provide effective analgesia for up to 4 hours in labour with the usual dose being 5 m

5. Meptazinol

- Meptazinol is usually given in doses of 100–150 mg intra- muscularly. It is fast-acting and is effective for about 4 hours. This opiate provides similar pain relief to pethidine.

6. *Regional (epidural) analgesia*

- The pain relief from an epidural is obtained by blocking the conduction of impulses along sensory nerves as they enter the spinal cord.
- It is an invasive procedure that requires informed consent from the woman and an experienced (obstetric) anaesthetist to initiate under strict aseptic conditions.
- The injection of bupivacaine into the epidural space bathes the nerves of the corda equina, blocking the au-

tonomic nerve pathways supplying the uterus.

Observations and care by the midwife

- Admit the patient to the waiting room, reassure her and introduce her to other patients
- Reassure her and explain what is being done at every stage
- The patient may have a warm bath and change into a hospital gown
- Encourage her to walk about and empty her bladder frequently
- Give her plenty of fluids with sugar or glucose as she has to work hard and needs the energy

Check the following regularly:

- Check the foetal heart rate half hourly or more often if

you suspect distress

- Check uterine contractions (strength, type, frequency and duration) as well as maternal pulse, BP and temperature
- Check the urine output and check for albumin and acetone if indicated every two hours
- Every four hours check the level of the presenting part and the degree of dilatation of the cervix
- Constantly check the woman's reaction to labour and be aware of her needs, especially for pain relief. You can repeat pethidine 50 mg IM if cervical dilatation is still 5 cm or less. Do not give more pethidine if delivery is imminent as it depresses the baby's respiration
- Towards the end of the first stage, she can rest on her side, or in any position she finds comfortable, for example, squatting
- Discourage pushing or bearing down before the cervix is fully dilated

- Early pushing only exhausts the woman and will cause oedema of the cervix and interfere with normal dilatation
- If the bladder is full and she cannot empty it on her own, catheterise her using aseptic technique
- When the membranes rupture, usually at the end of the first stage, check the colour of the liquor for meconium staining, the foetal heart rate and do a vaginal examination to exclude prolapse of the cord

- Write down the observations you are supposed to record in the partogram?
  - ✓Vital signs
  - ✓Blood pressure
  - ✓Details of vaginal examination
  - ✓Contraction strength and number of contractions in ten minutes

- ✓Fluid balance
- ✓Urinalysis
- ✓Drugs administered

NB

CHECK APPENDIX 1 (THE PARTOGRAPH)

- When observing the contractions, you should note the following:
  - ✓Uterine contraction duration, strength and frequency
  - ✓In early labour the contractions are mild, lasting 20 to 30 seconds and are infrequent
  - ✓As labour progresses, the contractions become stronger, lasting 40 to 50 seconds and are about three contractions per ten minutes.
  - ✓The uterus should always relax between contrac-

tions

- ✓The cervix dilates progressively from 4cm at a rate of approximately 1cm and 1.5cm hourly in primigravida and multigravida respectively
- ✓The descent of the presenting part can be noted by abdominal palpation or vaginal examination. Avoid unnecessary vaginal examination

Prevention of Infection

To prepare for clean delivery you should:

- ✓Allow the mother to have bath whenever she wishes as it is soothing during labour
- ✓Practice aseptic techniques through labour
- ✓Ensure a clean environment within and around the ward

- ✓After conducting a thorough examination of the mother and recording your observations in the partogram,
- ✓There are a number of things you can do to make her feel comfortable during her labour i.e. allow her to change position and move around, and also use back massage.

THE TRANSITION AND SECOND STAGE PHASES OF LABOUR

- The formal onset of the second stage of labour is traditionally confirmed with a vaginal examination to check for full dilatation of the cervical os

Uterine action

- Contractions become stronger and longer but may be less frequent, allowing both mother and fetus regular recovery periods.
- The membranes often rupture spontaneously towards the end of the first stage or during transition to the second stage.
- The consequent drainage of liquor allows the presenting part, either the hard, round fetal head or the buttocks, to be directly applied to the vaginal tissues.
- The contractions become expulsive as the fetus descends further into the vagina. Pressure from the presenting part stimulates nerve receptors in the pelvic floor. As a consequence, the woman experiences the need to push.

Soft tissue displacement

- As the fetal head descends, the soft tissues of the pelvis become displaced. Anteriorly, the bladder is pushed upwards into the abdomen where it is at less risk of injury during fetal descent.
- This results in the stretching and thinning of the urethra so that its lumen is reduced. Posteriorly, the rectum becomes flattened into the sacral curve and the pressure of the advancing head expels any residual faecal matter.
- The levator ani muscles dilate, thin out and are displaced laterally, and the perineal body is flattened, stretched and thinned.

Recognition of the Second Stage of Labour

Evidence

a) *Expulsive uterine contractions*

- Some women feel a strong desire to push before full dilatation occurs. Rupture of the forewaters Rupture of the forewaters may occur at any time during labour.

b) *Dilatation and gaping of the anus*

- Deep engagement of the presenting part may produce this sign during the latter part of the first stage.

c) *Anal cleft line*

- Some midwives have reported observing this line (also called 'the purple line') as a pigmented mark in the cleft of the buttocks which gradually ascends the anal cleft

as the labour progresses

d) Appearance of the rhomboid of Michaelis

- This is sometimes noted when a woman is in a position where her back is visible. It presents as a dome-shaped curve in the lower back, and is held to indicate the poste- rior displacement of the sacrum and coccyx as the fetal occiput moves into the maternal sacral curve.

e) Show

- This is the loss of bloodstained mucus which often accompanies rapid dilatation of the cervical os towards the end of the first stage of labour.

f) Appearance of the presenting part

- Very occasionally, a baby presenting by the vertex may be visible at the perineum at the same time as remaining cervix.

PHASES AND DURATION OF THE SECOND STAGE

The latent phase

- The latent phase, during which descent and rotation occur,

The active phase

- There is descent of the fetal head and the urge to push is established.
- The phase of labour that involves active bearing down is termed the *active* second stage of labour.

MATERNAL RESPONSE TO TRANSITION AND THE SECOND STAGE

Pushing

- If the maternal urge to push occurs before confirmation of full dilatation of the cervical os, or the appearance of a visible vertex, the mother should be encouraged to avoid active pushing.
- This has been done to conserve maternal effort and allow the vaginal tissues to stretch passively.
- Techniques to avoid active pushing efforts in this situation include position change, often to the left lateral, using controlled breathing, inhalation analgesia, or even narcotic or epidural pain relief.

Position

- If the woman lies flat on her back, vena caval compression is increased, resulting in hypotension. This can lead to reduced placental perfusion and diminished fetal oxygenation.
- The semi-recumbent or supported sitting position, with the thighs abducted, is the posture most commonly used.

Left lateral position

- The perineum can be clearly viewed and uterine action is effective, but an assistant may be required to support the right thigh, which may not be ergonomic

Upright positions: squatting, kneeling, all-fours, standing, using a birthing ball

- There is clear advantages for women in adopting any of the above position that was not horizontal
- The position the woman may choose to adopt is dictated by several factors:
  - ✓The woman's instinctive preference.
  - ✓The midwife's confidence.
  - ✓Maternal and fetal condition

THE MECHANISM OF NORMAL LABOUR (CEPHALIC PRESENTATION)

- Principles common to all mechanisms are:
  - ✓descent takes place
  - ✓whichever part leads and first meets the resistance of the pelvic floor will rotate forwards until it comes un-

der the symphysis pubis.

✓whatever emerges from the pelvis will pivot around the pubic bone.

- At the onset of labour the most common presentation is the vertex and the most common position either left or right occipitoanterior.
  - ✓the lie is longitudinal
  - ✓the presentation is cephalic
  - ✓the position is right or left occipitoanterior
  - ✓the attitude is one of good flexion
  - ✓the denominator is the occiput
  - ✓the presenting part is the posterior part of the anterior parietal bone

Main movements of the fetus

Descent

- Throughout the first stage of labour the contraction and retraction of the uterine muscles, exerts pressure on the fetus to descend further.
- Following rupture of the forewaters and the exertion of maternal effort, progress speeds up

Flexion

- At the onset of labour the suboccipito-frontal diameter, which is approximately 10 cm, is presenting.
- With greater flexion, the sub-occipitobregmatic diameter, that is, approximately 9.5 cm, presents. The occiput becomes the leading part.

Internal rotation of the head

- In a well-flexed vertex presentation the occiput leads, and rotates anteriorly through **1/8** of a circle when it meets the pelvic floor.
- This causes a slight twist in the neck as the head is no longer in direct alignment with the shoulders.
- The anteroposterior diameter of the head now lies in the widest (anteroposterior) diameter of the pelvic outlet.
- The occiput slips beneath the sub-pubic arch and crowning occurs when the head no longer recedes between contractions and the widest transverse diameter (biparietal) is born.

Extension of the head

- Once crowning has occurred, the fetal head can extend, pivoting on the suboccipital region around the pubic bone.
- This releases the sinciput, face and chin, which sweep the perineum, and then are born by a movement of extension,

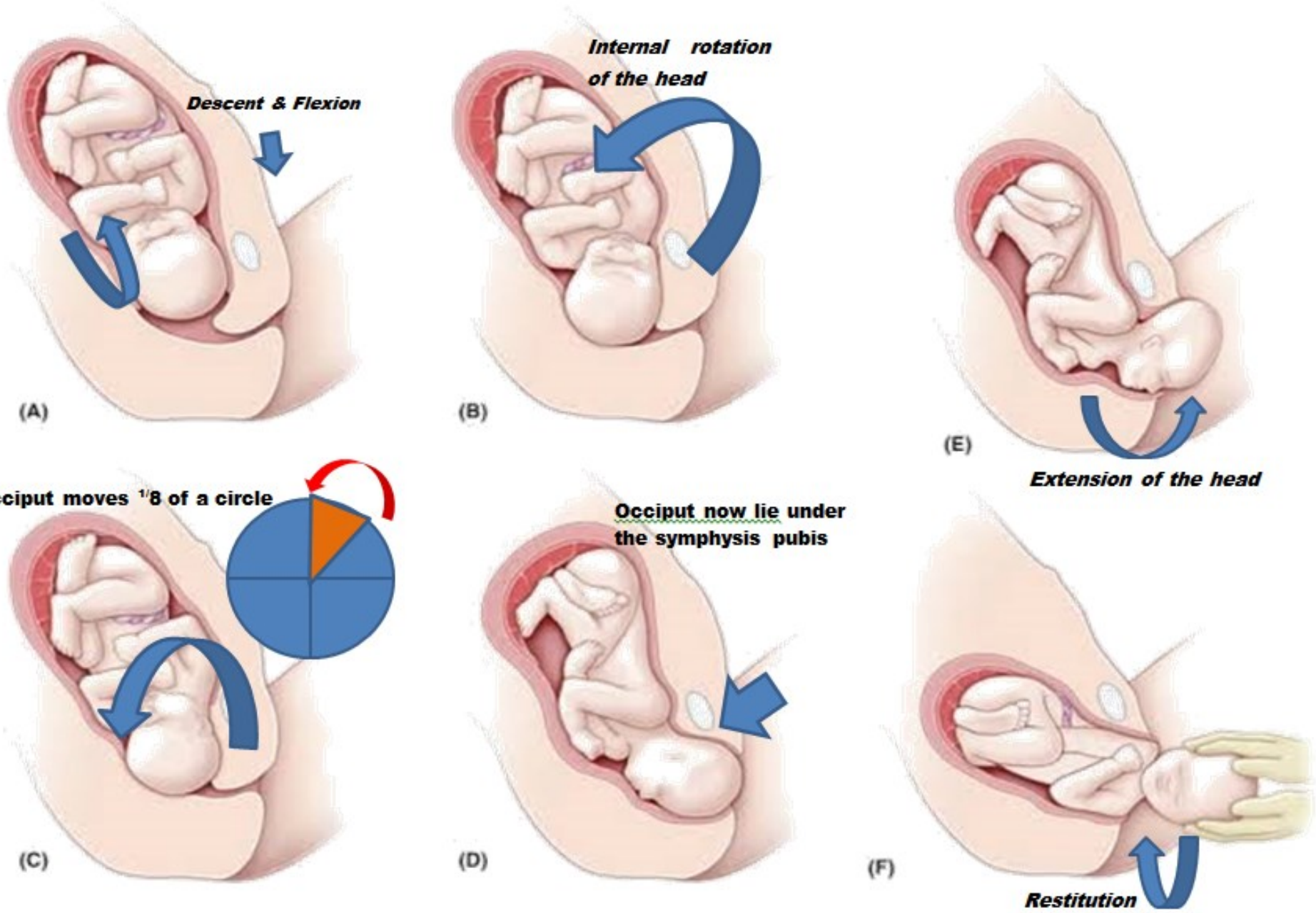
Restitution

- The twist in the neck of the fetus which resulted from internal rotation is now corrected by a slight untwisting movement.
- The occiput moves $^{1}/_{8}$ of a circle towards the side from which it started.

- The shoulders undergo a similar rotation to that of the head to lie in the widest diameter of the pelvic outlet, namely anteroposterior.
- The anterior shoulder is the first to reach the levator ani muscle and it therefore rotates anteriorly to lie under the symphysis pubis.
- This movement can be clearly seen as the head turns at the same time (external rotation of the head).

Lateral flexion

- The anterior shoulder slips beneath the sub-pubic arch and the posterior shoulder passes over the perineum.
- The remainder of the body is born by lateral flexion as the spine bends sideways through the curved birth canal.


Descent & Flexion
(A)
Internal rotation of the head
(B)
(E)
Extension of the head
Occiput moves 1/8 of a circle
(C)
Occiput now lie under the symphysis pubis
(D)
(F)
Restitution

Observations during the second stage

Four factors determine whether the second stage is continuing safely, and these must be carefully monitored:

- ✓ Uterine contractions
- ✓ Descent, rotation and flexion of the presenting part
- ✓ Fetal condition/suspicious or pathological changes in the fetal heart
- ✓ Maternal condition.

Uterine contractions

The strength, length and frequency of contractions should be assessed regularly by observation of maternal responses, and by uterine palpation during the second stage of labour. The posture and position adopted by the woman may influ-

ence the contractions.

Descent, rotation and flexion

- If there is a delay in descent on abdominal palpation, despite regular strong contractions and active maternal pushing, a vaginal examination may be performed with maternal permission.
- The purpose is to confirm whether or not internal rotation of the head has taken place, to assess the station of the presenting part and to determine whether a caput succedaneum has formed.
- If the occiput has rotated anteriorly, the head is well flexed and caput succedaneum is not excessive it is likely that progress will continue.
- In the absence of good rotation and flexion, and/or a

weakening of uterine contractions, change of position, nutrition and hydration, or use of optimal fetal positioning techniques maybe helpful.

Fetal condition/suspicious or pathological changes of the fetal heart

- If the membranes are ruptured, the liquor amnii is observed to ensure that it is clear.
- Thick fresh meconium is ominous, and experienced obstetric advice must be sought if this sign appears.
- It may, however, be the only indication of an undiagnosed breech presentation.
- If the woman is labouring normally, a Pinard's stethoscope or other hand-held system such as a Sonicaid should be used to monitor the fetal heart intermittently.

- During the second stage this is usually undertaken immediately after a contraction, with some readings being taken through a contraction if the woman can tolerate this.

Maternal condition

- Maternal pulse rate is usually recorded half-hourly and blood pressure every few hours, provided that these remain within normal limits.
- If the woman has an epidural in situ, blood pressure will be monitored more frequently, and continuous electronic fetal monitoring will probably be in use.

Maternal comfort

- The woman should be encouraged to pass urine at the be-

ginning of the second stage unless she has recently done so.

Preparation for the birth

- A clean area should be prepared to receive the baby, and waterproof covers provided to protect the bed and floor. Sterile cord clamps, a clean apron, and sterile gloves are placed to hand. In some settings, sterile gowns are also used.
- An oxytocic agent may be prepared, either for the active management of the third stage if this is acceptable to the woman, or for use during an emergency.
- Neonatal resuscitation equipment must be thoroughly checked and readily accessible.

Birth of the baby

- With each contraction the head descends. As it does so the superficial muscles of the pelvic floor can be seen to stretch, especially the trans- verse perineal muscles.
- The head recedes between contractions, which allows these muscles to thin gradually.
- Midwives place their fingers lightly on the advancing head to monitor descent and prevent very rapid crowning and extension, which are believed to result in perineal laceration.
- Once the head has crowned, the woman can achieve control by gently blowing or 'sighing' out each breath in order to minimize active pushing.
- The head is born by extension as the face appears at the perineum.

THIRD STAGE OF LABOUR

Physiology and care during the third stage of labour

- The third stage can be defined as the period from the birth of the baby to complete expulsion of the placenta and membranes.

Separation And Descent Of The Placenta

Mechanical factors

- Retraction of the oblique uterine muscle fibres exerts pressure on the blood vessels so that blood does not drain back into the maternal system.
- As the surface area for placental attachment reduces, the relatively non-elastic placenta begins to detach from the

uterine wall.

