LECTURE NOTES

ON

Reproductive Health

For
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BY

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BScN(UoN)

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KENYA MEDICAL TRAINING COLLEGE-KABARNET CAMPUS
COURSE OUTLINE
INTRODUCTION TO REPRODUCTIVE HEALTH 28 HOURS
YEAR ONE, SEMESTER ONE –MARCH 2018 KECHN
LECTURER: RUGENDO.M.M.(MR.)

Module competence

This module is designed to enable the learner to understand the background of RH and midwifery and apply knowledge of components, policies of RH and midwifery in provision of comprehensive and quality RH services

Module units

Unit1:	Fundamentals of Reproductive health	04 Hours
Unit 2:	Anatomy and physiology of Reproductive system.	10 Hours
Unit 3:	Sexuality; Sexual Health, Adolescent/Youth Health.	10 Hours
Unit 4:	Safe Motherhood.	04 Hours

Module Learning Outcomes

At the end of this module, the learner should be able to: -

1. Define terminologies in reproductive health
2. State RH policies, standards and guidelines
3. Outline the background and milestones of reproductive health and midwifery
4. Outline elements of quality of care in reproductive health services
5. Describe the anatomy and physiology of reproductive system
6. Discuss sexuality, sexual health and adolescent/youth health.

Module Content

1. **Background of RH**: Terminologies in reproductive health, policies, standards, guidelines; History and background of reproductive health. Elements of quality of care in reproductive health services. Concepts and history of reproductive health in Kenya. Components of reproductive health. **History of midwifery**: History of midwifery in ancient times; in developed world and in Kenya; Dynamics in midwifery.
2. **Male reproductive system**: Scrotum; testes; spermatogenesis; epididymis; vas deferens; spermatic cord; seminal vesicles; ejaculating duct; prostate glands; bulb urethral gland; penis.
3. **Female Reproductive system**: Female pelvis, bones, joints, ligaments, diameters, muscles, types of pelvis, pelvic deformities, female reproductive organs(external organs, internal organs, vagina, fallopian tubes, uterus ovaries)lymphatic supply, anatomical relations of reproductive organs to urethra, bladder, anus, rectum; structure and functions of female breast; physiology of lactation reproductive cycles;

types of nipples; fertilization; implantation; embryology; foetal growth and development; foetal skull; foetal circulation; placenta at term

4. **Sexuality; Sexual Health, Adolescent/Youth Health** :Sexual orientation; identity; body mapping; integration of sexual health into holistic care, attitude change towards sexuality and HIV-AIDS; youth sexual reproductive health needs; youth friendly services; roles of health care providers in promoting adolescent sexual and reproductive health.
5. **Safe motherhood**: Definition; Principles of safe motherhood, Objectives of safe motherhood; pillars of safe motherhood; strategies of achieving safe motherhood; challenges facing safe mother hood.

TEACHING AND LEARNING METHODS:

This course will be taught through various teaching and learning methods including and not limited to: lecture, demonstration, small group discussion, brainstorming, class presentation, and self-directed study, among others

INSTRUCTIONAL MATERIALS/EQUIPMENTS

Computers/laptops, manuals/notes, whiteboard, presentation slides/projector, projection boards, library, charts.

MODE OF EVALUATION AND ASSESSMENT

Evaluation and assessment of this module will be conducted as per the KMTC examination policies; however, the following will form part of evaluation and assessment

1. Assignments and class presentation.
2. Sit-in & take away C.A.Ts.
3. END SEMESTER EXAMINATION.

REFERENCES:

1. Fraser, D.M, 2010, Myles textbook for midwives African edition 2nd edition, Edinburg: Churchill Livingstone
2. MOH, 2004, National guidelines for obstetric & perinatal care, Nairobi: Ministry of health.
3. Waugh, A. and Grant, A. (2010) Ross and Wilson Anatomy and Physiology in Healthy and Illness. Churchill Livingstone.
4. Arthur C.Guyton and John E.Hall (2006).Text book of Medical physiology, 11th edition. Elsevier Saunders, Philadelphia.
5. William F.Ganong (2003).Review of medical physiology, 21st Edition. McGraw-Hill Companies, New York.
6. MOH (2007) National reproductive health policy-enhancing reproductive health status for all Kenyans. Nairobi: Ministry of Health
7. MOH (2003) Adolescent sexual reproductive health. A trainer's manual for health service providers.

Introduction to Reproductive health and Midwifery

Learning objectives

- By the end of the lesson the learner should be able to: -
  1. Define terminologies midwifery and reproductive health
  2. Describe historical background of reproductive health and midwifery
  3. Discuss roles and duties of a midwife
  4. Outline code of conduct in midwifery practice
  5. Explain reproductive health policies, standards and guidelines
  6. Outline sexual disorders
  7. Outline elements of quality of care in reproductive health services.
  8. Explain integration of reproductive health services

Introduction to midwifery

- **Midwifery** is a health care profession in which providers offer care to childbearing women during pregnancy, labour and birth, and during the postpartum period.
- **Midwives** also help care for the new-born and assist the mother with breastfeeding.
- A practitioner of midwifery is known as a **midwife**, a term used in reference to both women and men who have formal training in midwifery.
- Midwives also provides care to women during pregnancy and birth and other services related to reproductive health such as family planning, postnatal services and post-abortion care and post rape care.
- Midwives normally specializes in low-risk pregnancy, childbirth, and postpartum.
- They are also trained to recognize and deal with deviations from the normal as well as certain high risk situations. Obstetricians, in contrast, are specialists in illness related to childbearing and in surgery.
- Midwives are trained to handle certain more difficult deliveries, including breech births, twin births and births where the baby is in a posterior position, using non-invasive techniques.

Definition

- A midwife is a person who, having been regularly admitted to a midwifery educational program that is duly recognized in the country in which it is located, has successfully completed the prescribed course of studies in

midwifery and has acquired the requisite qualifications to be registered and/or legally licensed to practice midwifery.

- The midwife is recognized as a responsible and accountable professional who works in partnership with women to give the necessary support, care and advice during pregnancy, labour and the postpartum period.
- This care includes preventive measures, the promotion of normal birth, the detection of complications in mother and child, accessing of medical or other appropriate assistance and the carrying out of emergency measures.
- The midwife has an important task in health counselling and education, not only for the woman, but also within the family and community.
- This work should involve antenatal education and preparation for parenthood and may extend to women's health, sexual or reproductive health and childcare.

ROLES OF A MIDWIFE

- Typical duties of a midwife include:
  - ✓ Examining and monitoring pregnant women
  - ✓ Assessing care requirements/writing care plans
  - ✓ Undertaking antenatal care in hospitals, homes and GP practices
  - ✓ Carrying out screening tests
  - ✓ Providing information, emotional support and reassurance to women and their partners
  - ✓ Taking patient samples, pulses, temperatures and blood pressures
  - ✓ Caring for and assisting women in labour
  - ✓ Monitoring and administering medication, injections and intravenous infusions during labour
  - ✓ Monitoring the foetus during labour
  - ✓ Advising about and supporting parents in the daily care of their newborn babies
  - ✓ Helping parents to cope with miscarriage, termination, stillbirth and neonatal death
  - ✓ Writing records
  - ✓ Tutoring student midwives.

Key skills for midwives

- ✓ Good health and fitness
- ✓ Excellent teamwork skills
- ✓ Interpersonal skills
- ✓ Communication skills

The Code of conduct and regulation for midwives

I. Midwifery Relationships

A. Midwives respect a woman's informed right of choice and promote the woman's acceptance of responsibility for the outcomes of her choices.
B. Midwives work with women, supporting their right to participate actively in decisions about their care, and empowering women to speak for themselves on issues affecting the health of women and their families in their culture/society.
C. Midwives, together with women, work with policy and funding agencies to define women's needs for health services and to ensure that resources are fairly allocated considering priorities and availability.
D. Midwives support and sustain each other in their professional roles, and actively nurture their own and others' sense of self-worth.
E. Midwives work with other health professionals, consulting and referring as necessary when the woman's need for care exceeds the competencies of the midwife.
F. Midwives recognize the human interdependence within their field of practice and actively seek to resolve inherent conflicts.

II. Practice of Midwifery

A. Midwives provide care for women and childbearing families with respect for cultural diversity while also working to eliminate harmful practices within those same cultures.
B. Midwives encourage realistic expectations of childbirth by women within their own society, with the minimum expectation that no women should be harmed by conception or childbearing.
C. Midwives use their professional knowledge to ensure safe birthing practices in all environments and cultures.
D. Midwives respond to the psychological, physical, emotional and spiritual needs of women seeking health care, whatever their circumstances.
E. Midwives act as effective role models in health promotion for women throughout their life cycle, for families and for other health professionals.
F. Midwives actively seek personal, intellectual and professional growth throughout their midwifery career, integrating this growth into their practice.

III. The Professional Responsibilities of Midwives

A. Midwives hold in confidence client information in order to protect the right to privacy, and use judgment in sharing this information.

B. Midwives are responsible for their decisions and actions, and are accountable for the related outcomes in their care of women.
C. Midwives may refuse to participate in activities for which they hold deep moral opposition; however, the emphasis on individual conscience should not deprive women of essential health services.
D. Midwives participate in the development and implementation of health policies that promote the health of all women and childbearing families.

IV. Advancement of Midwifery Knowledge and Practice

A. Midwives ensure that the advancement of midwifery knowledge is based on activities that protect the rights of women as persons.
B. Midwives develop and share midwifery knowledge through a variety of processes, such as peer review and research.
C. Midwives participate in the formal education of midwifery students and midwives.

V. Ethical principles in midwifery practice.

A. Midwife should uphold ethical principles and expectations in executing his/her duties.
B. Some of the ethical principles in midwifery practice include: -
   i. Autonomy
   ii. Beneficence
   iii. Veracity
   iv. Non-maleficence
   v. Fidelity
   vi. Justice
   vii. Self-care.
      - **NB: Read on each of the above ethical principles.**

Reproductive Health

- **Definition**: Reproductive Health is a state of complete physical, mental, emotional and social well-being and not merely absence of disease or infirmity in all matters relating to the reproductive health system and its functions and processes. (ICPD 1994).

Components of reproductive Health

1. Safe motherhood, Maternal and Neonatal Health
2. Family Planning
3. Adolescent / Youth Sexual reproductive health,
4. Gender issues, sexual and reproductive health rights

5. Reproductive Tract Infections (RTIs)
6. Infertility
7. Cancer of Reproductive Organs
8. Reproductive Health for Elderly Persons

Elements of quality reproductive health

- Elements of quality reproductive health care include: -
    a) Technical competence
    b) Good interpersonal relationship
    c) Mechanisms to encourage continuity
    d) Integration of services
    e) Provision of factual information and counselling
    f) Availability of services

Reproductive health policy

- A policy is an official statement that is issued by the government or any other agency to guide its workers on what to do.
- It defines the decided course of action by the government or any organization.
- Policy guidelines refers to written instructions that give directives in relation to the practices that are supposed to be followed or adhered to while providing services to the clients and public in general.
- Reproductive health policy therefore refers to the official statement and guidelines issued by the government to guide provision of reproductive health services.

Aims and objectives of reproductive health policies and guidelines

1. Reduce maternal, perinatal and neonatal morbidity and mortality;
2. Reduce unmet family planning needs
3. Improve sexual and reproductive health of adolescents and youth;
4. Promote gender equity and equality in matters of reproductive health, including access to appropriate services;
5. Contribute to reduction of the HIV/AIDS burden and improvement of the RH status of infected and affected persons;
6. Reduce the burden of reproductive tract infections (RTIs) and improve access to, and quality of, RTI services;
7. Reduce the magnitude of infertility and increase access to efficient and effective investigative services for enhanced management of infertile individuals and couples;
8. Reduce morbidity and mortality associated with the common cancers of the reproductive organs in men and women.
9. Address RH-related needs of the elderly

10. Address the special RH-related needs of people with disabilities.
11. 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
12. 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
13. Enhance both men and women's health throughout their life cycle
14. Provide quality and sustainable comprehensive RH services in all service delivery points (SDP's) and community levels.

Integration of reproductive health services

- Integration is the process of by which various health services are provided at one delivery point.
- It also includes the process by which the scope of provision of a particular service is expanded or broadened.
- Integration of health services is referred to as supermarket approach of service delivery.

Advantages of integration of reproductive health services

1. It saves time
2. It promote provision of more comprehensive services
3. It allows optimal utilization of available health care workers.
4. Allows for implementation of new patterns of health services
5. Helps in developing new technologies.
6. Helps in assessment of new needs and how they can be addressed in new ways.
7. Promote low cost of health care services.
8. It improves clients satisfaction
9. It ensures provision of efficient and cost effective reproductive health services
10. Ensures no missed opportunity in provision of patient's reproductive health needs
11. It promote demand creation in provision of reproductive health services
12. Efficiency within the existing system so that key technical interventions can be provided up to the peripheral level
13. It improves reproductive health seeking behavior.

Principles for effective integration of Reproductive health services

- There should be intensive programme management.
- There should be involvement of all departments in the facility.
- There should be a coordinating committee in place
- Plans and budgets should be shared with all stake holders.
- Health standards, administrative policies and procedures should be well laid down and understood by all stakeholders.
- There should be well and coordinated flow of information. Communication systems should be well understood.
- There should be programmes involving different medical professionals

- There should be well laid quality monitoring and assurance procedures.
- Patient information and referral programme should be well coordinated.
- There should be a well established human resource development and management
- There should be effective Integration of reproductive health services including training
- Appropriate Identification, mobilization and allocation of resources.
- Operational research in reproductive health and monitoring and evaluation as well as supervision

Sexuality

- Sexuality refers to one's self sexual being which includes sexual feeling, attraction, behaving, dressing and communicating in sexual manner.
- Sexuality includes feeling, thinking or behaving as a male of female.
- Sexuality also extends to being sexually attractive, being in love and being in relationship with sexual intimacy and sexual activities.
- Sexuality includes Intimacy-the need and ability to be emotionally close to another human being and have that closeness reciprocated.
- Sexual identity-This is a person's understanding of who he or she is sexually.
- Sexual identity involves:-
    - Gender identity (I'm I male or female)
    - Gender role (what a man or woman can or cannot do because of their gender)
    - Sexual orientation (who am I attracted to sexually? (Heterosexual, homosexual)
    - Sexual preferences (what are my sexual limits? Monogamy? Polygamy? Bigamy?)

Psychophysiology of sex response.

Normal sexual behaviour has four phases in sexual response cycle:

I. Excitement
II. Plateau
III. Orgasm
IV. Resolution

I. Excitement/ Arousal: it is psychological stimulation or fantasy in presence of a love object

It consists of: -

a) Sexual drive
b) Sexual motivation
c) Sexual wish

II. Plateau: It is physiological sexual stimulation of the body.

This stage is characterized by: -

- In male's penile tumescence and erection occurs
- Vaginal lubrication
- Venous engorgement of external genitalia
- Vaginal barrel constricts
- Clitoris enlarge and retract
- Specific colour changes of genitalia.
- Breast size enlarges by 25%
- Testicular elevation occurs
- Voluntary contraction of large muscles
- Lasts for about 30seconds.
- May last for few minutes to hours

III. Orgasm: This is the peak of sexual pleasure.

This stage is characterized by:

- Contraction of the outer third of the vagina
- Swelling of the outer third of the vagina which reduces its diameter by half. This reduction in diameter increases the friction stimulation of the penis.
- Rhythmic contraction of perineal muscles
- In male ejaculation takes place
- Vigorous gasping and contraction of muscles around the neck, abdomen, buttocks and limbs.
- In both males and female's anal sphincter contracts rhythmically
- Contraction of the uterus in females
- Muscle spasms occurs both in male and females
- Blood pressure rises.
- Heart rate rises
- Respiration rate increases
- It last for seconds to minutes

IV. Resolution: This is the phase of muscular relaxation and the body system going back to its non sexual excitation state or baseline state.

- It last 10-15 minutes if orgasm is achieved.
- It is characterized by:-
  - Disgorgement of blood from genitals (detumescence)
  - Male are physiologically refractory to further erection and orgasm for a variable period of time.(Males are unable to initiate further orgasm until after some times)
  - Females may respond to additional stimulation almost immediately.

- Descending of the testes.
- Muscular relaxation
- General well being.
- If orgasm was not achieved, the individual may present with:-
  - Irritability
  - Discomfort
  - Prolonged resolution for hours

Sexual disorders

Sexual disorders are problem with sexual response that causes a person mental distress or intense sexual behaviour that involves unusual situations.

It is disturbance in the process that characterizes sexual response cycle.

Occurrence of sexual dysfunction disorders can be grouped depending on:

a) Onset can be :
   - Primary(lifelong)
   - Secondary (acquired)

b) Context in which the dysfunction occurs
   - Generalised-any time and any place
   - Situational-occurs in particular situations and places.
   - Lack of sexuality stimulating behaviour.

c) Aetiological factors
   - Psychological factors eg
     - Cognitive interference –negativism about sex
     - Fear of failure
     - Lack of communication by the factors
   - Organic and Biological causes .eg
     - Chronic diseases such as DM, sickle cell disease etc
     - Congenital anomalies of the reproductive system
   - Cultural and religion factors
     - Upbringing where sex topics are not supposed to be discussed
     - Prior learning-things learnt that affect sexual behaviour
     - Religious teachings against sex and sex before marriage
     - Cultural values and norms relating to sex.

- Sexual disorders are classified into three major types:-

I. Sexual dysfunctions
II. Gender identity disorder.
III. paraphilias

Sexual dysfunction disorders

I. Sexual desire disorders

- Hypoactive sexual desire disorder
- Sexual aversion disorder.

II. Sexual arousal disorder

- Female sexual arousal disorder
- Male erectile disorder.

III. Orgasmic disorders

- Female orgasmic disorder
- Male orgasmic disorder
- Premature ejaculation

IV. Sexual pain disorders

- Dyspareunia
- Vaginismus.

V. Sexual disorder due to a general medical condition

VI. Substance induced sexual disorder

VII. Sexual disorder NOS (Not Otherwise Specified)

Hypoactive sexual desire disorder

❖ It is reduced or lack of interest in sexual activity. It is manifested as:-

- Inhibited sexual desire
- Low sexual desire
- Deficient/ absent sexual fantasies and libido
- The individual avoid arousing situations
- Develops rapid turn off
- Complains of Poor or lack of response by the partner
- Anxiety and guilt may be manifested
- Specify the type either 1^{o},2^{o} etc.
- Common in females than in males
- Causes difficulties in marital relationship

❖ Causes of Hypoactive sexual desire disorder:-

- Organic causes
- Biological causes
- Psychological causes
- Cultural and religion factors

Sexual aversion disorder

❖ It is persistent or recurrent extreme aversion to or avoidance of all or almost all genital sexual contact with a sexual partner

- Sexual aversion disorder can be primary and secondary types
    - In primary type the genital sexual contact has never been experienced
    - In secondary type genital sexual contact has been experienced before.
- It can also assume situational type in which genital sexual contact is possible with different partner and in different settings and it is more common in women than in men.
- When confronted with the sexual situation the person may experience:
    - Panic attacks
    - Extreme anxiety
    - Feeling of terror
    - Faintness
    - Nausea
    - Vomiting
    - Palpitations
    - Dizziness
    - Dyspnoea.

- Persons with this disorder have impaired relationships

- They tend to avoid sexual situations or potential partners by covert strategies such as:

    - Going to sleep early
    - Travelling
    - Neglecting self appearance
    - Involving in substance use
    - Being over involved in other activities e.g. Work or school

Aetiology of sexual aversion disorder

A. Psychological factors-sexual traumatic experiences, sexual abuse etc
B. Cognitive aspect-low self esteem, hostile feelings towards the partner, fear of pregnancy, marital conflicts, affective disorders.
C. Certain organic causes- diabetes mellitus, hypertension, neurological diseases, liver diseases, gynaecological cancers, pharmacological agents e.g. antihypertensives, diuretics, TCAs, alcohol etc, nutritional deficiencies e.g. Vitamin A, zinc.

Female sexual arousal disorder

- It is inability to attain or maintain until completion of the sexual activity an adequate lubrication-swelling response.
- It is characterized by:-

    - Lack of response to sexual stimulation in females.
    - Failure to acquire adequate lubrication during sexual activity.
- It has two main causes:

- Subjective –feeling of no arousal
- Physiological –lack or failure of vaginal lubrication

Male erectile disorder

❖ It is persistent or recurrent inability to attain or maintain until completion of the sexual activity an adequate erection.

❖ It also referred to as:

- Erectile dysfunction
- Inhibited sexual excitement
- Impotence

❖ It can assume different patterns such as:

- Not able to attain an erection at all
- Erection may be achieved during masturbation.

❖ It can either be:

- **Primary** erectile dysfunction where by an individual has never achieved an erection
- **Secondary**-the individual has ever had adequate erection but unable to achieve one in subsequent sexual encounters.

❖ Associated causes or etiology of male erectile disorder include:-

- ❖ Sexual anxiety i.e. fear of failure
- ❖ Decreased sense of sexual pleasure
- ❖ Infertility
- ❖ Depression
- ❖ Perceived loss of physical appearance
- ❖ Poor communication between partners.
- ❖ Hostile attitude by the partner
- ❖ In adequate sexual information
- ❖ mistrust
- ❖ Substance use
- ❖ Severe stress
- ❖ Fear of pregnancy
- ❖ Traumatic sexual experience
- ❖ Religion factors
- ❖ Restrictive upbringing
- ❖ Organic disorders such as diabetes, circulatory heart diseases.
- ❖ Hormonal imbalance
- ❖ Neurological disorders
- ❖ Some medications

Female orgasmic disorder

- It is persistent or recurrent delay in or absence of orgasm following a normal sexual excitement phase.
- It can either be:
  a. Primary-the person has never reached orgasm
  b. Secondary-the person may have reached orgasm in the past.
- The person may experience orgasm in some certain circumstances e.g. When fantasising about sexual encounter.
- Also known as:
  - Orgasmic dysfunction
  - Anorgasmia
  - Inhibited female orgasm
- Causes of female orgasmic:
  - Fear of pregnancy
  - Depression
  - Poor sexual techniques.
  - Passivity due to cultural and religion rules
  - Lack of affection
  - Sexual boredom
  - Aversion towards the partner
  - Disturbed interpersonal relationship
  - Marital conflict
  - Poor sexual communication
  - Lack of interest in sexual activity
  - Depression/ Stress

Male orgasmic disorder

- It is persistent or recurrent delay in or absence of orgasm following a normal sexual excitement phase.
- Also known as:
  a. Retarded ejaculation
  b. Inhibited male orgasm
- Causes:
  a. Depression
  b. Poor sexual techniques
  c. Passivity due to cultural and religion rules
  d. Lack of affection
  e. Sexual boredom
  f. Aversion towards the partner
  g. Disturbed interpersonal relationship
  h. Marital conflict
  i. Poor sexual communication
  j. Lack of interest in sexual activity

k. Depression/Stress

Premature ejaculation.

- ❖ It is persistent or recurrent ejaculation with minimal sexual stimulation on or shortly after penetration and before the person wishes it.
- ❖ Aetiology/causes:
    - Factor that affects Duration of the excitement phase e.g. Age, frequency and duration of coitus.
    - Fear of being watched or discovered by others especially when sex is performed illegally or takes place in inappropriate places and situation.
    - Negative attitude towards the female partner
    - Focus on achieving an orgasm
    - Hostility by the partner
    - Inexperience
    - Environmental stress.
    - Organic causes:
    - Urethral disorders
    - Neurological disorders

Vaginismus

- ❖ It is recurrent or persistent involuntary spasm of the musculature of the outer third of the vagina that interferes with sexual intercourse.
- ❖ It may occur prior to or during penetration
- ❖ Penile penetration become impossible when there is contraction of the pelvic floor muscles to the extent that the vagina does not dilate.
- ❖ Extreme cases of Vaginismus may lead to non-consummation of marriage.
- ❖ Vaginismus is often psychogenic in origin.
- ❖ It is triggered by fear of penetration, pregnancy or contracting disease.
- ❖ Other causes may include:
    - Hostility and traumatic sexual experience
    - Strong religious belief.
- ❖ Organic causes:
    - Gynaecological lesions
    - Inflammation
    - Obstetric trauma
    - Hymenal remnants
    - Atrophy of the vagina in senile women.

Dyspareunia

- ❖ It is recurrent or persistent pain associated with sexual intercourse in either male or female.
- ❖ Dyspareunia may be an indication of inadequate vaginal lubrication possibly due to insufficient stimulation.
- ❖ Other factors:

- Lesions, scars, muscle spasm
- Effects of circumcision e.g. tight circumcision, formation of fibrous tissue.
- Pelvic infection on deep penetration
- Inflammation
- Ca cervix
- Ovarian cysts
- Penile infection in men
- Structural abnormalities in male genitalia

Gender identity disorder.

- A strong and persistent cross-gender identification that is not merely a desire for any perceived cultural advantages of being the other gender.

- **Transexualism**:- It is a disorder where the person has the conviction of being sex opposite to that indicated by the external genitalia.

Paraphilias.

- Paraphilias are unusual fantasies, sexual urges and behaviours that are recurrent and arousing.
- They include:
    a) **Paedophilia**-sexual urge towards arousal or activity with a pre-pubescent child
    b) **Exhibitionism**- exposure of genitalia by a male to unsuspecting female stranger which may be accompanied by a fantasy that the stranger will be sexually aroused
    c) **Fetishism**-use of women's underpants, bras, stockings, shoes, earings, bracelets among others for the purpose of achieving sexual arousal and gratification.
    d) **Transvestism**-recurrent act of cross-dressing, usually by heterosexual male in female dressing for the purpose of achieving sexual arousal and gratification.
    e) **Sexual masochism**-seeking of real humiliation or pain from physical injuries or psychological abuse in order to achieve sexual gratification. e.g.. Beating, being tied, stabbing, cutting, receiving electrical shock, piercing or psychological abuse before or during sexual intercourse.
    f) **Sexual sadism**-derives sexual excitement from physical and psychological suffering and humiliations of their victims
    g) Paraphilias NOS(Not Otherwise Classified):
        - Zoophilia/Bestialism: an animal
        - Telephone scatologia: obscene phone calls
        - Necrophilia: corpses
        - Partialism: exclusive focus on one part of the body
        - Coprophilia: feaces

- Klismaphilias: enemas
- Urophilia: urine

Management of sexual disorders: -

- Conduct a comprehensive assessment on the following key aspects:
  - The nature and development of the sexual problem
  - Family attitudes towards sexuality – "taboo" element
  - Sexual knowledge: how and from where was it gained
  - Gender identity and role: did the individual feel safe with the gender identity or role during childhood or adolescent
  - Puberty: when did this occur, was it early or late compared with peers, was it traumatic, for the female; ask about the onset and early understanding of menstruation and subsequent patterns.
  - Interest in opposite sex: when did it develop and what was the nature of the first heterosexual relationship?
  - Past sexual experiences
  - Current relationships: when did the couple meet; what attracted them to each other and how did the relationship develop
  - Assess for any medical conditions (e.g diabetes, neurological diseases, pelvic pathology, medicines) or psychiatric factors (mood and anxiety disorders) that could account for the problem.
- Psychological intervention
- Counselling –to allay myths, improving love making techniques and communication.
- Behavioural therapies-marital therapy, sensate focus (focussing on other areas other than sex organs to reduce sex performance anxiety)
- **Sensate focus**: involves exploration of each other's bodies in order to give and receive pleasurable sensations with emphasis on communication and giving pleasure in order to receive it. Sensate focus is meditation about sexual affairs.
- **Genital sensate focus:** the couple move to involve the genital and breast areas in their caressing and exploration.
- Squeeze techniques-a method commonly used to treat premature ejaculation.
  - In this technique, the female partner holds the male's sexual organ between her thumb and forefinger at the level of the frenulum
  - When the male partner is about to ejaculate he signals his partner to tightly apply squeeze technique by squeezing the tip of the male organ
  - The procedure is slightly painful and should be practiced for a while until mal e partner do not ejaculate too soon.
- Stop-start techniques-manual stimulation of the man's sexual organ. When the male partner is about to have an ejaculation he informs the partner to apply start-stop technique.
- Manage underlying medical conditions
- Cognitive and social interventions-self-instruction training
- Other therapies

- ✓ Individual therapy.
- ✓ Group therapy
- ✓ aversion therapies
- ✓ Negative Sex thinking.
- ✓ Positive sex thinking e.g. visualizing a past episode of a prolonged sexual activity.
- ✓ Non sexual thinking and practice- eg expressing gratitude for one another, Having dinner together etc.
- ✓ Sex incongruous.
- ✓ Drugs e.g. Sildenafil (Viagra)

❖ You can also Adopt Annon's PLISSIT model

- **P**-**P**ermission: -This is when you seek permission from the client to discuss feelings and concerns relating to specific health issues they are hesitant to discuss
- **LI**-**L**imited **I**nformation: This is the second stage where the therapist offers basic education about the topic at hand.
- **SS**-**S**pecific **S**uggestions: This level of intervention involves advanced knowledge of a particular health issue and develop an appropriate interventional plan
- IT: **I**ntensive **T**herapy: This is the fourth level of intervention and it requires specialized and intensive interventional program.

Youth and adolescent reproductive health

Learning objectives

- By the end of the lesson the learner should be able to: -
  1. Define terminologies related to youth and adolescent reproductive health.
  2. Define adolescent, youth and young people.
  3. Outline changes that occurs during puberty and adolescent.
  4. Explain rationale for focussing on adolescent and youth reproductive health
  5. Describe youth friendly services
  6. Outline roles of health service providers in adolescent and youth reproductive health.
  7. Discuss barriers to youth and adolescent reproductive health services.

Introduction

During this transition to adulthood, adolescents develop biologically and psychologically and move towards independence and due to these transitional changes, youths and adolescents: -

- Encounter health risks
- Exhibit risk taking behavior
- Experimental risk behavior

According to world health organization (WHO): -

- **Adolescence**-refers to the period of life between the ages of 10 and19 years.
- **Youth** -refers to the period of life between the ages of 15 and 24 years.
- **Young people**-refers to the period of life between the ages of 10 and 24 years.
- **Teenager**-persons aged 13-19 yrs

Social definition of adolescence: This is the stage in human development covering the onset of puberty until full social integration of the individual as an adult. This is a period in which an individual goes through physical and psychological changes accompanied by sexual maturation leading to the capacity to procreate.

Biological Definition of adolescence: This is a period in which an individual goes through physical and psychological changes accompanied by sexual maturation leading to the capacity to procreate.

Stages of adolescence development

Adolescence stage can be divided into three:-

1. Early adolescence
2. Middle adolescence
3. Late adolescence.

Early adolescence (10-13yrs)

- Onset of puberty and rapid growth
- Impulsive, experimental behavior
- Beginning to think abstractly
- Adolescent's sphere of influence extends beyond her/his own family
- Increasing concern with image and acceptance by peers

Middle adolescence (14-16 yrs)

- Continues physical growth and development
- Starts to challenge rules and test limits
- Develops more analytical skills; greater awareness of behavioral consequences
- Strongly influenced by peers, especially on image and social behavior
- Increasing interest in sex; special relationships begin with opposite sex
- Greater willingness to assess own beliefs and consider others

Late adolescence (17-19 yrs)

- Reaches physical and sexual maturity.
- Improved problem-solving abilities
- Developing greater self-identification
- Peer influence lessens
- Reintegration into family
- Intimate relationships more important than group relationships
- Increased ability to make adult choices and assume adult responsibilities
- Movement into vocational life phase

Puberty

- Puberty is the period in which individuals acquire sexual maturity.
- It occurs between 11-13 years.