Haemostasis

Control bleeding is achieved by:

a) Retraction of the oblique uterine muscle fibres in the upper uterine segment through which the tortuous blood vessels intertwine.

b) The resultant thickening of the muscles exerts pressure on the torn vessels, acting as clamps, and preventing haemorrhage.

c) The presence of vigorous uterine contraction following separation brings the walls into apposition in that further pressure is exerted on the placental site.

d) There is a transitory activation of the coagulation and fibrinolytic systems during, and immediately follow-

ing, placental separation.

e) Breast-feeding the release of oxytocin from the posterior pituitary in response to skin-to-skin contact between mother and baby, and the baby's nuzzling at the breast, causes uterine contractions

Expectant (or physiological) care during the third stage of labour (EMTSL)

- Maintain a calm, quiet, warm environment. Use warmed sheets or blankets to wrap mother and baby together, skin-to-skin.
- This close contact, and the baby's eventual nuzzling at the breast, will stimulate oxytocin release, which may shorten the third stage and increase breast-feeding on discharge.
- Maintain the woman in a comfortable, semi-upright posi-

tion (at least a 45° angle) to encourage placental separation by maintaining a gentle downward weight.

- Facilitate this time of parent–baby discovery and attachment by keeping quiet, observing from a distance and not interfering with the physiological processes.
- Watch and wait. Take cues from the woman's behaviour; if she is alert and happy, examining the Signs of placental separation:
  - **a.** The woman may fidget, make a face, or state that she has a contraction.
  - **b.** large 'gush' of blood may follow, indicating partial or complete separation of the placenta.

Signs of placental descent:

- The woman may wriggle, change position, or complain of

pressure, or a pain, in her back or bottom.

- ✓ The cord may lengthen and/or the walls of the vulva may bulge as the placenta descends.
- ✓ The uterus becomes hard, round and mobile

BIRTHING THE PLACENTA:

Active management of the third stage of labour (AMTSL)

- An active management policy usually includes the routine prophylactic administration of a uterotonic agent, either intravenously, intramuscularly or (occasionally) orally, as a precautionary measure aimed at reducing the risk of postpartum haemorrhage.

1. ***Combined ergometrine and oxytocin (a commonly used brand is Syntometrine)***

- A 1 ml ampoule contains 5 IU of oxytocin and 0.5 mg ergometrine and is administered by i.m. injection. Oxytocin

2. *Oxytocin (a commonly used brand is Syntocinon)*

- It is the recommended and commonly used uterotonic agent in kenya.
- Is a synthetic form of the natural oxytocin produced in the posterior pituitary, and is safe to use in a wider context than combined ergometrine/oxytocin agents.

3. *Prostaglandins*

- Misoprostol orally or sublingually (400–600 μg) appears to be a useful drug to prevent PPH, but is not as effective as Syntocinon and has unpleasant side-effects, such as severe shivering and higher temperature.

- Its use appears to be no more likely than Syntocinon

Clamping of the umbilical cord

- If the cord is looped several times around the neck it will be possible to gently tighten one, or more, of the loops of cord and then ease a looser loop over the baby's head.
- In this way, the baby's oxygen supply is not cut off prematurely, which could be very detrimental to their condition.
- If this is not successful, the midwife can be ready to clamp and cut the cord just as the woman starts a contraction, so that the oxygen supply is cut off only just before the birth.

Delivery of the placenta and membranes

Controlled cord traction (CCT)

Before proceeding, the midwife should check:

- ✓ that a uterotonic drug has been administered
- ✓ that it has been given time to act
- ✓ that the uterus is well contracted
- ✓ that counter-traction is applied
- ✓ that signs of placental separation and descent are present.

- As the placenta separates and falls into the lower uterine segment there is a small fresh blood loss, the cord lengthens, and the fundus becomes rounder, smaller and more mobile as it rises in the abdomen above the level of the placenta.
- No further step should be taken until a strong contraction is palpable. If tension is applied to the umbilical cord without this contraction, uterine inversion may occur.

Controlled cord traction (CCT)

- ✓ Once the uterus is found to be contracted, one hand is placed above the level of the symphysis pubis with the palm facing towards the umbilicus, exerting pressure in an upwards direction.
- ✓ This is counter-traction. The other hand, firmly grasping the cord, applies traction in a down- ward and backward direction following the line of the birth canal.
- ✓ Once the placenta is visible it may be cupped in the hands to ease pressure on the friable membranes.
- ✓ A gentle upward and downward movement or twisting action will help to coax out the membranes and increase the chances of delivering them intact.

COMPLETION OF THE THIRD STAGE

Careful inspection of the perineum and lower vagina is important. A strong light is directed onto the perineum in order to assess trauma accurately prior to instigating repair.

Blood loss estimation

Account must be taken of blood that has soaked into linen and swabs as well as measurable fluid loss and clot formation.

Examination of placenta and membranes

- ✓ A thorough inspection must be carried out in order to make sure that no part of the placenta or membranes has been retained.
- ✓ The membranes are the most difficult to examine as they become torn during the birth or delivery and may be ragged.

- ✓ Every attempt should be made to piece them together to give an overall picture of completeness.
- ✓ This is easier to see if the placenta is held by the cord, allowing the membranes to hang.
- ✓ The hole through which the baby was born can then usually be identified and a hand can be spread out inside the membranes to aid inspection
- ✓ The placenta should then be laid on a flat surface and both placental surfaces minutely examined in a good light.
- ✓ The amnion should be peeled from the chorion right up to the umbilical cord, which allows the chorion to be fully viewed.
- ✓ The lobes of a complete placenta fit neatly together without any gaps, the edges forming a uniform circle.

- ✓ Blood vessels should not radiate beyond the placental edge. If they do, this denotes a succenturiate lobe, which has developed separately from the main placenta

Immediate care

- Early physiological observations including ensuring a well-contracted uterus, assessment of vaginal blood loss and a gentle inspection of the genital tract to inspect for trauma should be undertaken
- The woman should be encouraged to pass urine because a full bladder may impede uterine contraction.
- Uterine contraction and blood loss should be checked on several occasions during this first hour. Most women intending to breastfeed will wish to put their babies to the breast during these early moments of contact.

NORMAL PUERPERIUM

Definition

Puerperium is the period following child birth. This is characterized by the following features:

- ✓The generative organs return back approximately to their pregravid state both anatomically and physiologically.
- ✓Lactation is initiated.
- ✓Recuperation from the physical, hormonal and emotional experience of parturition. This period is also known as post-partum, post-natal, post-delivery period.
- ✓Puerperium begins as soon as placenta is expelled and lasts for six weeks through the process of involution.

Physiological And Emotional Changes In Puerperium

1. Physiological Changes in Reproductive System

Now let us discuss the physical adaptations which takes place after the third stage of labour is completed. There is involution of reproductive organs specially in uterus.

i) INVOLUTION OF UTERUS

- ✓After the delivery uterus becomes firm and retracted with alternate hardening and softening. The uterus measures about 20×12×7.5 cm(length, breadth and thickness) and weighs about 1000 gms. At the end of 6 weeks it return to pregravid size of 7.5×5×2.5 cm and weighs 60 gms.
- ✓This reduction in weight and size is not in the number

of cells but also size of the same cells through the process autolysis of the muscle fibres and ischaemia of the uterus.

a. ***Reduction of the size:*** After labour, fundus is 5 cms below umbilicus or 12 cms above the symphysis pubis. After 24 hrs at the level of umbilicus. After 1 week 7.5 cms above the symphysis pubis and 12 days after labour the fundus is not usually palpable.

b. ***Position of the uterus:*** Uterus begins to descent into the pelvic cavity at a rate of about 1 cm a day until the 10th day, when it may be palpated at or below the level of symphysis pubis.

c. ***Consistency of the uterus:*** The strong frequent myometrial contractions that control blood flow to the uterus cause it to become hard. It should feel firm and round.

d. ***Endometrium:*** The major part of decidua is cast off along with the placenta and membranes, more that the placental sites, only the basal portion of the decidual remains. The superficial part containing the degenerative decidua, blood cells and bits of foetal membrane become necrotic and is cast off in lochia.

ii) CERVIX

It may take few weeks to revert back to normal shape and size of the isthmus. By the first post-partum day cervix has

sufficiently narrowed and regained its normal consistency to admit two fingers and by the end of first week narrows down to admit the tip of a finger only.

iii) VAGINAL CANAL

- The vaginal canal appears swollen and smooth after delivery, gradually becomes smaller and firm, never regains pre-pregnancy size, rugae partially reappears at third week but never to the same degree as in pregnant size.
- The introitus remains permanently larger than the vaginal state.
- The hymen is lacerated and is represented by nodular tags

iv) PERINEUM

- Muscle of the floor of perineum are stretched, swollen bruised. Even an intact perineum can be edematous, erythematous and uncomfortable.
- A scar may be present if episiotomy was performed.

v) OVARIES

- The ovaries are inactive during the last two trimesters of pregnancy, because of the drop in placental hormones level and gradually resumes the pre-pregnancy cycle.

vi) LOCHIA

- It is the vaginal discharge for the first fortnight during puerperium. It orginates from the uterine body, cervix and vagina.

- It contains blood, decidual tissue, epithelial cells from the vagina mucus, bacteria and on occasion, fragments of membranes and small clots.
- Its odour is fleshy but not offensive. Various types of lochia are:
  - ***Lochia Rubra:*** The first phase of lochia when discharge is red and bloody called lochia rubra means 'red'. Lasts from 1-4 days, may contain few small blood clots.
  - ***Lochia Serosa:*** Occurs next 5-9 days, the colour is yellowish pink or pale brownish.
  - ***Lochia-Alba:*** Pale white because of the presence of leukocytes, lasts from 10-14 days. The colour of lochia indicates the healing stage of the placental site.

The average amount of discharge for the

first 5-6 days is about 250 ml

Importance of Inspecting Lochia

- ✓It gives information about the puerperal state of the mother – pads to be inspected daily.
- ✓*Odour:* If offensive – infection, retained cotton piece or plugs to be kept in mind.
- ✓*Amount:* Scanty or absent – infection.
- ✓*Colour:* Persistence red – subinvolution retained bits of conception.
- ✓*Duration:* Lochia alba beyond three weeks suggestive of local lesions

vii) BREASTS

- For the first few days both breast feeding and non-feeding

breasts of women secrete colostrum, a creamy yellow precursor to milk, but the breasts remain soft and non-tender.

- Three days after delivery in response to increased prolactin level breasts become firm and tender and milk supply is initiated.
- They rapidly become distended, hard and warm because of increased flow, venous and lymphatic congestion called physiological engorgement, lasts about 24-48 hours and will resolve spontaneously, suckling by the baby stimulates ongoing milk production.
- The breast will remain firm, full and somewhat tender until emptied by nursing.

Physiology of lactation

- Lactation is under the control of numerous exocrine glands, particularly the pituitary hormones prolactin and oxytocin.
- It is influenced by the sucking process and by maternal emotions. Lactation, the process of breasts feeding results from interplay of hormones, instinctive reflexes and learned behaviour of the mother and newborn.
- The establishment and maintenance of lactation is determined by three factors:
  - ✓The anatomical structure of the mammary gland and development of alveoli, ducts and nipples (already studied in Unit on Anatony of Physiology of Breasts).
  - ✓The initiation and maintenance of milk secretion, and
  - ✓Milk ejection or propulsion of milk from the alveoli to the nipple.

Stages Of Lactation

Lactogenesis (milk initiation):

- It begins during the later part of pregnancy. Colostrum is secreted as a result of stimulation of the mammary alveolar cells by placental lactogen, a prolactin-like substance.
- It continues after birth as an automatic process. The continued secretion of milk is related to:
  - ✓Sufficient production of pituitary hormone prolactin.
  - ✓Maternal nutrition.
- Movement of milk from alveoli to the mouth of infant is an active process within the breast called “let down reflex” or “milks ejection reflex”.
- This reflex is a response to an infant’s sucking on the

breast. The sucking stimulates the post-pituitary gland to secret oxytocin.

- Under the influence of oxytocin, the cells surrounding the alveoli contract propelling the milk through the ductal system into the infant's mouth.
- **Colostrum:** A yellow, premilk substance, high in protein and contains antibodies. Its production decreases gradually after childbirth and production of true milk begins.
- The bluish white true milk usually comes in between 3rd and 5th post-partum day.
- The milk at the beginning of the feeding is known as fore milk which contains less fat and flows at a faster rate than at the end of the feeding, the hind milk.
- Hind milk is white and contains more fat, calories and is believed to satisfy the infant and signal that the feeding

should come to an end.

- **The last stage** of human lactation is ingestion of milk by the suckling baby. The full term healthy new born baby possesses three instintive reflexes needed for successful breast feeding:
  - ✓ The rooting reflex,
  - ✓ The sucking reflex, and
  - ✓ The swallowing reflex.

Maternal Breast Feeding Reflexes

- There are three major maternal reflexes involved in breast feeding which are:
  - ✓ Secretion of prolactin,
  - ✓ Nipple erection, and
  - ✓ The let down reflex.

- **Prolactin:** It is considered as the key lactogenic hormone initiating and maintaining milk secretion. Its production by the non-pituitary is mainly the result of the prolactin reflex resulting from the infant's suckling at the breasts.
- The sucking stimulus provided by the baby sends a message to the hypothalamus.
- Hypothalamus stimulates the anterior pituitary to release prolactin, the hormone that promotes milk production in the alveolar cells of the mammary gland.
- Stimulation of breast nipple by infant's mouth leads to nipple erection and prominence.
- The nipple erection reflex assists in the propulsion of milk through the lactiferous sinuses to the nipple pores.
- **The ejection of milk** from the alveoli and milk ducts occurs as a results of the milk- ejection of letdown reflex

which is regulated in part by the CNS.

- The suckling stimulus arrives at the hypothalamus, which promotes release of oxytocin from the post-pituitary. Oxytocin stimulates contraction of the my epithelial cells around the alveoli in the mammary glands.
- Contraction of these muscle-like cells causes milk to be propelled through the duct system and into the lactiferous sinuses where it becomes available to the breast feeding infant.

Let down reflex

- The let down reflex appears to be sensitive to small differences in circulatory oxytocin levels. Signs of let down reflex is easily recognized by mothers.
- It is characterized by a tingling sensation that progresses

to a feeling of pulling or of being squeezed from the inside.

- Many women will feel this reflex by simply thinking about their baby or cry of their baby. It seems to be somewhat consciously controlled.
- Sign includes milk dribbling from the breast opposite to the one being used and uterine cramping during feeding caused by the action of oxytocin on the uterus.
- Minor emotional and psychological disturbances may influence the ease with which breast milk is released to the baby.
- The attitude of mother towards breast feeding whether positive, doubtful or negative is a powerful factor in achieving successful lactation, influencing milk production and facilitating the art of breast feeding.

Cultural Aspects of Lactation

- The nurse should also consider the cultural background of the client to provide proper assistance to a new mother from a different culture and should become aware of that culture's practice.

Stimulation of lactation:

- Following methods can be adopted to improve adequate milk yield:
- During pregnancy:
  - ✓ To improve the maternal instinct to nurse the baby, explaining the advantages of breast feeding to the mother.
  - ✓ Care and preparation of nipples.
  - ✓ Teaching the mother how to express out the colostrums and take care of crust formed on the nipples.

Following delivery:

- ✓ To allow the baby to put to the breast at 4-6 hours interval for 3-5 minutes from the first day.
- ✓ Plenty of fluids to drink.
- ✓ To avoid engorgement and trapping of milk, manual expression prior to nursing.

Suppression of lactation:

- In case baby is born dead, dies in the neonatal period or when the mother does not like to breast feed her baby or it is contraindicated.
- This can be effective, either by using hormones or by mechanical means.

a) ***Hormones***: Use of hormones is effective if started soon after delivery. It suppresses lactation through in-

hibition of pituitary hormone. The drugs used are Tab ethynyl oestradiol 0.05 mg thrice daily for 5 days or combination of testosterones and oestrogen preparations etc. as prescribed.

b) ***Mechanical***: This is effective where the lactation is to be suppressed after the esablishment of milk secretion:

- ✓ Patient should stop breast feeding.
- ✓ Should not express or pump out the milk from the breast.
- ✓ A tight compression bandage or binder on breasts for 2-3 days.
- ✓ Analgesic tablets containing aspirin and may be given to relieve pain.

METHODS OF INFANT FEEDING

- Breast milk is the best form of nutrition for a newborn baby however if the mother cannot feed her baby at the breast or the baby requires a supplement in addition to breastfeeding, there are alternative feeding methods available i.e. syringe feeding, cup feeding or bottle-feeding.

The oral feeding methods available to us are of two main types:

1. Baby-lad
2. Carer-led

Baby-led feeding method

- This method is where the baby controls the length and amount of feed taken

Carer-led feeding method

This method is where milk is actively put into the baby's mouth and he has no control of the amount or the pace of the feed.

- ✓Cup feeding.
- ✓Syringe feeding
- ✓Spoon feeding
- ✓Dropper feeding
- ✓Bottle. (This method is not encouraged as it can at times lead to breast/ teat confusion)

Whatever feeding method is chosen, it should always be:

- ✓Discussed with the parents and detailed information given on the different feeding methods available.
- ✓Safe for the baby.
- ✓A method that will help the baby to breastfeed

- ✓Compatible with the baby's age,sizeand condition.
- ✓Easy to the parent to use
- ✓Appropriate for the leng th of time it will be used.

CUP FEEDING

- It is simple, practical and a safe method of feeding babies. One of its advantages is that it is baby-led not carer-led.
- Cup feeding also involves tongue movement that is similar to the tongue movement that occurs during breastfeeding

Advantages

- ➢Baby-led. Baby can pace his own intake in time and quantity.
- ➢Stimulates the development of the suck and swallowing reflexes.

- Saliva and lingual lipase stimulated leading to a more efficient digestion of breast milk.
- Little energy used.
- Easy method of feeding.

Disadvantages

Babies tend to dribble

- ✓Term babies can become addicted to the cup if they are not offered the breast regularly.
- ✓If the cup is held too tightly in contact with the baby's lips the skin can become broken (not common but can occur if the cup has a sharp rim).

NB *A cup feed should not replace breastfeeding without a very good reason*

SYRINGE FEEDING

- A variety of syringes can be used to give oral feeds. An appropriate-sized syringe should be used to accommodate the amount of milk that the newborn baby requires.

Method

- ✓The baby should be wrapped.
- ✓The baby should be in a semi-upright position.
- ✓The baby's breathing and swallowing needs to be well coordinated and needs to be observed and monitored throughout the feed.
- ✓Milk should never be put directly on to the baby's tongue.
- ✓The syringe should be placed in the baby's mouth and directed towards the baby's cheek

- ✓A small amount of milk should be **slowly** administered to the baby. This helps to prevent aspiration, which is always a danger when the baby cannot control the amount given to him.
- ✓The baby should not be fed by syringe if he is lying down.
- ✓Syringes can also be used to encourage babies to breast-feed:
- ✓The baby should be positioned at the breast close to the mother's nipple and areola.
- ✓A little EBM can be dripped onto the nipple area from the syringe.
- ✓The baby can then be encouraged to lick
- ✓the milk from the nipple.
- ✓If successful attachment is achieved then the syringe

can be discontinued.

This method can be useful for babies who are reluctant at the breast as well as for premature babies who are learning to breastfeed

Physiological Changes in Other Systems of Body

Cardiovascular Function

Volume adjustment:

- During pregnancy blood increased by 30% to 50%. During vaginal birth and placental delivery woman loses about 500 ml of blood, 1000 ml during cesarean birth.
- Without the extra blood vessels of the uterus and placenta, blood is returned to the central circulation.
- Cardiac output increase 25% to 80% depending on the

type of delivery with resultant increase in stroke volume (SV). This required special attention in woman with cardiac problem.

Heart rate:

- During pregnancy heart rate increases to 15 beats per minute and the SV is also increased, thus improving cardiac output (CO) to effectively circulate a larger blood volume in the expanded uterine and placental vascular bed.
- After delivery, body attempts to compensate for increase central venous load, slowing the heart rate to as low as 40-60 beats per minute to control CO and prevent systematic overload and hypertension.

Blood pressure:

- Blood pressure may decrease in the early recovery period in response to anesthesia, blood pressure etc. orthostatic hypotension may occur because of fluid shift and decreased intra-abdominal pressure.
- It returns to normal within first week after delivery unless the women experience complications such as pregnancy induced hypertension.

Hemoglobin and Hematocrit:

- Hematocrit may rise in the first 3-7 days gradually return to normal levels by 4-5 weeks as old cells die out and fewer new ones form. Non-pregnant levels are reached by 5-8 weeks.

***White blood counts**:*

- Normal adult WBC count is between 5000 and 10000/mm^3. Count rise during pregnancy and labour up to the level of 15,000 to 20,000/mm^3.
- According to expert load is acceptable upto 40,000/mm3 for the first 24 hours to 48 hours post-partum. It falls to normal in 4-7 days. Persistent elavation indicates infec-tion

***Coagulation factor** :*

- Clotting factor increase near term and remain high in immediate post- partum period.
- Platelet, fibrin and fibrinogen levels are elevated during recovery. Their function is to protect against bleeding caused by delivery of foetus and placenta. But they also

contribute to thrombus if the woman is immobile. All levels return to normal in 3-4 weekS

Respiratory Function

- After delivery with the decrease in abdominal pressure, the diaphragm descents to its normal position permitting better lung expansion and ventilation but the respiratory rate does not noticeably change.

Excretory Function

- Body water in the extra-vascular spaces and excess plasma volume from the pregnancy are rapidly eliminated. But the second post-partum day diuresis and polyurea occur, upto 3 litre/day urine is passed for few days and within one week returns to normal voiding pattern.

- Bladder increases its capacity, filling upto 1000 or 1500 ml of urine without discomfort.

Gastrointestinal Function

- Increased thirst in early puerperium is due to loss of fluid during labour, lochia, diuresis and perspiration. Slight intestinal paresis leads to constipation.
- Lack of tone of the perineal and abdominal muscles and reflex pain in the perineal region are contributing factors for constipation.

Integumentary Function

- Striae gravidarum may fade to a silvery colour in light skinned women but they remain deeper on darker skin.
- The linea nigra and darkened areola fade, but in some

women faint traces will persist. In few months hair and nail growth will return to pre-pregnant pattern.

Musculo-skeletal Function

- Women may be fatigued or exhausted after labour. The labour position and pushing technique may leave arms, neck, shoulders and perineal muscle sore and aching.

Abdominal muscles:

- Uterine ligaments remain loose and relaxed, abdominal muscles have less tone, resulting in soft, flabby abdomen. Exercise may help but restoration of the muscles may be prolonged.

Joints:

- Under the influence of relaxation, the pelvis joints particularly the symphysis pubis may separate slightly during labour, causing pain and discomfort, becomes stabilized by 6-8 weeks

Endocrine Functions

Menstruation and Ovulation

- Cycles can begin in lactating mothers as early as 8 weeks after delivery or as late as 18 months

Immunologic Function

Infection

- Puerpral women are at special risk for wound infection and infections of uterus, urinary tract, respiratory tract or breast.

- Puerperal sepsis is the most common post-partum infection of the genital tract in the post- partum period appearing before the 10th day after delivery.
- An elevated temperature in the first 24 hours after delivery may be caused by dehydration fatigue, chilling and blood loss.
- The temperature may be as high as 38o c is considered within normal limits.
- If temperature remains high after the first day, cause must be found and treated especially if there is history of premature rupture of membranes, long or traumatic labour and delivery.

Psychological Adjustments And care in Puerperium

Attachment:

- Parent-infant attachment leads to bonding depending on infant's responsiveness. This encourages them to continue interaction.
- Bond formation is an outgrowth of reciprocal attachment stimulus-response and affectional ties that help form a constructive social relationship.

Maternal Development Tasks:

- After delivery the mother is exhausted and needs rest and sleep and during the first and second day she will be taking in all the experiences of labour and delivery and asking many question.
- Her physical needs and deficits of nourishment and needs of her infant should be met.
- She is usually eager to learn how to care for the child and

herself.

Potential for Mood Changes:

- The first few days, even to 10-14 days would be considered a period of "normal" crisis and disequilibrium especially for the first time mothers.
- **The Blues:** Many mothers may experience mood swings known as the "Post-Partum Blues" episodes of unexpected crying, sensitivity and sadness generally 3-7 days after delivery due to fatigue and hormonal shifts and last for 1-2 weeks. The reason is drop in the level of hormone estrogen and progesterone.
- **Post-partum Depression:** Beginning 2 weeks after delivery more severe symptoms characterize post-partum depression may be due to lack of sleep, additional responsi-

bilities and discomforts if infection or pain.

MANAGEMENT OF NORMAL PEURPERIUM

Care of Mother

- The management of puerperium consists of providing the means whereby the woman can recuperate physically and emotionally and gain supervised experience in the care of her infant.
- This consists of the following principles:
  - ✓To restore the health status of mother.
  - ✓To prevent infection.
  - ✓To take care of breasts including promotion of breast feeding.
  - ✓To provide for care of the baby.

✓To motivate and guide for family planning.

✓To give need based health education.

Immediate Care

- The first hour after delivery does not end the recovery process. The clinical phase of recovery continues throughout hospitalization and weeks after discharge.
- During this time accurate observations, nursing history and physical assessment allow formation of appropriate nursing diagnosis and effective plan of care. These may be as follows:

Initial observations

✓First impression of woman provide an overview of how

she is recovering of childbirth. Her general appearance and presence of pain, her colour reflects circulation and perfusion.

- ✓Observe her for pallor, flusting or cynosis.
- ✓Note whether she is very fatigue, quiet, excited or anxious. Is she looking comfortable or in distress.
- ✓Assess the I/V line in place, amount of fluid and medication etc. If she had surgery?
- ✓Whether the Folley's catheter is in place? Is she concerned about the baby and herself?

Physical Assessment

- It should be provided in the following order:
- ***Vital signs:*** Take pulse, respiration and blood pressure. Temperature is taken to ensure that woman is not dehy-

drated and to rule out infection.

- Post-partum checks include vital signs every 15 minutes for one hour, then 30 minutes in the second hour and then every 4 hours for 24 hours.
- ***Uterus:*** For vaginal delivery, check the fundus for consistency, height and descent. Measurement of abdominal girth after lower segment caesarian section(LSCS).
- ***LSCS:*** check the dressing for presence of bleeding.
- ***Perineal area:*** Check perineal pad for amount, colour of lochia, odor, clots, intact sutures, odema, pain and anus for any repaired lacerations or haemorrhoids.
- ***Rest and ambulation:*** For most of the woman 8-12 hours of rest is enough following delivery. She is able to feed the baby, move out of bed and go to toilet. Now-a-days early ambulation is followed because of the following

advantages:

- ✓Provides a sense of well being
- ✓Reduces bladder and bowel complications.
- ✓Facilitate uterine drainage and involution.
- ✓Reduces puerperal venous thrombosis and embolic phenomenon.
- ✓Early ambulation does not mean return to normal activities. These should be restricted for at least 6 weeks.
- ✓During this period she should take as much rest as possible, avoid strenuous work like lifting, staining and pushing heavy things.
- ✓If normal delivery lies down for sometime in prone position to help in anteversion of uterus. Take at least 2 hours of rest after midday meals.

- ***Diet:*** The woman should be given light diet on the first

day and normal diet from the second day. The lactating mother should be given high calories, adequate proteins, fats, mineral, vitamins and plenty of fluids, and green leafy vegetables. The mother must consume iron, folic acid and calcium also. In a non-lactating mother normal diet is enough.

- ***Care of bladder:*** The woman is encouraged to pass urine within 6-8 hours following delivery and then after 4-6 hours interval. Many times woman do not pass urine because of the following reasons:
  - ✓Lack of privacy and unaccustomed position.
  - ✓Reflex from perineal injuries.
- Patient may be allowed to use the toilet. If fails to pass urine catheterization should be done.
- It can be done in incomplete emptying of the bladder be-

cause of residual urine more than 60 ml. Continuous drainage is kept until the bladder tone is regained to prevent infection and cystitis.

- ***Care to bowel:*** Abdomen should be visually inspected for distension, palpated for firmness or rigidity and auscultated for the presence of bowel sound specially after surgical delivery. Ask the woman if she is able to pass flatus and feel urge defecate.
- ***Care of breast:*** Breast and nipples to be washed and cleaned with water, and soap to be applied while taking bath. Supporting brassiere of right size to be worn for proper support. If proper care has not been taken during antenatal period dried scales formed by the breast secretions may become firmly adherent closing the duct openings.

- ***Sleep:*** The amount of energy spend during labour and birth leaves the mother in need of rest both physical and mental. She should be protected against worries and fatigues.
- If there is some discomfort such as after pains, engorged breast should be dealt with adequate analgesics as necessary. Child care should be planned so that mother can rest while other members of family to be encouraged helping her rest.
- ***Care of the vulva and episiotomy wound:*** After delivery vulva and buttocks are washed with saline, lotion or soap and water. Antiseptic ointment or lotion applied over the episiotomy sterile pad given.
- This should be done at least 3-4 times a day with the each act of micturation and defecation. This will also relieve

pain.

- Cold compresses are applied for the first 24 hours to prevent and decrease odema and diminish local sensation. Some women feel more comfortable with warm water sitz bath.

Postnatal Exercises

The objectives of post-partum exercises are:

1) To improve the muscle tone which have stretched during pregnancy and delivery, the abdominal and perineal muscles.
2) To teach about the correct posture to be maintained while getting up from the bed and practice correct principles of lifting and working during daily activities. (Refer

to the unit on post-natal exercises)

Health Checkup and Advices on Discharge

Health Checkup

- Thorough health checkup of mother and baby prior to discharge.
- Examination includes checkup of vitals, anaemia, breast condition, progress of involution and lochial discharge.
- Inspection of perineal wound if present.
- Complete checkup of the body – general condition, weight, feeding of the baby, immunization status and any congenital abnormalities to be treated.

Advices on Discharge

- ✓Measures to improve general health of the mother, continuation of supplementary therapy.
- ✓Breast care, personal hygiene.
- ✓Post-natal exercises to be done at least for 6 weeks.
- ✓Breast feeding demand/schedule, exclusive till 6 months.
- ✓Care of newborn baby vaccinations to be done.
- ✓Abstinence for intercourse for 6 weeks.
- ✓Family planning advice and guidance to prevent accidental pregnancy.
- ✓Post-natal checkup after 6 weeks.

Role Of The Midwife In Postnatal Care.

The role of nurse midwife during postnatal period is to pro-

vide care and support to the mother and baby based on the following principles :

a. Promoting physical and psychological well-being of the mother, her baby and the family unit.
b. Identification of deviation from normal physiological or psychological progress and make prompt referral as required.
c. Encourage sound methods of infant care and feeding and prompt development of effective parent-infant relationship.
d. Support and strengthen woman, her husband and family's confidence within their family and culture environment.
e. Monitor progress of mother and child according to the needs, expectations and attitudes of a particular mother

and baby.

f. Promotion of a relaxed environment conducive to establish effective communication between mother and her family.
g. Provide non-judgemental approach, offer guidance, advise whenever necessary. Not to make decisions on behalf of the woman or convey disapproval of her decision.
h. Promote breast feeding whenever possible. Respect individual choice and support the mother concerning method of feeding. In case of artificial feeding advise about preparation and sterilization equipment.

PREVENTION OF MOTHER TO CHILD TRANSMISION OF HIV/ AIDS (PMTCT)

INTRAPARTUM CARE

a) Avoidance of early artificial rupture of membranes (AROM)
b) Avoidance of routine episiotomies
c) Non-traumatising vaginal operative delivery
d) Proper Use of the Partogram
e) Vaginal cleansing
f) Active management of the third stage of labour
g) Avoidance of foetal scalp puncture

Care of the newborn

Blood and vaginal secretions of the mother are infectious to the newborn. To limit the risk of transmission of HIV from mother to child, it is recommended to:

- ✓ Wipe the infant's mouth and nostrils with cotton when the head is delivered to remove infectious se-

cretions and blood

- ✓ Clamp the cord immediately after birth and avoid milking the cord
- ✓ Use suction only in cases of meconium-stained liquor; in this situation use soft manually operated suction, as electrically operated suction can more easily create small wounds and an entry point for HI

Other important elements of care for the newborn include the following:

- ✓Wipe the infant dry with a towel and establish skin-to-skin contact with the mother
- ✓Keep the infant covered as much as possible to maintain warmth
- ✓As for any infant, exposed infants should receive 1% tet-

racycline eye ointment or 1% silver nitrate eye ointment as prophylaxis against ophthalmia neonatorum, as well as Vitamin K 0.5mg IM immediately after birth

- ✓Exposed infants should also receive Nevirapine prophylaxis as soon as possible after delivery, irrespective of the infant's age (see chapter 5)
- ✓Support the mother to initiate infant feeding within the 1st hour of life

Before discharge:

- ✓Give the newborn all routine recommended immunizations.
- ✓Counsel the mother on the importance of co-trimoxazole prophylaxis starting at 6 weeks
- ✓Counsel the mother on the importance of Nevirapine

prophylaxis for the infant while breastfeeding

- ✓Women on ART and those who are not going to breast-feed should be reminded to stop infant Nevirapine prophylaxis at 6 weeks of age.
- ✓Counsel the mother on the need for a DNA PCR at 6 weeks of age and discuss where to take the child for the test.
- ✓Encourage early intervention for any infections or illness

POSTPARTUM CARE

- HIV infected women who have just deliver need the same postpartum care as uninfected women. The postpartum period is a critical transitional time for women, their new-borns and families.
- Ideally a skilled health worker should care for the mother

and newborn together in the postpartum period.

- Important components of postpartum care at six hours and seven days (one week) after delivery for the new mother and infant are outlined below.
- Annex 2 provides a package of services for women and infant during recommended subsequent follow- up visits.

Care before discharge from the health facility

✓Continue micronutrient supplementation for the mother with iron, folate, and Vitamin B complex

✓Offer HIV testing as soon as possible if not done alread.