Physiological and Physical changes that occurs during puberty

- This is going to be discussed based on girls and boys

Girls

- Breasts increase in size and are spherical in shape due to enlarged glandular tissue
- Typical female shape and contour of the body develop, that is broad hips and narrow chest and shoulders
- Hair develops in the armpits and pubic region
- Internal organs of reproduction, that is, vagina, uterus, ovaries mature and menstruation (menarche) begins

- Face may become smooth or facial pimples (acne) may develop

Boys

- Enlarged testis and penis
- Development of armpit, pubic and facial hairs
- First ejaculation (spermache) and nocturnal emissions (wet dreams) occur
- Gain in muscular strength and weight
- Voice changes with the voice becoming deeper
- Skin problems such as acne develop and the face looks rough
- Body shape takes on typical adult characteristics, for example, broad shoulders
- Rapid growth in height depending on genetics

Emotional and psychological changes in 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 behaviors 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. This is called peer influence.
- The relationship with the opposite sex increases as they learn how to cope with romantic and sexual feelings. This is the period of sexual debut for many adolescents.
  Sexual Debut is the age at which and individual engages in his/her first sexual intercourse.
- Personal feelings are also affected and there is a need to accept themselves as an independent individual
- Values and behaviors 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
- Increased role identification and role modeling.

Reasons for focusing on adolescents and youths Reproductive health

1. Adolescents and youths RH problems are compounded by many myths, misconceptions and misinformation.
2. They have different needs because of their physical and psychological stages.
3. They are more involved in unsafe abortions (for females).
4. Adolescents and youth are neglected as a group by the health system.
5. They have different cognitive abilities and skills, which requires different counseling approaches and more time.

6. They tend to be less well-informed and require more information
7. Conflicts between cultural or parental expectations and adolescents' emerging values present serious challenges for young people.
8. Using substances or drugs for the first time typically occurs during adolescence.

Reasons why adolescents and youths require specialized Reproductive Health services

1. The specific biological and psychological needs of adolescents.
2. High risk of STIs, HIV and pregnancy.
3. Disproportionately high risk of sexual abuse and violence.
4. Importance of behavior related risks that are responsive to education and counseling.
5. Opportune age/stage to learn good health practices.
6. Severities of consequences from lack of reproductive health care.

Reproductive Health problems faced by adolescents and youth

a) Early and unprotected sexual intercourses.
b) Female genital cutting
c) Menstrual problems
d) Multiple sexual partners
e) Early and forced marriages
f) Teenage pregnancy and child birth
g) Unsafe abortions
h) Lack of access to RH services and information unmet need for FP
i) Susceptibility to STIs
j) Gender based violence/sexual abuse
k) Drug and substance abuse

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 sexually transmitted 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

Reproductive Health rights of adolescents and youth

1. The right to good reproductive health.
2. The right to decide freely and responsibly on all aspects of one's sexuality.
3. The right to information and education about sexual and reproductive health so that good decisions can be made about relationships and having children
4. The right to own, control, and protect one's own body.

5. The right to be free of discrimination, coercion, and violence in one's sexual decisions and sexual life.
6. The right to expect and demand equality, full consent, and mutual respect in sexual relationships.
7. The right to quality and affordable reproductive health care regardless of sex, creed, color, marital status, or location.
8. The right to privacy and confidentiality when dealing with health workers and doctors.
9. The right to be treated with dignity, courtesy, attentiveness, and respect.
10. The right to express views on the services offered.
11. The right to gender equality and equity.
12. The right to receive reproductive health services for as long as needed.
13. The right to feel comfortable when receiving services.
14. The right to choose freely one's life/sexual partners.
15. The right to celibacy.
16. The right to refuse marriage.
17. The right to say no to sex within marriage.

Barriers to adolescents and youth Reproductive Health services

A. Staff barriers:-

- Negative attitude toward young people
- Lack of training on how to handle young people
- Ignorance of the policy is on provision of ASRH services to youth
- Personal, religious, and cultural biases among staff
- Lack of confidentiality
- Lack of privacy

B. Facility barriers:-

- Not designed to cater for youth (Inappropriate opening hours, long waiting time)
- Lack of privacy
- Lack of youth friendly corners
- Personal, religious, and cultural biases among staff
- Cost of RH services
- Lack of Availability of RH services
- Long waiting time
- Shortage of staff

C. Socio-cultural barriers:-

- Lack/inadequate information about youth friendly services among community members
- Community beliefs, attitudes and misconceptions
- Community cultural and religious beliefs
- Level of education
- Political environment

D. Personal/Adolescent's/Youth's barriers:-

- Being embarrassed
- Medical procedures (blood tests, pelvic exam)
- Non-friendly service providers

- Negative perceived notions towards service providers
- Service provider's attitudes to SRH problems
- Stigma associated with sexual activity and sexual health problems
- Discussing ARH problems with adults

Adolescent and youths vulnerabilities

Adolescent and youth vulnerabilities can be classified as follows:-

A. Physical vulnerabilities
B. Emotional vulnerabilities
C. Socio-economic vulnerabilities.

Physical vulnerabilities

❖ Physical vulnerabilities may include:-
- Poor nutrition and inadequate diet
- Poor eating habit
- Poor health in infancy and childhood
- Repeated and untreated infections
- Cultural and traditional practices eg.FGM, forced marriage

Emotional vulnerabilities

❖ Emotion vulnerabilities may include:-
- Adolescents often lack assertiveness and good communication skills, thereby rendering them unable to articulate their needs and withstand pressure or coercion from their peers or adults.
- Sexual and physical abuse
- Adolescents may feel pressure to conform to stereotypical gender roles.
- Young people may lack the maturity to make good, rational decisions.

Socio-economic vulnerabilities.

❖ Socio-economic vulnerabilities may include:
- Little access to money and meaningful employment
- Poverty and economic hardships
- Gender discrimination
- Early marriages
- Drugs and substance abuse

Psychosocial and behavioral concerns of adolescents

They include: -
- Gender roles
- Peer Relationships/Peer Pressure
- Relationships with Parents/Other Adults
- Self-Esteem

Gender roles
- Gender roles are masculine or feminine behaviors expressed according to cultural or social customs and norms.

- Boys achieve more autonomy, mobility, and power, whereas girls tend to get fewer of these privileges and opportunities.
- Boys' power relative to girls' translates into dominance in sexual decision-making and expression, often leaving girls unable to fully assert their preferences and rights and to protect their health.

Peer Relationships/Peer Pressure

- Adolescents develop very close relationships with their peers, conforming to language, dress, and customs. This helps them feel secure and gives them a sense of belonging to a large group.
- Given the significance of peer influence, this power can sway adolescents toward greater or lesser risk-taking.
- Peer pressure, combined with gender inequities within a sexual relationship, can mean that males have undue power to dictate sexual decisions to females.

Relationships with Parents/Other Adults

- During adolescence, relationships with parents become more conflicted as the young person tests limits and moves toward greater independence.
- At the same time, parents have significant influence over, and responsibility for, adolescent children.
- Providers are encouraged to promote parent-child communication during this period

Self-Esteem

- Self-esteem is the ability to feel confidence in, and respect for, oneself. It is a feeling of personal competence and self-worth.
- Self-esteem plays a key role in a young person's sense of how well s/he can deal with life's options and challenges.
- Specifically for reproductive health, self-esteem influences how young people make judgments about relationships, sex, and sexual responsibility.

Important life skills for adolescents and youths

- Adolescents need skills to:
  - Help clarify their needs and rights.
  - Express themselves effectively.
  - Decide upon a course of action.
- Life skills are essential component of dealing with youth reproductive issues
- Life skills are abilities or psychological competences that help the individual to deal or cope effectively with the challenges of everyday life.
- They help young people identify goals and build good and healthy futures.
- The acquired abilities are practiced, mastered and perfected to become skills.
- Life skills can be categorized into three:-
  1) Skills for dealing and coping with oneself

2) Skills for dealing and coping with others
3) Skills for making effective decisions

- Skills for dealing and coping with oneself include: -
  - Self-awareness
  - Self esteem
  - Coping with emotions
  - Coping with stress
  - Goal setting
  - Time management
- Skills for dealing and coping with others include: -
  - Interpersonal relationships
  - Friendship formation
  - Conflict resolution
  - Empathy
  - Effective communication
  - Resisting peer pressure /assertiveness
  - Negotiation
- Skills for making effective decisions include: -
  - Critical thinking
  - Creative thinking
  - Decision making
  - Problem solving
  - Employment/ economic empowerment
  - Socialization and Education
- Two life skills will be discussed in details. Students ensure that they have read and understood other types of life skills.

Decision Making

- A decision is a choice that we make between two or more possible courses of action
- As young people grow, they make decisions some of which will affect them for the rest of their lives.
- The most important parts of decision making is predicting outcomes or understanding the consequences of a choice.

Steps in decision making

1. Identifying the problem, situation, or issue that is calling for a decision.
2. Getting more information if you have questions about the situation.
3. Thinking about the possible consequences or outcomes of each course of action.
4. Thinking about your personal and family values, and which courses of action are consistent with these values.
5. Thinking about the ways in which your decision may affect other people.
6. Choosing the decision that seems most appropriate based on your knowledge, values, morals, religious upbringing, and present and future goals.

7. Re-thinking the decision and how you feel about it – whether you feel that you carefully considered all the alternatives and feel comfortable with the choice you have made.

❖ Another way you can look at decision making is the use of acronym "DECIDE" Where:-

D-Describe the problem in your own words
E-Explore the available options
C-Choose the option that best fits you
I-Identify the advantages and disadvantages of the option you have chosen
D-Do it if the advantages outweigh the disadvantages
E-Evaluate whether your option is working. If not go back to the first "E"

Three ''Cs'' for decision making

1. CHALLENGE
2. CHOICES
3. CONSEQUENCES

- CHALLENGE-Describe the CHALLENGE (or decision) you have.
- CHOICES-List at least three CHOICES you have
- CONSEQUENCES-Consider the positive and negative CONSEQUENCES of each choice.

Goal setting

- ❖ A goal is an achievement and accomplishment towards which our efforts are directed.
- ❖ Goals give young people something to look forward to.
- ❖ Goals should be specific, practical, and have a deadline.
- ❖ Goals should be realistic, manageable and achievable.
- ❖ Achieving a goal makes it easier and creates confidence among young people to move to other, greater goals.
- ❖ Thinking about the expected benefits can be motivating.
- ❖ To help achieve a goal, it is helpful to have a plan with steps that are needed to achieve the goal, and also think about possible difficulties and how they can be overcome.

Questions to ask in the goal setting process.

- ➢ When do you want to accomplish this goal?
- ➢ If you reach this goal, in what ways is it going to help you?
- ➢ What are the steps that you will have to take to reach your goal?
- ➢ What are the things that might prevent you from achieving your goals?
- ➢ What actions can you take to overcome these difficulties?

Youth friendly services

- YFS are services that are accessible, acceptable, affordable and appropriate for adolescents/youth.
- They are in the right place at the right price (free where necessary) and delivered in the right style to be acceptable by young people
- In the right place, at the right price and delivered in the right style to be acceptable to young people.
- Effective safe and affordable.
- Meet the individual needs of young people who return when they need to and recommend these services to friends.

Rationale of Guidelines of Youth Friendly Services

- Services previously offered to young people have been fragmented and varied from one institution to another.
- Guidelines aim at harmonising the provision of the services to the beneficiaries.
- They provide for a minimum package for services to be considered youth friendly,
- Ensures national uniformity of provision of YFS.

Barriers to provision of YFS

- Barriers to YFS can be classified into: -
  a) Staff/health care provider's barriers
  b) Health facility barriers
  c) Socio-cultural barriers
  d) Adolescent barriers

Staff/health care providers' barriers: -

- Negative attitude toward young people
- Lack of training on how to handle young people
- Ignorance of the policy is on provision of ASRH services to youth
- Personal, religious, and cultural biases among staff
- Lack of confidentiality
- Lack of privacy
- Staff using adolescent clients as bad example

Health facility barriers

- Not designed to cater for youth (Inappropriate opening hours, long waiting time)
- Lack of youth friendly corners
- Cost of RH services
- Availability of RH services

Socio-cultural barriers

- Lack/inadequate information about youth friendly services among community members
- Community beliefs, attitudes and misconceptions
- Community cultural and religious beliefs
- Level of education
- Political environment

Adolescent barriers

- Being embarrassed
- Fear of Medical procedures (blood tests, pelvic exam)
- Non-friendly service providers
- Negative perceived notions towards service providers
- Service provider's attitudes to SRH problems
- Stigma associated with sexual activity and sexual health problems
- Fear of discussing ARH problems with adults
- Lack of awareness of risks/symptoms of SRH problems
- Unaware of location of SRH facility and services offered
- Fear of facilities with mixed clientele
- Dislike seeking services within their locality

Patterns of seeking Reproductive Health services by adolescents

- Adolescents are late/poor seekers of SRH services
- Adolescents camouflage SRH problems
- Self-medication/treatment before seeking appropriate care e.g. for management of STIs, termination of pregnancy
- Adolescents don't like to be seen seeking RH services
- Adolescents tend to prefer seeking RH services at specific times eg after when other people have left the facility
- Douching after sex with water/detergents to prevent pregnancy/STIs
- Attempted abortions before carrying pregnancy to term

Approaches for Delivery of Youth Friendly Services

- There are two approaches to provision of youth friendly services, namely:
    1. Targeted approach
    2. Integrated approach

1. **Targeted approach**
    - Services are designed and planned for youth alone.
    - Services maybe clinical, non-clinical or a combination of both.
2. **Integrated approach**
    - Young people receive services as part of the general public.
    - Special arrangements are made to make the services more acceptable to young people**.**

Models applied in youth friendly services

- They are three models to youth friendly services:-
    1. Clinic based model
    2. Youth centre model
    3. School based model/peer programs

1. Clinic model

- In this model, services are provided in a health facility.
- The following services are Provided in this model: -

- General Counseling Services.
- Screening and treatment of Sexually transmitted infections, HIV/AIDS.
- Voluntary Counseling and Testing (VCT)
- Provision of information and Education on Reproductive Health.
- Training in life skills.
- Provision of post abortion care services.
- Availability of IEC, audio / vision Materials.
- Ante and post-natal care.
- Comprehensives post rape care.
- Provision of contraceptives including condoms.
- Curative services for minor illness including ante & postnatal care
- Promoting community based and school based outreach / peer education activities.
- Recreational facilities (Indoor and Outdoor) where possible.
- Linkage to school based and Youth center based model
- Referral where necessary

2. Youth centre model

- In this model, services are provided in centres designated for youth friendly services where youths are likely to congregate. Mainly at market places, churches etc.
- Provide the following services: -
  - Health prevention and promotion.
  - General counseling services.
  - Provision of information and education on reproductive health.
  - Training in livelihood / life / income generation activities (IGA)
  - Availability of IEC, audio / visual materials.
  - Promoting school based outreach IEC activities.
  - Promoting school based outreach IEC activities.
  - Working with peer youth educators.
  - Provision of contraceptive including condoms
  - Recreation facilities (In and Outdoor games)
  - Voluntary Counseling and Testing (VCT)

3. School based model/peer programs

- Services are provided in school's premises and focuses on adolescents and youths in learning institutions.
- Provides the following services: -
  - Skill training.
  - General counseling services.
  - Peer education
  - School health talks
  - Personal hygiene
  - Sexuality and grown up
  - Reproductive Health
  - STD and HIV-AIDS Prevention
  - Rape Prevention

- Communication / skills Post rape care
- Linkage to clinic-based and Youth center based model
- Referral for treatment and management

Characteristics of Youth Friendly Services

- Convenient Working hours/time
- Convenient location
- Availability of adequate, space that is separate and offers sufficient privacy.
- Comfortable secure surroundings.
- Specially trained Staff.
- Respect for young people
- Adequate time for client provider interactions.
- Necessary referral mechanism should be available.
- Wide range of services available (like one stop shop)
- Educational materials available on site and to take away.
- Community mobilization / gatekeepers involvement
- Youth involvement

Minimum Conditions for Youth Friendly Services

- Affordability and accessibility
- Safe and basic range of services
- Privacy and confidentiality
- Provider competence/attitude
- Quality and consistency
- Reliability and sustainability
- Trained healthcare providers
- Inbuilt monitoring and evaluation system

Addressing barriers to Reproductive Health services among adolescents and youths

- Barriers to youth friendly services can be addressed through the following ways: -
  - Reassure the adolescent that it is normal to feel, Embarrassed, Afraid or Shy
  - Provide accurate, factual information on adolescent growth and development.
  - Create awareness on availability of ASRH services through media, campaigns, IEC etc.
  - Give information: -To enable adolescents recognize signs and symptoms of STIs and explain the need to seek services early
  - Reassure adolescents on privacy and confidentiality.
  - Sensitize the community on: -
    - Adolescent SRH needs
    - Consequences of SRH behavior

    - Implications of not managing ASRH needs
    - The need for community support
- Define role of parents in giving SRH information
- Training of health care workers on youth friendly services
- Ensuring availability of reproductive health services
- Ensuring that reproductive health services are accessible and affordable.
- Creating youth friendly corners
- Appropriate and convenient working hours
- Reducing waiting time
- Positive attitude towards young people among health care workers
- Conducting outreaches on RH services.
- Use of youth seminars, conferences and other related programs to create awareness
- Working with youth groups within the community.
- Develop a comprehensive reproductive health package to address youth/adolescent issues through the provision of counseling and user friendly clinics
- Promote responsible and healthy RH and sexual behavior of the youth through counseling and guidance
- Sensitize leaders, programme managers, service providers, teachers, the community, adolescents and youths themselves, on the reproductive health needs and rights of adolescents and youths
- Advocating the recognition of socioeconomic and reproductive health needs and rights of adolescents and the youth
- Establishing an understanding with youth advisory councils at all levels to coordinate and advise on youth and adolescent health
- Developing specific messages for different target groups (parents, religious and other leaders, youths and adolescents)
- Implementing youth friendly and accessible RH services to enable the youth to seek services and receive counseling without barriers. Health providers should create a conducive environment when counseling and avoid biases that discourage youths from coming to the facility
- Educating youths on their rights in order to help them attain the highest degree of health and self-esteem.
- Conducting basic/applied research on youth and adolescent issues on regular basis and implementing the findings
- Policy formulation on youth and adolescent issues regarding reproductive health.

Preconception Care

Learning objectives

- By the end of the lesson the learner should be able to: -
  1. Define preconception care
  2. Outline objectives of preconception care
  3. Discuss importance of preconception care
  4. To outline services provided in preconception care.

- **Definition**
  - This is a set of interventions that identify and modify biomedical, behavioural, and social risks to a woman's health and future pregnancies. It includes health promotion, prevention and management of any preexisting conditions; emphasizing health issues that require action before conception or very early in pregnancy for maximal impact. The target population for pre conception care is women of reproductive age (15 to 49 years), although men are also targeted by several components of pre conception care.
- **Objectives of Pre conception Care:**
  - To provide Health promotion and education to improve knowledge attitudes and behaviours of men and women with regard to pregnancy
  - To provide Evidence - based Screening for pregnancy risks
  - To provide Interventions to address identified risks and conditions
  - To Achieve universal coverage of Essential Obstetric Care
- **Reasons for focusing on preconception care include: -**
  - Poor birth outcomes continue
  - Increasing Newborn mortality rate.
  - Postpartum hemorrhage
  - Poor pregnancy outcomes e.g. malaria and anaemia remain prevalent; smoking, alcohol use and drug abuse are on the increase.
- **Reproductive Health risks include the following:**
  - Age of the couple
  - Very young (16yrs and below); Elderly (35 yrs and above)
  - Parity
  - Primigravida; Grand multiparity (gravida five and above); Short pregnancy interval (less than 2 years)
  - Nutritional status
  - Under nutrition, obesity, malnutrition
  - Low Socio-economic status
  - Previous adverse pregnancy outcome
  - Recurrent spontaneous abortions, Stillbirths, Early neonatal deaths (first one week)

- Previous baby with congenital abnormalities
- Medical conditions such as
- Anaemia, Malaria, HIV/AIDS, Tuberculosis, STIs/RTIs, cardiac disease, Diabetes, Sickle cell disease, Asthma, Hypertension (Pre and post conception) ABO and Rhesus incompatibility, Breast cancer, cervical cancer, renal disease
- Obstetric Complications such as
- Previous obstetric Haemorrhage; previous C/S scars, previous preterm labour, Previous PET / eclampsia
- Substance abuse
- Smoking; Alcohol or Drug abuse; Intake of prescription or over the counter drugs that are known to be teratogens.
- Gender based violence
- FGM, Early marriage, Physical / psychological abuse, Sexual violence
- Negative cultural practices
- Food restrictions, Health seeking behavior

❖ **Preconception care protocol**

➢ History taking should be comprehensive and include

- Family history: hereditary conditions, Medical conditions, congenital abnormalities
- Medical history: Diabetes, hypertension, HIV, TB, RT cancers e.g. Breast cancer, cervical cancer
- Surgical history: Previous myomectomy, C/section, Obstetric fistula repair
- Obstetric/gynecological history: Pregnancy wastage, previous preterm deliveries, STI/RTI, menstrual disorders, prolonged sub fertility
- Environmental history: exposure to radiation, Chemical
- Occupational history: type of work and length of working hours as in long distance drivers, athletes, bicycle riders
- Nutritional history: diet
- Male partner history: mumps, STIs/HIV, substance abuse, tight clothing (around scrotum)

❖ **Physical examination**

- This should encompass a general examination (head to toe) to include vital signs, weight; e.t.c.
- The systemic examination of the thyroid, heart, breasts, abdomen, pelvis and other relevant systems will be based on the history obtained from the woman.

❖ **Investigations**

- Minimum investigations should include: Full blood count, random blood sugar, Syphilis test, HIV test, Blood group and rhesus, Urinalysis
- Additional investigations are based on the history and examination

❖ **Interventions:**

- Health education and counselling

- ✓ Psychosocial counselling
- ✓ Family planning: Each woman, man, and couple should be encouraged to have a reproductive life plan including healthy timing and spacing of pregnancy
- ✓ Life styles issues
- ✓ Nutrition: Assess dietary status and advice on healthy nutrition.
- ✓ Weight: Check BMI, advise on weight gain or loss where BMI in <20 or >30
- ✓ Substance abuse such as alcohol, hard drugs, tobacco, traditional medications, herbs
- ✓ Timing of intercourse: Check that the couple understands the ovulatory cycle and can determine the most fertile days relative to the woman's cycle. Advice that for conception to occur, intercourse should occur regularly (two to three times a week and should cover the most fertile time.)
- ✓ Regular exercises
- ✓ Adequate rest
- ✓ Spiritual nourishment
- ✓ Prenatal diagnosis: Educate women about options for prenatal diagnosis including genetic counseling (Down's syndrome, sickle cell disease, thalassemia, medical conditions); and virologic screening (TORCHES)
- ✓ Discourage over the counter drugs and use of teratogenic medications

- **Other Specific interventions**
  - ✓ Prophylaxis
  - ✓ Folic Acid
  - ✓ Women who are trying to conceive should take folic acid supplements (400mcg) daily to reduce the risk of neural tube defects. This should begin 3months before pregnancy. Women with a history of neural tube defects or epilepsy should take 5mg daily.
  - ✓ Iron, Zinc, Vitamin A 10,000 IU, Iodine and Calcium may be taken during the preconception period depending on the health status of the patient and any underlying medical conditions or risks.
  - ✓ Management of Pre-existing medical problems
  - ✓ Stabilize medical conditions and ensure that medical control is optimal
  - ✓ Check that any drugs or treatments used are safe for use in pregnancy and do not affect sperm function (cytotoxic and radiation, smoking and alcohol etc)
  - ✓ Where appropriate, refer women for specialized care.

❖ **Nutrition in the pre–conception period**

- Pre-pregnancy nutrition is as important as nutrition during pregnancy.

- It influences a woman's ability to conceive, determines the foetal growth and development and as such the size of the foetus and its overall health as well as the health of the mother.
- A woman's body provides the environment for conception and development of the foetus; therefore, her nutrition influences the health of that environment.
- A well-nourished woman before conception begins her pregnancy with a reserve of several nutrients so that the needs of the foetus can be met without jeopardizing her health.
- Underweight and overweight women experience more complications during pregnancy than normal women.
- Underweight women risk delivering preterm and low birth weight infants. Obese women have an increased risk of complications such as hypertension, gestational diabetes and higher risk of caesarean sections since they tend to deliver larger birth weight babies.
- Low birth weight (LBW) is a major underlying cause of infant mortality and other developmental and learning disorders in children.
- Full term infants weighing less than 2500 grams are referred to as small for gestational age (SGA) and this is due to intrauterine growth retardation (IUGR). Deficiencies of some nutrients such as calcium, iron, vitamin D and folic acid as well as the use of certain drugs and alcohol have detrimental effects embryonic growth even before a woman realizes she is pregnant.
- Pre-pregnancy BMI influences gestational weight gain and favorable pregnancy outcome. It is recommended that more emphasis be placed on preconception and early pregnancy nutrition due to the following reasons:
- In Kenya, 17-18% of all births are to women under the age of 20 years. This is a time of rapid physical growth with nutritional requirements increasing significantly to support growth and development. The additional energy and nutrient demands of pregnancy place adolescents at nutritional risk.
- Prevention of stunting in girl children during the first two years can help break the cycle of malnutrition and improves their chances of surviving the delivery. Stunted women are at risk of obstructed labour because of the disproportion between the size of the baby's head and the maternal pelvis.
- Approximately 50% of cases of neural tube defects may be prevented with adequate intakes of folic acid from the pre-conception period and throughout the early months of pregnancy.
- Birth weight is closely associated with child survival, well-being, and growth. Nutrient stores built up in adolescence determine the nutrition of the mother when she enters pregnancy during and between pregnancies. This in turn impacts on birth weight and child survival
- Efforts to improve eating patterns and achieve healthy weights can be implemented, in part, through school-based nutrition programs and integration of nutrition and health promotion counselling into primary health care services.

❖ PRE CONCEPTION CARE DELIVERY AREAS

- It is important that these services are not stand alone, but are rather integrated into other services and programmes; such as: Family planning services, Antenatal care services, Child welfare clinic, Postpartum care, Outpatient services, Youth friendly sites, Comprehensive care clinics, Specialized clinics, School health programmes, VCT centres, and other specific service sites that target men
- Creating linkages with other disciplines to promote pre-conception care
- Create awareness for other professionals e.g.,
  - ✓ Physicians to educate diabetics, cardiac patients, and others with medical conditions; pediatricians; nutritionist etc.
- Community awareness and participation
  - ✓ Schools, Women's groups, Public barazas, faith based institutions, youth clubs, etc.
  - ✓ Linkages with other programmes (HIV, Child health, vaccines), Other sectors /Ministries (Education, Gender, Agriculture, Culture and Social services) and other stakeholders

Community midwifery

Learning objectives

- By the end of the lesson the learner should be able to: -
  1. Define terminologies related to community midwifery
  2. Describe the theory of three delays
  3. Outline aims of community midwifery
  4. Describe health care organization in Kenya
  5. State services offered in community midwifery services
  6. Outline roles and duties of community midwives
  7. Describe the process of recruiting and selection of community midwifery service providers

Introduction

- Community midwifery was developed to close the gap that exists among women on childbirth by a skilled birth attendant.
- The community midwifery model ensures that skilled care is available during pregnancy, labour and child birth and follow-up of both mother and baby postnatally in the community
- The Community Midwifery Model (CMM) uses skilled attendants out of work or retired licensed health care professionals who are resident within a given community and seeks to contribute towards improvement of reproductive health.
- Community midwifery model seeks to support the provision of equitable, accessible, affordable and quality health and related services at the highest attainable standards to all Kenyans using the primary health care approach.
- Community midwifery model is a key strategy in ensuring that women access adequate reproductive health services from a skilled birth attendant.
- **Definition of Community:** it is a specific group of people, often living in a defined geographical area, who share a common culture, values, and norms and who are arranged in a social structure according to relationships the community has developed over a period of time.
- **Definition of community midwifery**: It is the care given by a skilled birth attendant to childbearing women during the process of childbirth, labour and postnatal in the community or at home.
- **Skilled Birth Attendant' (SBA)** is defined as "an accredited health professional such as a midwife, doctor or nurse who has been educated and trained to proficiency in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in identification, management and referral of complications in women and newborns"
- **Definition of a midwife:-**
  - A midwife is a person who, having been regularly admitted to a midwifery educational program that is duly recognized in the country in which it is located, has successfully completed the prescribed course of studies in

midwifery and has acquired the requisite qualifications to be registered and/or legally licensed to practice midwifery.

- Reasons that have been found to contribute to home deliveries includes:-
  - Lack of privacy
  - Long distance to health facilities
  - High cost of healthcare services
  - Uncooperative health staff
- **Theory of the '3' delays:-**
  - 1st delay- Delay at home
  - 2nd delay- Delay in reaching a health facility
  - 3rd delay-Delay at the hospital
- 1st delay:
  - First delay is the delay that occurs at home. The mother delays from seeking health care as a result of home related reasons. These factors may include:
    - Lack of funds to seek health care
    - Cultural factors that prohibit use of health services
    - Religious factors that prohibit use of health services
    - Lack of knowledge to recognize danger signs/symptoms
- 2nd delay:
  - This is the delay that occurs in reaching a health. This may include
    - Poor road network
    - Lack of means of transport
    - Sparsely located health facilities
    - Delay in referral between various health facilities
- 3rd delay:
  - This is the delay that occurs within a health facility. It may include:-
    - Lack of services
    - Shortage of staff
    - Long waiting time
    - Hospital beaurocracy
    - Health care provider's attitude
    - Shortage of supplies

Aims/ objectives of community midwifery:-

- To make reproductive more accessible to the community
- To reduce maternal mortality rate and neonatal mortality rate.
- To increase utilization for reproductive health services by the community members.
- To promote community involvement in maternal and newborn care.
- To provide basic emergency obstetric and newborn care within the community.
- To promote childbearing by a skilled birth attendant.
- To create link between the community and the formal health system in matters relating to reproductive health

Current organization of health care system in Kenya: -

- The current system is organized into four tiers, namely:-

- **TIER I:Community level:** The foundation of the service delivery system, with both demand creation and specified supply services that are effectively delivered at the community.
- **TIER II: Primary care level**: The first physical level of the health system, comprising all dispensaries, health centres & maternity /nursing homes. It is the 1st care level, where most clients' health needs should be addressed.
- **TIER III: County level:** The first level hospitals, whose services complement the primary care level to allow for a more comprehensive package of services.
- **TIER IV: National level:** The tertiary level hospitals, whose services are highly specialized.

Services offered at community level:

- Immunization services
- Child health
- Maternal and newborn health
- Screening for diseases
- Water and Sanitation,
- Provision of basic curative care
- Prevention of HIV/STIs
- Family planning among others

Providers of health services at the community level:

- Community Health Workers (CHWs)
- Community Health Extension Workers (CHEWs)
- Community Midwives.

Criteria for selecting community midwifery service providers:

- In selection of potential candidates for community midwifery services, the following core qualifications are mandatory:

I. A health professional with evidence of one of the following qualifications:
   - ✓ Registered Nurse/ Midwife; Enrolled Nurse/ Midwife Registered
   - ✓ Clinical Officer
   - ✓ Medical officer

NB-Should be verified with the relevant professional body

II. A retired or out of employment health professional with obstetric/midwifery skills.
III. Has residency within the community to be served.
IV. Evidence of retention on a professional register (Nursing Council of Kenya, Kenya
V. Clinical Officers' Council, the Medical Practitioners and Dentist Board)

Other selection criteria:

- Get involved in the running of health related or welfare activities within the community as a sign of the community's trust in them
- Be ready to be supervised and monitored by the county Health Management
- Be ready for Training and Supervision by the county Teams (RH Coordinators)

- Be able to Link with the health care system through the nearest health facility for support such as updates, transport, supplies, equipment and their sterilization
- Be willing to work closely with the community leaders and community groups to identify the most common health problems and work together for a solution.

Roles and responsibilities of community midwife:-

I. Providing reproductive health care to women and their family members
II. Serving as a link between level I and the formal health system
III. Data collection and reporting

I. Providing reproductive health care to women and their family members

- Provision of information and education on preconception care and early initiation of antenatal care to women.
- Provision of information on the importance of when and where to seek health care services during pregnancy, labour and childbirth and the postnatal period for mother and baby.
- Provision of information on importance of testing for HIV and referral for HCT and PMTCT.
- Educating women and their families on the importance of an individualized birth preparedness and postnatal plan.
- Assisting a woman and her family to prepare a birth, postnatal care plan including postpartum family planning.
- Educating women on the identification of danger signs in pregnancy labour, childbirth and postnatal period.
- Educating women on how to recognize danger signs in the newborn including sepsis to ensure family seeks early treatment
- Provision of reproductive health knowledge among women and their male partners.
- Provision of information on the importance of breastfeeding.
- Provision of information on the availability of family planning commodities.
- Educating women on the importance of completing immunization schedules for infants/children and TT schedule for women.
- Monitoring of pregnancy through FANC
- Following up with the link facility to ensure that antenatal profile is done
- Provision of targeted postnatal care to women
- Supporting HIV care including ART adherence, opportunistic infections management and linkages to HIV support centres and local support groups
- Counseling women on exclusive breast feeding and Lactational Amenorrhoea Method (LAM) as well as on broader aspects of nutritional counseling.
- Provision of minor curative services as defined in the community heath strategy.
- Referral of clients to health facilities for laboratory tests, immunizations, etc
- Receiving referrals from community health workers for further management.
- Coordination of activities with the health extension workers and community health committees

- The role of community midwives includes the initial appointments with pregnant women, managing clinics, postnatal care in the home, and attending home births.
- A community midwife would typically have a pager and be responsible for a particular area, contacted by ambulance control when needed. Sometimes they are paged to help out in the hospital when there are insufficient midwives available.

II. Serving as a link between level I and the formal health system:

- Community midwife works closely with community Health extension workers (CHEWs) and community health workers (CHWs) in delivery of maternal and newborn health interventions at the community.
- The community midwife is expected to link with other players at the community level as well as formal health system.
- Community midwife is also required to establish a regular contact with various teams at community level.
- Community midwife should create links with local health committees.
- The community midwife will act an advisor to the local health committees on maternal and newborn health issues.
- The main functions of local health committee are:-
  - ✓ Resource mobilization
  - ✓ Providing support to community reproductive activities
  - ✓ Educating households on matters pertaining to reproductive health issues.
  - ✓ providing leadership support for safe pregnancy and childbirth
  - ✓ Facilitating the acquisition of key infrastructure for community health workers and community midwives.
  - ✓ Providing security to community midwives.

How health facilities links with community midwives:-

- The health facility in-charges and the facility management teams supported by the by county and sub-county authorities should provide support to the community midwife

Ways through which health facilities can support community midwives:

- Overseeing the performance of the community midwife and other extension workers
- Supplying the community midwife with drugs, equipment and other supplies for safe delivery
- Facilitating referral of clients (or women) with complications or other forms of emergency to static health facilities by availing transport.
- Providing stationery or forms to the community midwife for monthly reports.
- Strengthening infection prevention and control efforts e.g. In the disposal of sharps and sterilization of equipment, etc.
- Organizing for in-service training/Continuing Professional Development, involving community midwives in relevant stakeholder meetings, seminars etc.

III. Link between a community midwife and a community health worker:-

- Community midwife should provide overall support to community health workers with a view to building their skills and knowledge in the core basic and technical components in reproductive health.
- community midwife will equip the CHW with appropriate skills and knowledge to be able to:
  - Advise on items required for the delivery
  - Assist the woman and her family to identify somebody to assist her after childbirth
  - Advise family to look out for danger signs in mother and baby
  - Advise the mother/family to register the baby's birth with the local administration
  - Advise on taking baby to health facility for immunizations and growth monitoring and women for postnatal care
  - Map where all pregnant and newly delivered women live
  - Encourage the woman's family to provide social support in pregnancy/ postnatal period
  - Report on any deaths of mothers and infants in the community including any stillbirths

Data collection and compiling reports: -

- A community midwife should be able to: -
  - ✓ Compile data, write and submit reports to the local health management teams and committees promptly.
  - ✓ Register or advise the woman on where to register the birth
  - ✓ Notify the civil registration office/health facility of any death in the community
  - ✓ Share monthly reports with the link health facility using the appropriate register(s) document(s) from the ministry of health. The report should include; Number of women assisted during childbirth; Number registered for birth certification; Number of Stillbirths (FSB and MSB) and any maternal deaths.
  - ✓ Document the number of referrals; reasons for referral for both mother and
  - ✓ newborn; means of transport used; source of funds for transport; person accompanying patient and the outcome of the referral process (if known).

Scope of practice:-

- The Community midwives scope of practice is:
  - ✓ Preconception care counseling
  - ✓ Normal pregnancy
  - ✓ Childbirth, postpartum
  - ✓ New born care and
  - ✓ Family planning.
  - ✓ Community
- **NB:**

- midwives will practice within the guidelines and protocols developed by regulating bodies.
- Referral care should be provided in case of emergency

Training of community midwives in Kenya:

- According to Community Midwifery Services in Kenya: Implementation Guidelines; Second Editon of August 2012 stipulates that although midwives at retirement ,resignation or departure are qualified and experienced, the environment they start working as community midwives is different.
- Therefore this guidelines recommends that those who want to become community midwives should complete the following steps:-
    1. Orientation
    2. Clinical attachment in a busy health facility for skills updates.
    3. Certification and
    4. Licensing.

Orientation:-

- The orientation will focus on the following core skills:
    - Maternal and newborn care
    - Maternal and perinatal death surveillance and response.
    - Recording and reporting data.
    - Infection prevention and control
    - Family planning
    - communication and referral
    - Entrepreneurship and marketing skills
    - Interpersonal and communication skills.

Clinical attachment in a busy health facility for skills updates:

- The practical attachment should be at a busy health facility where there is a high client load and a range of maternal and newborn health care services provided.
- The community midwife should be provided with a log book to record required procedures which should be carried out under supervision
- Areas to cover in clinical placement include:-
    - In ANC Clinic
        - Understand focused antenatal care (diseases prevention and health promotion , IBP)
        - Participate in Health talks
        - Head to toe examination including palpations to identify the gestation, lie, presentation and position
        - Breast examination
        - TT immunisation, heamatinics, IPT for malaria ITN
        - PMTCT
        - Assist 5 women prepare an individualized birth and postnatal plan
        - Record all procedures in the appropriate documents (ANC card and registers)

- Labour and delivery
  - Admit women in labour (history taking)
  - Manage labour using a partogragh
  - PMTCT
  - Assist mothers during childbirth (10)
  - Active management of third stage of labour (AMTSL)
  - Manual removal of retained placenta
  - Suturing of any simple tears or episiostomy
  - Record all procedures in the appropriate documents (delivery, PNC, ANC card)
  - Familiarize with the data collecting tools
- Postnatal:
  - Carry out complete postnatal check on mother before leaving hospital
  - Carry out complete postnatal check on the baby before discharge
  - PMTCT care and follow-up (know where to refer CCC/support groups etc)
  - Record all procedures on appropriate documents (ANC/PNC card and register)
  - Postnatal check at 14 days
  - Postnatal check at 6 weeks
  - Family planning advice - LAM and transition to other methods
  - Breastfeeding support
  - Essential newborn care - specifically in nursery
  - Health education/counsel the woman eg on danger signs for both mother and newborn
  - Immunisations /child welfare clinic
- Documents
  - Monthly summary reporting fo
  - Patients case notes
  - Referral forms
  - Partographs
  - Maternity Register
  - Post natal register
  - Mother Child Health Booklet

Certification and licensing:

- Once the Community Midwife has satisfactorily completed all the procedures outlined in the log book, they will be certified by the Ministry of Health. A regulatory body such as the (Nursing Council of Kenya or its equivalent) will then issue a license to the health provider to practice in the community
- The community midwives will be required to have relevant regular updates and refresher courses in order to meet requirements for retention.

Principles of community midwifery:-

- Community participation
- Resource mobilization

- Effective community organization
- Effective community leadership
- Effective monitoring and supervision strategies
- Awareness creation and consensus building.
- Intersectoral collaboration.
- Effective health management information system
- Sustainability

How to make community midwifery effective: -

- For effective community midwifery there should be: -
  - ✓ identification and recruitment of Community Midwives
  - ✓ Identification potential local facilitators to conduct updates and on-job training for CMs
  - ✓ Facilitate training of trainers for Community Midwives
  - ✓ Train Community Midwives according to guidelines
  - ✓ Register all Community Midwives working in the district
  - ✓ Ensure all Community Midwives have the appropriate licensing documents
  - ✓ Compile monitoring data and produce periodic reports
  - ✓ Facilitate collaboration with stakeholders and secure resources for the program
  - ✓ Coordinate on-going support supervision
  - ✓ Ensure re-supply of consumables through facilities and or District stores,
  - ✓ Support supervision
  - ✓ Details for communication set up
  - ✓ Referral mechanisms for emergencies agreed with VHC and HF Management Boards
  - ✓ Organizing capacity building and CPD/in-service training
  - ✓ Identify sources of supplies, equipment and essential drugs
  - ✓ Provide Community Midwife with necessary equipment

Community midwifery financing:

- Government (treasury allocations)
- Health sector services Fund(HSSF)
- Output based aid(OBA)
- Direct budgetary allocation to community units.
- Private financing
- National hospital insurance fund(NHIF)
- Support from development partners
- Donations from charity organizations.
- Leveraging from local development funds eg CDF.

Maternal mortality and maternal death reviews

Learning objectives

- By the end of the lesson the learner should be able to: -
  1. Define terminologies related to maternal mortality and death reviews
  2. Outline causes of maternal deaths
  3. State factors influencing perinatal mortality.
  4. List ways of preventing perinatal deaths
  5. Describe approaches to maternal deaths surveillance and response.

Definition of terms

- **Maternal death /mortality**: It is the death of a woman while pregnant or within 42 days of the termination of pregnancy irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.
- **Maternal mortality ratio**: It is the number of maternal deaths per 100,000 live births. The current maternal mortality ratio in Kenya is 362/100,000 live births.
- **Perinatal mortality/death**: It is foetal deaths after 28 weeks gestation and those occurring within the first 7 days after birth including still births.
- **Perinatal Mortality Rate (PMR):** It is the number of perinatal deaths divided by the number of total births multiplied by 1000
- The current perinatal rate is 22 deaths per 1,000 live births.

Factors influencing perinatal mortality

- Maternal age
- Parity
- Birth weight
- Quality of management of labour and delivery
- Mode of onset of labour
- Duration of labour
- Mode of delivery
- Complications of labour in mature babies/newborns
- Low Birth Weight
- Infections
- Congenital malformations

Prevention of perinatal deaths

- Active management of labour using the partograph and use of timely caesarean section
- By appropriate antenatal care, including acceleration of lung maturity, screening for STIs
- Appropriate neonatal resuscitation

- By careful preconception screening and counseling, screening (CVS, U/S, maternal serum and amniotic fluid alpha fetoprotein) and early termination of pregnancy.

Causes of maternal deaths

- Causes of maternal deaths is classified into two:
    1. Direct causes
    2. Indirect causes

Direct causes

- These are deaths from complications of pregnancy, labour, and puerperium.
- These causes include: -
    - Ectopic pregnancy
    - Abortions
    - APH (Antepartum hemorrhage)
    - PPH (Postpartum hemorrhage)
    - Eclampsia
    - Ruptured uterus
    - Obstructed labour
    - Sepsis
    - Embolism

Indirect causes: -

- Indirect causes include: -
    - HIV-AIDS
    - Anemia
    - Malaria
    - Cardiac diseases
    - Tuberculosis
    - Pneumonia
    - Diabetes

Maternal deaths review/maternal audit: -

- A maternal death audit is an in-depth systematic review of maternal deaths to identify underlying health; social and other contributory factors to maternal death.
- It also provides a learning opportunity as such audits are used in making recommendations to prevent similar deaths in future.
- It is not a process for apportioning blame or shame but exists to identify and learn lessons from the remediable factors that might save the lives of more mothers in future.
- MOH form 372 is used for maternal death review.

Importance of maternal deaths review/ audit: -

- Provides ways of preventing future deaths
- Provides an opportunity to evaluate health systems
- Provides evidence based decision making process on the relevant interventions
- It also provides evidence based resource allocation

Approaches in reviewing maternal deaths/ maternal audit: -

- WHO has described five (5) approaches in maternal death review; namely: -

1. Facility-based maternal death review
2. Community-based maternal death review (verbal autopsy)
3. Confidential enquiries into maternal deaths
4. Survey of severe morbidity (near misses)
5. Clinical audit

Facility-based maternal death review

- It is an in-depth investigation of the causes of and associated factors in maternal deaths that occur in
- It entails interviews of health personnel who attended to the deceased.
- It can also be extended to members who accompanied the deceased.
- The review is nonjudgmental to encourage the cooperation of the health workers involved.
- It provides information for improving obstetric care.

Community-based maternal death review (verbal autopsy)

- It is in-depth nonjudgmental investigation of the causes and the associated factors of maternal deaths that occur outside health facilities.
- It entails interviews of family members who cared for the deceased.
- This requires a community informant to let local authorities know whenever there is a death of a reproductive-age female in the community.
- The interviewer, who is usually not a health worker, should be sensitive when probing the circumstances leading to the death. In some cultures, the interview is done after the mourning period.
- A team of health care workers then examines the interview notes to determine the cause of death.
- When this is combined with the facility-based review described above, it gives a more complete picture of maternal deaths in a given local jurisdiction.
- MOH form 519 is used in verbal autopsy.

Confidential enquiries into maternal deaths:

- A national or sub-national multidisciplinary committee meets periodically to systematically investigate a representative sample of (or all) maternal deaths to identify the causes and associated factors.
- The committee gives written guidelines to health personnel and administrators on how to prevent similar deaths in future.
- The investigation is carried out in a confidential manner ("No blame, no shame").
- The files are recalled to a central unit where anonymization process takes place.
- It requires a complete and functioning civil registration or health management information system.
- A sub national or sub-county -level panel might be more appropriate in countries with high mortality, so that the guidelines issued can be tailored to local situations.
- Facilitating steps in confidential maternal review include: -
    - An adequate legal framework
    - A clear and systematic way of retrieving files
    - A more efficient process for anonymizing case notes

- Improved quality of data
- Improved capacity to accurately identify the underlying cause of death
- Surveillance of maternal deaths
- Remedial action
- Sustained source of funding

Survey of severe morbidity (near misses)

- A near-miss event refers to one in which a woman has nearly died but survived a complication that occurred during pregnancy, childbirth, or within 42 days of termination of pregnancy.
- This survey is an in-depth investigation of the factors that led to the near miss, what worked well in the treatment of the life-threatening complications, and the lessons learned.
- Unlike the other approaches, in this one the pregnant woman herself is also interviewed, creating the opportunity to obtain more insight into the circumstances.
- This survey is less threatening to health personnel than the others, since the women have survived.

Clinical audit

- This entails a systematic review or audit of the obstetric care provided to pregnant women against established protocols or criteria aimed at improving the quality of care.
- Protocols for the management of obstetric complications will have to be established beforehand in order to ascertain whether cases are properly being managed at health facilities.
- If well implemented, it leads to standardized and improved care across health facilities.

NB: Maternal Death review should be conducted within 7 days after occurrence of death in case of facility based review and 30 days for community based review.

Maternal death notification

- Notification is the process of issuing a formal message officially.
- Maternal death that occurs within the facility should be notified within 24 hours
- Maternal death that occurs within the community should be notified within 48 days.
- The notification is made through filling form MOH 370
- The form provides information on the following:-
    - Locality where the death occurred
    - Details of the deceased
    - Details of admissions
    - Underlying cause of death.

Maternal death surveillance and response (MDSR)

- It is a continuous cycle of identification, notification and review of maternal deaths followed by actions to improve quality of care and prevent future maternal deaths.

Key Components of a National Maternal Death Surveillance and Response (MDSR) System

- A national policy to notify all maternal deaths
- A national policy to review all maternal deaths
- A national maternal death review committee in place
- Sub national maternal death review committees in place
- Both national and sub national maternal death review committees in place
- A national maternal death review committee that meets at least biannually.

Principles of MDSR:

- Notification within 24 hours of maternal deaths in facilities (or within 48 hours when a woman dies in the community)
- Zero reporting when no suspected maternal deaths have occurred
- Timely review of all probable maternal deaths
- Immediate recommendations, where possible, to help facilities and communities prevent similar deaths, ensuring that key messages reach people who can make a difference
- Timely review and analysis at county and national levels to identify trends and patterns Timely publication of findings and recommendations at national level
- Continuous monitoring of the MDSR system and of how recommendations are implemented

General functions of maternal death surveillance and review include:-

- Review all maternal deaths at health facilities.
- Ensure that the recommendations issuing from committee meetings are followed through to improve obstetric services;
- Report the findings (without personal identifying information) to the higher-level committee(s)—Sub county, county, or national and the civil registration system.
- Provide feedback to lower-level committees;
- Share aggregate statistics with the HIMS
- Provide input into any future revisions of the audit forms and guidelines.

ASSIGNMENT:

Each student to read and write short notes on

a) Various committees at different levels
b) Advantages and disadvantages of each maternal review approach

Safe motherhood/Maternal and Newborn Health

Learning objectives

- By the end of the lesson the learner should be able to: -
  1. Define safe motherhood
  2. Outline objectives of safe motherhood
  3. State principles of safe motherhood
  4. List challenges facing safe motherhood
  5. Discuss pillars of safe motherhood

Introduction

- The concept of maternal and newborn health (MNH) is now being used to refer to safe motherhood.
- Safe motherhood is an approach of ensuring that women have access and ability to have safe and healthy pregnancy and delivery.
- Making motherhood safe requires action on three key areas:
  - Reduce the number of high risk and unwanted pregnancies
  - Reduce the number of obstetric complications
  - Reduce the cases of high fertility rate in women with complications
- Strategies that are required to achieve safe motherhood initiative include:-
  - Improving availability of maternal and newborn health
  - Increasing access to maternal and newborn health
  - Increasing utilization of quality maternal and newborn health.
  - Reducing unmet family planning needs for women
  - Strengthening referral system
  - Advocating for increased commitment and resources for MNH
  - Promoting and strengthening community based MNH
  - Strengthening monitoring and evaluation for MNH
- The Kenya MNH model recognizes the potential role communities have in the promotion of their own health including that of maternal and newborn health.
- It reiterates the importance of strengthening the interface between the community and health services, as well as promoting the human rights approach to health service delivery.
- For effective maternal and newborn health ,the following should be ensured:-
  - Ensuring training and deploying of adequate number of skilled health workers to provide antenatal, intrapartum and postnatal care.
  - Creating enabling environment for health care workers including infrastructural advancement
  - Effective coordination of MNH services
  - Promotion of quality MNH services
  - Establishing effective referral system
  - Promoting community involvement and partnership
  - Ensuring equity for all

- Advocating and maintaining reproductive health for mothers and newborns.

Challenges facing MNH

- Limited availability of MNH services
- Shortage of staff trained on MNH
- Low basic emergency and newborn care coverage.
- Lack of community involvement in MNH
- Limited national commitment and resources for MNH

Objectives of MNH include:-

1. To increase the availability, accessibility, acceptability and utilization of skilled birth attendance during pregnancy, child birth and postnatal period at all levels of health care delivery system.
2. To strengthen the capacities of individuals, families, communities and social networks to improve maternal and newborn health.
3. To strengthen data management and utilization for improved MNH

Pillars of safe motherhood/ maternal and newborn health

1. **Family planning and pre-pregnancy care**– To ensure that individuals and couples have the information and services to plan the timing, number and spacing of pregnancies.
2. **Focused Antenatal Care** – To prevent complications where possible and ensure that complications of pregnancy are detected early and treated appropriately.
3. **Essential Obstetric Care** – To ensure that essential care for the high-risk pregnancies and complications is made available to all women who need it.
4. **Essential Newborn Care** – To ensure that essential care is given to newborns from the time they are born up to 28 days in order to prevent complications that may arise after birth.
5. **Targeted Postpartum Care**– To prevent any complication occurring after childbirth and ensure that both mother and baby are healthy and there is no transmission of infection from mother to child.
6. **Post Abortion Care** – to provide clinical treatment to all women and girls seeking care, for complications of incomplete abortion and miscarriage as well as counseling and contraceptives.
7. **Clean and Safe Delivery**: This ensures that birth attendants have the knowledge, skills, positive attitude and equipment to perform a clean and safe delivery and provide postpartum care to the mother and baby.
8. **Prevention of Mother to Child Transmission of HIV (PMTCT)**: These are measures and interventions that are put in place to ensure little or no transmission of HIV virus from the mother to the baby.

Anatomy and Physiology of Reproductive system

Learning objectives

- By the end of the lesson the learner should be able to: -
    1. Describe main structures of male and female external genitalia.
    2. Describe major structures of male and female internal genitalia
    3. Discuss spermatogenesis and oogenesis.
    4. Explain the process of ejaculation in males
    5. Explain the reproductive cycle in females
    6. Describe the structure and functions of female breast
    7. Outline types of nipples
    8. Explain the physiology of lactation
    9. Describe structure and function of female pelvis.
    10. Describe foetal skull.

Introduction

- Reproductive system and structures are adapted to propagate new individuals and for continuation of human species.
- Organs that are specialized for production of male and female sex cells are called gonads.
- The male gametes are called spermatozoa and female gametes are called ova.
- Gonads produces both gametes secrete and sex hormones
- Male gonads are the testes and female gonads are the ovaries.
- Males and females produce specialized reproductive germ cells known as gametes.
- Sex cells are referred to as gametes and they are the ones that creates genetic variation
- Reproductive system is made up of the following structures
    - Gonads, ducts, glands & supporting structures
- Chromosome passes inherited characteristics on to the next generation.
- Gametes contain only 23 chromosomes whereas other body cells contain 46chromosomes.
- Gametes are formed through meiosis.

Male reproductive system

- Male reproductive system is classified as:-
    1. External male reproductive system
    2. Internal reproductive system.

External male reproductive system.

- The structures that forms external male reproductive system include:-
    1. Scrotum
    2. Penis

1. Scrotum

- Scrotum is Sac of loose skin, fascia & smooth muscle divided into two pouches by a septum.
- It is made up of deeply pigmented skin fibrous connective tissue &smooth muscle.
- Each compartment of the scrotum contains:
    a) One testes
    b) One epididymis
    c) One testicular end of a spermatic cord
- Scrotum lies below symphysis pubis in front of upper part of thighs and behind pelvis
- The **cremaster muscle** draws the testes closer to the body when it is too cold, and lowers the testes away from the body when it is too warm.
- Cremasteric reflex is contraction of the **cremaster** muscle, in response to the stroking of the thigh.
- Sperm production and survival requires 2-3 degrees' lower temperature than core body temperature

Functions of the scrotum

a) Contains and protects the testes.
b) Regulate temperature less than body temperature for the purpose of spermatogenesis
c) Contracts to bring the testes close to the body when temp are cold and vice versa

Layers of the scrotum

- Layers of the scrotum include:-
    a) The skin
    b) Superficial 'Dartos' fascia
    c) External spermatic fascia
    d) Cremaster muscle and fascia
    e) Internal spermatic fascia
    f) Parietal layer of tunica vaginalis

Blood supply to the scrotum

- Scrotum receives arterial blood supply from:-
    a) Anterior scrotal artery
    b) Posterior scrotal artery
- Anterior scrotal artery is a branch of external pudendal artery
- Posterior scrotal artery arises from internal pudendal artery
- The scrotal venous drainage is through scrotal veins that runs along major arteries and drains into external pudendal veins

Innervations of the scrotum

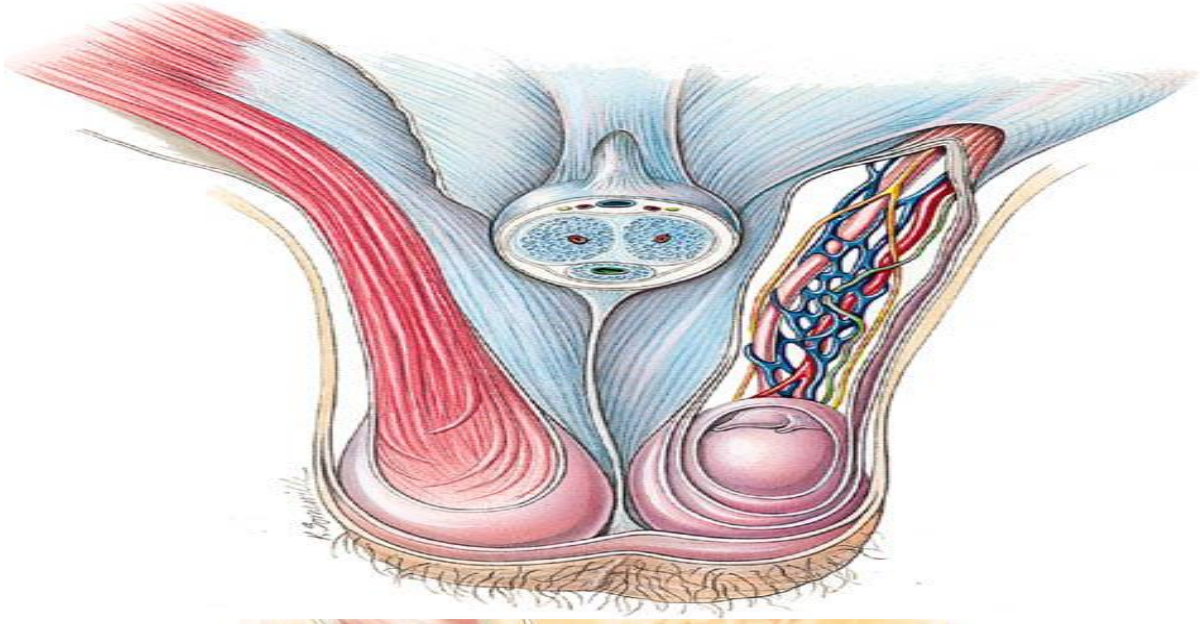
- Innervations of the scrotum is derived from the following nerves:
    a) **Genital branch of genitofemoral nerve**-Derived from the femoral plexus and supplies the anterolateral aspect of the scrotum
    b) **Anterior scrotal nerves**-They are derived from ilioinguinal nerve and supplies the anterior aspect of the scrotum.

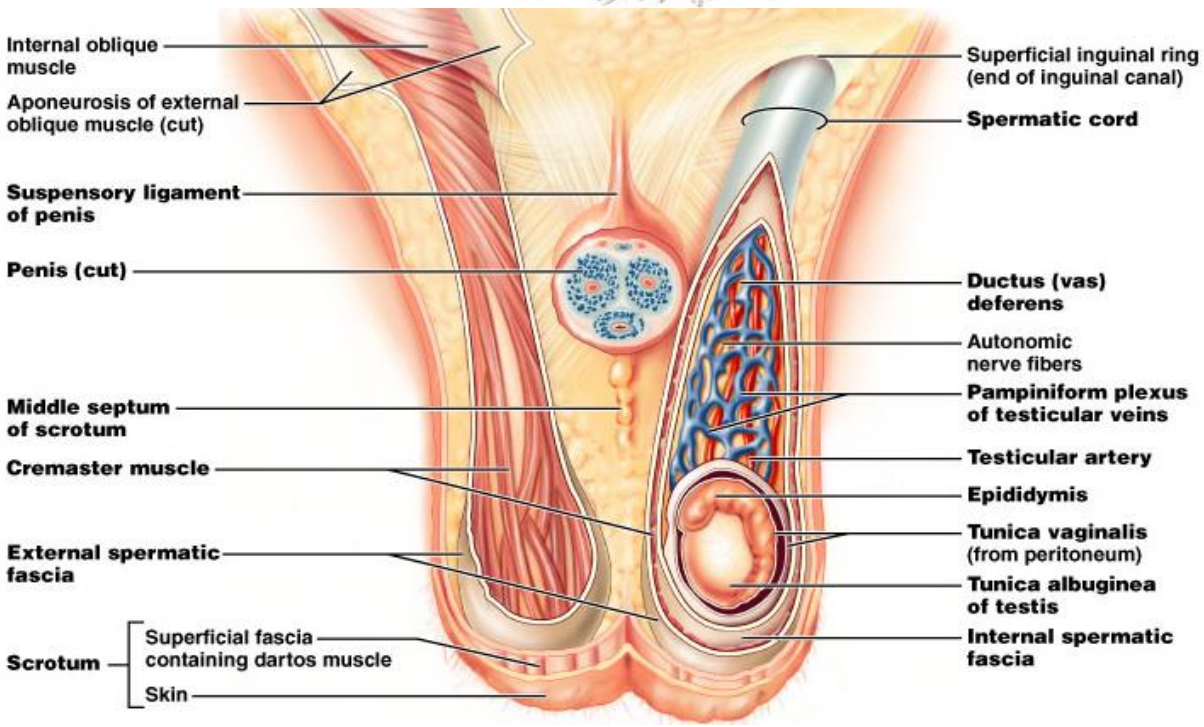
c) **Posterior scrotal nerves**-They are derived from the perineal nerve and supplies the posterior aspect of the scrotum.
d) **Perineal branches of posterior femoral cutaneous nerve**-Derived from the sacral plexus and supplies the inferior aspect of the scrotum.

Lymphatic drainage

- The lymph system of the scrotum drains into the superficial inguinal nodes.