✓Initiate Nevirapine prophylaxis immediately for the infant in case of a positive test result.

✓Women with advanced HIV disease are at higher risk for complications such as infection or severe anaemia; spe-

cial attention should be given to the following before discharge from the health facility:

a. Signs and symptoms of postpartum infection: pain on passing urine; fever; foul-smelling lochia; cough; sputum; shortness of breath; redness, pain, pus, or drainage from vaginal lacerations, episiotomy site, or caesarean section incision; lower abdominal tenderness.

b. Signs and symptoms of severe anaemia: pallor; tachycardia; shortness of breath; fatigue

Early post-partum care (one week post delivery):

- HIV infected women should be seen for the first postpartum visit 7 days after delivery. Issues to address at this visit include:

a) Interventions for the mother:

History

- ✓ Any current complaints or any danger signs?
- ✓ Post partum history: Is the lochia decreasing? Is there any abdominal pain?
- ✓ Care and treatment for HIV: Has the mother continued using her ARVs since delivery? When is her next CD4 count or appointment for HIV care planned?
- ✓ What is her tetanus toxoid status?
- ✓ Infant feeding: How is it going? Is she practising her feeding method of choice exclusively? If exclusively breast feeding, are there any nipple or breast complaints? When and how does she plan to wean? If exclusively replacement feeding, are the feeds be-

ing prepared appropriately and hygienically? Ensure that she is not mixed feeding.

b) Interventions for the infant

History

- ✓Was the infant immunized at birth?
- ✓Is the infant still taking Nevirapine, and for how long should the child take it?
- ✓Are there danger signs for the newborn?

Physical examination

- ✓Check respiratory rate, pulse, and temperature
- ✓Check the infant's weight
- ✓Check the infant's general condition (respiratory effort, alertness, tone, nutrition, hydration, pallor, reactivity, cry)

✓Check the cord: Is there any bleeding or oozing pus?

c) Counsel on:

- Danger signs for the mother and infant during the postpartum period
- Birth spacing plan and family planning
- Complication readiness
- Nutrition
- Infant feeding
- Safer sex
- Early infant diagnosis of HIV
- Co-trimoxazole prophylaxis for the infant at 6 weeks of age
- Counsel on continuation of Nevirapine prophylaxis for 6 weeks for infants of mothers on ART and

those who have opted not to breastfeed

- Counsel on continuation of Nevirapine prophylaxis until one week after cessation of all breastfeeding for infants of mothers who are not on ART
- Infant follow-up: growth, development, clinical monitoring, immunizations
- Early infant diagnosis of HIV using DNA PCR test at 6 weeks of age or as soon as possible thereafter.

ANTIRETROVIRAL REGIMENS FOR PMTCT

- Antiretroviral drugs, used for prophylaxis, decrease viral replication and viral load and significantly reduce the risk of mother to child HIV transmission.

- Combination ARV prophylaxis is recommended for PMTCT for all women who do not meet the eligibility criteria for ART.
- HIV positive pregnant women with clinical Stage 3 or 4 disease or with Clinical Stage 1 or 2 disease with a CD4 cell count ≤ 350 cells/mm^3 should be started on ART irrespective of gestational age, and continue throughout pregnancy, delivery and thereafter.

ARV PROPHYLAXIS REGIMENS FOR PMTCT (CD4 > 350)

Antepartum

- ***AZT 300 mg BD*** is initiated at 14 weeks gestation, or as soon as possible thereafter, (if Hb is 8 g/dl or above and

the woman does not show any clinical signs of severe anaemia).

- **AZT 300 mg BD** should be initiated even before the CD4 count result has been received. The prophylaxis regimen can later be switched to ART without interruption if the CD4 count result indicates that she is eligible for treatment.

Intrapartum

- The health care worker should confirm that the mother has taken labour doses of prophylaxis and, if not, administer them as follows:
- ***NVP 200 mg, AZT 600 mg (2 tablets),*** and ***3TC 300 mg (2 tablets)*** [***or Combivir 2 tablets***]; then ***AZT 300 mg and 3TC 150 mg (or Combivir 1 tablet)*** 12 hours later if

delivery has not yet occurred.

- It should be ensured that the woman is in active labour before the prophylactic drugs are given.
- The tablets must be taken at least 2 hours before delivery to be effective. If delivery is imminent when the woman presents, (cervical dilatation is complete and presentation is engaged), the tablets should be omitted.

Postpartum

- ***AZT 300 mg BD and 3TC 150 mg BD (or Combivir 1 tablet BD)*** should be given for 7 days. If ***Nevirapine*** was not taken by the mother during labour, these medications are not necessary as their purpose is to prevent maternal resistance to NVP.

Infant prophylaxis

- ***Nevirapine syrup*** (1.5ml if birth weight is ≥ 2.5kg, or 1ml if birth weight is 2 – 2.49kg) should be given immediately after birth (or as soon as possible thereafter), and continued daily at the appropriate dose for age throughout the breastfeeding period (until at least one week after cessation of all breastfeeding).
- For mothers on ART and those who choose to exclusively formula feed their children, ***Nevirapine***
- prophylaxis should be given for 6 weeks only.
- Table 8 below indicates the dosing of infant Nevirapine prophylaxis for age.

Infant dosing of Nevirapine Syrup

Infant Age	NVP Daily Dose
Birth to 6 weeks • Weight < 2kg • Weight 2-2.49kg • Weight ≥ 2.5kg	consult paediatric HIV specialist 1 ml 1.5 ml
≥ 6 weeks to 6 months	2 ml
≥ 6 months to 9 months	3 ml
≥ 9 months to end of breastfeeding	4 ml

CARE OF THE EXPOSED INFANT

- It is extremely important that exposed infants are followed

up closely, monitored for normal growth, development, and general health, and receive co-trimoxazole prophylaxis and the appropriate ARV prophylaxis to prevent MTCT.

- Any signs of HIV infection should be considered seriously and proper care and treatment administered to the infant immediately.
- DNA PCR testing for early infant diagnosis should be performed to allow for appropriate follow-up, treatment decisions, initiation of ART as soon as possible since all HIV infected children ≤ 2 years are eligible for ART regardless of clinical or immunological stage..

HIV TESTING AND COUNSELLING FOR INFANTS AND YOUNG CHILDREN

✓In order to definitively determine HIV status in young in-

fants, a direct (virological) test, such as DNA PCR, is required.

- ✓Every infant born to an HIV positive mother should receive a DNA PCR test to determine their HIV status at birth (this is performed at 6 weeks of age). A serological (rapid, or antibody-based) test is then
- ✓All exposed infants whose mothers are on ART should receive daily NVP from birth (or as soon as possible thereafter) until 6 weeks of age.
- ✓All breastfeeding exposed infants whose mothers are not on ART should receive daily NVP from birth (or as soon as possible thereafter) until 1 week after all exposure to breast milk has ended.
- ✓Infant NVP prophylaxis may be initiated at any age, provided the infant is still breastfeeding.

- ✓All non-breastfeding infants should receive daily NVP from birth (or as soon as possible thereafter) until 6 weeks of age
- ✓**Co-trimoxazole prophylaxis** should be provided to all exposed infants from 4-6 weeks of age, according to the ART guidelines, and continued until HIV infection has been definitively excluded.
- ✓Immunizations should be administered as per the MOHSW guidelines;
- ✓Note that BCG vaccination is contraindicated in known HIV infected infants only; exposed infants without signs or symptoms of HIV

TARGETED POSTNATAL CARE

- **Postnatal care** this is care given to both the mother and the baby from birth in order to reduce the incidence of complications and deaths as well as to promote the health of the mother and baby.
- **The post partum period** for the mother starts after the expulsion of the placenta up to 42 days (6 weeks) after delivery.

Four (4) Targeted PNC Assessments

The following are the recommended timings for PNC for Mother & baby

- Within 48 hours after birth
- Within 1-2 weeks
- Within 4-6 weeks

- Within 4- 6 months

Danger signs in the mother during the postnatal period

- High fever, lower abdominal pain and foul smelling discharge (infection)
- Severe headache blurred vision, High BP, (pre-eclampsia)
- Convulsions or fits (eclampsia)
- Heavy vaginal bleeding (PPH)
- Urinary or fecal incontinence (obstetric fistula)
- Extreme tiredness, Anemia
- Anxiety and depression (puerperal psychosis)
- Breast problems: Engorgement, sore, cracked bleeding or inverted nipples **Note:** Most cited reason for stopping breastfeeding

Other maternal health problems

- ✓ Stress incontinence (long second stage)
- ✓ Backache (long second stage, epidural analgesic)
- ✓ Pelvic pains /pain in symphysis and or legs (relaxation of pelvic joints during pregnancy)
- ✓ Hemorrhoids (long 2nd stage, heavier babies, forceps delivery)
- ✓ Perineal pain / dyspareunia (assisted vaginal delivery, episiotomy)
- ✓ Constipation

Dangers signs for the newborn

- Baby refuses to feed, poor sucking
- Poor body temperature control (baby feels very hot or very cold)

- Difficulty breathing (grunting or wheezing, fast breathing, in-drawing of chest, blue around mouth)
- Wet cord with blood/ pus & swelling around cord
- Swollen eyes, pus draining from eye or ear
- Jaundice – yellow body, eyes or palms
- Lethargic/floppy
- Convulsions

PNC SERVICES WITHIN 24 - 48 HOURS

MOTHER

Check / perform:

- Mental status assessment

- Physical assessment:
  - ✓Pallor,
  - ✓Temperature,
  - ✓Blood Presure,
  - ✓uterine involution,
- Inspection of the C/S wound- if present- for bleeding
- Assess lochia and blood loss
- Breast examination for establishment of lactation,
- Calf tenderness
- Record in PNC register and mother Child booklet

Provide:

- Pain management
- Screening for TB and treat as appropriate
- Vitamin A (200 000 iu) Iron/folic acid supplements

LLITN

- Treat or refer if any complications are detected
- Appropriate FP method

If HIV positive give ARV's for prophylaxis or treatment

Counsel on:

- HIV Counselling and testing /re- testing
- FP Counselling (healthy Timing & spacing of pregnancy)

Advice on;

- Danger signs for mother
- Personal hygiene and hand washing,
- Breast care
- Exercises
- Care of the perineum

- Harmful practices
- Maternal nutrition
- Use of Insecticide Treated Nets.
- **Return date**

BABY

Check / perform:

- Apgar scoring
- Take temperature
- Take and record birth weight
- Head to toe examination
- Assess for danger signs for baby
- Observe a breast feed
- Record in PNC register and mother Child booklet

Provide:

- Ensure warmth and put hat on baby.
- Delay baby's first bath for the first 24 hours If pre term encourage skin-to-skin care Encourage early initiation of, and exclusive breastfeeding
- Tetracycline eye ointment 1% Vitamin K
- Immunization (BCG & birth Polio)
- Infant prophylaxis for HIV as indicated
- Treat or refer the infant if any complications are detected
- Encourage and facilitate birth registration Counsel on:
  - ✓Cord care
  - ✓Hand washing for care giver
  - ✓Return date

PNC SERVICES WITHIN 1-2 WEEKS

MOTHER

Check /perform:

- Mental status
- Pallor, BP, temperature, pulse rate
- Lochia loss- (colour, amount, smell)
- Assess for calf tenderness
- Infection /pus from C/S site or perineal wound
- Breast condition
- Uterine involution
- Observe a breast feed

Record in PNC register and Mother Child booklet **Provide:**

- Vitamin A supplementation (if not yet given)
- Haematinics
- LLITN (if not yet given)
- Treatment for any complications detected

Referral as appropriate **Counsel on:**

- Danger signs for mother
- CT for HIV
- Family Planning / HTSP
- Maternal Nutrition
- Personal hygiene and hand washing for caregiver
- Breast care and Exclusive breast feeding
- Harmful practices
- Cervical cancer screening
- Return date

BABY

Check /perform:

- Growth monitoring; chart weight
- Head to toe examination
- Assess for danger signs for baby
- Check eyes for discharge
- Immunisation status
- Observe a breast feed

Record in PNC register and Mother Child booklet **Provide:**

- Vitamin A if not yet given
- Immunisations if not yet started
- INH prophylaxis as appropriate
- Treatment of any complications detected

- Referral as appropriate

Birth registration if not yet done **Counsel mother on:**

- Danger signs for Baby
- Exclusive breast feeding
- Hand washing for caregiver
- Keeping baby warm
- Cord care
- Adherence to ARV prophylaxis as appropriate
- Return date

PNC SERVICES WITHIN 4 -6 WEEKS

MOTHER

Check:

- General condition of mother
- Mental status
- BP, Weight, temperature
- Uterine involution
- Lochia (amount /colour)
- Observe a breast feed

Record in PNC register and Mother Child booklet **Provide:**

- FP method of choice CT for HIV
- Screening for cervical cancer
- Clinical breast examination
- Screening for STI/ RTI Screen for TB

Treatment for any complications detected Referral as appropriate **Counsel on:**

- Danger signs for the mother
- Exclusive breast feeding and Breast care
- Family Planning (HTSP)
- Maternal nutrition
- Harmful practices
- Personal hygiene and hand washing for the caregiver
- Return date

Check:

- General health of mother

Provide:

- FP method of choice
- Screening for RTI /STI
- Screening for cervical cancer –if not done

- Screening for TB
- Clinical Breast examination
- CT for HIV
- Treat any complications that are detected
- Refer as appropriate

Record in PNC register and Mother Child booklet

Counsel on:

- Continued breast feeding
- Complimentary feeding
- Maternal Nutrition
- Harmful practices
- Family Planning /HTSP
- Hygiene and hand washing for the caregiver

BABY

Check:

- Growth monitoring; chart weight
- Head to toe examination
- Assess for danger signs for baby
- Immunisation status
- Record in Integrated register and Mother Child booklet

Provide:

- Immunizations as per schedule INH prophylaxis as appropriate
- Treatment of any complications detected
- Referral as appropriate

- Early infant diagnosis (EID) for HIV Management of HIV positive infant Birth registration if not yet done

Counsel mother on:

- Danger signs for Baby
- Exclusive breast feeding
- Hand washing for caregiver
- Hygiene
- Return date

Check:

- Growth monitoring; chart weight
- Head to toe examination
- Assess for danger signs for baby
- Immunisation status

Provide:

- Vitamin A supplementation
- Immunizations as per schedule INH prophylaxis as appropriate
- Treatment of any complications detected Referral as appropriate
- Birth registration if not yet done
- Record in Integrated Register and Mother Child booklet

Counsel mother on:

- Danger signs for Baby
- Hand washing for caregiver
- Continued breast feeding and Complementary feeding
- Treatment adherence for HIV positive infant

NORMAL BABY

PHYSIOLOGICAL ADAPTATION OF A NEWBORN

Respiratory system

- Factors affecting lung maturity
- Hormones – including steroids, insulin, prolactin and thyroxine – influence lung maturity and dictate how well the baby's lung will function following birth.

Fetal breathing movements

- Fetal breathing movements occur from 11 weeks of gestation.
- As the fetus grows, the strength and frequency of breathing movements increases until a rate of 30–70 breaths

per minute.

Respiration in the neonate

- Ribcage and respiratory musculature are immature and will continue to develop into adulthood .
- The diaphragm and abdominal muscles are used for respiratory movement.

Breathing rate

- The respiratory rate is usually between 40 and 60 breaths per minute.

Breathing movements

should be *symmetrical*.

- Babies mainly use the diaphragm to aid breathing, and so

the *diaphragm* should also move symmetrically, confirming phrenic nerve integrity.

Abnormal signs

- *Stridor* – suggests upper airway obstruction, which could be due to oedema or abnormal growths.
- *Expiratory grunting* – problem with lower airway function, such as surfactant not functioning appropriately or meconium inhalation into the alveoli.
- *Nasal flaring* – the baby increases its ability to inhale oxygen by flaring the nostrils.
- Cyanosis in room-Cyanosis is best observed by looking at the central circulation, such as in the gums and tongue, since they are more likely to show the level of central perfusion.

Control of respiration

- The control of the respiratory system is mainly autonomic, involving the cortex, brainstem, airways, aortic/carotid chemoreceptors and central control by the medulla.
- These physiological changes normally starts when the neonate takes the first breath. The neonatal brain must be functioning adequately in order for the baby to continue to breathe at a sufficient rate to allow homeostasis of oxygen and carbon dioxide within the body.

Changes in the blood

- At birth, the baby has a high haemoglobin concentration (about 17 g/dL), mostly fetal type, HbF, which is required in utero to increase the oxygen-carrying capacity of the

blood.

- After birth, the high number of red blood cells is not required, so haemolysis of excess red blood cells takes place.
- This may result in physiological jaundice of the newborn within 2–3 days of birth.
- At birth, the prothrombin level is low because of lack of *vitamin K*, a cofactor required for the activation of several clotting proteins in the blood.

Temperature control

- The heat-regulating mechanism in the newborn is inefficient and the body temperature may drop unless great care is taken to avoid chilling.
- Heat is lost by radiation, convection, evaporation and

conduction.

Skin

- The skin of full-term newborns is covered with a varying amount of Vernix caseosa, a thick white, creamy substance.
- This forms between 17 and 20 weeks' gestation and by 40 weeks is found primarily in creases such as the axilla, neck and groins, acting as protection during uterine.
- Vernix is a perfectly balanced moisturizer and any surplus should be massaged gently into the baby's skin after the birth.

Gastrointestinal system

- After birth, the maturation of the GI tract is stimulated by

specific peptides: enteroglucagon stimulates intestinal mucosa to develop and motilin encourages gut motor activity.

- 0–2 days – **meconium** is passed – the first stool being passed within the first 48 hours. This indicates that the lower bowel is patent.
- 2–4 days – as food is digested, the residue mixes with the remaining meconium and the stool changes colour to a greenish brown (*changing stool*).
- 5th day onwards – the stools become yellow:

Renal system

- At term, the kidneys are relatively immature, especially the renal cortex.
- Glomerular filtration rate and ability to concentrate urine

are limited. Relatively large amounts of fluid are required to excrete solids.

- The baby should pass urine, which has a low specific gravity, within 24 hours of birth.
- Initially, urinary output is about 20–30 mL per day, rising to 100– 200 mL daily by the end of the first week as fluid intake increases.

Glucose metabolism

- Fetal metabolism is directed to anabolism under the influence of insulin, utilizing glycogen, fat and protein.

Metabolic adjustments after birth

- The normal term neonate is able to adapt physiologically to episodes of starvation by utilizing ketone bodies.). Fol-

lowing birth, the breakdown of glucose continues under the influence of insulin, but about 8 hours after birth, the baby begins to switch to glucagon metabolism.

Musculoskeletal system

- The newborn's skeleton is flexible, the bones mainly consisting of cartilage, and joints are elastic, facilitating the passage through the birth canal.

Central nervous system

- At birth, the baby's autonomic system maintains homeostasis of all major organs, regulating temperature and car- diorespiratory function.
- The baby stores the memory of the stimulus and with repeated episodes learns not to respond to it. Maternal–

infant interaction is facilitated by eye-to-eye contact with the mother.

Protection against infection.

- During the last trimester of pregnancy, there is a trans-placental transfer of IgG from the mother to the fetus, providing protection against the infectious diseases to which the mother has antibodies.
- These antibodies provide baby passive immunity for about 6 months.
- The newborn baby has no immunity to the common organisms, and when exposed to them at birth for the first time, is highly susceptible to infection.

THE APGAR SCORE

- Five indicators are used to measure this: heart rate, respiratory effort, colour, muscle tone and response to stimuli
- The heart and respiratory rate, the most important measures within this scoring system, will indicate the nature and timing of active resuscitation.
- An Apgar score of 8–9 indicates that the neonate is in good condition.
- The midwife should expect that most mature babies would obtain a score of about 9 as those above 38 weeks' gestation will have a mature neurological system restricting blood flow to the extremities in order to supply the brain and other major organs with extra oxygenated blood.
- Therefore the baby will have acrocyanosis and this continues until after 24 hours because of poor peripheral circulation

The Apgar score			
Sign	**Score**		
Heart rate	**Absent**	**Slow < 100**	**Fast > 100**
Respiratory effort	**Absent**	**Slow irregular**	**Good/crying**
Muscle tone	**Limp**	**Some flexion of extremities**	**Active**
Reflex irritability	**No response**	**Grimace**	**Cry, cough**
Colour	**Pale blue**	**Body pink, extremities blue**	**Completely pink**

Vitamin K

- Following birth, free circulating vitamin K is low, de-creas- ing during the first few days of life and gradually rising after 3–4 days.
- This may result in excessive bleeding if trauma occurs, It has been advised that all babies should be given vita-min K.

THE INITIAL (FIRST) POST-BIRTH EXAMINATION

- This initial examination uses information elicited from intuitive knowledge gained from experience; the Apgar score; and physiological assessment using the senses: sound, vision and touch.

1. Head

The average full-term head circumference, occipital– frontal diameter measurement, should be approximately 33–38 cm avoiding the ears.

The Face

This is examined for normal appearance and symmetry of eyes, ears and features during crying and rest.

- Observe shape (moulding, caput succedenium, cephalo-haematoma)
- Measure head circumference
- Palpate if fontanels /sutures are fused or not

2. Eyes

- *Eye examination*: Pupils should be equal and react to light and the red reflex should be present and complete-

ly round in shape.

- Eyes are also checked for congenital cataracts and any small haemorrhage within the conjunctiva or under the eyes.
- Ophthalmia neonatorum is conjunctivitis that occurs in the newborn. Conjunctivitis is an inflammation of the conjunctiva, the surface or covering of the eye, due to infectious or non-infectious causes.

Also Check for:

- Swelling
- Position
- Bleeding
- Discharge
- Presence of eyeball

3. Nose

- Check for
- Deformities
- Bleeding
- Flaring nostrils

4. Mouth

Check for:

- Cleft lip/palate
- Bleeding
- False teeth
- Tongue tie

5. Ear

Check for:

- Bleeding
- Leakage of CSF
- Shape and position

6. Neck

Check for:

- Webbed neck (turner syndrome)
- Tumor

7. Chest

- Observe shape
- Observe expansion
- Check breast for swelling/ discharge
- Count heart rate

8. Arms

Check:

- Equality
- Injuries
- Webbed fingers, extra digits
- Palmer creases

9. Abdomen

Check:

- Shape and distension
- Bleeding from umbilical cord
- Umbilical hernia
- Veins in umbilical cord (2 arteries, 1 vein)

10. Genitalia

Female:

- Presence of labia majora and minora
- Injuries and bruises, oedema
- Abnormalities
- Discharge

Male:

- Presence of penis, foreskin
- Descence of testicles
- Urethral opening & position
- Colour and oedema of scrotum

11. Legs

- Equality in length
- Movements (flexion/extension)
- Abnormalities e.g. talipes

- Webbed toes, extra digits

12. Hip joints

Check signs for dislocation (symmetry)

Ortolani test

- Stabilize one hip by bending the knee and hip, keeping the pelvis stable and firmly on the mattress
- Bend the other knee and hip
- Place two fingers over the greater trochanter (outer upper leg)
- Position the thumb on the inner trochanter
- Attempt to *abduct* (away from the midline of the body) the thigh to 90 degrees by applying pressure with the two fingers on the greater trochanter.

If the hip is dislocated, it will not be possible to abduct it

and the neonate will keep the thigh at an angle less than expected.

Barlow test

- Continue to stabilize one hip, keeping the pelvis stable and firmly on the mattress
- Bend the other knee and hip
- Place two fingers over the greater trochanter (outer upper leg)
- Position the thumb on the inner trochanter
- The thigh is lifted and *adducted* (moved towards the midline of the body)

13. Back

Check for

- Spina bifida (running middle finger over baby's

- spine to feel for a dimple)
- Meningomyelocele / Meningocele

14. Anus

- Check patency of anus with tip of thermometer (only if baby has not passed meconium)

15. Skin

Check colour:

- Jaundice
- Pallor
- Cyanosis

Check for:

- Haemangioma
- Vernix caseosa

- Lanugo
- Milia
- Birth marks e.g. Mongolian spots

16. Height

Measure from crown to heal.

PERFORM PRIMITIVE REFLEXES AS FOLLOWS:

Moro reflex

- Put the baby on a flat table
- Support infant's trunk and head in supine position with neck slightly flexed
- Quickly but gently extend the neck by releasing the head from your fingers.

- The infant normally responds with a cry, throws arms outwards and laterally with fingers extended, then arms and fingers are flexed
- Bilateral failure of response may indicate nervous system abnormality
- Unilateral failure of response may indicate Erbs palsy, fractured clavicle, or humerus

Rooting reflex

- Put the child on a flat surface in supine position
- Touch the cheek using a finger or tip of nipple
- The infant's head turns towards the side of the cheek touched, opening the mouth and protruding the tongue

Sucking reflex

- Put mothers nipple or finger in infant's mouth
- Sucking commences automatically in normal cases
- Palmar grasp / plantar grasp reflexes
- Place any object on the newborn's palm or plantar surface of the foot
- Object will be held tightly

Stepping reflex

- Put the child upright with the feet touching the edge of a table
- The child automatically moves the foot on top of the table

Traction reflex

- Put the baby in supine position on a flat surtace

- Grasp the baby by his hands and start lifting the baby towards Sitting Po
- The baby is supposed to try lift it's head upwards
- After the procedure leave the baby comfortable
- Inform the mother about the state of the baby

CHARACTERISTIC OF NORMAL NEONATE

- Weight is 2.5 -3.5 kgs.
- Length from vertex to heel is 45-52 cm
- Head circumference is 35 cm and increases by 1-2 cm during the first month.
- Fontannelles and sutures are patent. Anterior fontanel closes at 18 -24 months while the posterior closes at 6-8 weeks.
- Skin is covered by vernixcaseosa, a secretion of the seba-

ceous gland that helps in heat retention and acts as a lubricant during delivery.

- Umbilical cord shrivels by necrosis and falls off in 7 days. The remaining part forms abdominal ligaments. Hernia may develop but usually disappears spontaneously.
- Reflexes are fully developed.
- Senses are developing.

IMMEDIATE CARE OF THE NEWBORN

Basic needs of the newborn are:

✓To breathe
✓To be warm
✓To be fed
✓To be protected

Call out time of birth.

- Deliver baby onto the mother's abdomen.
- Dry the baby with a wam, clean towel or piece of cloth.
- Wipe eye
- Assess the baby's breathing while drying
- Clamp and cut the ummlical cord
- Put the baby between the mothers breasts for skin-to-skin contact.
- Place an identity label on the baby.
- Cover the mother and baby with a dry clean
- warm cloth Cover the baby's head.

Cord Care

- Change gloves. If not possible, wash gloved hands
- Clamp and cut the cord:
- Put ties tightly around the cord at 2cm and 5cnm from the baby's abdomen
- Cut between the ties with a sterile instrument.
- Observe for oozing of blood
- Do not apply any substance to the stump
- Do not bandage or bind the stump

Eye Care

A baby's eyes should be wiped as soon as possible after birth and an antimicrobial eye medicine should be applied within.1 hour of birth

- 1%% tetracycline ointment is the drug which can be used to prevent infection at the time of birth
- It should not be washed away

What should be done for a baby at the time of birth and in what order?

- Skin-to-skin contact
- A baby's skin temperature falls within seconds of being born.
- If the temperature continues to fall the baby will become ill (hypothermia) and may die.
- This is why a baby MUST be dried immediately after birth and delivered onto a warm towel or piece of cloth, and loosely wrapped before being placed (naked) between the mother's breasts.

- It also explains why the mother and baby should be covered with a warm and dry cover if the room temperature is lower than 25° C.
- The position of the baby between the mother's breasts ensures the baby's temperature is kept at the correct level for as long as the skin contact continues.
- This first skin-to-skin contact should last uninterrupted for at least one hour after birth or until after the first breast feed.
- Skin-to-skin contact can re-start at any time if the mother and baby have to be parted for any treatment or care procedures.

Early initiation of breastfeeding

- Help the mother to initiate breastfeeding within 1 hour, when baby is ready.
- After birth, let the baby rest comfortably on the mother's chest in skin-to-skin contact.
- Tell the mother to help the baby to her breast when the baby seems to be ready, usually within the first hour.

Signs of readiness to breastfeed

- Baby looking around/moving
- Mouth open.
- Searching.
- Check that position and attachment are correct at the first feed. Offer to help the mother at any time
- Let the baby release the breast by her/himself then offer the second breast.

- If the baby does not feed in 1 hour, examine the baby to rule out any problem.
- If healthy, leave the baby with the mother to try later.

KEEPING THE BABY WARM

Causes of hypothermia

- The room is too cold.
- The baby is exposed to cold draught.
- Wet clothing
- The baby is uncovered, even for short time.
- The baby is not feeding well
- The baby is placed on a cold surface or near cold wall or window.

- The baby has an infection
- Baby has birth asphyxia and does not have energy to keep warm.
- Mother& baby are not together or under care giver

The warm chain

- Warm delivery room.
- Immediate drying.
- Skin-to-skin contact.
- Breasteeding.
- Bathing and weighing postponed.
- Appropriate clothing and bedding
- Mother and baby together
- Warm transportation (skin-to-skin).
- Warm resuscitation.

- Training and awareness.

Signs and symptoms of hypothermia

- Examine the baby's temperature and activity
- Look for
- Low temperature (<36.5C)
- Limp-floppy
- Poor sucking or feeding.
- A weak cry.
- Slow or shallow respiration <30/min, slow heart ate (< 100/min).
- Baby's skin cold, baby's cold extremities.

Management

- Cover adequately remove cold clothes and replace with warm clothes.
- Warm the room/bed.
- Take measures to reduce heat loss.
- Ensure skin-to-skin contact with mother, if not possible, keep next to mother after fully covering the baby.
- Breast feeding.
- Provide extra heat.
- Room heater.
- Radiant wamer
- Incubator.
- Apply warm towels.

At birth and within the first hour

- Warm delivery room: For the birth of the baby the room temperature should be 25-28°C, no draught.
- Dry baby: Immediately after birth, place the baby on the mother's abdomen or ona warm, clean and dry surtace.
- Dry the whole body, head and hair thoroughly,With a dry cloth.
- Skin-to-skin contact: Leave the baby on the mother's abdomen (before cord cut) or chest (after cord cut) after birth for at least 2 hours.
- Cover the baby with a soft dry cloth.
- If the mother cannot keep the baby skin-to-skin because of complications, wrap the baby in a clean, dry, wam cloth and place in a cot, Cover with a blanket: Use a radiant warmer if room not warm or baby small.

Subsequently (First Day)

- Explain to the mother that keeping baby warm is important for the baby to remain healthy.
- Dress the baby or wrap in soft dry clean cloth.
- Cover the head with a cap for the first few days especially if baby is small.
- Ensure the baby is dressed or wrapped and covered with warm clothes
- Keep the baby within easy reach of the mother
- Do not separate them (rooming-in).
- If the mother and baby must be separated, ensure baby is dressed or wrapped and covered with a blanket.
- Assess warmth every 4 hours by touching the baby's feet,

f feet are cold use skin-to-skin contact, add an extra blanket and reassess.

- Keep the room for the mother and baby warm
- If the room is not wam enough, always cover the baby with a blanket and/or use skin-to-skin Contact

At home

- Explain to the mother that babies need one more layer of clothes than other children or adults.
- Keep the room or part of the room warm, especially in a cold climate
- During the day, dress or wrap the baby.
- At night, let the baby sleep with the mother or within easy reach to facilitate breastfeeding.

- Do not put the baby on any cold or wet surface.
- Do not bath the baby at birth. Wait at least 6 hours before bathing.
- Do not swaddle (wrap too tightly). Swadding makes them cold.
- Do not leave the baby in direct sun.

Keeping a small baby warm

- The room for the baby should be warm (not less than 25 C) with no draught.
- Explain to the mother the importance of warmth for a small baby
- After birth, encourage the mother to keep the baby in skin-to-skin contact as long as possible.

- Advise to use extra clothes, socks and a cap blankets, to keep the baby warm or when the baby is not with the mother.
- Wash or bath a baby in a very warm room, in warm water. After bathing, dry immediately and thoroughly. Keep the baby wam after the bath.
- Avoid bathing small babies.
- Check frequently if feet are warm. If cold, rewarm the baby (see below).
- Seek care if the baby's feet remain cold after rewaming.

Rewarm the baby by skin-to-skin contact

- Before rewarming,remove the baby's cold clothing
- Place the newborn skin-to-skin on the mother's chest

dressed in a pre-warmed shirt open at the front, a nappy (diaper), hat/cap and socks.

- Cover the infant on the mother's chest with her clothes and an additional (pre-warmed) blanket.
- Check the temperature every hour until normal
- Keep the baby with the mother until the baby's body temperature is in normal range.
- If the baby is small, encourage the mother to
- keep the baby in skin-to-skin contact for as long as possible, day and night.
- Be sure the temperature of the room where the rewarming takes place is at least 25 C.
- If the baby's temperature is not 36.5°C or more after 2 hours of rewarming, reassess the baby.
- If referral needed, keep the baby in skin-to-skin posi-

tion/contact with the mother or other person accompanying the baby.

Hyperthermia Symptoms

- Baby is irritable
- Has increased HR> 160 min& RR 60/min
- Has a flushed face
- Skin is hot and dry
- Late stages apathetic, lethargic and then Comatosed

ROUTINE CARE OF THE NEW BORN
EVERY DAY CARE

- Exclusive Breast feeding

- Support exclusive breastfeeding for the first six months on demand day and night.
- Ask the mother to get help if there is a breastfeeding Difficulty

Keeping the baby warm

- Within the first hours
- If skin-to-skin contact NOT possible:
- Wrap the baby in a clean dry warm cloth
- Place the baby in a cot and cover with a blanket.
- Use a radiant warmer.
- The first day and later
- Dress baby.
- Wrap in soft dry clean cloth and cover head with cap

- Ensure baby is dressed or wrapped and covered with a blanket
- Assess warmth every 4 hours by touching baby's feet; if feet are cold, place in skin-to-skin contact and add an extra blanket and reassess.
- Keep the room warm; if room not warm, cover baby with a blanket or use skin-to-skin contact.