A diagram showing the scrotum





2. Penis

- Penis: a cylindrical-shaped male organ made of specialized erectile spongy tissue that erects upon sexual arousal.
- Its reproductive purpose is as a conduit for semen (and sperm).
- The head of the penis or glans contains many nerve endings and is covered by a loosely fitting skin called the foreskin.
- **Tumescence** is the engorgement of penile blood vessels leading to an erection.
- **Detumescence** is the process in which the blood leaves the penile tissue leading to its flaccid state.
- At tip penis is expanded into triangular structure i.e. glans penis.
- Above glans, skin is folded upon itself to form a movable double layer **foreskin or prepuce**
- The penis is composed of three cylinders, containing sponge-like erectile tissue to cause an **erection.**
  I. **Corpora cavernosa**- two cylinders lie on the upper sides of the penis.
  II. **Corpus spongiosum**- central cylinder lies on the bottom and contains the urethra.
- Penis has two(dual) states:
  a) Flaccid
  b) Erect
- It has two(dual) functions
  a) Expulsion(passage) of urine
  b) Expulsion (passage) of semen
- Penis is anatomically made of three parts ,namely:-

a) The root

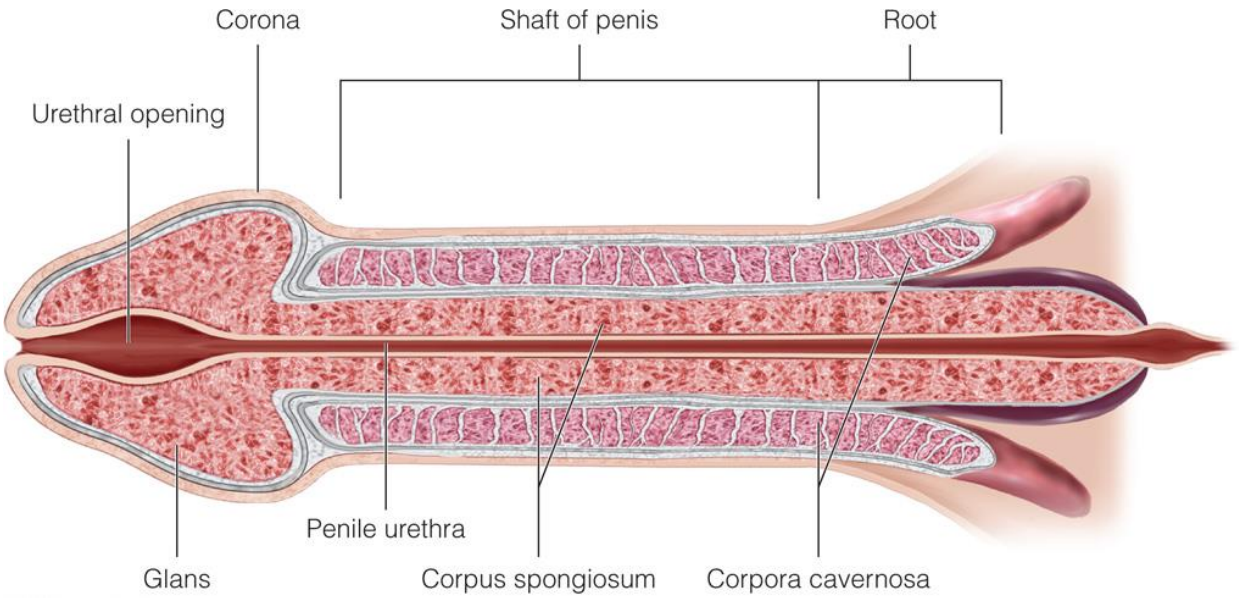
- ✓ it is the most proximal, fixed part of the penis. It is located in the superficial perineal pouch of the pelvic floor.
- ✓ It is not visible externally.
- ✓ The root contains three erectile tissues (two crura and bulb of the penis), and two muscles (ischiocavernosus and bulbospongiosus).

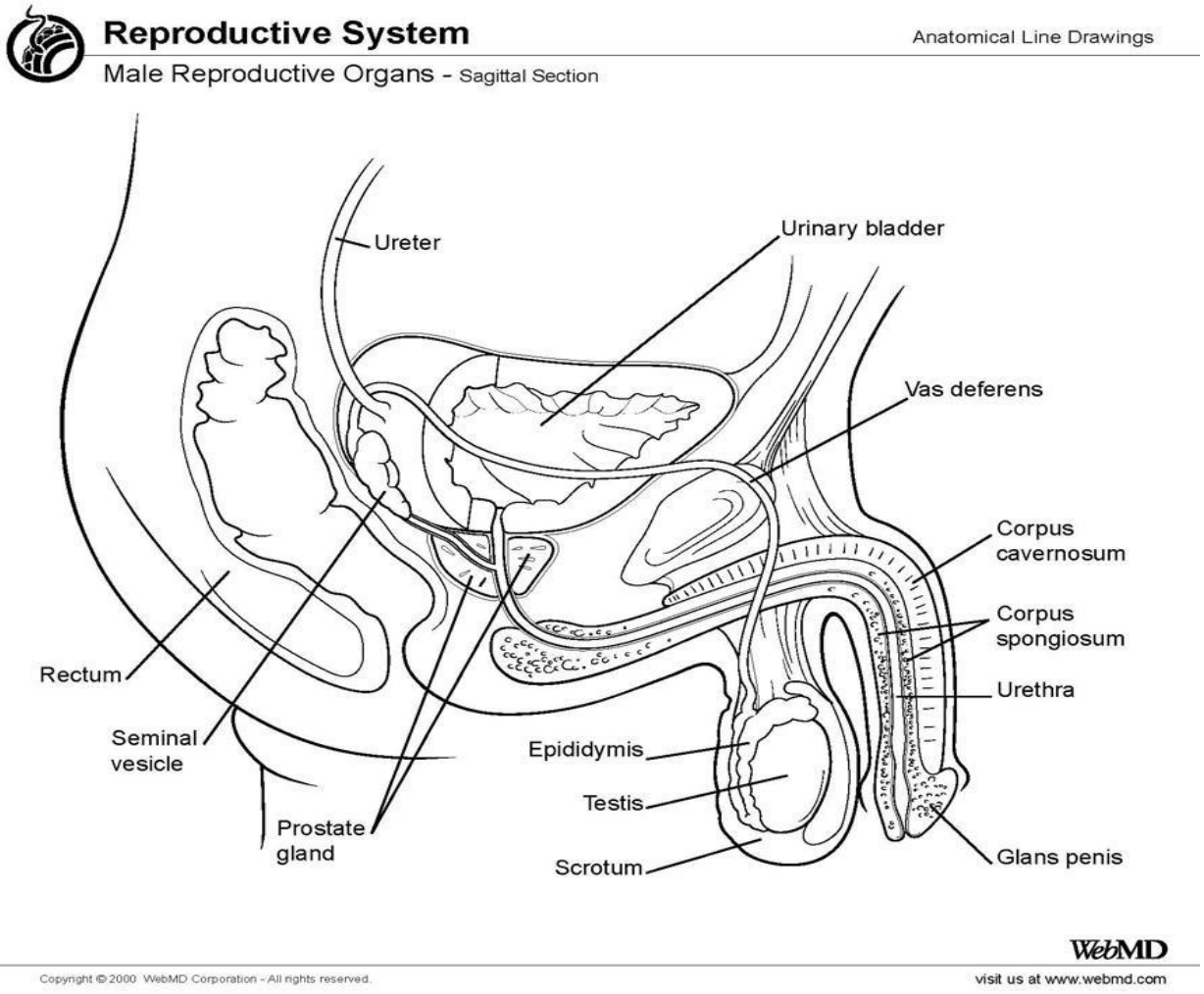
b) The shaft(body)

- ✓ The free part of the penis, located between the root and glans.
- ✓ It is suspended from the pubic symphysis.
- ✓ It is composed of three cylinders of erectile tissue – two corpus cavernosa, and the corpus spongiosum.

c) Glans penis

- ✓ The most distal part of the penis.
- ✓ It is conical in shape, and is formed by the distal expansion of the corpus spongiosum.
- ✓ This contains the opening of the urethra, termed the external urethral orifice (external urethral meatus).
- ✓ It has dense concentration of nerve endings making it highly sensitive.


Corona
Shaft of penis
Root
Urethral opening
Penile urethra
Glans
Corpus spongiosum
Corpora cavernosa


Reproductive System
Anatomical Line Drawings
Male Reproductive Organs - Sagittal Section
Ureter
Urinary bladder
Vas deferens
Corpus cavernosum
Corpus spongiosum
Urethra
Rectum
Seminal vesicle
Epididymis
Testis
Prostate gland
Scrotum
Glans penis
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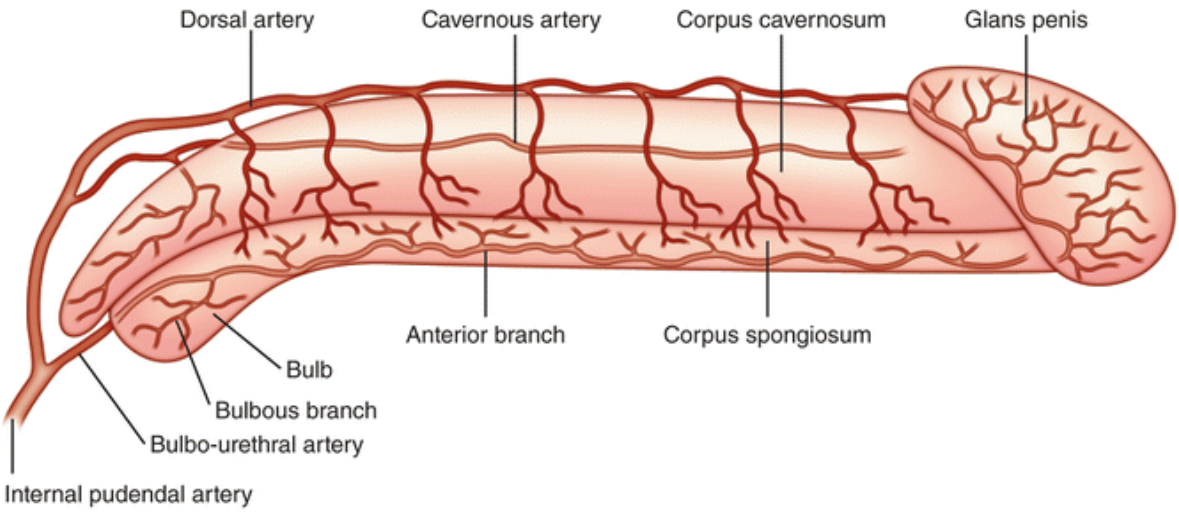
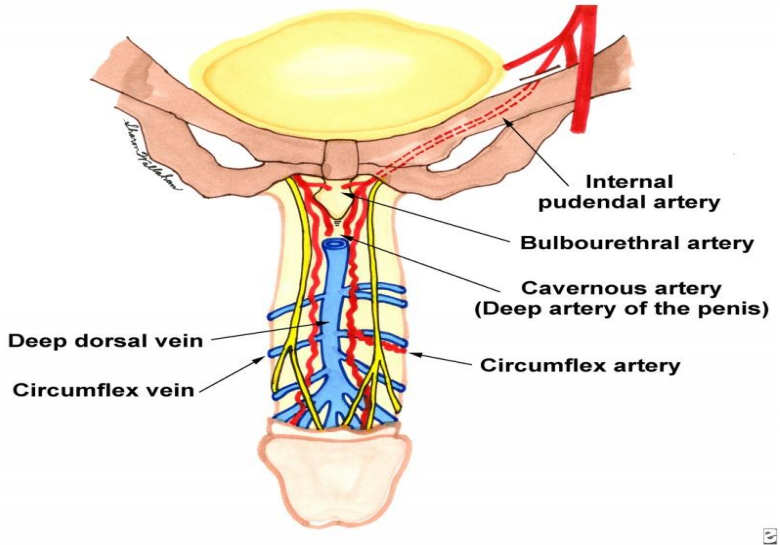
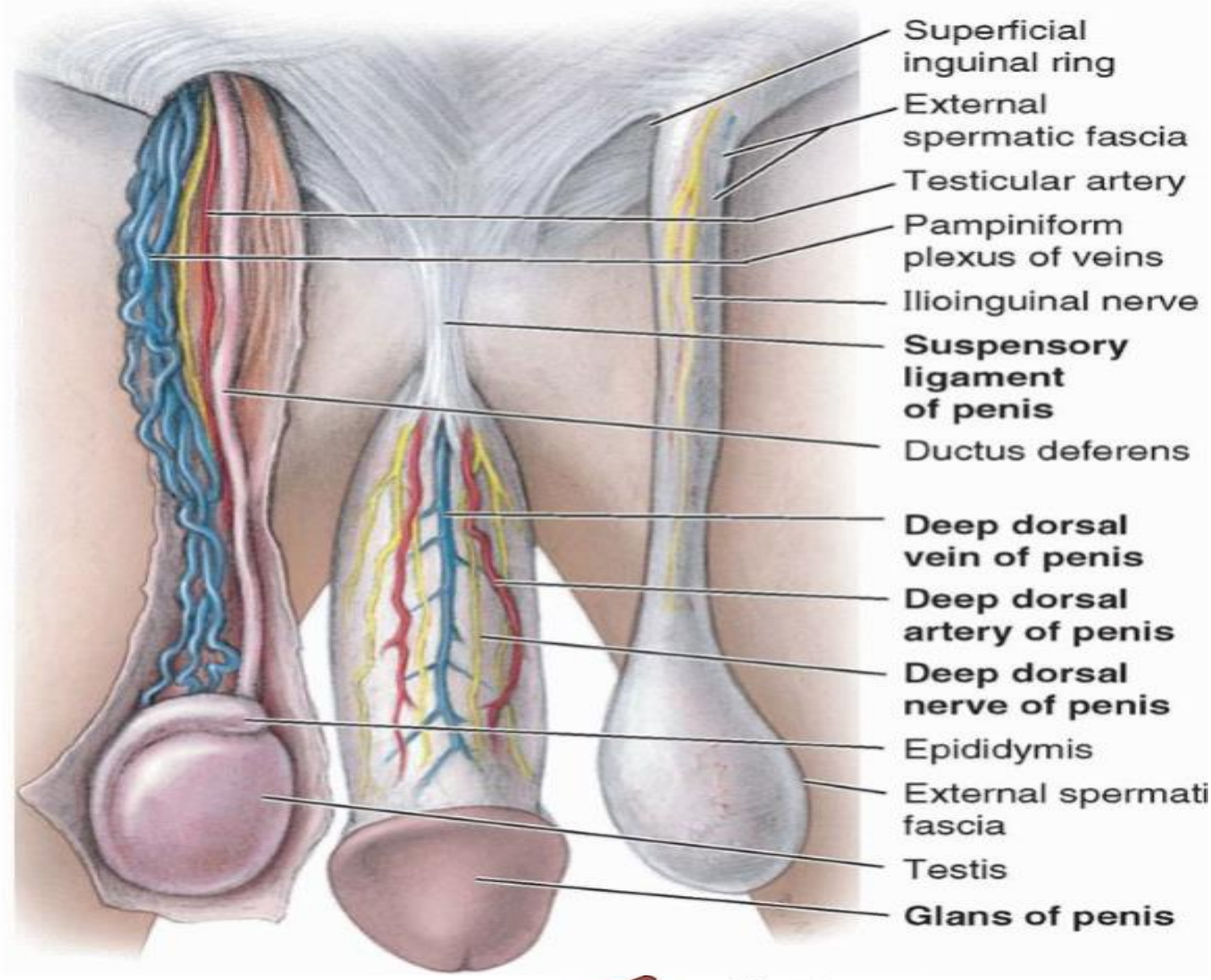
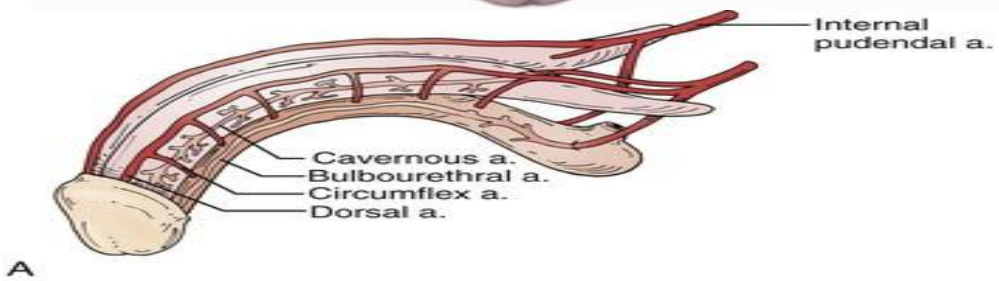
Vasculature of the penis

- Arterial blood supply to the penis is derived from three main sources: -
  a) Dorsal arteries of the penis
  b) Deep arteries of the penis
  c) Bulbourethral artery
     - **NB:** These arteries are branches of common penile artery (internal pudendal artery).
- Venous blood is drained from the penis by two veins.
  a) The cavernous spaces are drained by the **deep dorsal vein of the penis** – This empties into the prostatic venous plexus.
  b) The **superficial dorsal veins** supply the superficial structures of the penis, such as the skin and cutaneous tissues.
     - **NB:** These veins eventually drains into internal pudendal and internal iliac veins

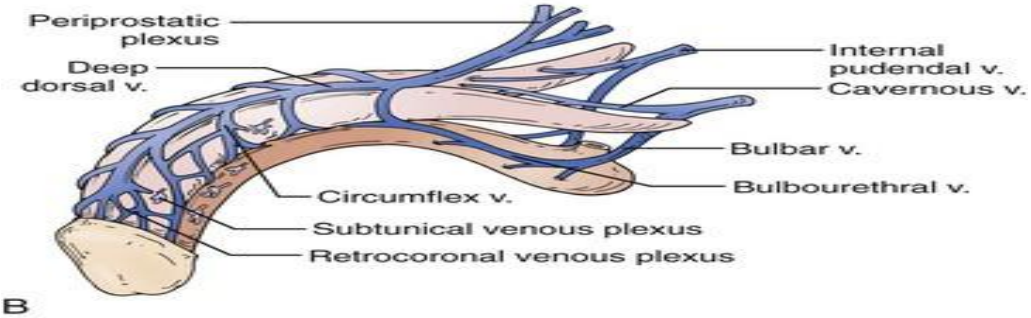




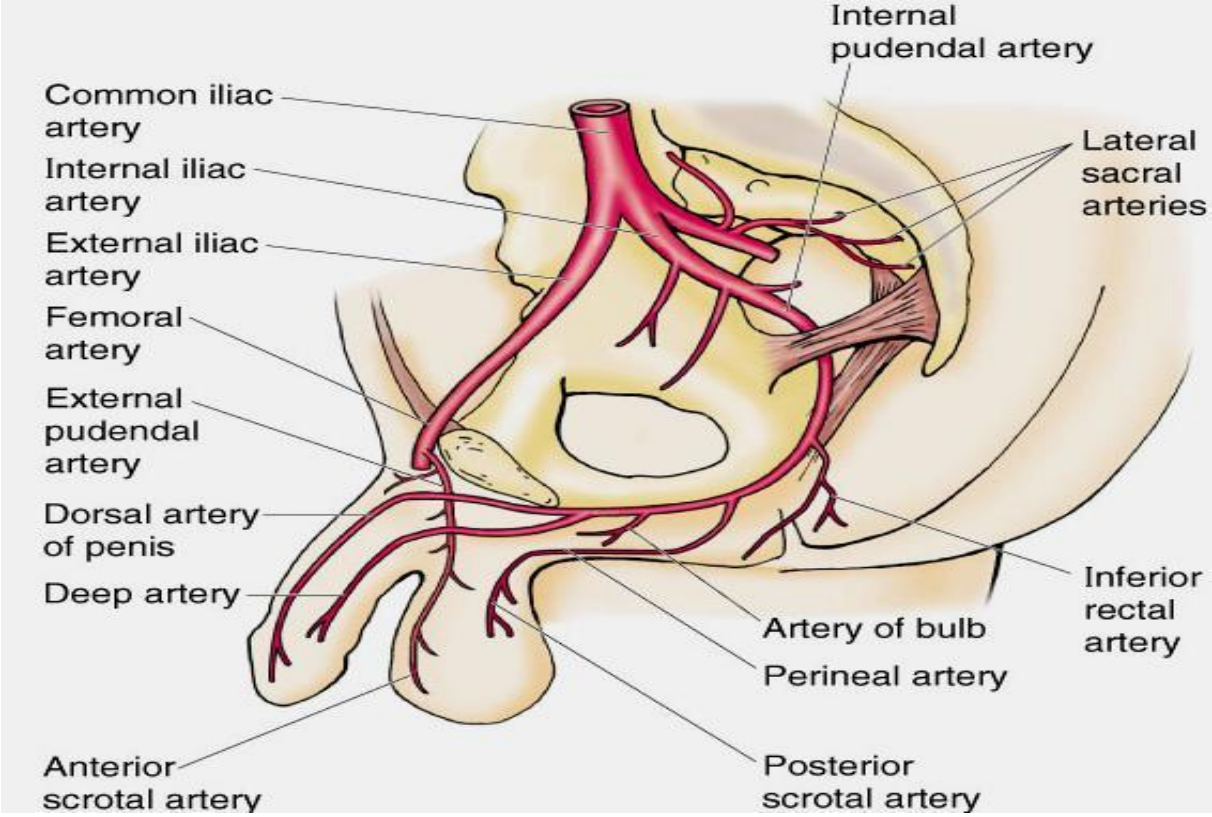

Superficial inguinal ring
External spermatic fascia
Testicular artery
Pampiniform plexus of veins
Ilioinguinal nerve
Suspensory ligament of penis
Ductus deferens
Deep dorsal vein of penis
Deep dorsal artery of penis
Deep dorsal nerve of penis
Epididymis
External spermati fascia
Testis
Glans of penis


Internal pudendal a.
Cavernous a.
Bulbourethral a.
Circumflex a.
Dorsal a.

A


Periprostatic plexus
Deep dorsal v.
Internal pudendal v.
Cavernous v.
Bulbar v.
Bulbourethral v.
Circumflex v.
Subtunical venous plexus
Retrocoronal venous plexus

B



Innervations of the penis

- Nervous supply to penis is by autonomic and somatic nerves.
- The penis is supplied by S2-S4 spinal cord segments and spinal ganglia.
- Sensory and sympathetic innervation to the skin and glans penis is supplied by the dorsal nerve of the penis, a branch of the pudendal nerve.
- Parasympathetic innervation is carried by cavernous nerves from the prostatic nerve plexus, and is responsible for the vascular changes which cause erection.
- Sympathetic innervation is responsible for ejaculation.

Ligaments

- The root of the penis is supported by two ligaments, which attach it to the surrounding structures:
    a) **Suspensory ligament** – It is the condensation of deep fascia. It connects the erectile bodies of the penis to the pubic symphysis.
    b) **Fundiform ligament** – It is the condensation of abdominal subcutaneous tissue. It runs down from the linea alba, surrounding the penis like a sling, and attaching to the pubic symphysis.

Skin of the penis

- The skin of the penis is more heavily pigmented than that of the rest of the body.
- It is connected to the underlying tunica albuginea by loose connective tissue.

- The **prepuce** (foreskin) is a double layer of skin and fascia, located at the neck of the glans. It covers the glans to a variable extent.
- The prepuce is connected to the skin of the glans by the frenulum, a median fold of skin on the ventral surface of the penis.
- The potential space between the glans and prepuce is termed the preputial sac.

Internal structures/organs of male reproductive system

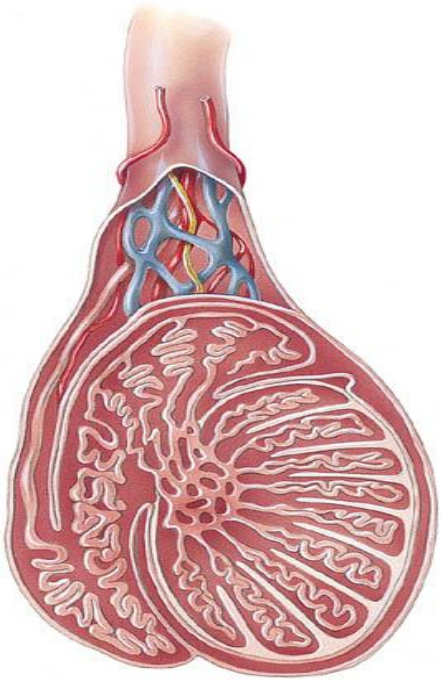
1. Testes

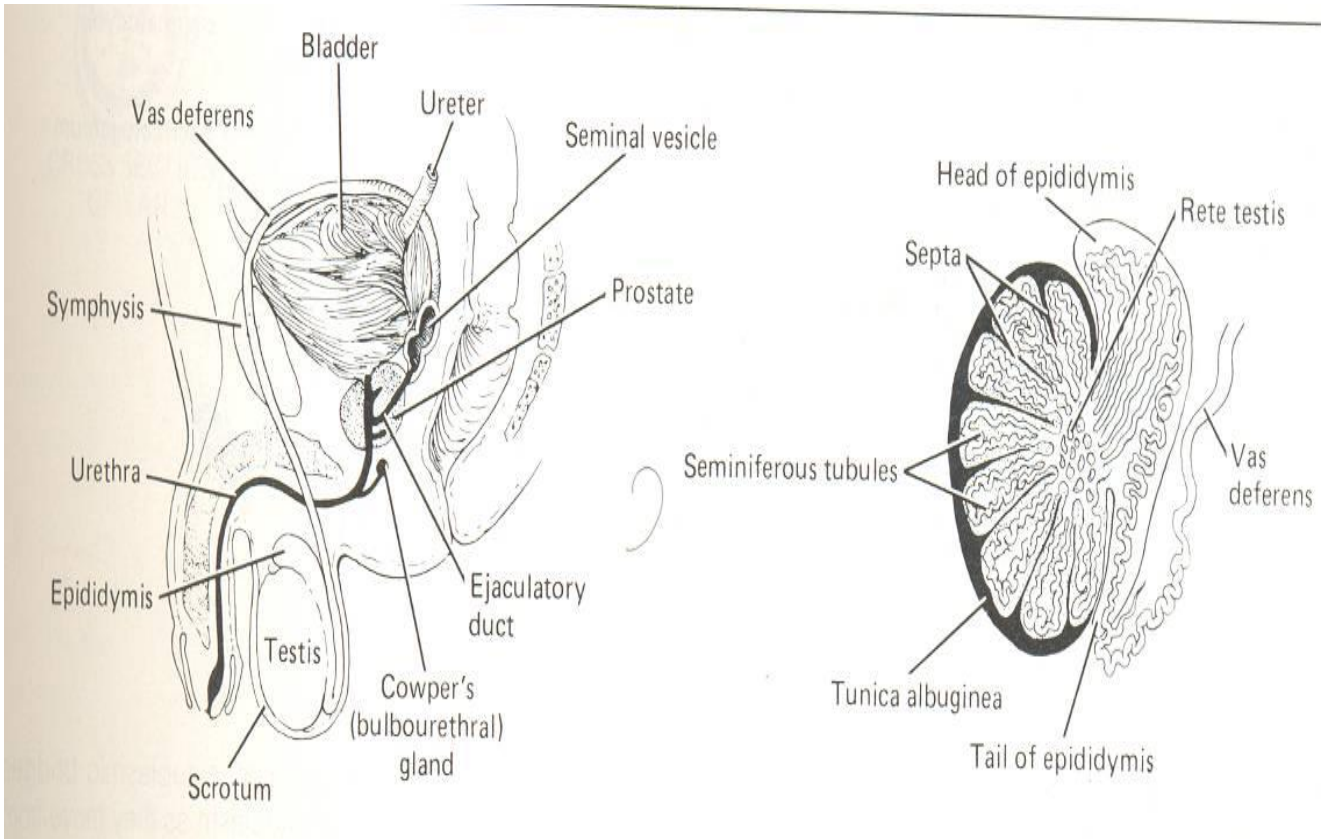
- Testes are reproductive glands of the male equivalent of the ovaries in female.
- They are suspended in scrotum by the spermatic cords.
- Testes are surrounded by three layers of tissue:-
    a) Tunica vaginalis
    b) Tunica albuginea
    c) Tunica vasculosa
- **Tunica Vaginalis**-this is a double mebrane forming the outer covering of testes and it is the down growth of the abdominal and pelvic peritoneum.
- **Tunica albuginea**-this is the fibrous covering beneath tunica vaginalis. It is the one that divides the glandular structure of the testes into lobules.
- **Tunica vasculosa**-this consist of a network of capilaries supported by delicate connective tissue

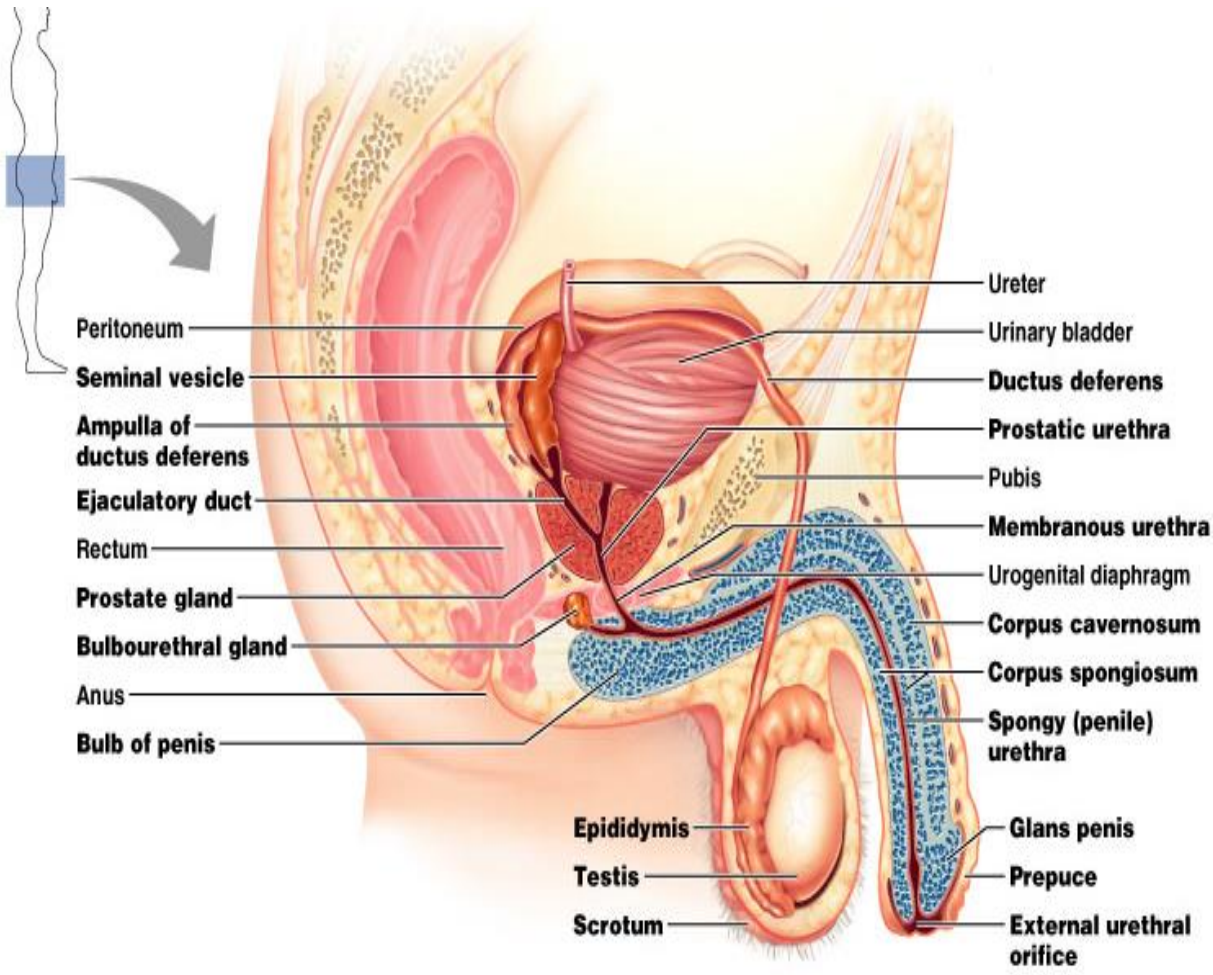
Anatomical Structure of testes

- Each testis has about 200-300 lobules.
- Each testis is about 4.5 cm long 2.5 cm wide and 3cm thick.
- It is suspended by spermatic cord in the scrotum.
- Each lobule has 1-4 convoluted loops composed of germinal epithelia cells called seminiferous tubules.
- Seminiferous tubules contain: -
    a) Sperm forming cells
    b) Sertoli cells (supporting cells)
- Sertoli cells extend from basement membrane to lumen of seminiferous tubules.
- The functions of sertoli cells include: -
    a) Forms blood-testis barrier
    b) Support developing sperm cells through nourishment.
    c) Produce fluid & control release of sperm into lumen
    d) Secretory Function-Secretes various proteins that are key in spermatogenesis such as: inhibin which slows sperm production; Adrogen Binding protein that binds testosterone; Activins that stimulates spermatogenesis
    e) Phagocytosis –Sertoli cells engulfs and consumes unwanted elements during spermatogenis
    f) Immunological functions-Sertoli cells ensures that pathogens from the blood and other sources are not able to destroy the developing sperms
- Between the seminiferous tubules are interstitial cells (of Leydig) that secrete testosterone.