At home

- One more layer of clothes for the new-born than older children or adults.
- Keep the room warm for the baby
- During the day, dress or wrap baby
- At night let baby sleep with mother or close by for

breastfeeding.

Giving cord care

- Wash hands before and after cord care
- Do not apply anything on the stump.
- Fold napkin/diaper below stump.
- Keep stump loosely covered with clean clothes
- If the stump is wet, wash with clean water and soap, dry with clean cloth.
- If umbilicus is red or draining pus or blood, give
- appropriate treatment (refer to Neonatal Infection
- Module)

Hygiene

- Wash or bathe a baby in a WARM, draught-free room.
- Wash the face, neck, underarms DAILY.
- Wash the buttocks when soiled. Dry thoroughly.
- Bathe when necessary
- Use warm water for bathing
- Thoroughiy dry the baby, dress and cover after the bath
- Use cloth on baby's bottom to collect stool. Dispose as for woman's pads.

WASH HANDS

- DO NOT bathe a baby before 6 hours of age.
- DO NOT put anything in the baby's eyes or ear

KANGAROO MOTHER CARE

Definition

- Kangaroo mother care(KMC) is a way of providing a well preterm on low birth-weight baby with the benefits of incubator care, by keeping the mother and baby together with body contact (skin-to-skin)both day and night.
- This kind of care has many advantages. It also emphasizes the important central role the mother plays in the survival and well-being of her baby.

The advantages of kangaroo mother care to the baby

The baby is next to the mother's breasts.

This helps to;

- Keep the baby warm and his temperature stable, so the baby uses less energy.
- May reduce hypothermia, ie. babies becoming clinically cold.
- Keep the baby's heat and breathing rates stable.
- Keep oxygenation, oxygen consumption and blood glucose levels equal or better than infants receiving conventional treatment? In other words, in an incubator.
- Maintains sleep patterns
- Reduced stress in preterm and low-birth-weight babies, which results in less crying.
- Larger daily weight gains whilst in hospital.
- The baby has ready access to the breast.

The advantages of KMC to the mother and the rest of the family

- It helps the mother to form strong emotional bonds with her baby.
- The mother feels more confident in handling her baby.
- The mother feels good about herself and the care she can give her baby.
- The mother feels less stressed during kangaroo mother care.
- The mother is more likely to exclusively breastfeed her baby.
- Any mother who has given birth to a small baby, whether or not kangaroo mother care is being considered,

should be encouraged to start expressing her breast milk within

- 30mins of delivery. The father and other relatives can be involved in providing kangaroo mother care if the mother is sick or needs to be away from her baby.

The benefits of KMC to the health services

- Lower capital investment and recurrent costs.
- There is less need for incubators.
- Earlier discharge times are possible for small babies; reduced readmission rates.
- The mother and family are involved, leaving staff free to provide medical and nursing care.

When to start Kangaroo mother care

(KMC)

- When to begin kangaroo mother care depends upon the condition of both the mother and the baby..
- The care of a smal baby will depend on his condition. The more preterm the baby and the lower the birth weight, the more problems that are likely to occur.
- Babies of 1800 g and above can in most cases start KMC after birth, if they are in a stable condition.
- Babies below this weight commonly have problems that need hospital care and treatment for several days or weeks.
- The more premature the longer it takes before the baby is stable enough to begin KMC.
- However, kangaroo mother care may provide a sick baby

with his best and in some cases, only chance of survival in a situation where referral to a specialized newborn unit is not possible.

THE END

CHECK THE APPENDIX BELOW FOR MORE INFORMATION

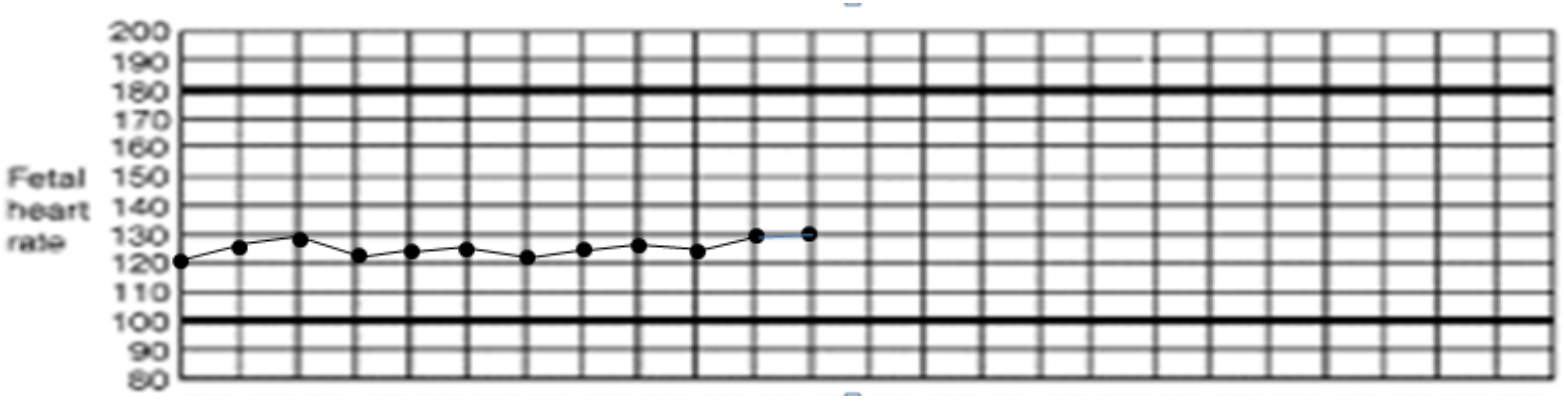
THE PARTOGRAPH

The graph sections of the partograph

The graph sections of the partograph are where you record key features of the fetus or the mother in different areas of the chart.

FETAL HEART RATE

- Record the **Fetal Heart Rate** initially and then every 30 minutes.



LIQUOR

- **Liquor** – which is the medical term for the *amniotic fluid*;
- Record
- the color of amniotic fluid as follws
-
- if the fetal membranes have ruptured, you should record the *colour* of the fluid initially and every 4 hours.
  - ❖**I**, or membranes intact
  - ❖**R**, membranes raptured
  - ❖If membranes have raptured use **C**, for clear liquor or **M**, for meconium stained, if blood stained use **B.**
  - ❖Meconium can graded as
    - Grade 1 (M+)
    - Grade 1 (M++)

– Grade 1 (M+++)

- ❖**I**, or membranes intact
- ❖**R**, membranes raptured
- ❖If membranes have raptured use **C**, for clear liquor or **M**, for meconium stained, if blood stained use **B.**
- ❖Meconium can graded as
  - – Grade 1 (M+)
  - – Grade 1 (M++)
  - – Grade 1 (M+++)

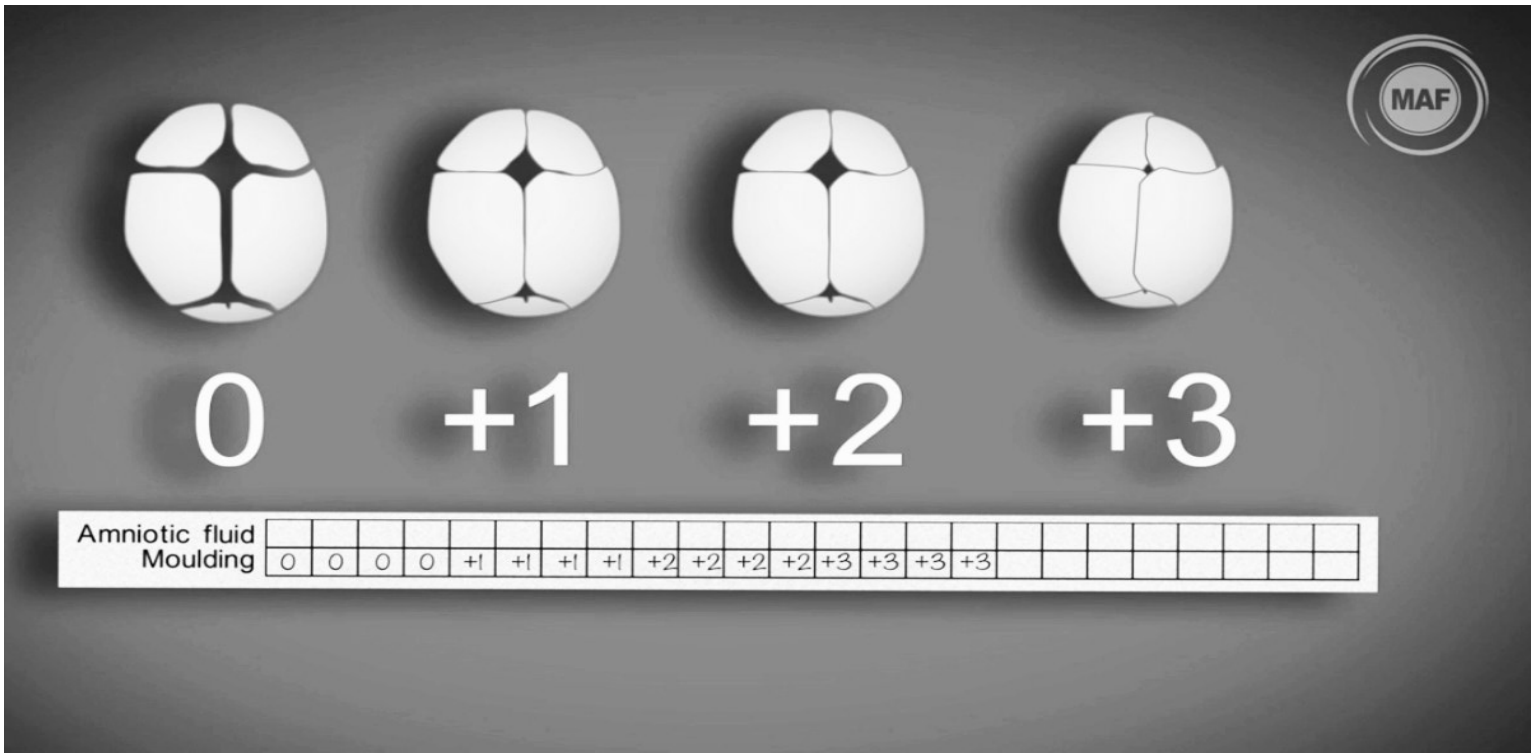
NB

- Record moulding and the color of amniotic fluid as follows

Amniotic fluid	I						C							M+									
Moulding																							

MOULDING

- The row below 'Liquor' is labelled **Moulding**; this is the extent to which the bones of the fetal skull are overlapping each other as the baby's head is forced down the birth canal; you should assess the degree of moulding initially and every 4 hours.



Recording moulding on the partograph

- To identify moulding, first palpate the suture lines on the fetal head and appreciate whether the following conditions apply.
- **Sutures apposed:** This is when adjacent skull bones are touching each other, but are not overlapping. This is called degree 1 moulding (+1).
- **Sutures overlapped but reducible:** This is when you feel that one skull bone is overlapping another, but when you gently push the overlapped bone it goes back easily. This is called degree 2 moulding (+2).
- **Sutures overlapped and not reducible**: This is when you feel that one skull bone is overlapping another, but when you try to push the overlapped bone, it does not go back. This is called degree 3 moulding (+3). If you find +3

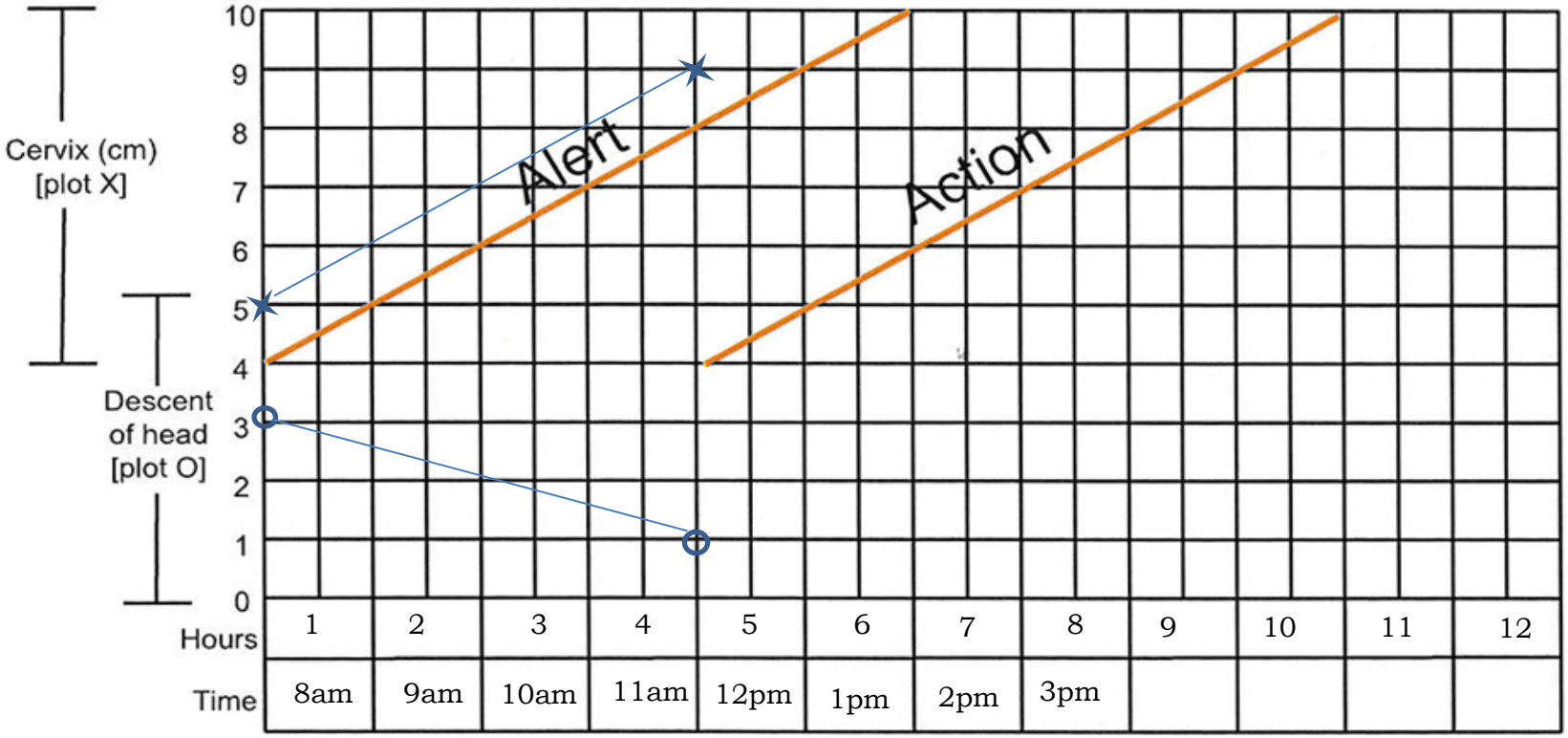
moulding with poor progress of labour, this may indicate that the labour is at increased risk of becoming obstructed.

CERVICAL DILATATION

- **Cervix (cm) (Plot X)** for recording **cervical dilatation**, i.e. the diameter of the mother's cervix in centimetres.
- This area of the partograph is also where you record **Descent of Head (Plot O)**, which is how far down the birth canal the baby's head has progressed.
- You record these measurements as either **X** (**cervical dilatation**)or **O (Descent)**, initially and every 4 hours.
- There are two rows at the bottom of this section of the partograph to write the number of hours since you began

monitoring the labour and the time on the clock.

Partograph for A normal progressing labour



ASSESSING DESCENT OF HEAD

- Descent can be determined by the degree of ***engagement*** I.e descent of the head is measured by abdominal palpation and expressed in terms of fifths above the pelvic brim ***(Figure. II.5).***
- Descent will also be determined by assessing the ***station*** of the prepresenting part in relation to the maternal ischial spines. ***(Figure 4.3)***

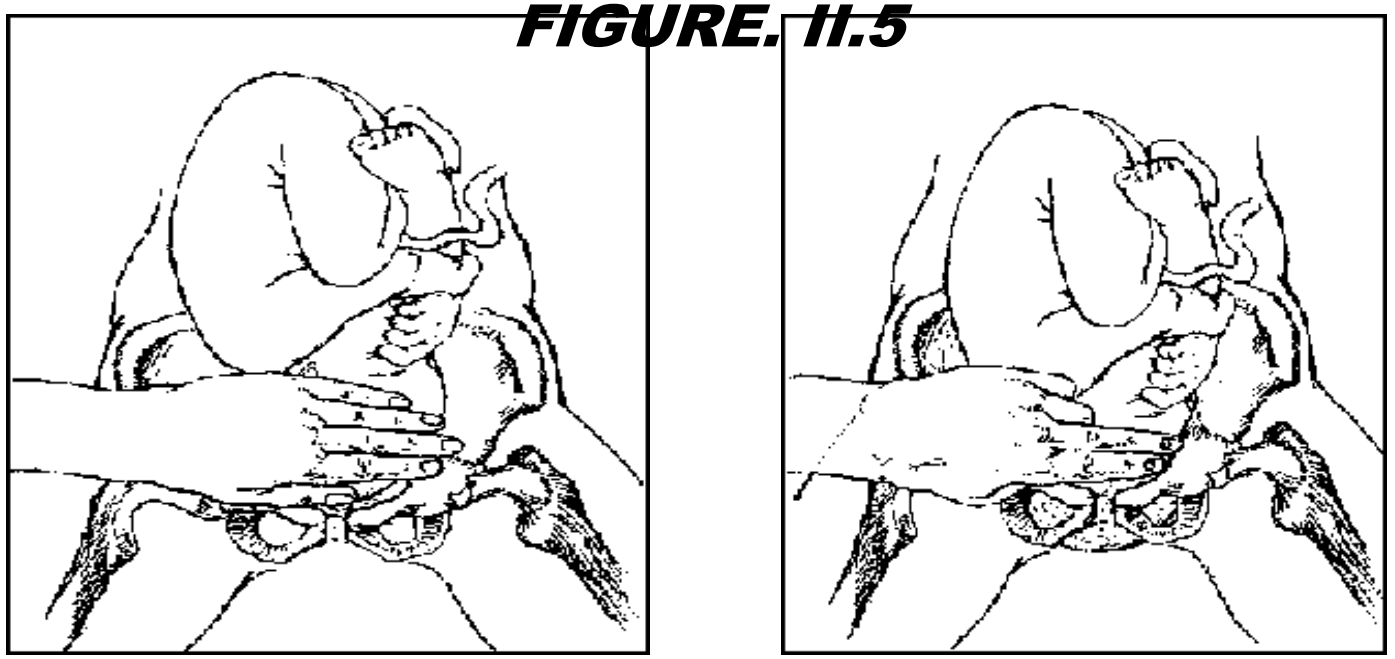
Assessing Degree of Engagement

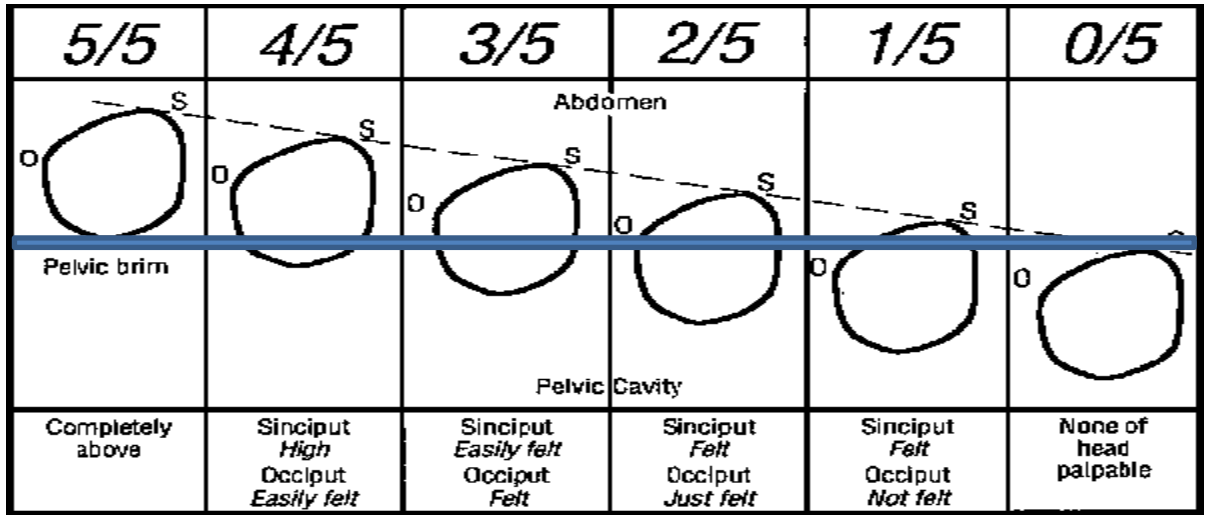
- The figure below shows assessment of descent by palpation of fraction of the fetal skull palpable above the pelvic brim.
- For convenience, the width of the 5 fingers is a guide to

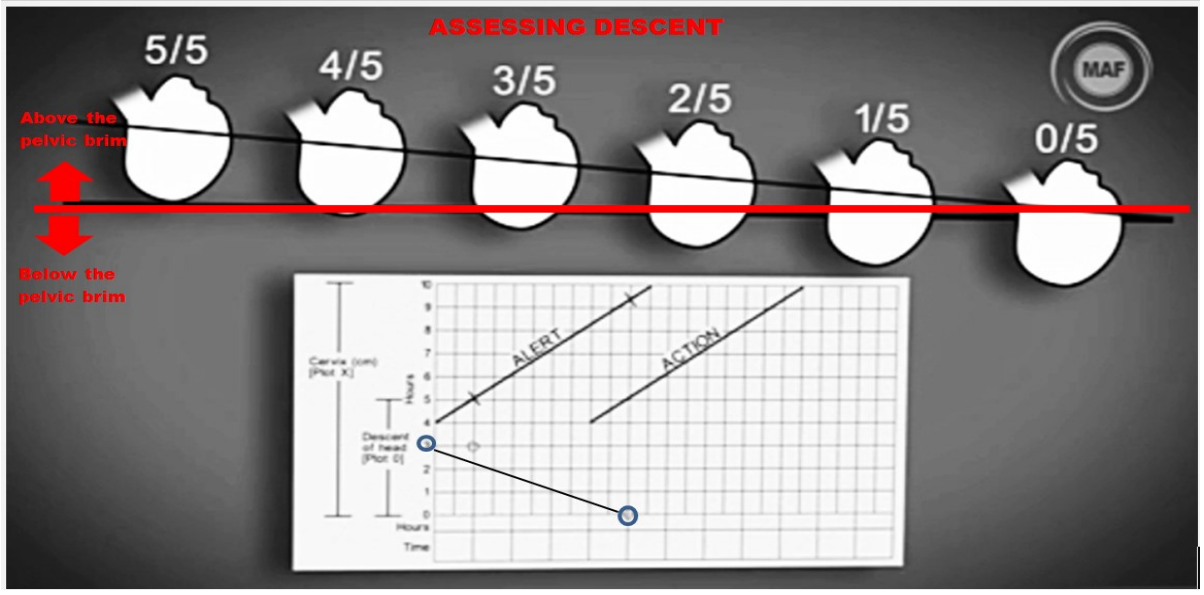
the expression in fifths of the head above the brim. A head that is mobile above the brim will accommodate the full width of 5 fingers (closed)

- As the head descends, the portion of the head remaining above the brim will be represented by fewer fingers (4/5, 3/5, etc.)

FIGURE. II.5




5/5
4/5
3/5
2/5
1/5
0/5
Abdomen
S
O
Pelvic brim
Pelvic Cavity
Completely above
Sinciput High
Occiput Easily felt
Sinciput Easily felt
Occiput Felt
Sinciput Felt
Occiput Just felt
Sinciput Felt
Occiput Not felt
None of head palpable


ASSESSING DESCENT
5/5
4/5
3/5
2/5
1/5
0/5
MAF
Above the pelvic brim
Below the pelvic brim
ALERT
ACTION
Hours
Time

Assessing Station

- The station can only be determined by examination of the woman's vagina with your gloved fingers, and by reference to the position of the presenting part of the fetal skull relative to the ischial spines in the mother's pelvic brim.

Figure 4.3:

Assessing the station (descent) of the fetal head by vaginal examination, relative to the ischial spines in the mother's pelvis.

- When the fetal head is at the *same level* as the ischial spines, this is called **station 0**.
- If the head is *higher up* the birth canal than the ischial spines, the station is given a *negative* number.
- At **station –4** or **–3** the fetal head is still 'floating' and not yet engaged; at **station –2** or **–1** it is descending closer to the ischial spines.
- If the fetal head is *lower down* the birth canal than the ischial spines, the station is given a *positive* number.
- At station **+1** and even more at station **+2**, you will be able to see the presenting part of baby's head bulging forward during labour contractions.
- At station **+3** the baby's head is **crowning**, i.e. visible at the vaginal opening even between contractions.
- The level of the station will then be converted to the corre-

sponding fraction as show in the table below.

- The fraction will then be plotted on the partograh.

Corresponding positions of the station of the fetal head (determined by vaginal examination) and the record of fetal descent on the partograph (determined by palpation above the pelvic brim.

Station of fetal head (Figure 4.3)	Corresponding descent mark on the partograph
–4 or –3	5
–2 or –1	4
0	3
+1	2
+2	1
+3	0

NB

In the partograph, there is no specific space to document caput formation. However, caput detection should be part of your assessment during each vaginal examination. Like moulding, you grade the degree of caput as ***0, +1, +2 or +3.***

CONTRACTIONS

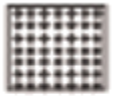
- **Contractions per 10 mins** (minutes) initially and every 30 minutes.

Uterine contractions

- Normally, contractions become more frequent and last longer as labour progresses.
- Contractions are recorded every 30 minutes on the partograph in their own section, which is below the hour/time rows. At the left hand side is written 'Contractions per 10

mins' and the scale is numbered from 1–5.

- Each square represents one contraction, so that if two contractions are felt in 10 minutes, you should shade two squares.
- On each shaded square, you will also indicate the *duration* of each contraction by using the symbols shown in Figure 4.7.

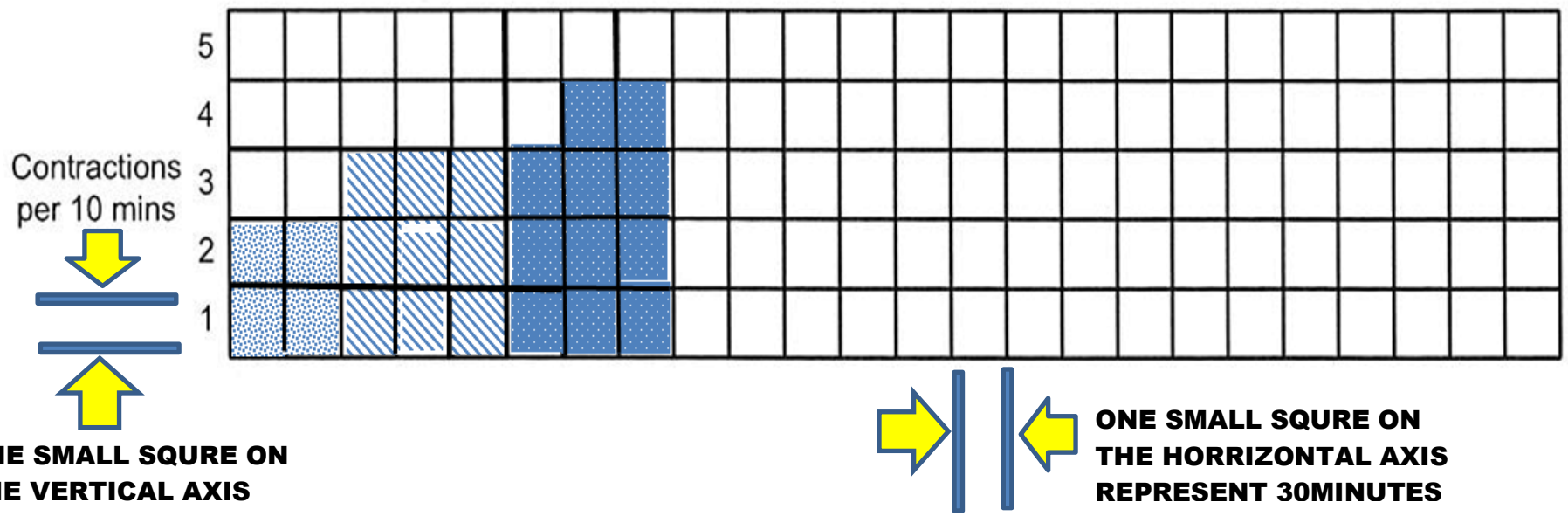


Dots represent mild contractions of less than 20 seconds' duration.

Diagonal lines indicate moderate contractions of 20-40 seconds' duration

Solid shading represents strong contractions of longer than 40 seconds' duration

- Different shading on the squares you draw on the parto-graph indicates the strength and duration of contractions.



ONE SMALL SQURE ON THE VERTICAL AXIS REPRESENT NUMBER OF CONTRACTIONS WITHIN 10 MINUTES

ONE SMALL SQURE ON THE HORRIZONTAL AXIS REPRESENT 30MINUTES

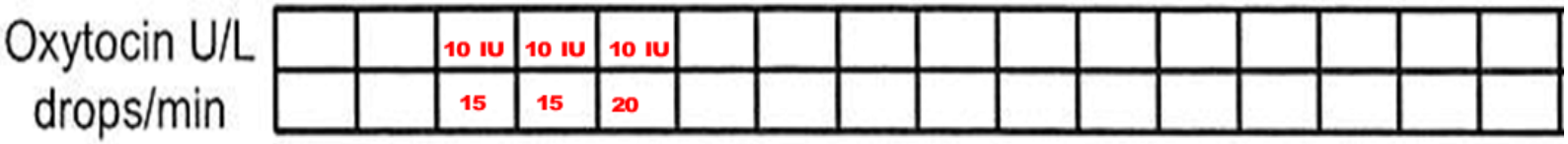
MILD CONTRACTIONS (LAST LESS THAN 20 SECONDS

MODERATE CONTRACTIONS (LAST FOR 20 - 40 SECONDS)

STRONG CONTRACTIONS (LAST FOR MORE THAN 20 SECONDS)

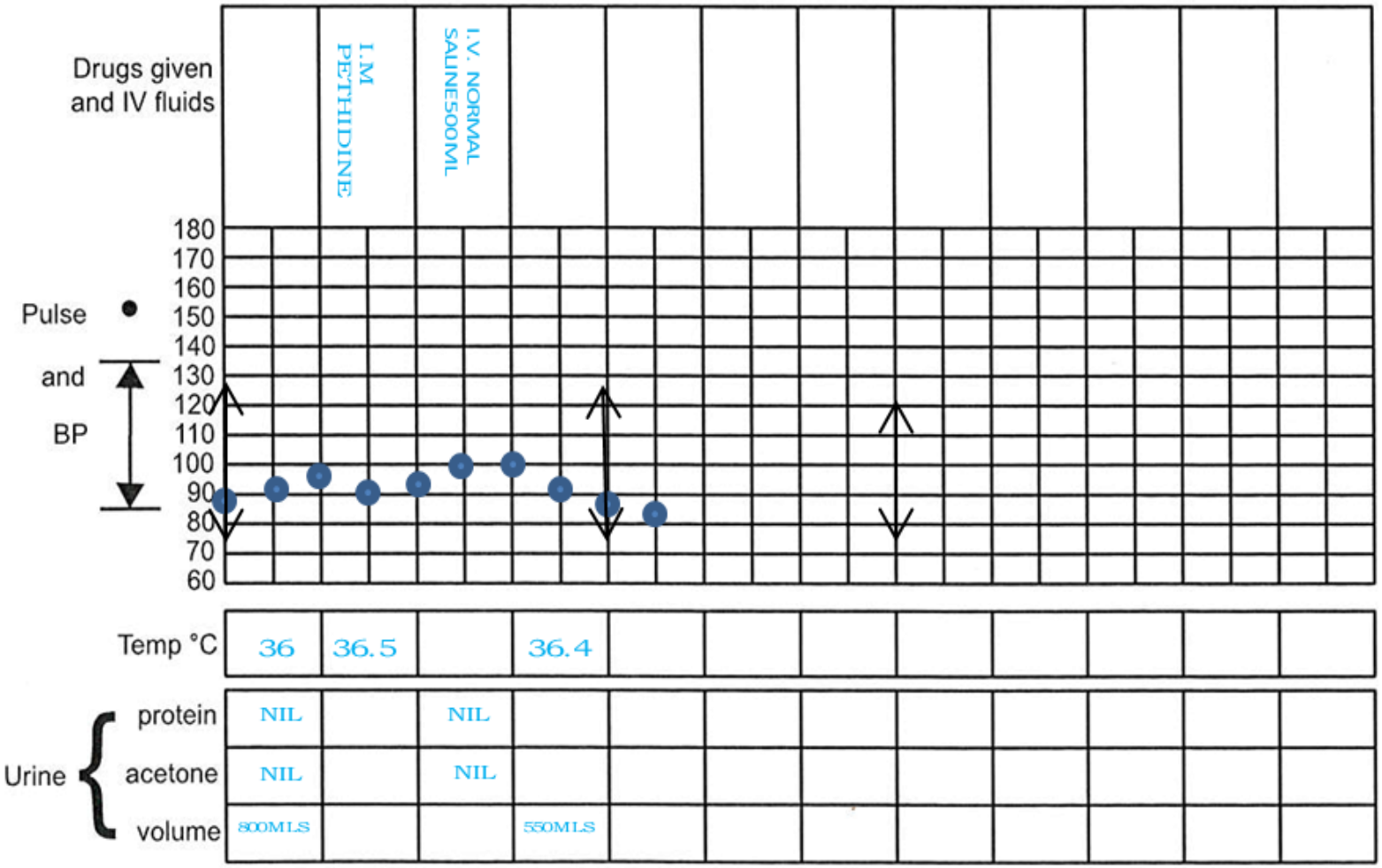
OXYTOCIN, DRUGS GIVEN AND IV FLUIDS

- There are two rows for recording administration of **Oxytocin** during labour and the amount given.
- The next area is labelled **Drugs given and IV fluids** given to the mother.