- At the upper part of the testes, the tubules combine to form a single tubule. This tubule is called the **epididymis** and leaves the scrotum as **deferent duct** (Vas deferens) in the spermatic cord.
- Blood and lymph vessels pass to the testes in the spermatic cord.







Functions of the testes

1. Manufactures spermatozoa in seminiferous tubules.
2. Stores sperms in the epididymis.
3. Initiates motility of sperms during ejaculation
4. It has endocrine Function-Synthesis of testosterone.

Vasculature of the testes

- Arterial blood supply to the testes and epididymis is through:
    a) Paired testicular arteries that runs through the spermatic cord
- Venous drainage is via paired testicular veins that run through the spermatic cord.
    - ✓ Testicular veins are network of veins that are coiled around the testicular artery. This is known as pampiniform plexus
    - ✓ Left testicular vein drains into the left renal vein while right testicular vein drains directly into inferior vena cava.

Lymphatic system of the testes

- Lymphatic drainage of the testes is through lumbar and para-aortic lymph nodes which are located L1 of the vertebrae.

Innervation to the testes

- Testes are supplied by the genital branch of genitofemoral nerve and testicular nerves that form the sympathetic nerve supply.

2. Spermatic cord

- It is a cord- like structure in males that runs from the deep inguinal ring dwon to each of the testes.
- It suspends the testes in the scrotum.
- This cord extends through the inguinal canal and attached to the testes on the posterior wall.
- Spermatic cord is surrounded (covered) by three layers of tissues; namely: -
    a) External spermatic fascia
    b) Cremasteric muscle
    c) Internal spermatic fascia
- Each cord contains (content of spermatic cord)
    a) Arteries: Testicular artery, cremasteric artery and deferential artery.
    b) Testicular veins (Pampiniform plexus)
    c) Lymph vessels
    d) Vas Deferens (deferent duct)
    e) Testicular (autonomic nerves) and genitofemoral nerve
    f) Processus vaginalis

3. **Epididymis:**

- It is a tubular, coiled structure within the scrotum attached to the backside of each testis.
- It serves to store, mature, and transport sperm between the testes and the vas deferens.
- Epididymis is made up of three parts:
    a) **The head**- It is located on superior pole of testis. It stores sperms for maturation
    b) **The body**- It connects the head to the tail of the epididymis. It is the portion of sperm maturation
    c) **The tail**- The tail of the epididymis is continuous with the deferent duct.

4. **Vas Deferens**:

- These are two long, thin tubes that lead from the epididymis to the seminal vesicles and prostate gland.
- Also known as ductus deferens
- The contraction of the vas deferens during ejaculation pushes the sperm out.
- Vas deferens forms a conduit for sperms during ejaculation into the ejaculatory duct.

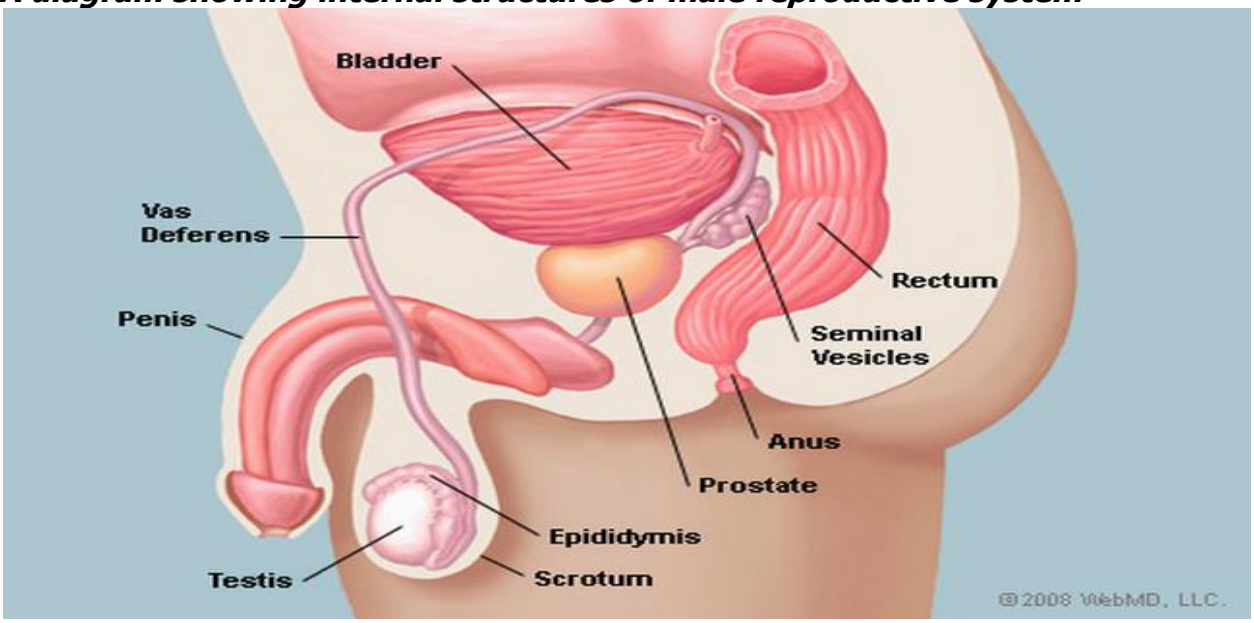
5. Ejaculatory duct:

- Ejaculatory is a tubular pathway that is formed from the union of vas deferens and the seminal vesicle ducts.
- Ejaculatory ducts pass through the prostate gland and empties semen into the urethra during ejaculation.
- It helps in combining sperms from vas deferens with secretions from the seminal vesicles.

- ❖ After mixing of the sperms and fluid from seminal vesicle, this content then passes through the ejaculatory duct where it mixes further with the content from the prostate gland. The content of then drains into prostatic urethra.

6. **Seminal Vesicles**:
   - ❖ These are two vascular glands lying behind the bladder with ducts joining the vas deferens.
   - ❖ They are located posteriorly and inferiorly to the urinary bladder and lateral to vas deferens
   - ❖ The excretory ducts of the seminal vesicles join with the vas deferens to form ejaculatory duct.
   - ❖ They secrete a sticky fluid (constituting 70% of the semen) that nourishes and enables the sperm to move.
7. **Prostate Gland**:
   - ❖ This a doughnut-shaped gland with two lobes
   - ❖ It is located in below the bladder and about half between rectum and the base of the penis.
   - ❖ It lies below the seminal vesicles and surrounds the urethra at the base of the bladder.
   - ❖ It stores and secretes an alkaline fluid that neutralizes acid found in the male urethra and the female reproductive tract. Without the secretions of the prostate gland, many sperm would die and fertilization of an ovum would be impossible.
   - ❖ This fluid from prostate gland contains clotting enzyme that thickens the semen in the vagina
   - ❖ The fluid also gives semen milky like appearance.
   - ❖ During ejaculation the smooth muscles of the prostate contract squeezing its content into the prostatic urethra and later expelled out as semen.
   - ❖ Functions of the prostate gland include: -
     a) Secrets thin milky fluid that makes up 30% of semen gives it milky appearance.
     b) Contains clotting enzyme which thickens semen in the vagina increasing likelihood of semen being retained close to the cervix.
     c) The fluid is alkaline in nature neutralizing acidic environment in the vagina.
8. **Cowper's Gland**:
   - ❖ These are two small, pea-sized glands located beneath the prostate gland on both sides of the base of the penis.
   - ❖ They are situated in the deep perineal pouch.
   - ❖ Also known as bulbourethral glands
   - ❖ They secrete a clear, sticky fluid (pre-ejaculation) that keeps the urethra moist.
   - ❖ It is alkaline to help neutralize the acidity of the urethra.
   - ❖ They are located below the prostate gland and at the origin of the internal part of the penis.
   - ❖ Secretions from these glands drain into the penile urethra.

A diagram showing internal structures of male reproductive system

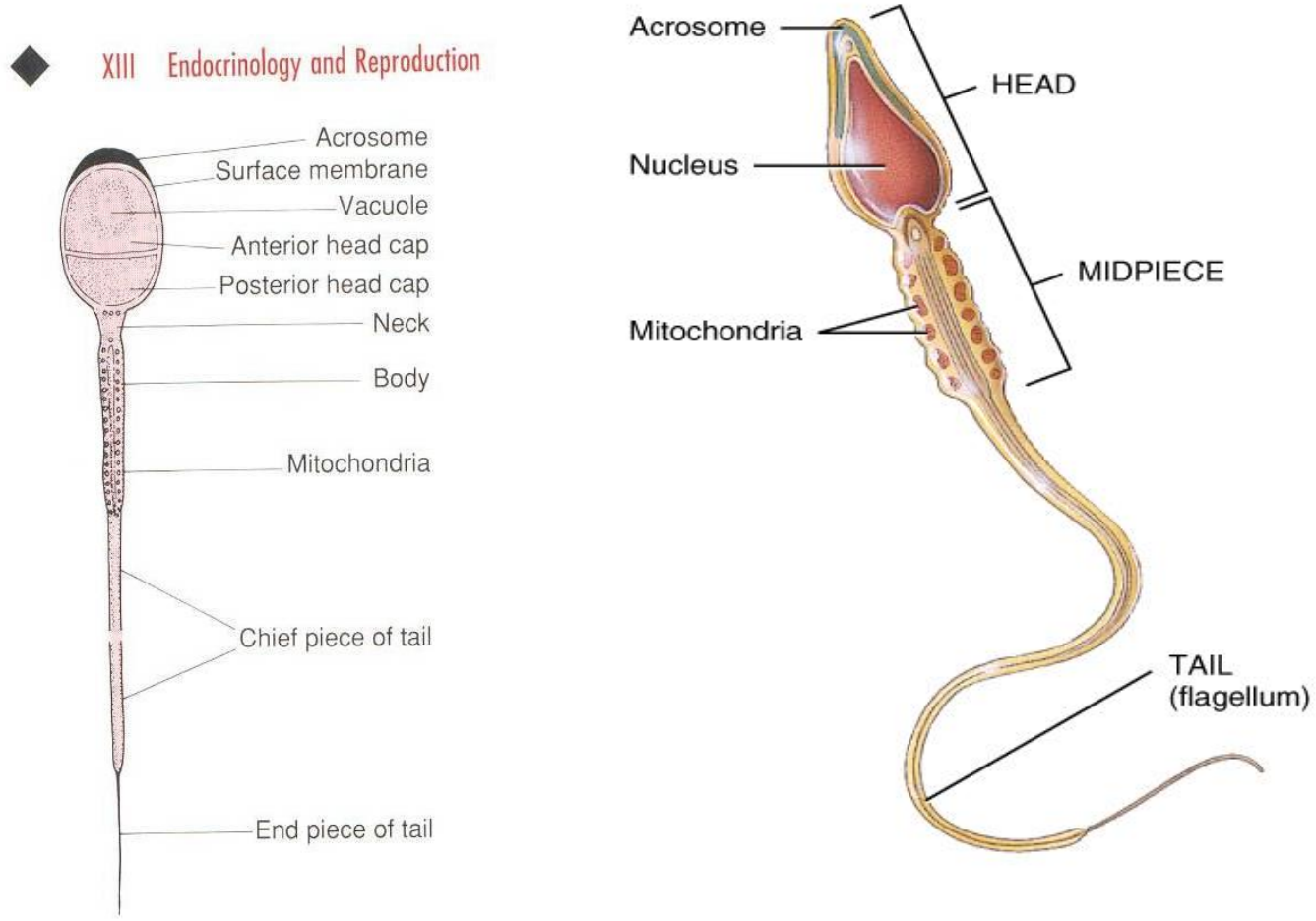


9. **Urethra**:
   - ❖ Urethra is a pathway dual-purpose tube running the length of the penis from the bladder to the outside that transports both semen and urine.
   - ❖ The urethra in male provides a common pathway for the flow of urine and semen.
   - ❖ Urethra is approximately 19-20 centimeters.
   - ❖ The male urethra consists of three parts: -
     a) **The prostatic Urethra**-Originates at the urethral orifice of the bladder and passes through the prostate gland.
     b) **The membranous urethra**-originate from the prostate gland to the bulb of the penis.It is the shortest urethra.
     c) **Spongiose urethra/Penile Urethra**-Lies within the corpus spongiosum of the penis and terminates at the external urethra orifice at glans penis
   - ❖ There are two urethral sphincters, namely: -
     a) Internal urethral sphincter.
     - ✓ It is formed between the urethra and the urinary bladder (At the neck of the bladder)
     - ✓ It is made up of smooth muscle and it is under involuntary control.
     - ✓ It is supplied by sympathetic nervous system which is a branch of autonomic nervous system.
     - ✓ During ejaculation it closes to prevent semen from draining into the urinary bladder (This phenomena of semen getting redirected to urinary bladder is called **retrograde ejaculation**)

     b) External urethral sphincter
     - ✓ It made up of skeletal muscles and therefore it is under voluntary control.
     - ✓ It is located at the level of membranous urethra in males.
     - ✓ In females it is located at the distal inferior end of the bladder.
     - ✓ It is supplied and controlled by somatic nervous system.

10. **Sperm**:
    - ❖ The male reproductive microscopic cell, produced by the testicles that can fertilize the female's ovum.
    - ❖ Sperm is a motile cell and is adapted for reaching and fertilizing the female ovum.
    - ❖ They are fertile for about 24-48 hours after being deposited into the female reproductive tract.
    - ❖ It is made up of three distinctive parts: -
        a) The head –It contains DNA and the acrosome with enzymes for penetrating the ovum
        b) The midpiece-It contains mitochondria to form ATP for energy
        c) The Tail(flagellum)- It is used for locomotion

Diagrams showing structure (Morphology) of the sperm

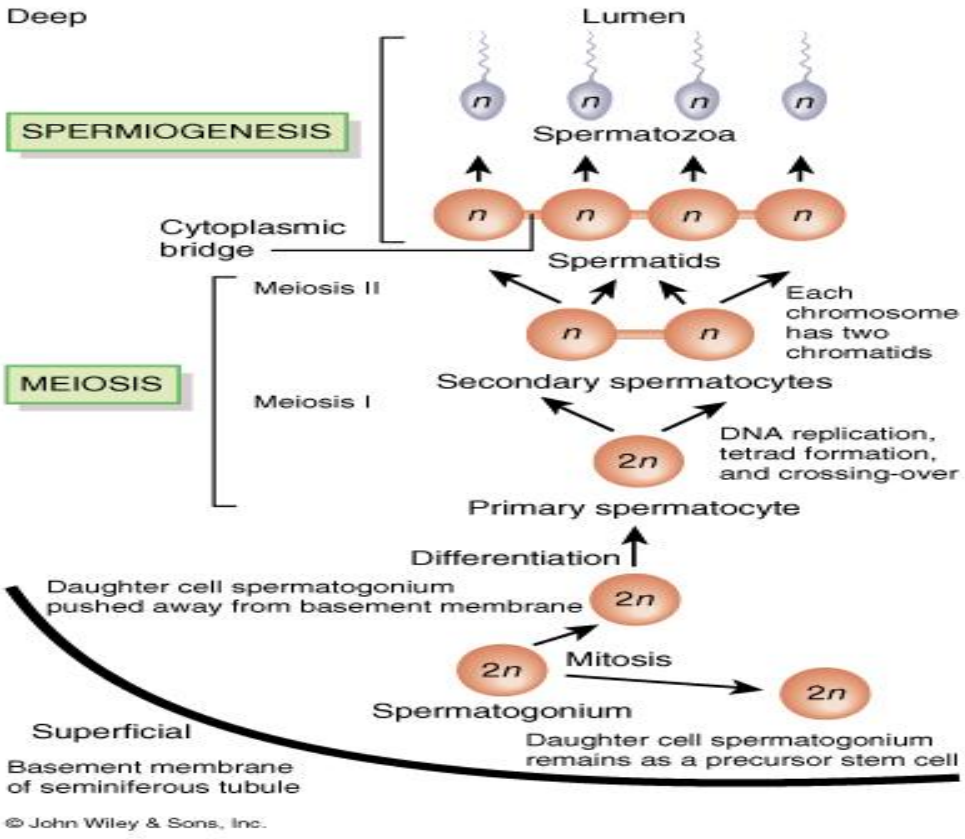


The head of the sperm has acrosome that contains substances that assist in digesting the walls the ovum during fertilization. This will be discussed in details during topic on fertilization

Spermatogenesis

- Spermatogenesis is the physiological process of synthesizing and producing sperms in males.
- Spermatogenesis occurs in the seminiferous tubules located within the testes.
- Sperm formation occurs through meiosis that makes diploid cells into haploid sex cells.
- Sperm forming cells undergoes two meiotic divisions:
    a) First meiotic division
    b) Second meiotic division
- Spermatogonium is the undifferentiated germinal cell that eventually will differentiate into sperms.
- Spermatogonium is a progenitor cell for spermatozoa.
- Progenitor cell is a cell that has been committed to differentiate into sperm cell.
- Spermatogonium (diploid cell) undergoes mitotic division to form daughter cell spermatogonium (diploid) that is pushed away from the basement membrane.
- Daughter cell spermatogoniums further differentiate into primary spermatocyte with 46 chromosomes.
- Primary spermatocyte undergoes first meiotic division to form two haploid secondary spermatocytes.
- Secondary spermatocytes undergo second meiotic division to form four spermatids each with 23 single stranded chromosomes.
- Each of the four spermatids will develop and mature into sperms.

A diagram showing spermatogenesis



- The spermatid later reorganizes itself to form a head, a midpiece, and a flagellum, or tail.
- Cells involved in spermatogenesis include: -
    a) Sertoli cells (nurse cells)
    b) Leydig

Erection in males

- It occurs as a result of sexual stimulation
- Erection in males is controlled by Parasympathetic nervous system reflex
- Dilation of the arterioles supplying the penis makes more blood to enter the penis compressing the veins so that the blood is trapped.
- This trapping of the blood within the penile vessels causes engorgement leading to an erection. This process is known as **tumescence**.
- During resolution phase of sexual excitement, the penile arteries constricts decompressing the veins hence the penis becomes flaccid. (The penis goes back to non-erect state). This process is called **detumescence**.

Emission and Ejaculation in males

- **Emission**
    - Muscle contractions close sphincter at base of bladder
    - Fluids are then propelled through ductus deferens, seminal vesicles, & ejaculatory ducts into bulb of penis and mixes with prostatic fluid.
- **Ejaculation**
    - It is controlled by sympathetic nervous system reflex
    - Skeletal muscles squeeze semen out through urethra

Hormonal control in male physiology

- Hypothalamus secretes gonadotropin releasing hormone (GnRH)
- Anterior pituitary secretes FSH and LH
- FSH causes Sertoli cells to secrete ABP and inhibin
- LH causes interstitial cells to secrete testosterone
- Testosterone: -
    - ✓ stimulate spermatogenesis
    - ✓ Development and maintenance of male secondary sex characteristics.
    - ✓ inhibitory feedback on pituitary LH secretion
    - ✓ Exert protein-anabolic, growth promoting effect.
- It is controlled through negative feedback by an increase in testosterone and inhibin

Semen:

- Semen is a mixture of sperms and seminal fluid
- It is 60% from seminal vesicles and about 30% from prostate
- It is slightly alkaline, milky appearance and sticky in nature
- Semen contains nutrients, clotting proteins and an antibiotic to protect the sperms from injurious
- A typical ejaculate is 2.5 to 5 ml in volume and a normal sperm count is 50 to 150 million/mL
- Actions of many sperm are needed for one sperm to penetrate the ovum
- If less than 20 million/mL the person is regarded as infertile.

Female reproductive system

Introduction

- Ovaries produce are adapted for production of eggs (oocytes) and hormones
- Uterine tubes transport the eggs
- Uterus is where fetal development occurs.
- Female reproductive system is also made up of two structures/organs, namely: -
    a) External genitalia (External reproductive structures)
    b) Internal female genital organs (internal reproductive organs).
- **Vulva** refers to all the structures that form the entire female external genitalia.
- Vulva comes from a latin word that means "covering"
- External genitalia are made up of the following: -
    a) Mons Veneris/ Mons Pubis
    b) Labia Majora
    c) Labia Minora
    d) Clitoris
    e) Vestibule
    f) Vaginal Opening
    g) Urethral Opening
    h) Hymen
    i) Skene's Glands
    j) Bartholin's Glands
    k) Fourchette

a. Mons pubis:

- Mons pubis (Mons Veneris) is pad of adipose tissue located over the symphysis pubis (pubic bone joint)
- **Function:** protects the junction of pubic bone from trauma
- It is richly supplied with sebaceous glands
- In childhood it is hairless and smooth
- During puberty it is covered by a triangular coarse of curly hairs (escutcheon)
- Pattern of hair growth:
    - ✓ Female: Triangular
    - ✓ Male: Diamond- shaped
- Growth of pubic hair is stimulated by Testosterone while the pattern of hair growth is governed by estrogen.
- The arterial blood supply to the mons pubis is from the inferior epigastric artery which is a branch of external iliac artery.
- The lymphatic drains into the inguinal lymph nodes.

b. Labia majora: -

- These are two thick folds of adipose tissues originating from the mons pubis and terminating in the perineum.
- It unites anteriorly to form the anterior commissure and posteriorly to form the posterior commissure.
- Its outer surface is thick and covered by hair; inner surface is smooth and moist
- Main function of the labia majora is to provide covering and protection to the external organs located under it.

- In nulliparous women: in close apposition to each other; but tends to gape wider after birth.
- Two folds of skin running from the mons pubis to below the vaginal opening.
- The area is rich in apocrine glands and sebaceous glands.
- Labia majora arterial blood is from deep external pudendal artery.
- Nerve supply is from the perineal branch of posterior femoral cutaneous nerve.

c. Labia minora:

- These are two thin fold of skin lying between labia majora.
- It divides anteriorly to enclose the clitoris to form the prepuce.
- Posteriorly labia minora fuse to form the fourchette.
- It is most highly vascular, sensitive and richly supplied with sebaceous glands
- In nulliparous women labia minora covers the vaginal introitus, vestibule and urethra

d. Clitoris:

- It is a small knob composed of erectile tissues and many sensitive nerve endings.
- It is found above the opening of the vagina where the folds of the labia minora meet at the front.
- It is homologous to the male penis.
- It is regarded as the center of sexual sensation and stimulation in females.
- highly sensitive and erectile tissue situated under the prepuce of the labia minora
- Clitoris is covered by a fold of skin called prepuce; Sensitive to both touch and temperature
- It is extremely sensitive and highly vascular and it plays part in orgasm of sexual intercourse. (female erogenous organ)
- Clitoris is made up of three parts; namely:
    a) **Crura**-Supports the exterior structures of the clitoris
    b) **Body**-It is the cylindrical part of the clitoris containing erectile tissues. Extends from the clura and has blood vessels that when sexually aroused makes the clitoris to grow in size.
    c) **Glans**-It is the pointed part of the clitoris that is highly sensitive.

e. Vestibule:

- It is a triangular space between the labia minora where the following are located:
    - ☑ Urethral Opening (urethral meatus)
    - ☑ Vaginal Opening (vaginal introitus)
    - ☑ Opening of Bartholin's Glands
    - ☑ Opening of Skene's Glands

f. Vaginal opening:

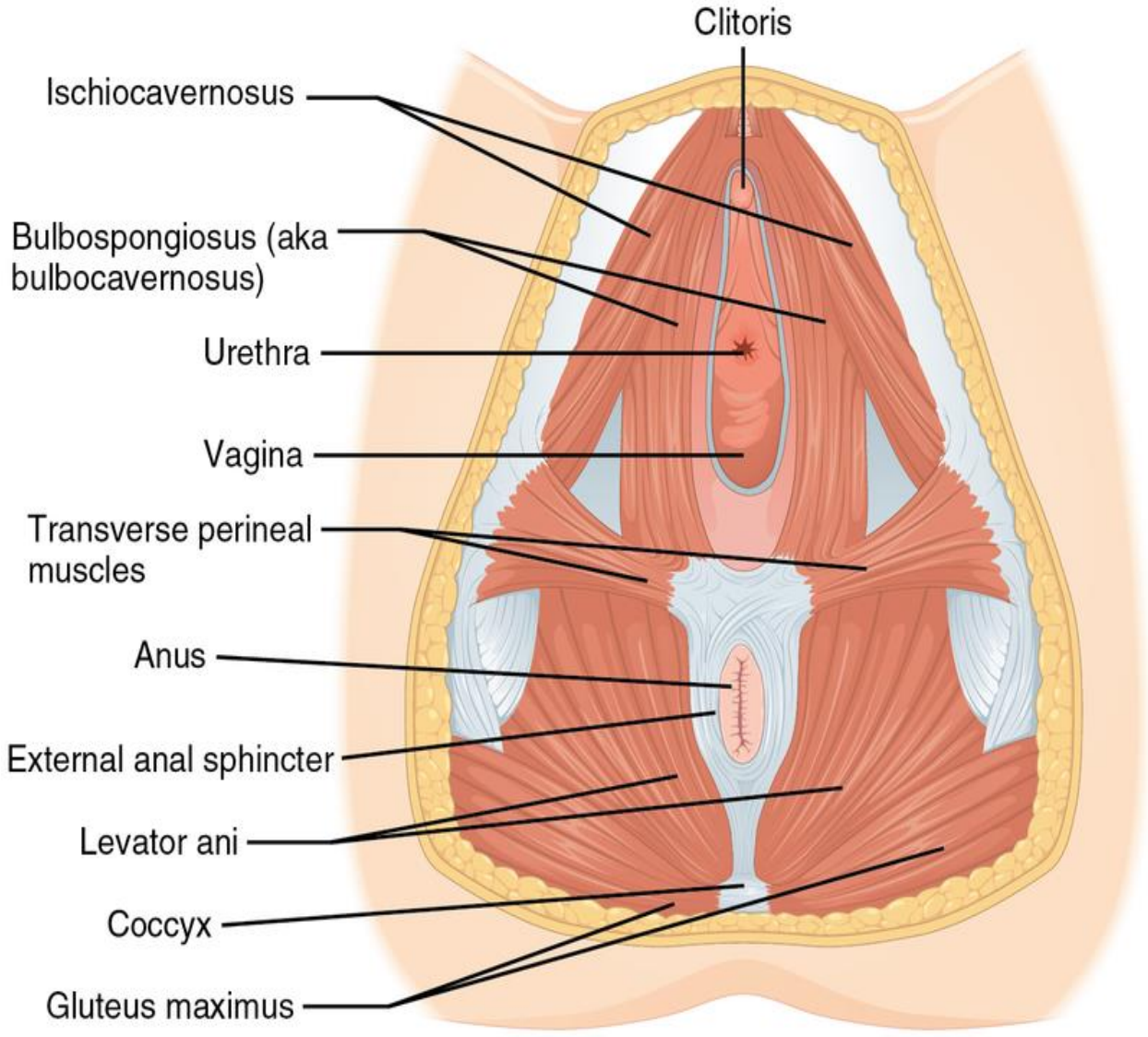
- It located between the opening of the urethra and the anus.
- It is lined by outlets of Bartholin's Glands-They secretes mucus to lubricate vagina during sexual intercourse and its alkaline nature promotes sperm survival.
- It is usually covered by a hymen in virginity
- **Hymen** is thin and elastic semicircular membrane that covers the opening of the vagina. It is usually torn during the first sexual intercourse.

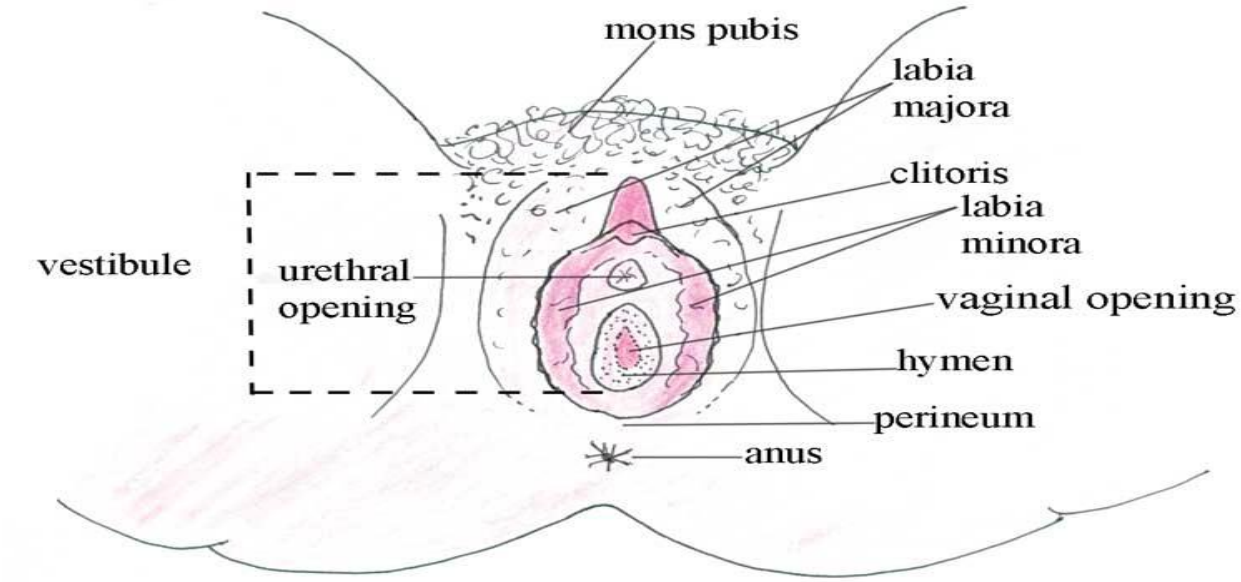
- ❖ **Imperforate Hymen** – a hymen that completely covers the vaginal opening preventing coitus and passage of menstrual discharge

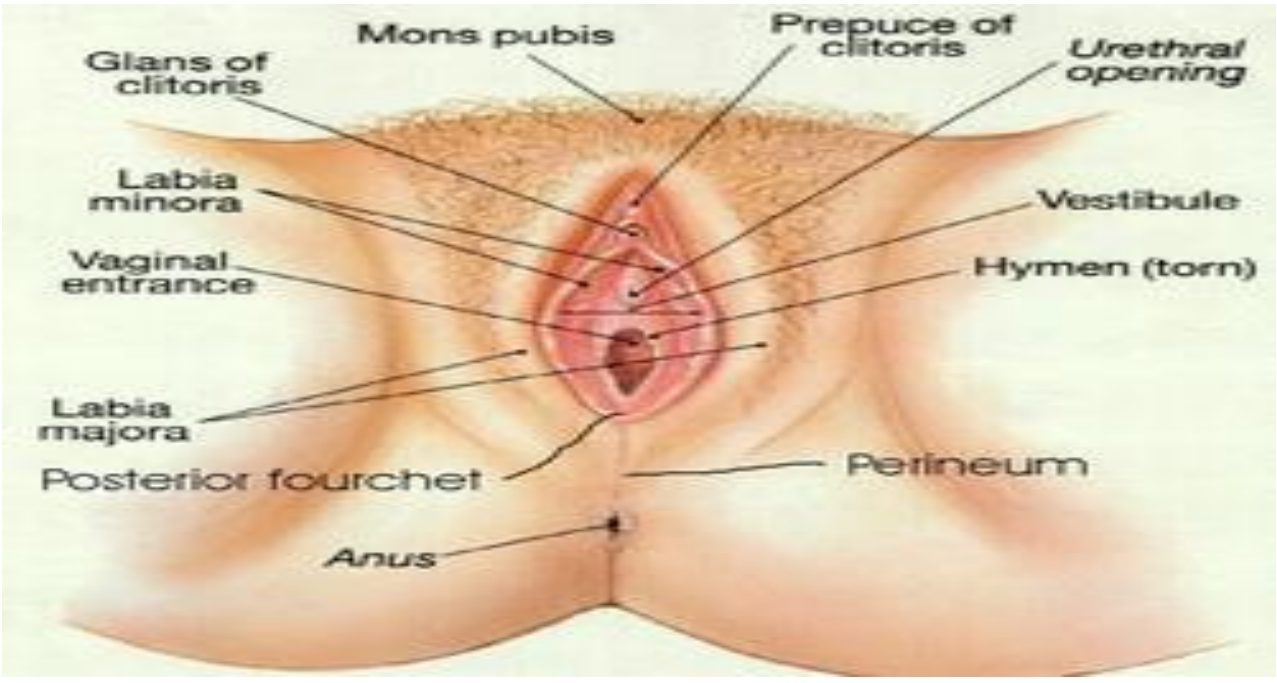
g. Skene's Gland-Located on each side of urethral opening and secretes fluid that also lubricate female genitalia during sexual intercourse.

h. Fourchette: It is the ridge of tissue formed by the posterior joining of the two labia minora and majora.

Diagram showing external female genitalia







Blood supply, lymphatic drainage and innervation to the vulva

- Blood supply is via Internal and external pudendal artery and drainage through corresponding veins.
- Lymphatic drainage is through inguinal glands.
- Nerve supply is through branches of pudendal nerve. vaginal nerve supplies erectile tissue of vestibular bulb of clitoris.
- Parasympathetic fibers have a vasodilator effect to the structures of the vulva.

Internal female reproductive organs

- Internal female reproductive organs include: -
    a) Vagina
    b) Cervix
    c) Uterus
    d) Fallopian tubes
    e) Ovaries

a. Vagina:

- Canal running from vestibule to the cervix passing upwards and backwards into the pelvis along a line approximately parallel to the plane of the pelvic brim.
- It is approximately four-inch-long fibromuscular organ ending at cervix and lies between urinary bladder and rectum.
- Vagina does not contain glands and it is moistened by mucus from cervix and other glands such as Bartholin's glands.
- Vaginal fluid is strongly acid Ph of 4.5 due to presence of lactic acid formed by action of ***doderleins bacillus (***are normal inhabitants of vagina).
- Its walls are made up of skin folds known as rugae. Rugae appears at puberty and disappear at menopause.
- Rugae allows vaginal canal to stretch and enlarge during intercourse and delivery.
- Functions of the vagina include: -
    - ☑ Forms exit or escape of menstrual flow.
    - ☑ Receive penis and ejected sperms during sexual intercourse.
    - ☑ Provides passage for fetus during delivery.
- Anatomical relation of the vagina.
    - ☑ **Anterior**-bladder and urethra. Closely connected to anterior vaginal
    - ☑ **Posterior** –pouch of Douglas, rectum and perineal body
    - ☑ **Lateral** –on either side of upper 2/3 are pelvic fascia and ureter pass beside the cervix, on either side of lower 1/3 are Ms. of pelvic floor
    - ☑ **Superior**-uterus.
    - ☑ **Inferior**-external genitalia.
- **Blood supply to the vagina**: Arterial supply is via branches of internal iliac artery and includes vaginal artery and a descending branch of uterine artery.
- **Venous supply** is through corresponding veins.
- **Lymphatic drainage**-via inguinal, internal iliac and sacral glands.
- Nerve supply is from pelvic plexus.
- **NB:** Vaginal nerves follow vaginal arteries to supply vaginal walls and erectile tissue of the vulva.

b. Cervix:

- Cervix is the lower fibromuscular portion that joins with the uterus.
- It is approximately 3-4 cm in length and 2.5 cm in diameter; however, it varies with age, parity and menstrual status.
- It has three major parts; namely: -
    - ☑ Internal os- is the narrow opening between isthmus and cervix. Isthmus is the junction between the cervix and the uterus. It is where squamocolumnar junction is located.

- ☑ Cervical canal- A spindle-shaped tubular portion extending from the isthmus of the uterus to the opening of the uterus into the vagina
- ☑ External os- is the opening at the lower end of the cervix. It is small and round before pregnancy, and becomes a transverse slit after pregnancy.

❖ Cervix is joined to the uterus through isthmus.

c. Uterus:

❖ Uterus is the site of implantation and foetal development during pregnancy.
❖ It is also a site for menstruation.
❖ It is situated in the cavity of true pelvis behind bladder and in front of rectum.
❖ It leans forward-**anteversion** and bends forwards on itself-**anteflexion**.
❖ When woman is in standing position it results in almost horizontal position with fundus resting on the bladder.
❖ Non-pregnant uterus is a hollow, muscular, pear shaped organ situated in the true pelvis.
❖ Non pregnant uterus measures 7.5 cm long, 5cm wide and 2.5cm in depth, each wall being 1.25 cm thick.
❖ Cervix forms lower 1/3 of the uterus and measures 2.5cm in direction.
❖ The anatomical relation of the uterus is a follows: -
  - ☑ **Anterior** –uterovesical pouch and bladder.
  - ☑ **Posterior** –recto uterine pouch of Douglas and rectum.
  - ☑ **Superior**-intestine. Inferior-vagina
  - ☑ **Lateral** –broad ligaments, uterine tubes, and ovaries.
❖ Uterus is supported to its position by: -
  - ☑ Pelvic floor and maintained in position by several ligaments.
    - ➢ Transverse /cardinal/mackenrodts ligaments, uterosacral ligaments, pubocervical ligaments- It attaches the cervix to the lateral pelvic wall by its attachment to the Obturator fascia of the Obturator internus muscle, and is continuous externally with the fibrous tissue that surrounds the pelvic blood vessels.
    - ➢ **Broad ligaments-** formed from folds of peritoneum which are draped over the uterine tubes. Hang down like a curtain and spread from sides of uterus to sidewalls of pelvis.
    - ➢ **Round ligaments-** maintains anteverted position of uterus. Arise from cornua of the uterus and in front of and below insertion of each uterine tube and pass between folds of broad ligament through inguinal canal to be inserted into each labium major.
    - ➢ **Ovarian ligaments-** begin at cornua of uterus behind uterine tubes and pass down between folds of broad ligament to ovaries. Round ligament, uterine tubes and ovarian ligament are very similar in appearance and arise from same area of uterus.
❖ The following are the parts of the uterus: -
  - ☑ **Body/corpus**-makes upper 1/3 of the uterus and is the greater part.
  - ☑ **Fundus** –doomed upper wall between insertion of uterus tubes. In midwifery fundus is essential in: -
    - ➢ Determining fundal height to assess fetal growth

- Assessing uterine contractions and progress of labor
- Assessing uterine involution

☑ **Cornua** – upper outer angles of uterus where uterine tubes join the uterus

☑ **Cavity** – potential space between anterior and posterior walls. Changes in shapes, base of triangle being uppermost.

☑ **Isthmus**- narrow area between cavity and cervix 7mm long. Enlarges during pregnancy to form lower uterine segment jointly with the cervix.

❖ Layers of the uterus includes: -

i. Endometrium
ii. Myometrium
iii. Perimetrium

i. Endometrium: -

❖ Endometrium forms lining of ciliated epithelium (mucous membrane) on a base of connective tissue or stroma and its made up of simple columnar epithelium.

❖ Endometrium is the innermost ciliated mucosal layer that contains numerous glands that secretes thin alkaline fluid that keep the uterine cavity moist.

❖ In uterine cavity endometrium is constantly changing in thickness throughout menstrual cycle and it is made up two sub layers, namely

☑ **Functional layer** also known as stratum functionalis.

✓ It is the one that proliferate in readiness for implantation and it is the one that undergoes thickening.

✓ It is the layer that is shed during menstruation

☑ **Basal layer** also known as stratum basalis.

✓ It is the one that replaces functional layer each month

✓ It undergoes changes in response to hormones at different phases of menstrual cycle

ii. Myometrium: -

❖ It is the middle muscular layer that is responsible for uterine contractions and thickest at the fundal region.

❖ It is made up of three layers of smooth muscles.

❖ Its muscle fibres runs in all direction and interweaves to surround blood vessels and lymphatic that passes to and from the endometrium. This is important because myometrial contraction after delivery helps in controlling bleeding.

❖ Outer layer is formed of longitudinal fibers that are continuous with that of uterine tubes, uterine ligament and vagina.

❖ In cervix muscle fibers are embedded in collagen fibers which enable it to stretch in labour.

iii. Perimetrium: -

❖ It is the outermost double serous membrane attached to the broad ligament.

❖ It is an extension of peritoneum draped over the uterus.

Blood supply, innervation and lymphatic drainage to the uterus

❖ Arterial blood supply to the uterus is via: - **Uterine artery** which enters at the level of the cervix. It sends some branches to upper vagina then runs upwards in a twisted fashion to meet ovarian artery where it forms an anastomosis with it

near cornua. **Ovarian artery** is a branch of abdominal aorta and supplies ovary and uterine tube before joining the uterine artery.

- ❖ The venous drainage is through uterine veins. There are two uterine veins on each side of the uterus.
- ❖ The Lymphatic drainage to the uterus is through Internal iliac glands drains uterine body and other pelvic lymph glands drain cervical area.
- ❖ Innervations to the uterus is mainly through autonomic nervous system-sympathetic and parasympathetic via inferior hypogastric or pelvic plexus.

Functions of the uterus

- ☑ It acts as an organ of reproduction. Uterus functions as a site for reception, implantation, retention and nutrition of the fetus
- ☑ It is an organ where menstruation occurs.
- ☑ It is the site of uterine contraction for the expulsion of the fetus during delivery and to seal torn blood vessels after placental delivery.

d. Fallopian tubes: -

- ❖ These are pair of tube like structures originating from the cornua of the uterus with distal ends located near the ovaries.
- ❖ Also known as uterine tubes.
- ❖ They are narrow tubes measuring approximately 4-inch (10 cms) extending from the ovary to uterus
- ❖ Anatomical relation of the fallopian tubes includes: -
  - ☑ Anteriorly, posteriorly, and superiorly is the peritoneal cavity and intestines.
  - ☑ Lateraly is the sidewalls of pelvis.
  - ☑ Inferioryly is broad ligament and ovaries.
  - ☑ Medially is the uterus.
- ❖ Uterine tubes are held in position via the following: -
  - ☑ Attachment to the uterus
  - ☑ Infundibulopelvic ligaments.
- ❖ Each tube has four parts: -
  - ☑ **Interstitial portion(interstitium)**-it lies within wall of uterus. It is approximately 1.25 cm with a lumen of about 1mm wide.
  - ☑ **Isthmus** – it is the narrowest part. It is about 2.5 cm long. It is the site for tubal ligation.
  - ☑ **Ampulla**-it is the widest portion of about 5cm long where fertilization takes place.
  - ☑ **Infundibulum**- it is funnel shaped end with many processes known as fimbriae that are in close proximity with the ovaries.
  - ☑ **NB**-Cornua is the region of the uterus where uterine tubes join the uterus. It is where uterine pace makers are situated.

Functions of the fallopian tubes

- ☑ Propels ovum towards uterus (The effects of cilia and peristalsis helps the ovum to move through the fallopian tubes)
- ☑ Receives spermatozoa
- ☑ Provides site for fertilization
- ☑ Supplies the fertilized ovum with nutrition during its journey to uterus.

A diagram showing female internal organs

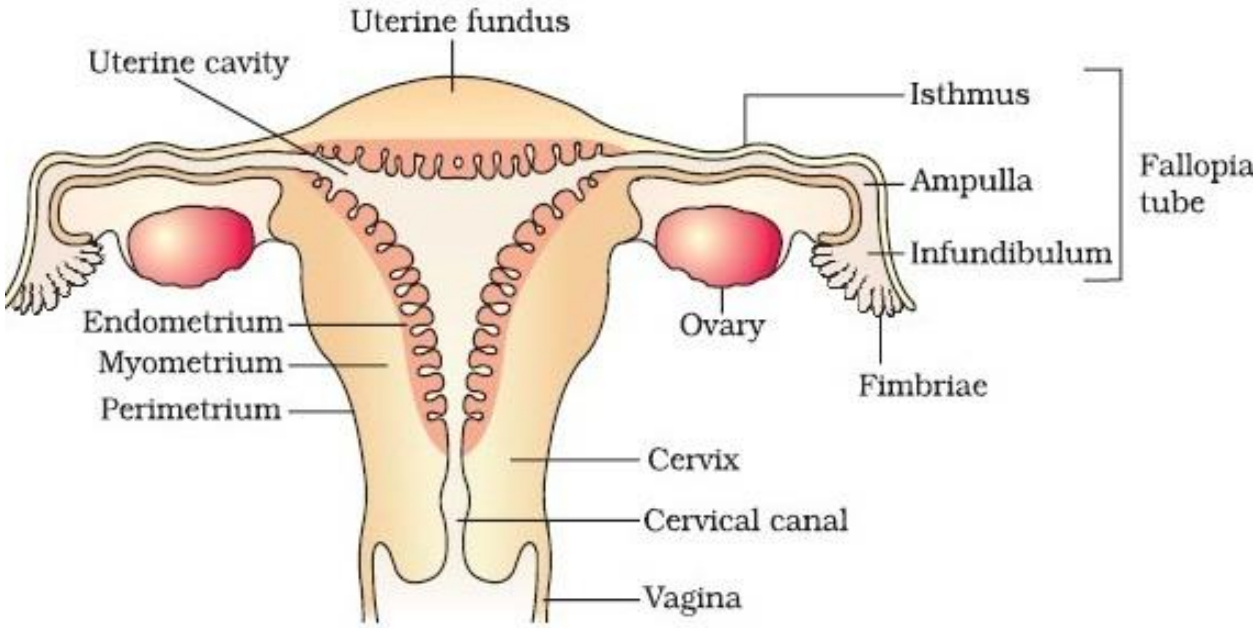
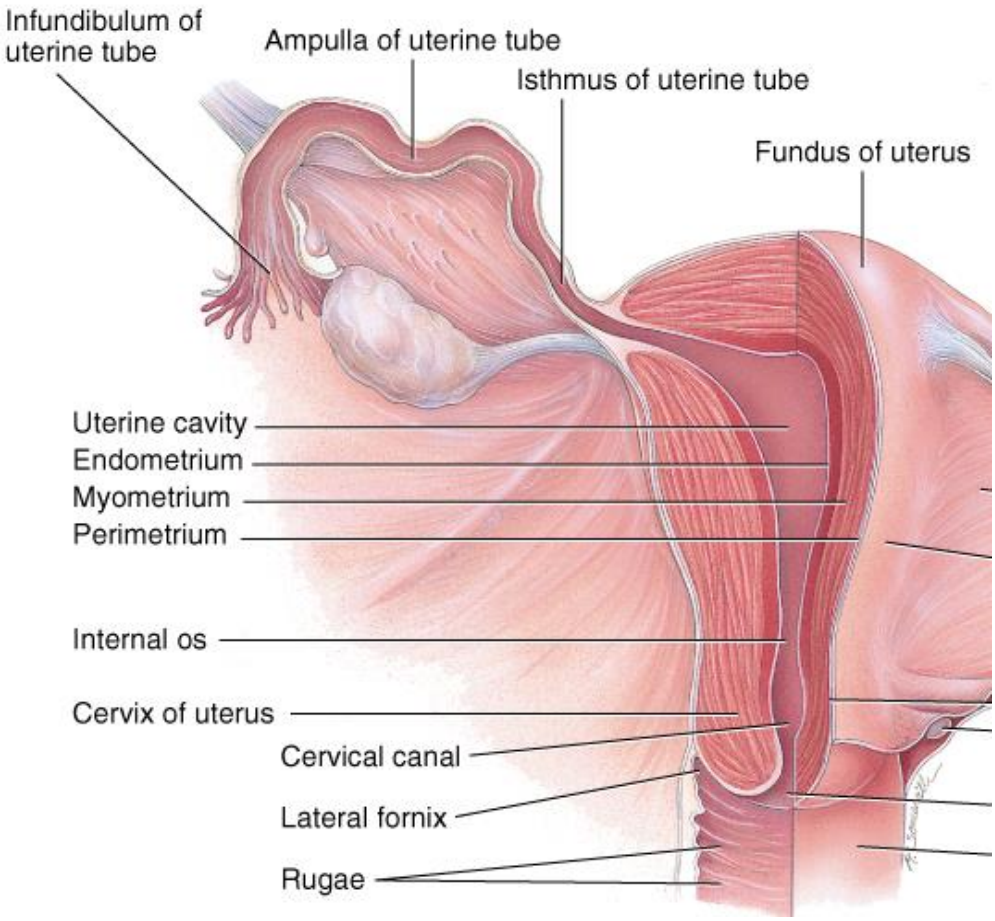


Figure 3 (b). Diagrammatic sectional view of the female reproductive system



e. Ovaries: -

- Ovaries are Almond shaped glandular organs located on each side of the uterus.
- Ovaries are the site for oogenesis and endocrine function.
- Ovary has the following layers: -
  - ☑ **Capsule** of dense Connective tissue
  - ☑ **Cortex** just deep to capsule contains follicles with egg cells (oocytes). It is surrounded by the stroma.
  - ☑ **Medulla** is middle region composed of connective tissue, blood vessels and lymphatics.
  - ☑ **Tunica albuginea**. Over this lies germinal epithelium modification of peritoneum. This forms germinal epithelium which is a peritoneal membrane covering the ovary
- Anatomical relation to the uterus include: -
  - ☑ **Anterior**-broad ligament
  - ☑ **Posterior**-intestines
  - ☑ **Lateral**-infundibulopelvic ligament and sidewalls of pelvis.
  - ☑ **Superior**-uterine tubes
  - ☑ **Medial**-uterus and ovarian ligaments'
- Ovaries are supported by:
  - ☑ Attached to broad ligament from above, supported by ovarian ligament medially and infundibulopelvic ligament laterally.
- Blood supply, lymphatic drainage and innervation to the ovaries is through:
  - ☑ Ovarian arteries and ovarian veins. Right ovarian vein drains into inferior venacava, but left ovarian vein drains into left renal vein.
  - ☑ Lymphatic drainage is to lumbar glands.
  - ☑ Nerve supply is from ovarian plexus.

f. Ovarian follicles: -

- Ovarian follicles contain oocytes in various stages.
- Ovarian follicles (specifically Granulosa cells) secrete estrogens that is responsible for: -
  - ☑ Growth and repair of uterine lining
  - ☑ Regulation of monthly female cycle
  - ☑ Female sexual characteristics
  - ☑ Maintenance of bone and muscle
  - ☑ Other functions of oestrogen include:
    - ➢ It suppresses ovulation.
    - ➢ It inhibits lactation.
    - ➢ It assists water and electrolyte retention in the body.
- Mature follicle is called graafian follicle.
- Graafian follicle releases oocyte every month through ovulation.
- After ovulation, empty follicle becomes a corpus luteum
- Corpus Luteum secretes: -
  - ☑ Progesterone – completes the preparation of uterine lining.
  - ☑ Estrogens – Thickens the endometrium.
  - ☑ Relaxin – relaxes uterine muscles and pubic symphysis

- ☑ Inhibin – decreases secretion of FSH and LH

❖ Corpus albicans is a white scar tissue left after the corpus luteum degenerate..

Morphological structure of graafian follicle:

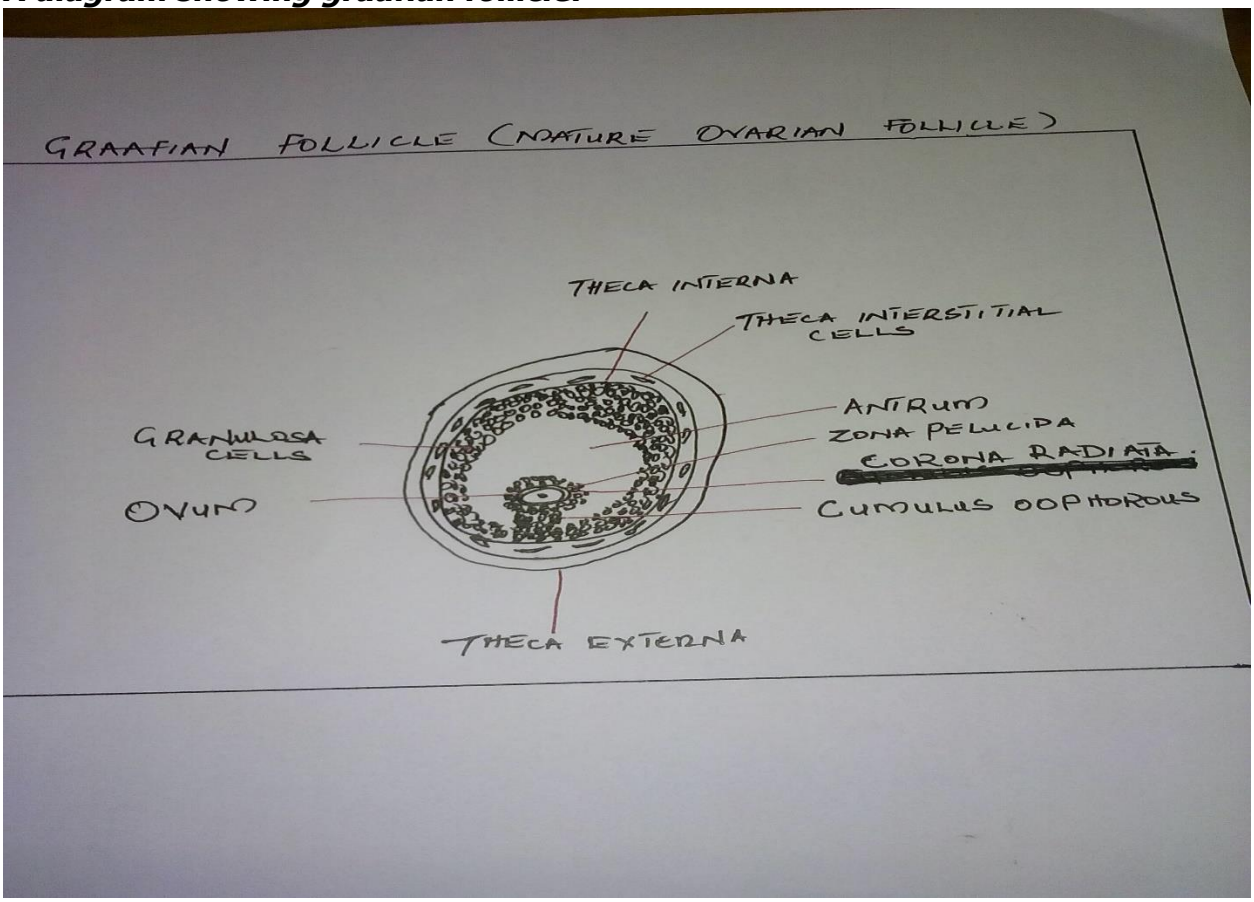
❖ Graafian follicle is made up of the following features:
- ☑ Theca interna
- ☑ Theca externa
- ☑ Granulosa cells
- ☑ Antrum
- ☑ Follicular fluid
- ☑ Theca interstitial cells.

❖ Granulosa cells of the graafian follicle secretes estrogen which has several functions as discussed earlier.

❖ Theca interstitial cells provides nourishment, structural support and development of vascular system necessary for follicle development.

❖ Antrum contains follicular fluid

A diagram showing graafian follicle.

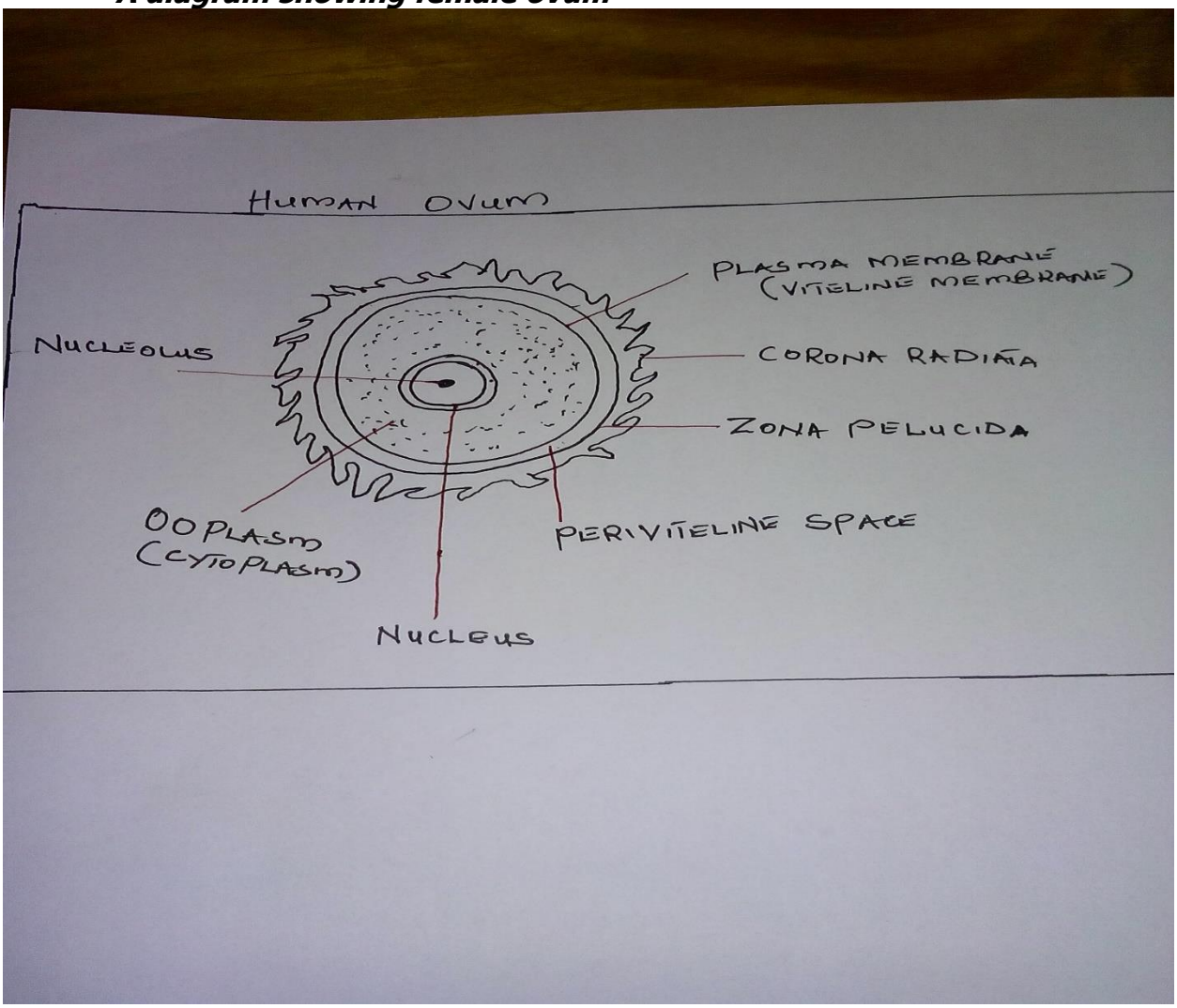


Morphology and structure of human ovum: -

❖ The human ovum is composed of: -
- ☑ Corona radiata
- ☑ Present in freshly ovulated ovum and provides support and protection to the developing ovum. It also has a function of providing specific proteins in

- ☑ Zona pellucida-It is the outermost most layer of the ovum that controls sperm entry. It has other functions as discussed elsewhere in this handout.
- ☑ Plasma membrane (Viteline membrane)-Also help in creating further block to sperm entry into the ovum.
- ☑ Periveteline space- Creates an additional sperm entry control into the ovum.
- ☑ Ooplasm (Cytoplasm). Provides nutrients to the ovum
- ☑ Nucleus-Contains the genetic material.

A diagram showing female ovum



Female reproductive cycle

- ❖ Female reproductive cycles are controlled by hormonal changes occurring every by month.
- ❖ These hormones are majorly from the hypothalamus, anterior pituitary and ovary
- ❖ Reproductive changes occur in two major organs, the ovaries and the uterus. This provides two cycles.
  - ☑ Ovarian cycle: Changes in ovary during and after maturation of the follicle and oocyte

- ☑ Uterine cycle (menstrual cycle): These are changes that occurs within the uterus to receive fertilized ovum and implantation.

❖ Hormonal control of the female reproductive cycle is through Gonadotropin Releasing Hormone (GnRH) which is secreted by the hypothalamus. It stimulates anterior pituitary to secrete Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH). FSH and LH target the ovaries and drive the ovarian. Estrogens and progesterone from the ovaries drive the uterine cycle.

Ovarian cycle.

❖ These are changes that occur with the ovaries in every reproductive cycle.
❖ Ovarian cycle is made up of three phases, namely: -

i. Follicular phase
ii. Ovulation
iii. Luteal phase

i. Follicular phase

- ☑ About 20 follicles are stimulated to develop at each reproductive cycle but only one reaches maturity
- ☑ FSH from anterior pituitary is responsible for stimulating follicle growth.
- ☑ This phase leads to a mature (Graafian) follicle that will undergo ovulation.
- ☑ Granulosa cells of follicle secrete estrogens and inhibin
- ☑ Increasing levels of estrogens and inhibin inhibit FSH
- ☑ Increasing estrogens also stimulates secretion of LH
- ☑ As ovarian follicle matures, it moves closer to the surface of the ovary.