- Near the bottom of the partograph is where you record the mother's *vital signs*; the chart is labelled **Pulse and BP** (blood pressure) with a possible range from 60 to 180.
- Below that you record the mother's **Temp ˚C** (tempera ture).
- At the very bottom you record the characteristics of the

mother's **Urine: protein, acetone, volume**.

- 

CONDUCTING NORMAL DELIVERY

REQUIREMENTS

- Draw sheet and mackintosh
- Syntocinon drawn, in a receiver
- Lignocaine
- 5% dextrose solution 500mls
- Needles
- Branulars
- Syringes (for emergency)
- Sterile gloves

The following steps are suggested in the management of the second stage of labour:

- Explain the procedure to the mother and reassure her
- Ask your assistant to open and arrange the delivery pack while you scrub up
- Gown and glove yourself methodically

- Instruct your assistant to put the patient in the dorsal position
- Swab the mother methodically
- Rinse the vulva and perineum with clean water.
  – The bladder should be emptied, naturally if possible.
- In cases of urinary retention only, insert a urinary catheter using sterile technique (sterile gloves; sterile, single use catheter).
- Lubricate your two fingers and perform vaginal examination to confirm second stage
- You should also instruct your assistant to check the foetal heart beat after every contraction, the mother's pulse after every ten minutes and to administer syntometrin after the delivery of the anterior shoulder

The Management of the Second Stage of Labour

- Tell the patient to wait for a contraction. When it comes, she should take in a full breath, close her mouth and bear

down as strongly as she can, then quickly take in another breath and bear down again.

- She should be able to make at least two efforts during each contraction and relax between contractions. Encourage her all the time and explain the progress being made towards the birth of her baby.
- If labour is progressing well and there is no foetal heart rate abnormality, let the woman follow her own urge to push.
- In other cases, expulsive effort should be directed. The woman should push during the uterine contraction.
- Pushing may be done either with held breath (after a deep inhalation, glottis closed, abdominal muscles and diaphragm contracted, directed toward the perineum) or with exhalation.
- Expulsive effort is maintained for long as possible: in general, 2 to 3 pushes per contraction.
- At this stage the head might start distending the perine-

um. The anus starts dilating and the head is seen at the vulva. It keeps receding between contractions.

- When the head distends the perineum check if the perineum is stretching well.
- Place the left hand on the advancing head with fingers spread equally over the vertex towards the bregma to stop any sudden explosive effort during and after crowning of the head.
- With the right hand guard the perineum, holding it with the pad.
- Check if the perineum is stretching. If not, give an episiotomy at the height of a contraction if there is any indication that the head is about to crown.

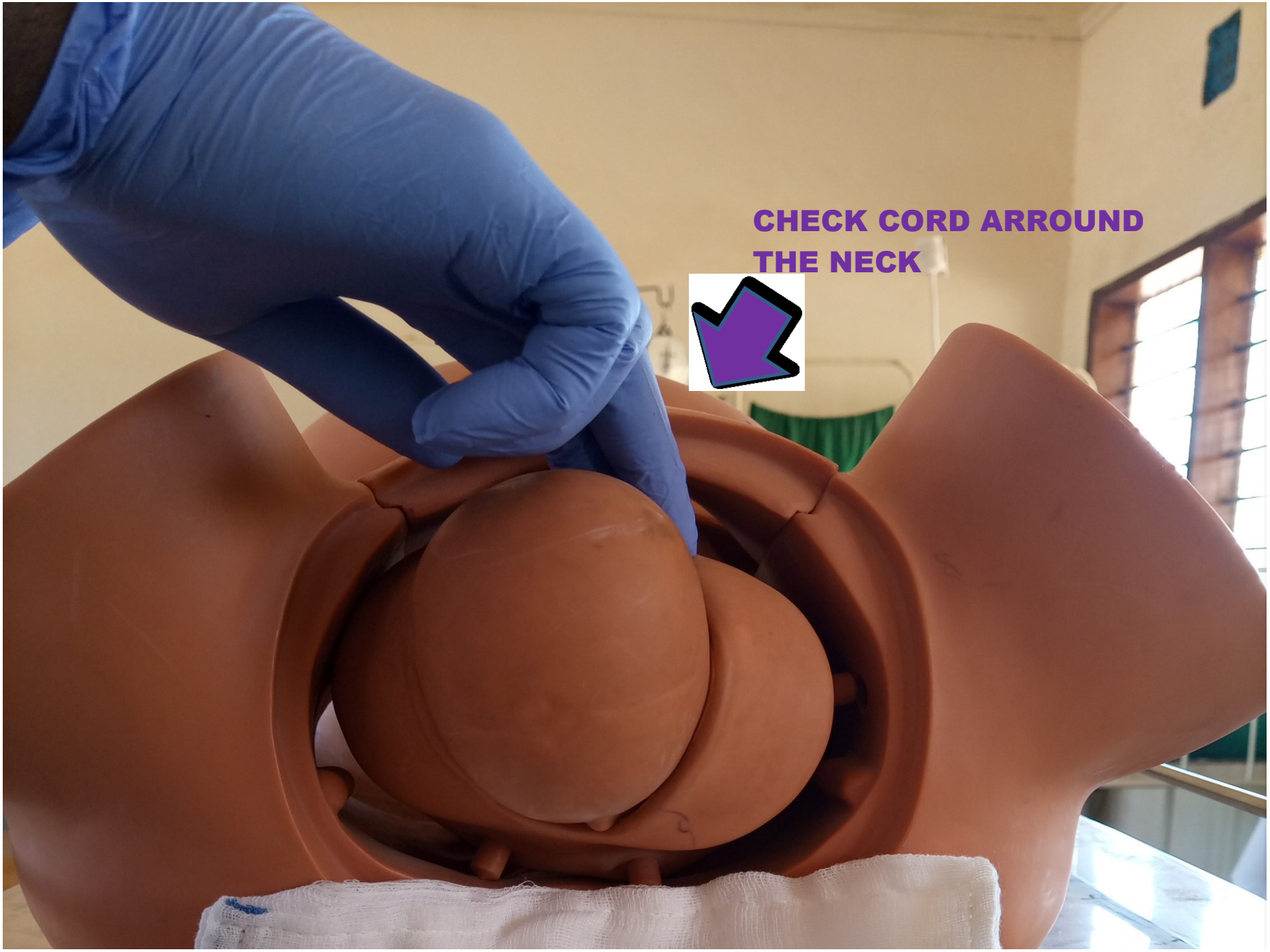

Advancing Head

Crowning of the Head

- Next is the crowning of the head. The parietal eminences pass through the bony outlet. At this stage the head no longer recedes between contractions.
- Tell the mother to stop pushing as this might lead to a rapid delivery of the head and consequent brain damage. Ask her to pant. Research has shown that a series of short pushes are more effective than a long push. Encourage her as she pushes.

Extension of the head

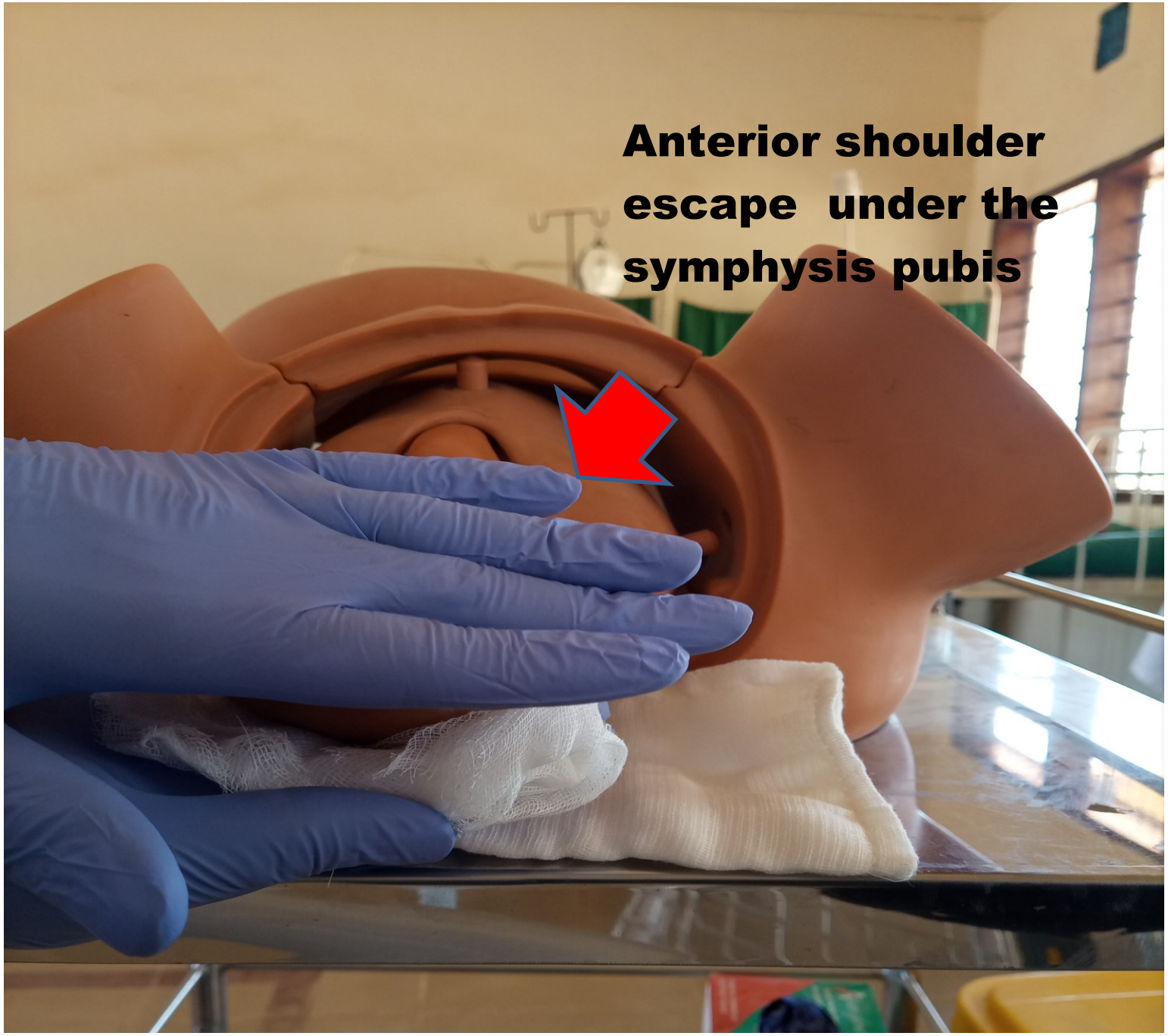
- Assist the extension by grasping the parietal eminences with your left hand.
- Let the head come out slowly and naturally. Feel for the cord around the baby's neck. If it is there, slip it from the baby's neck over the head.
- If it is too tight, place two artery forceps on the cord and cut it between them.


CHECK CORD ARROUND
THE NECK

- When the nose and mouth come out, wipe away the mucus with a sterile swab.

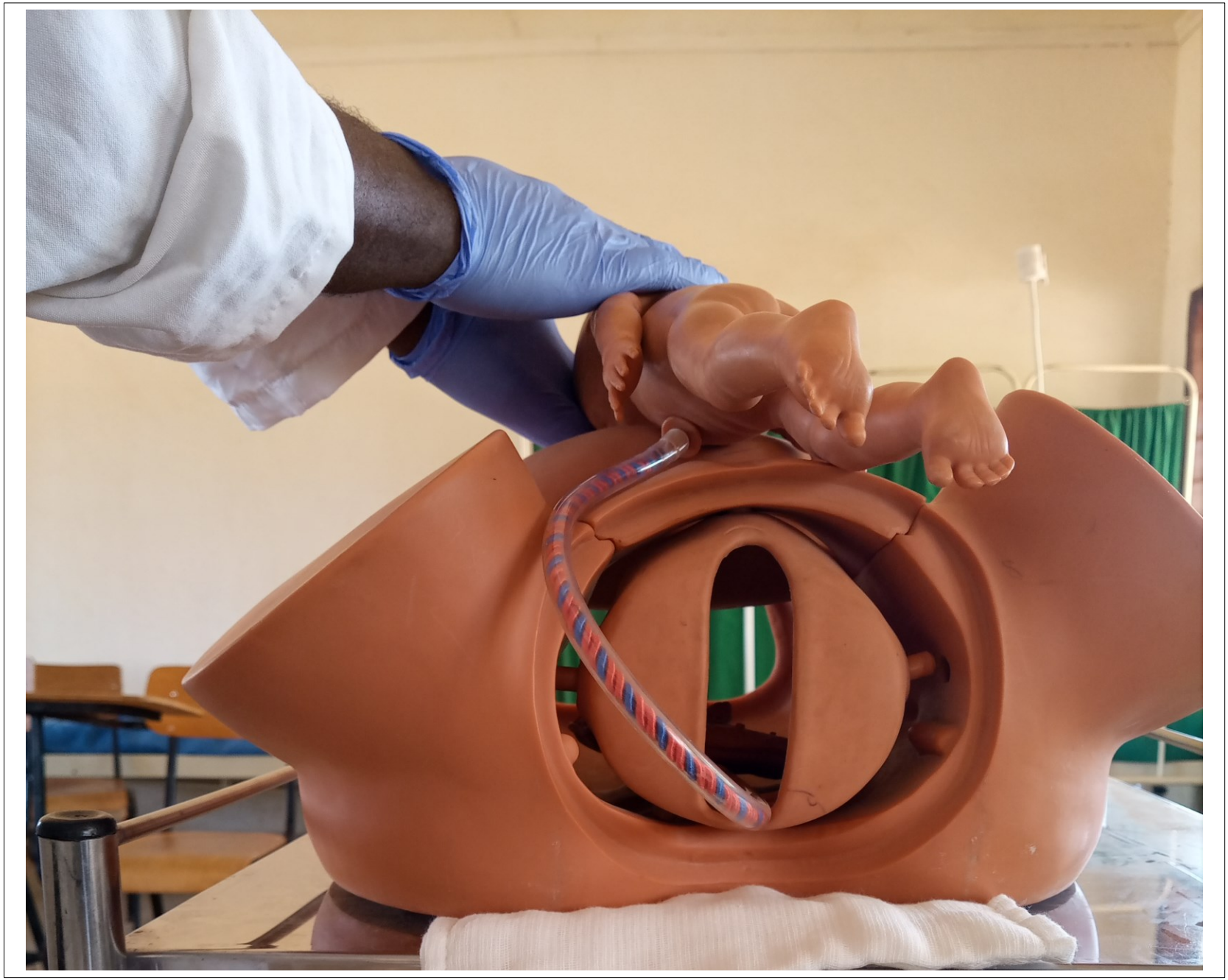
The delivering of anterior shoulder

- Wait for restitution to occur.
- The following procedure should be followed when delivering the shoulders.
- Grasping the head in both hands and exerting gentle downward traction to bring the anterior shoulder under the symphysis and then deliver it then, smooth upward traction to deliver the posterior shoulder .
- Depress the head gently toward the anus/neck making sure it is neither twisted nor bent sideways till the anterior shoulder is free.
- Remind your assistant to give syntometrine 0.5mg intramuscularly (in a single dose)
- To reduce the risk of perineal tears, control the delivery of the posterior shoulder.


Anterior shoulder
escape under the
symphysis pubis

Delivering the Posterior Shoulders by Lateral Flexion of the Body

- Guide the head upwards in the direction of the mother's abdomen as shown above.
- The posterior shoulder will escape smoothly over the perineum.
- The rest of the body will be born by lateral flexion.



- Ask your assistant for the time and note the time of birt.
- Place the baby at a slight slant to drain the mucous.
- Put the baby on the baby towel, clamp and cut the cord
- Give the APGAR score to the baby.
- Show the baby to the mother to identify the sex of the baby.
- Ask your assistant to continue with the immediate care of the baby Continue with the delivery of the placenta by using control cord traction.
- Check the placenta for completeness and/or malformation
- Measure blood loss.
    - ✓Do the first examination of the baby
    - ✓Weigh the baby
    - ✓Do a post natal examination and record all the findings
    - ✓Give the mother a hot drink and transfer her to the postnatal ward

REFERENCE

- Wilson churchil _ Miles textbook for midwives.
- Orientation_Package_for_Targeted_Post_Natal_Care_1270[1]
- KMTC procedure Manual.
- MOH Orientation Manual for Health Providers_on reproductive health.
- NCK procedure Manual.
- GOK: MOH –National road map for Mother & Newborn health.
- The beyond zero complain .

juma