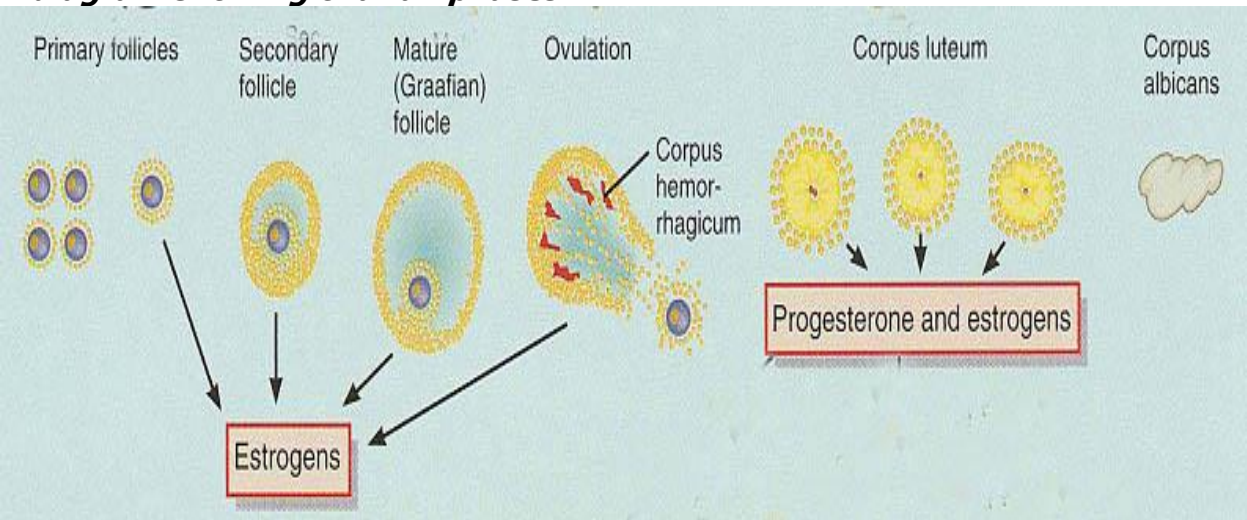
ii. Ovulation: -

- ☑ Ovulation is the rupturing of the graafian follicle to release the ovum
- ☑ LH stimulates rupture of the Graafian follicle and release of oocyte from ovary into the pelvic cavity and fimbriae of fallopian tube picks up the ovulated oocyte into the uterine tubes.
- ☑ The follicle then ruptures expelling the ovum at mid cycle 14^{th} +_1day of a 28 days' cycle.
- ☑ Anovulatory cycles sometimes occur. This means that there is no ovulation in this case but menstruation take place.
- ☑ Sometimes ovulation vary in timing ranging from 8^{th} to 20^{th} day of menstrual cycle.
- ☑ **Symptoms of ovulation**
  - ➢ Sharp cutting abdominal pain(mittleschmerz)
  - ➢ Raise in body temperature (0.2) for 1-2 days
  - ➢ Thick sticky elastic cervical/vaginal mucus
  - ➢ Endometrial proliferation.
- ☑ Mechanisms that leads to ovulation include: -
  - ➢ LH Surge
  - ➢ Increase in intrafollicular pressure
  - ➢ Ischemia to the graafian follicle
  - ➢ Effects of proteolytic enzymes.

Luteal phase

- It is also known as post ovulatory phase
- LH stimulates development of Corpus luteum from ovulated or ruptured follicle however increasing levels of progesterone suppresses levels of LH.
- Corpus luteum secretes mostly progesterone & some estrogens
- Progesterone prepares endometrium for possible pregnancy
- In case pregnancy does not occur: -
  - ☑ After about two weeks, corpus luteum atrophies to corpus albicans (white body)
  - ☑ Progesterone and estrogen levels decline and this decline makes the developing functional layer of the endometrium not to be supported hence menstruation.
- If pregnancy occurs, the developing embryo produces human chorionic gonadotrophin hormones. This hormone supports the development of corpus luteum. Corpus development is critical because it forms the main source of progesterone in the first 3-4 months before placenta is fully formed.
- If pregnancy does not occur:
  - ☑ Increasing levels of progesterone cause negative feedback that inhibits LH secretion
  - ☑ After about two weeks' corpus luteum atrophies to corpus albicans (white body)
  - ☑ Progesterone and estrogen levels decline
  - ☑ Functional layer of endometrium discharged into first five days of next cycle.

A diagram showing ovarian phases



Uterine cycle.

- These are changes that occur in the uterus in readiness for a possible implantation.
- These are cyclic changes which occur in the endometrium of the uterus of a fertile female.
- The changes aim at preparing the endometrium to receive a fertilized ovum
- There are three phases in uterine cycle, namely: -

- ☑ Proliferative
- ☑ Secretory
- ☑ Menstruation

❖ **Proliferative phase**

- ☑ Rising estrogen levels from the growing follicle stimulates growth of the functional layer of endometrium to 4-10 mm thickness
- ☑ It follows menstruation and last until ovulation. **Regenerative** phase is the first few days when the endometrium is reforming.
- ☑ Under influence of oestrogen and consist regrowth and thickening of endometrium.
- ☑ At completion of the phase endometrium has two layers.
  - ➢ **Basal layers**-
    - above Myometrium.1mm in thickness.
    - Never alters during menstrual cycle.
    - Consists of rudimentary structures for building up new endometrium.
  - ➢ **Functional layer**
    - Contains tubular glands and is 2.5mm thick. Changes constantly according to hormonal influences of the ovary. There is development of **Cuboidal ciliated cells** covers the functional layer.

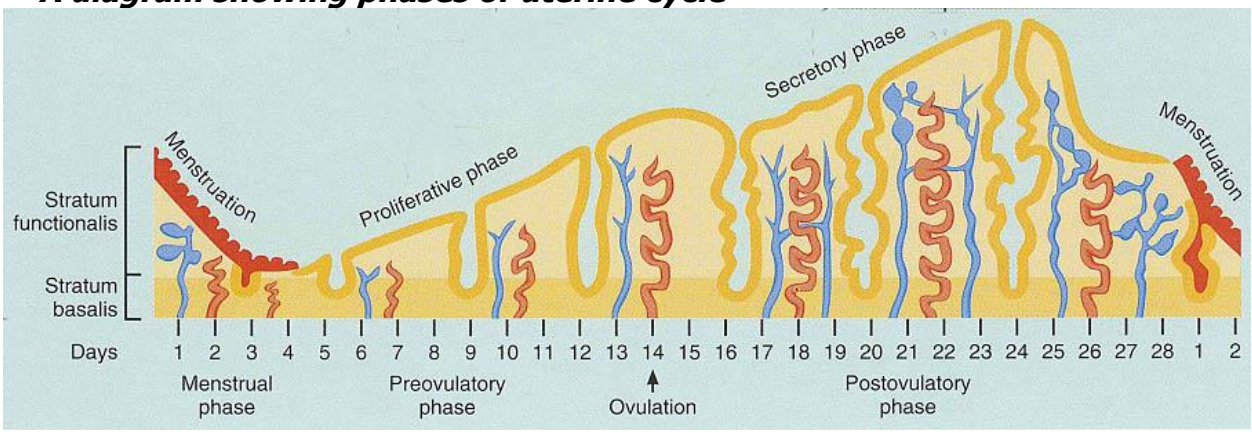
❖ **Secretory phase**

- ☑ Corpus luteum of ovary secretes progesterone.
- ☑ Progesterone stimulates thickening of the functional layer of endometrium to 12-18 mm and become well vasculised ready for implantation thus increased blood supply into the endometrium.
- ☑ Functional layer becomes spongy in appearance coz glands are more tortuous.
- ☑ There is growth of endometrial glands and secretion of uterine milk.

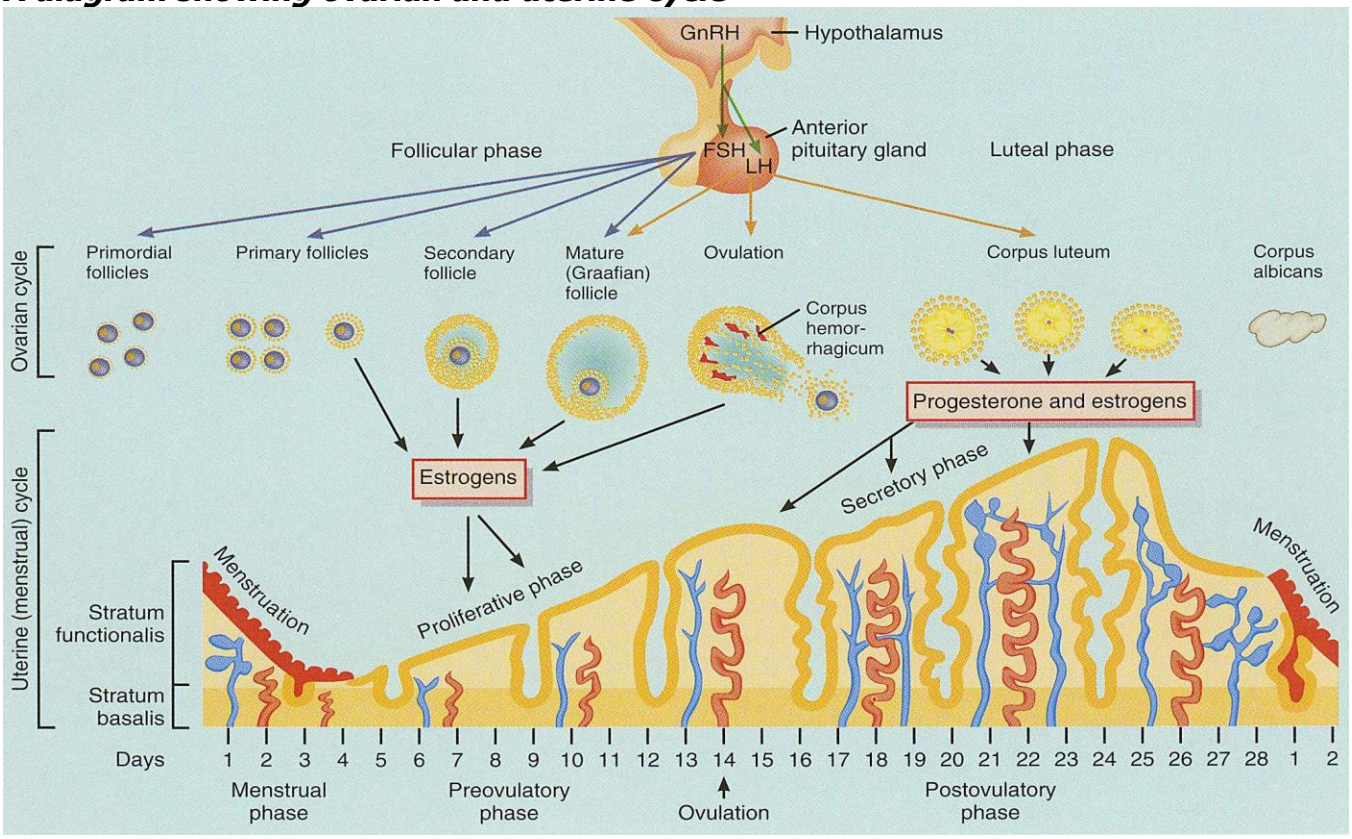
❖ **Menstruation phase (menses)**

- ☑ Decline in progesterone levels causes functional layer of endometrium to discharge resulting in vaginal bleeding called menstruation and last 3-5 days. This is because declining levels of progesterone interferes with the maintenance of functional layer, blood vessels to the functional layer diminishes in its function. This leads to ischemia to the functional layer thus necrosis.
- ☑ It's the terminal phase of the cycle when endometrium is shed to the basal layer along with blood from capillaries and unfertilized ovum.
- ☑ It marks the beginning of the next cycle.
- ☑ The menses are not coagulated (**What is the reason for this?)**

A diagram showing phases of uterine cycle



A diagram showing ovarian and uterine cycle



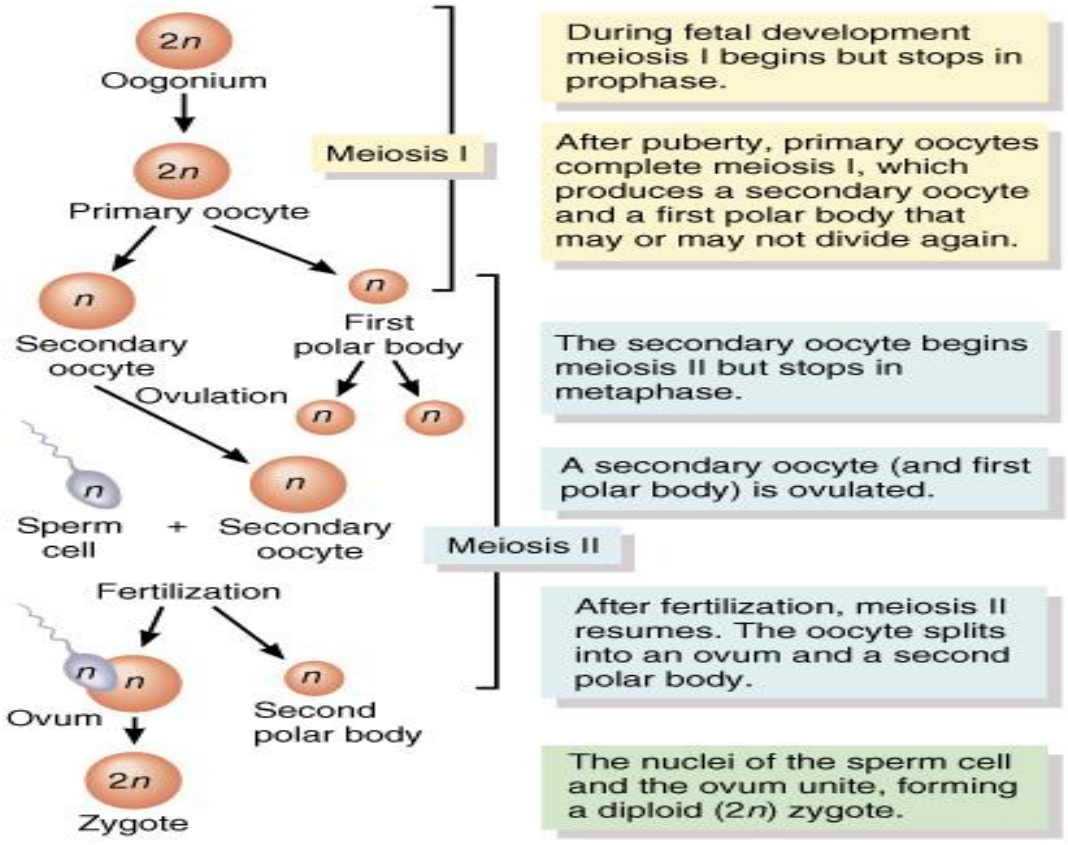
Hormones that controls female reproduction

- Main hormones that controls female reproduction include: -
  - ☑ Estrogen
  - ☑ Progesterone
  - ☑ Follicle stimulating hormone.
  - ☑ Luteinizing hormone
  - ☑ Relaxin
  - ☑ Prolactin
  - ☑ Oxytocin
- **NB-Read and write short notes on each of the above mentioned hormone (Review endocrine system lectures).**

Oogenesis:

- It is the process of ovum formation in the ovaries.
- Germinal cells migrate to ovary and become potential egg cells called oogonia
- In fetus, millions of oogonia produced by mitosis but most of them degenerate (atresia)
- Some develop into immature egg cells called primary oocytes during fetal development
- About 200,000 to 2 million present at birth, 40,000 remain at puberty but only 400 mature during a woman's reproductive life
- Each month about 20 primary oocytes become secondary oocytes but usually only one survives to be ovulated from Graafian follicle.
- Egg forming cells (oocytes) go through two divisions: -
  - ☑ Primary
  - ☑ Secondary
- oogenesis starts with a diploid primary oocyte that divides, resulting in two haploid cells (one is a large secondary oocyte and one is a small 1st polar body that may itself divide).
- Second division only occurs if secondary oocyte is fertilized. Results in one large haploid ovum (egg) and one smaller haploid 2nd polar body.
- The ovum division starts and get arrested(stops) at prophase I until puberty.
- After puberty, the ovum continues with cell division and again stops at….. The ovum completes cell division only if fertilization occurs.

A diagram showing oogenesis



Anatomy and physiology of female breast (Mammary Gland)

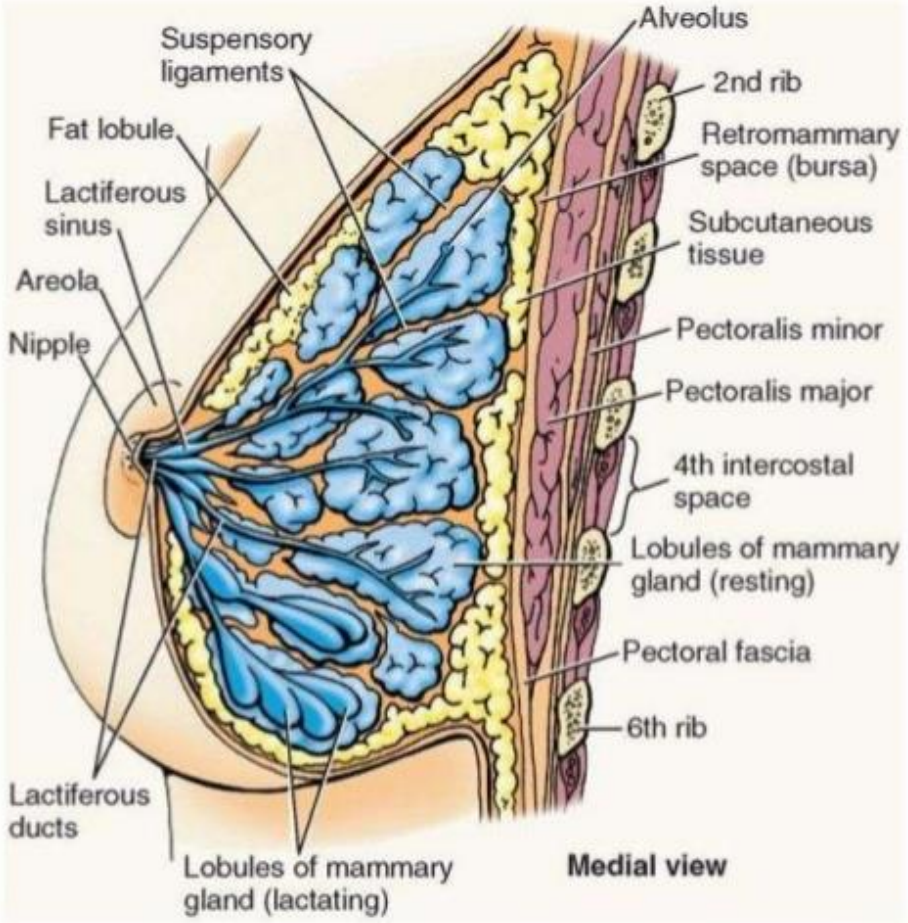
- Breasts is a milk secreting gland composed of glandular tissue arranged in lobes (about 20 in number). Each lobe is divided into lobules that consist of alveoli and ducts.
- It is situated on anterior chest wall on either side of the midline and lies between 2nd and 6th rib extending from sternum with tail at the axilla (axillary tail of Spence).
- During pregnancy **oestrogen** are responsible for **growth of duct system** and **progesterone** for the **increase of alveoli**.
- **Prolactin** is responsible for milk synthesis and production.
- Under influence of **oxytocin hormone,** the myoepithelial cells contracts making the tubules shorter and wider.
- The alveoli contain acini cells, which produce milk. The acini cells are surrounded by myoepithelial cells, which contract and relax to propel milk out.
- Small lactiferous ducts, carrying milk from the alveoli, unite to form larger ducts. These are open by lactiferous ducts at the nipple. Several ducts **(lactiferous tubules**) conveying milk from one or more lobe emerge on the surface of nipple.
- One large duct leaves the lobe and widens to form an ampulla (lactiferous sinus) which acts as a milk reservoir. These tubules are distensible and as they extend they provide a temporary reservoir for milk often described as **lactiferous sinuses or ampullae**.
- Amount of adipose tissue determines size of breast
- The nipple is composed of erectile tissue, which is covered with epithelium and muscle fibres. These muscles have a sphincter-like action which controls the flow of milk.
- Around the nipple is an area of pigmented skin called the areola, which contains the **Montgomery's glands.** The glands produce sebum, which lubricates the breasts during pregnancy and throughout breastfeeding.
- Suspensory (Cooper's) ligaments suspend breast from deep fascia of pectoral muscles.
- **Blood supply**-internal and external mammary **arteries** branch from intercostal arteries. During lactation blood supply is increased. Drainage via corresponding **veins** which are arranged in a circular fashion around the nipple.
- **Lymphatic drainage** through lymph nodes in axillae and mediastinum. The lymphatic drainage systems of the two breasts communicate freely. This accounts for the rapid spread of malignant growth from one breast to another.
- The breasts have poor nerve supply and their function is controlled by hormones.

Physiology of lactation

- During pregnancy, oestrogen and progesterone hormones stimulate the growth of duct and alveoli systems. Increased levels of oestrogen inhibit milk production.
- Hormone production is reduced by delivery of the placenta at the end of the third stage of labour and this stimulates the anterior pituitary gland to release Prolactin, which initiates milk production.
- The sucking reflex by the infant stimulates the production of oxytocin by the posterior pituitary gland.

- The oxytocin causes the myoepithelial cells to contract and propel milk along the ducts.
- Milk production and secretion is facilitated by:
  - ✓ Estrogens develop the ducts system in the breasts
  - ✓ Progestrone develop the milk-secreting glands which are called alveoli
  - ✓ Prolactin stimulate milk synthesis in the alveoli
  - ✓ Oxytocin stimulate milk ejection from the alveoli
- Milk ejection (release from glands) is through: -
  - ✓ Nursing stimulates the hypothalamus to produce oxytocin
  - ✓ Oxytocin secreted from the posterior pituitary
  - ✓ Oxytocin causes smooth muscles around alveoli to contract and squeeze milk into lactiferous ducts, lactiferous sinuses and into the nipple
  - ✓ Operated by positive feedback

A diagram showing female breast



Female pelvis

- The bony pelvis is the largest bone in the body. Its basin shaped and situated in the lower portion of the trunk.
- Functions of the pelvis include: -
  - ✓ Allows movement-walking and running
  - ✓ Permits one to sit and kneel, supports spinal column
  - ✓ Adapted for childbearing. Forms a bony passage through which fetus passes
  - ✓ Contains and protects reproductive organs.
  - ✓ Articulates with the lumbar vertebrae above, with the heads of femur below, hence transmitting the weight of the body to the lower limbs and in a way maintaining body posture.
  - ✓ Provides appropriate attachment sites for spinal, perineal and abdominal muscles. Also muscles of the lower limbs.

Pelvic bones:

- Pelvic bones are: -
  a) Two innominate bones(hipbones)
  b) One sacrum
  c) One coccyx

A. Innominate bones: -

- There are two innominate bones namely: -
  a) Ileum
  b) Ischium
  c) Pubis
- The three innominate bones meet at the acetabulum.
- Before an individual is 25 years of age, these bones have not ossified completely and appears as three distinct bones.
- **Ileum: -**
  - ✓ It is the great flared out part.
  - ✓ The inside is smooth and the outside is rough and marks the attachment of muscles of the gluteal region.
  - ✓ It is curved on the upper border to form iliac crest.
  - ✓ Ileum has a concave anterior surface that creates the iliac fossa.
  - ✓ At the front of iliac crest there is a bony prominence known as **anterior iliac spine**.
  - ✓ Below it is **anterior inferior iliac spine**.
  - ✓ There are two similar points at the end of iliac crest namely **posterior superior & posterior inferior iliac spines.**
- **Ischium: -**
  - ✓ It is the thick(dense) lower part of Innominate bones.
  - ✓ It has two large inferior prominences.
  - ✓ Below iliac fossa there is **iliopectineal line** which ends in a rough swelling called **iliopectineal eminence** formed where the superior ramus of pubic bone meets Ilium.
  - ✓ It is the bone we sit on and forms the lowest part of the innominate bone.
  - ✓ It creates the posterior-inferior part of pelvis

- ✓ Ischium is the strongest part of the pelvis which holds the body weight in sitting up position
- ✓ It has large inferior prominences called **ischial tuberosities.**
- ✓ It has two ischial spines that are important in determining fetal station.

❖ **Pubis**: -

- ✓ It is the smallest part of the pelvic bone with the superior and inferior rami.
- ✓ The left and right join to form the pubic symphysis.
- ✓ It forms the anterior part of the pelvis.
- ✓ It has body and two oar-like projections referred to as superior and inferior ramus.
- ✓ The two pubic bones meet at symphysis pubis to form the pubic joint and the pubic angle.
- ✓ Two inferior rami form the pubic arch merging onto a similar ramus on the ischium.
- ✓ The space created by body of pubic bone rami and the ischium is called **obturator foramen**.
- ✓ At the lower border of the Innominate bone, there are two curves.
- ✓ One of the curve extends from posterior inferior iliac spine up to ischial spine and is called **greater sciatic notch** which is wide and rounded.
- ✓ The other one lies between ischial spines and ischial tuberosity and is lesser sciatic notch.

B. Sacrum: -

- ❖ It is a Wedge shaped consisting five fused vertebrae and forms the back of the pelvis.
- ❖ The upper border of the 1st sacral vertebrae protrudes forward forming **sacral promontory**.
- ❖ It has four sets of foramina that forms the exit of sacral nerves (*cauda eqiuna*) to supply pelvic organs.
- ❖ The anterior surface of sacrum is concave forming the **hollow of sacrum**.
- ❖ On the other side of the sacral promontory are **alae** or **wings of the sacrum**.
- ❖ Posterior surface is roughened to receive attachment of muscles.

C. Coccyx: -

- ❖ It is a small triangular shaped bone that give attachment to ligaments, muscle fibres of anal sphincter, ischiococcygeus muscle.
- ❖ Coccyx is a vestigial tail.
- ❖ It consists of four vertebrae which may or may not be fused.
- ❖ During labour it moves backwards to increase pelvic outlet.
- ❖ It articulates with 5th sacral vertebrae to form sacrococcygeal joint.

Pelvic joints: -

- ❖ There are four pelvic joints, namely: -
  a) One symphysis pubis
  b) Two sacroiliac joints
  c) One sacrococcygeal joint.

- ❖ Pelvic joints are rigid in non-pregnant women, however during pregnancy and labour they become more mobile due to the influence of relaxin and progesterone hormones.

a) Symphysis pubis: -

- ✓ It is formed at the junction of the two pubic bones united by a plug of cartilage.
- ✓ It widens during the last months of pregnancy diameter increasing from 4mm to 7mm and this may cause pain to a pregnant woman upon ambulation.

b) Sacroiliac joint: -

- ✓ It is the strongest pelvic joint.
- ✓ It is created through articulation of the sacrum and the ilium
- ✓ During labour and pregnancy this joint relaxes increasing the diameter of the pelvic brim on the conjugate diameter.

c) Sacrococcygeal joint: -

- ✓ Formed where base of the coccyx articulates with tip of sacrum.
- ✓ Allows coccyx to more backwards during birth widening the outlet of the pelvis.

Pelvic ligaments

- ❖ Each pelvic joint is supported together by ligaments-**interpubic** ligament at symphysis pubis, **sacro iliac** and **sacrococcygeal** ligaments.
- ❖ Other important ligament in midwifery includes: **sacrotuberous**-from sacrum to ischial tuberosity, **sacrospinous**-from sacrum to ischial spine.
- ❖ The two ligaments cross sciatic notch and forms posterior wall of pelvic outlet

Pubic arch: -

- ✓ Pubic arch is formed through convergence of inferior rami of the ischium and pubis (Ischiopubic rami) on either sides.

Pubic angle (Subpubic angle).

- ✓ It is formed by inferior borders of ischiopubic rami.
- ✓ It is the distance between right and left ischial tuberosities.

Iliopectineal line

- ✓ It is an iliopubic eminence created by the arcuate line from the ilium and pectineal line from the pubis.
- ✓ It is the area that divides the pelvis into true and false pelvis.
- ✓ It also forms the pelvic brim.

Pelvic floor

- ❖ Formed by soft tissues that fill outlet of pelvis.
- ❖ Most important is the strong diaphragm of muscle slung like a hammock from walls of pelvis where through it urethra, vagina and anal canal pass
- ❖ Functions of pelvic floor includes: -
  a) Supports weight of abdominal and pelvic organs.
  b) Muscles are responsible for voluntary control of micturition and defecation and sexual intercourse.
  c) During childbirth it influences passive movement of fetus through the birth canal and relaxes to allow exit of fetus from pelvis.

d) Creates a counter resistance during second stage of labour that help in delivery of the baby.
e) Muscles creates pump that promotes venous return from the pelvic region.
f) Helps in maintaining intra-abdominal pressure.

Muscle layers of pelvic floor

- Pelvic floor is made up of two layers of muscles, namely: -
  a) Superficial layer
  b) Deep layer

a) **Superficial layer** is composed of:
   a) **External anal Sphincter**-Encircles anus and is attached behind by few fibers to the coccyx
   b) **Transverse perineal muscles**-From ischial tuberosities to centre of perineum
   c) **Bulbo-carvenosus** Muscles-Pass from perineum forwards around vagina to corpora carvernosa of the clitoris just under pubic arch.
   d) **Ischio-carvenosus** muscles pass from ischial tuberosities along pubic arch to corpora carvernosa.
   e) **Membranous sphincter of the Urethra**-Composed of muscle fibers passing above and below urethra and attached to pubic bones. Not a true sphincter as it's not circular but acts to close urethra.

b) **Deep muscle layers**: -

- Deep layer is composed of three pairs of muscles which together are known as **levator ani muscles** because they lift or elevate the anus.
- They are attached to either side of the pelvis (right and left).
- These muscles include:
  a) **Pubococcygeus muscle**-pass from pubis to coccyx with few fibers crossing over in the perineal body to form its deepest part
  b) **Iliococcygeus muscle**-pass from fascia covering obturator internus muscle (white line of pelvis fascia) to coccyx
  c) **Ischiococcygeal muscles** pass from ischial spine to coccyx in front of sacrospinous ligament.

Pelvic ligaments:

- Each pelvic joint is held together by ligaments. These ligaments are
  a) **interpubic** ligament at symphysis pubis.
  b) **sacro iliac**
  c) **sacrococcygeal** ligaments.
- Other important ligament in obstetrics includes:
  a) **sacrotuberous**-from sacrum to ischial tuberosity
  b) **sacrospinous**-from sacrum to ischial spine.
     - **NB**: These two ligaments cross sciatic notch and forms posterior wall of pelvic outlet.

Anatomical division of pelvis.

- Pelvis is divided into two parts, namely:
  a) False pelvis (Greater pelvis)
  b) True pelvis (Lesser pelvis)

- **False pelvis**
  - ✓ It is the portion above the pelvic brim.
  - ✓ It does not take part in the mechanism of delivery and is of no obstetric importance.
- **True pelvis**
  - ✓ It is the portion that is below the pelvic brim.
  - ✓ It determines the size and shape of the birth canal.
  - ✓ It has brim, cavity and outlet.

Pelvic brim: -

- It is Round in gynaecoid pelvis except where sacral promontory projects into it.
- The posterior border of the pelvic brim is promontory and wings of sacrum.
- The lateral border of the brim is iliac bones
- The anterior border of the pelvic brim is pubic bones.
- Major landmarks of the pelvic brim are: -
  - Sacral ala or wing
  - Sacral iliac joint
  - Iliopectineal line-edge formed at inward aspect of Ilium
  - Iliopectineal eminence-roughened area formed where superior ramus of pubic bone meets Ilium
  - Superior ramus of pubic bone
  - Upper inner border of body of pubic bone
  - Upper inner border of symphysis pubis
- Diameters of the pelvic brim are: -
  a) **Anteroposterior diameter (AP Diameter**). This is from sacral promontory to upper inner border of symphysis.
     - ✓ It has three dimensions, namely;
       i. **Anatomical conjugate diameter**- From the uppermost point of symphysis pubis to sacral promontory. It is usually 12cm.
       ii. **Obstetrical conjugate diameter-**From posterior border of upper surface to the sacral promontory. It is usually 11cm.It represents the available space for passage of the fetus.
       iii. **Diagonal conjugate**-From lower border of symphysis to sacral promontory. It is 12-13cm (usually 1.25cm more than obstetric conjugate). It can be estimated on vaginal examination as part of pelvic assessment.
     - ✓ **NB**: **True conjugate** is a term that is used to refer to both **Anatomical conjugate diameter and Obstetrical conjugate diameter**

b) **Transverse Diameter**:
   - ✓ It is formed between points furthest apart on the iliopectineal lines and measures 13cm. Some structures pass through pelvic brim and may affect space available for fetus to pass e.g. descending colon

c) **Oblique Diameter:**
   - ✓ It is the diameter formed form sacro-iliac joint to iliopectineal eminence. It usually measures 12 cm.

- **NB: Sacrocotyloid dimension**-passes from sacral promontory to iliopectineal eminence on each side and measures 9-9.5 cm. it is concerned with posterior position of occiput when parietal eminences of fetal head are stuck in the pelvis.

Pelvic cavity: -

- ✓ It is formed by the pubic bones, ischium, ilium, and Sacrum.
- ✓ It extends from brim above to outlet below.
- ✓ Anterior wall is formed by pubic bones and symphysis pubis and it is 4cm in depth.
- ✓ Posterior wall is formed by curve of sacrum 12cm in length.
- ✓ Lateral walls formed by sides of pelvis mainly covered by obturator internus muscle.
- ✓ The cavity is circular in shape. Diameter is considered to be 12cm.
- ✓ The mid-cavity is at the level of the ischial spines.

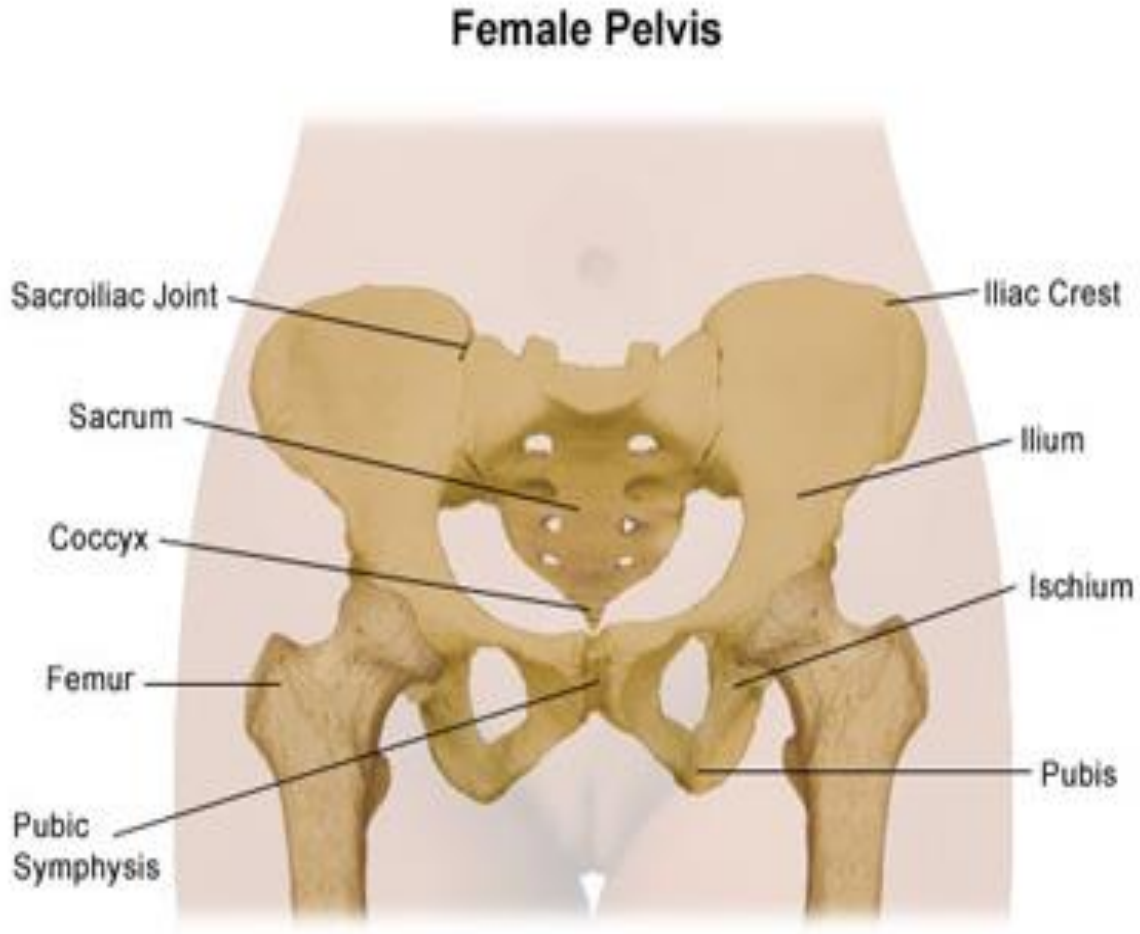
Pelvic outlet

- ✓ It is diamond-shaped
- ✓ It is made up of the pubic bones, ischium, ischial tuberosities, sacrotuberous ligament, and 5th segment of sacrum.
- ✓ There are two outlets described as: -
  a) Anatomical
  b) obstetrical
- ✓ **Anatomical Outlet-**Formed by lower borders of each of the bones together with sacrotuberous ligament
- ✓ **Obstetrical outlet**-includes narrow pelvic strait through which fetus must pass. This strait lies between sacrococcygeal joint, 2 ischial spines and lower border of symphysis. Obstetrical outlet is the space between narrow pelvic strait and anatomical outlet. Pelvic outlet is diamond shaped.
- ✓ Diameters of the pelvic outlet include:
  a) **Anteroposterior diameter**-from lower border of symphysis pubis to sacrococcygeal joint and measures 13 cm.
  b) **Oblique diameter**-between obturator foramen and sacrospinous ligament. It measures 12cm.
  c) **Transverse diameter**-between the 2 ischial spines, narrowest diameter in the pelvis. It measures between 10-11cm.

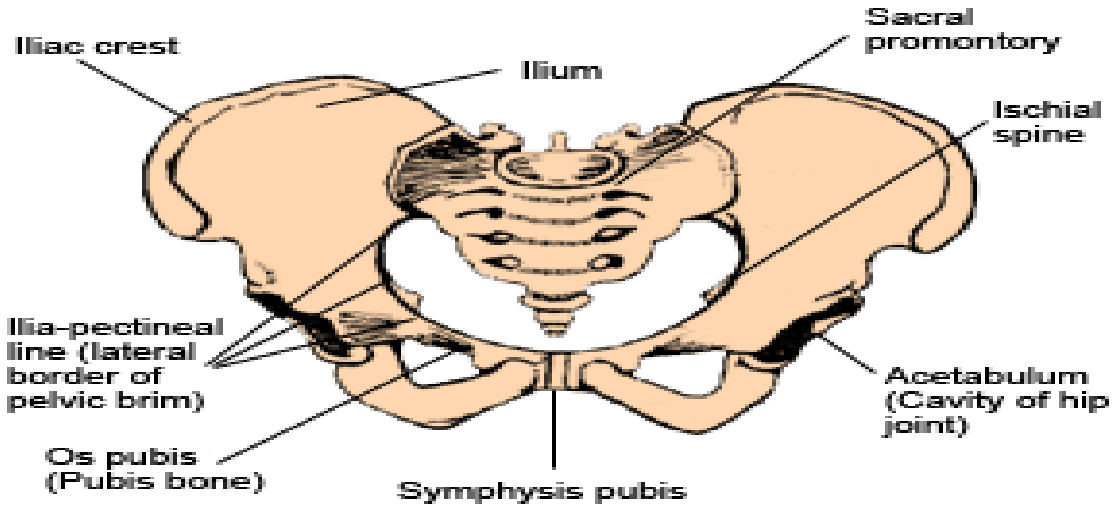
A Tables showing summary of pelvic diameters

	Antero-posterior diameter	Oblique	Transverse
Brim	**11**	**12**	**13**
Cavity	**12**	**12**	**12**
Outlet	**13**	**12**	**11**

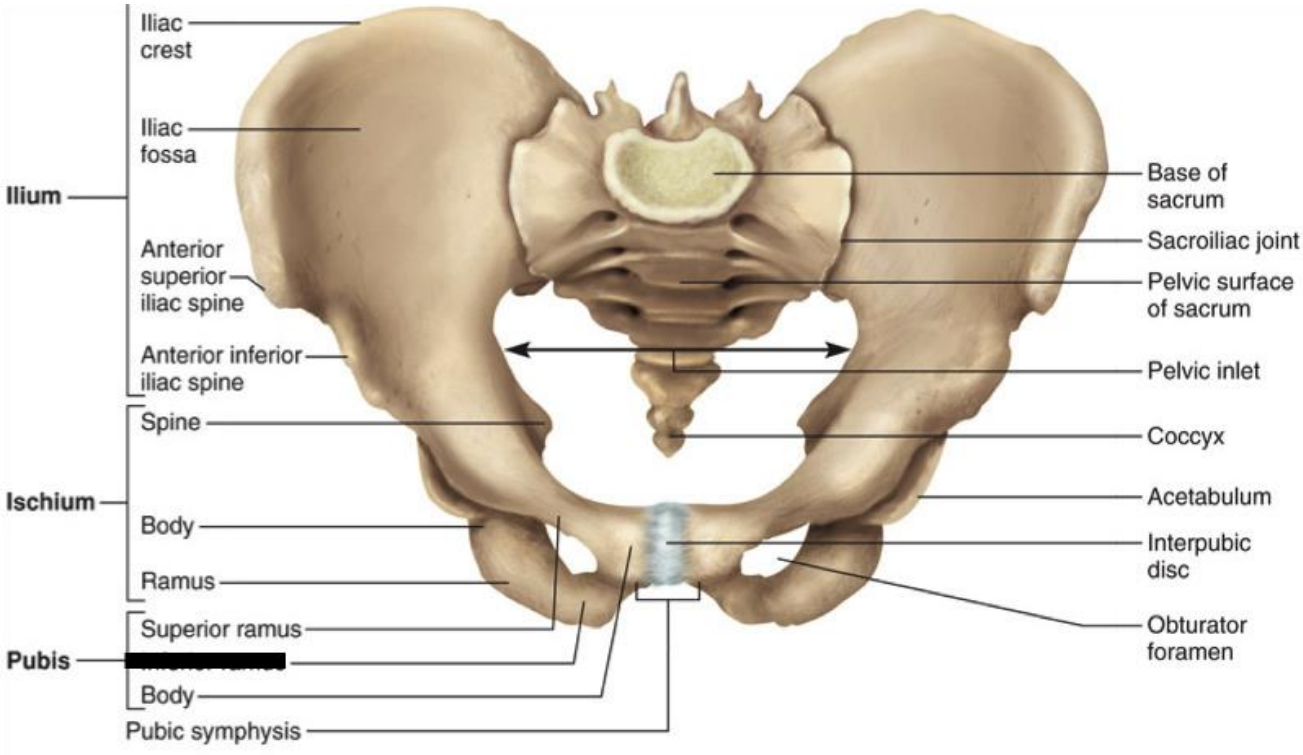
A diagram showing parts of a female pelvis.



A diagram showing parts of the pelvis

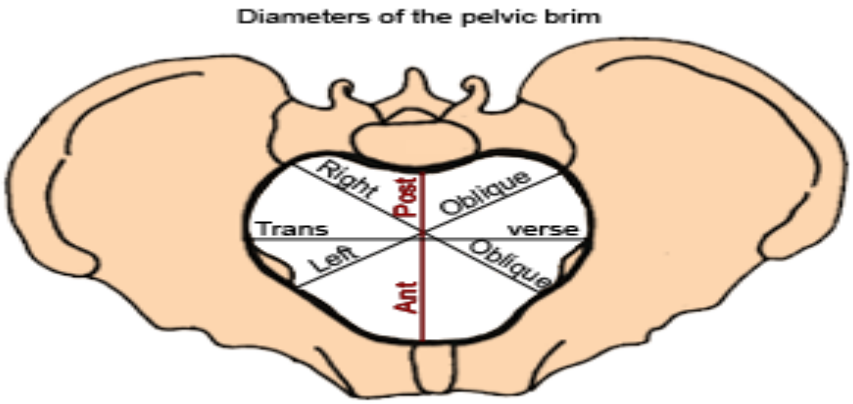


A diagram showing parts of the pelvis and pubic arch



(a) Anterosuperior view

A diagram showing pelvic diameters



Types (Classes) of pelvis

- Pelvis is classified in two major ways, namely:
  1. **Inherited**- These are due to genetic predisposition and racial characteristics tics. The shape of brim defines the type of the pelvis under this classification.
     - ✓ Major types under this category include: -
       a) Gynaecoid pelvis
       b) Android pelvis
       c) Anthropoid pelvis
       d) Platypelloid pelvis
  2. **Acquired** –These are as a result of diseases and conditions affecting pelvis especially during childhood.
     - ✓ Major types under this category include: -
       a) Rachitic pelvis.
       b) Naegeles or asymmetrical pelvis
       c) Roberts pelvis
       d) Osteomalacic pelvis
       e) Justo minor pelvis

a) Gynaecoid pelvis: -

- ✓ It is the ideal pelvis favoring a normal delivery and child bearing.
- ✓ It is found in about 50% of all women.
- ✓ It has the following features:
  - Rounded brim,
  - Generous fore pelvis (part in front of transverse diameter).
  - Straight sidewalls
  - Shallow cavity with a broad, well curved sacrum.
  - Blunt ischial spines (Ischial spines not prominent).
  - Rounded sciatic notch.
  - Rounded Sub-pubic arch (Roman arch) and Sub-pubic angle of 90^{o}

- Sacrum curved
- Obtuse greater sciatic notch
- Triangular obturator foramen

b) Android pelvis: -

- ✓ It is the male-type pelvis.
- ✓ It is found in about 22.4% of women.
- ✓ It has the following features: -
  - The Brim is heart-shaped with narrow fore pelvis.
  - Sacrum curved
  - Ischial spines prominent
  - Acute greater sciatic notch (sciatic notch narrow)
  - Oval obturator foramen
  - Sub-pubic arch very narrow [Gothic arch] less than 90^{o}.
  - Transverse diameter is towards the back.
  - Sidewalls converge making it funnel shaped with deep cavity and straight sacrum.
  - Predisposes one to occipito-posterior position of the fetal head.
- ✓ It is less suited for child bearing because of the following: -
  - The heart shaped brim favors a posterior position of the occiput as a result of insufficient space for biparietal diameter in the narrow fore pelvis.
  - This is combined with the fact that the greater space lies in the hind pelvis.
  - Funnel shaped cavity may hinder progress in labour.
  - At outlet, prominent ischial spines sometimes prevent complete internal rotation of head and AP diameter becomes caught on them causing deep transverse arrest.
  - Narrowed subpubic angle can't easily accommodate biparietal diameter and this displaces head backwards

c) Anthropoid pelvis: -

- ✓ It an Ape-like pelvis favoring OP positions often requiring operative vaginal deliveries.
- ✓ It is found in about 22.7% of women.
- ✓ It has the following features: -
  - Has a long, narrow oval inlet.
  - Sacrum slightly curved.
  - Long-cone funnel pelvis with straight sidewalls.
  - Sidewalls diverge and sacrum is long and deeply concave.
  - Obtuse greater sciatic notch.
  - Oval obturator foramen.
  - Sub-pubic arch narrow.
  - Sciatic notch is very wide.
  - Has a long oval brim in which AP diameter is longer than transverse.
  - Ischial spines are not prominent.
  - Subpubic angle is also wide.

- Labour doesn't present with difficulties but direct occipitoanterior or direct OPP is often seen in engagement and may persist to delivery.

d) Platypelloid pelvis: -

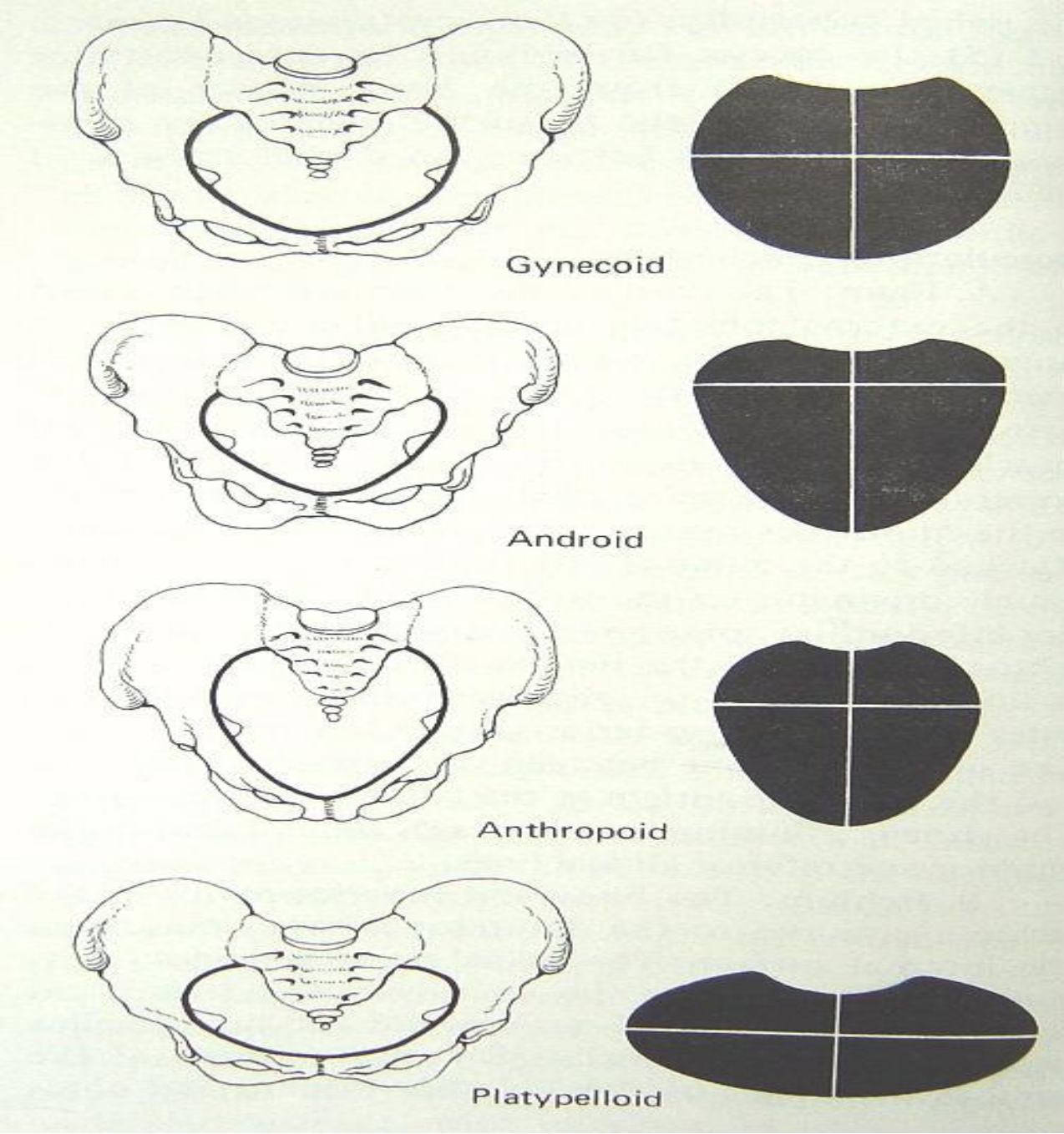
✓ It has the following features: -

- It has a kidney shaped brim.
- Antero-Posterior diameter is reduced and transverse increased.
- Sidewalls diverge.
- Sacrum flat and cavity shallow.
- Ischial spine blunt.
- Sciatic notch and subpubic angle wide.
- Often leads to cephalo-pelvic disproportion.
- It is found in about 4.4% of women.
- Triangular obturator foramen
- Side walls are straight
- Head must engage with saggital suture in transverse diameter but usually descend through cavity without difficulty.
- Engagement may necessitate lateral tilting of head (asynclitism) in order to allow biparietal diameter to pass the narrowest AP diameter of the brim.

A Table showing differences in various types of pelvis.

Features	Gynaecoid	Android	Anthropoid	Platypelloid
Brim	rounded	heart-shaped	long oval	kidney-shaped
Fore pelvis	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 degrees	<90 degrees	>90 degrees	>90 degrees
Incidence	50%	20%	25%	5%

A diagram showing various types of pelvis.



Other types of pelvis

a) Rachitic pelvis: -

- ✓ It is due to dietary deficiency of vitamin D causing rickets.
- ✓ Bones are excessively softened by the disease process, distorting the alignment due to weight of the body.
- ✓ Sacral promontory is forced inwards towards symphysis pubis while the lower end of sacrum swings backward and ischial tuberosities moves further apart.

- ✓ This increases all the diameter apart from AP diameter of the inlet.
- ✓ Since brim is reduced and the preferred mode of delivery is C/S.

b) Naegeles/asymmetrical pelvis: -

- ✓ Results either from developmental anomalies or disease in childhood e.g. poliomyelitis.
- ✓ Pelvis is characterized by unequal exertion of pressure on the growing pelvis.
- ✓ Mostly associated with congenital hip dislocation or poliomyelitis or congenital trauma.
- ✓ There is inadequate development in the side of intense pressure leading to bony fusion.
- ✓ It is the type where one of the sacral wings is missing giving it an oblique shape.

c) Robert's pelvis: -

- ✓ It has no wings. This means that there is absence of alae or poor development of alae.
- ✓ It is generally contracted and C/S is always necessary for delivery.
- ✓ This leads to early fusion of sacroiliac joint hence brim is abnormally small.

d) Osteomalacic pelvis: -

- ✓ It a rare deformity due to adult's rickets.
- ✓ It leads to gross contraction of the pelvis

e) Justo minor pelvis: -

- ✓ It is similar to Gynaecoid pelvis in miniature.
- ✓ It is found in woman of small stature.
- ✓ It is found in women of normal stature.
- ✓ All the diameters are reduced but are in proportion.
- ✓ Outcome of labour depend on fetus.
- ✓ Often these women have small babies and outcome is favorable.
- ✓ If fetus is large, degree of CPD will result.
- ✓ If malpresentation or malposition of fetus exists, CPD results.

Differences between female and male pelvis

a) The vertical height is less in female than in males
b) Sub-pubic angle is greater in the female than in males
c) Female sacrum is shorter, wider, less curved.
d) Female Ischial spines are less prominent and less curved.
e) Height of pubic symphysis is less in females
f) Greater sciatic notch and wider in females
g) Distance between symphysis pubis and anterior margin of acetabulum is greater in females than in males.

Perineum (Perineal boy)

- ✓ Perineum is a pyramid of muscles and fibrous tissue situated between vagina and rectum.
- ✓ It is made up of fibers from muscles.
- ✓ Apex (deepest part) formed from fibers of Pubococcygeus muscle which cross over at this point.

- ✓ Base is formed from transverse perineal muscles which meet in the perineum together with Bulbo-carvenosus in front and external anal sphincter behind.
- ✓ Perineal body measures 4 cm in each direction.
- ✓ It is the part that is supported during second stage of labour to avoid perineal tears.

Fetal skull

- ❖ The foetal skull contains a delicate brain, which may be subjected to great pressures as the head passes through the birth canal
- ❖ The **landmarks of the skull** are described as:
  - ✓ The **vault,** which lies between the orbital ridges and the nape of the neck-bones are thin and pliable so as to allow for alterations of the skull at birth, composed of the occipital bone, two parietal bones and two frontal bones.
  - ✓ The **base -**comprised of firmly united bones that protect the vital centres in the medulla.
  - ✓ The **face** -composed of 14 small bones that are firmly united and cannot be compressed.
  - ✓ The **mentum**, also called the **chin**.
- ❖ The regions of the fetal skull include: -
  - ✓ The **occiput**: It is the area which lies between the foramen magnum and the posterior fontanelle. The sub-occipital region is the part below the occipital protuberance. It is limited by the occipital bone.
  - ✓ The **vertex**: It is the area bounded by the posterior fontanelle, the two parietal eminences and the anterior fontanelle. It is a quadrangular area bounded anteriorly by the bregma and coronal suture, posteriorly by the lambda and lambdoidal sutures and laterally by lines passing through the parietal eminences.
  - ✓ The **brow**: It is an area bounded on one side by the anterior fontanelle and coronal sutures and on the other side by the root of the nose and supra-orbital ridges of either side.
  - ✓ **Face:** It is the area bounded by the root of the nose and supra-orbital ridges and on the other, by the junction of the floor of the mouth with neck.
  - ✓ **Sinciput:** it is the area lying in front of the anterior fontanelle.
- ❖ The fetal skull is composed of the following: -
  a) **Fetal skull Bones which are:** 2 parietal bones, 2 frontal bones, 2 temporal bones and one occipital bone.
  b) **Sutures which include:** sagittal, frontal, lamboidal, coronal and temporal
  c) **Fontanelles which are:** anterior (bregma) fontanelle and posterior (lambda) fontanelle.
- ❖ **Sutures: -**
  - ✓ Sutures are non-ossified membranes attached to the margins of flat bones of foetal vault where the skull bones are not joined together with each other.
  - ✓ Sutures and fontanelles separate the bones of the skull from each other. This allow for a degree of moulding during labour and delivery.

- ✓ Sutures of the foetal skull include: -
    a) **Saggital suture**-lies between two parietal bones. It joins anterior and posterior fontanelle. Saggital suture is important in determining position in cephalic presentation during vaginal examination.
    b) **Coronal suture:** runs between parietal and frontal bones on either sides. Separates the frontal bones from the parietal bones.
    c) **Lambdoidal suture**: Separates the occipital bone from the two parietal bones.
    d) **Frontal suture(Also known as metopic suture)-** lies between two frontal bones. Becomes obliterated with time while the other sutures become fixed joints.

❖ **Fontanelles: -**

- ✓ Fontanelles are wide gaps that are formed when two or more suture lines meet at one point.
- ✓ Fontanelles includes:
    a) Anterior fontanelle
    b) Posterior fontanelle
    c) Sphenoidal fontanelle
    d) Mastoid fontanelle
- ✓ **NB: Only anterior and posterior fontanelles that have obstetrical importance.**

a) Anterior fontanelle(Bregma): -

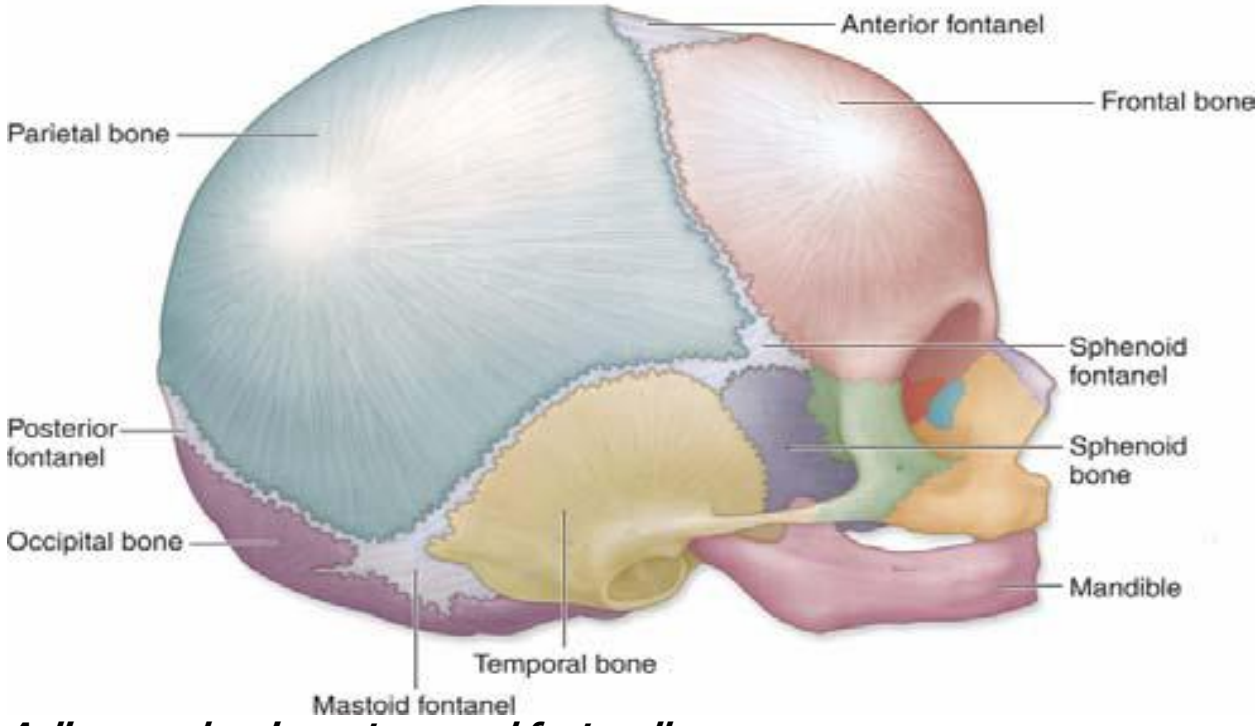
- ✓ Anterior fontanelle is formed by joining four sutures in mid plane. These include: -
    - Anteriorly is frontal suture.
    - Posteriorly is the saggital suture.
    - On either side are the coronal sutures.
- ✓ It is diamond in shape.
- ✓ Its floor is made by a membrane.
- ✓ It closes (Ossify) at 18mth after birth. (However may close as early as 9 to 12 months in some babies).
- ✓ It measures about 3 to 4 centimeters long and 1.5 to 2 centimeters wide.
- ✓ It is more pulsatile than posterior fontanelle.
- ✓ Obstetrical significance of anterior fontanelle includes:
    - Helps in determining the degree of fetal head flexion on vaginal examination
    - It facilitates the moulding of foetal head.
    - It helps in accommodating the marked brain growth.
    - It helps in determining intracranial status of the foetus/ newborn.

b) Posterior fontanelle(Lambda): -

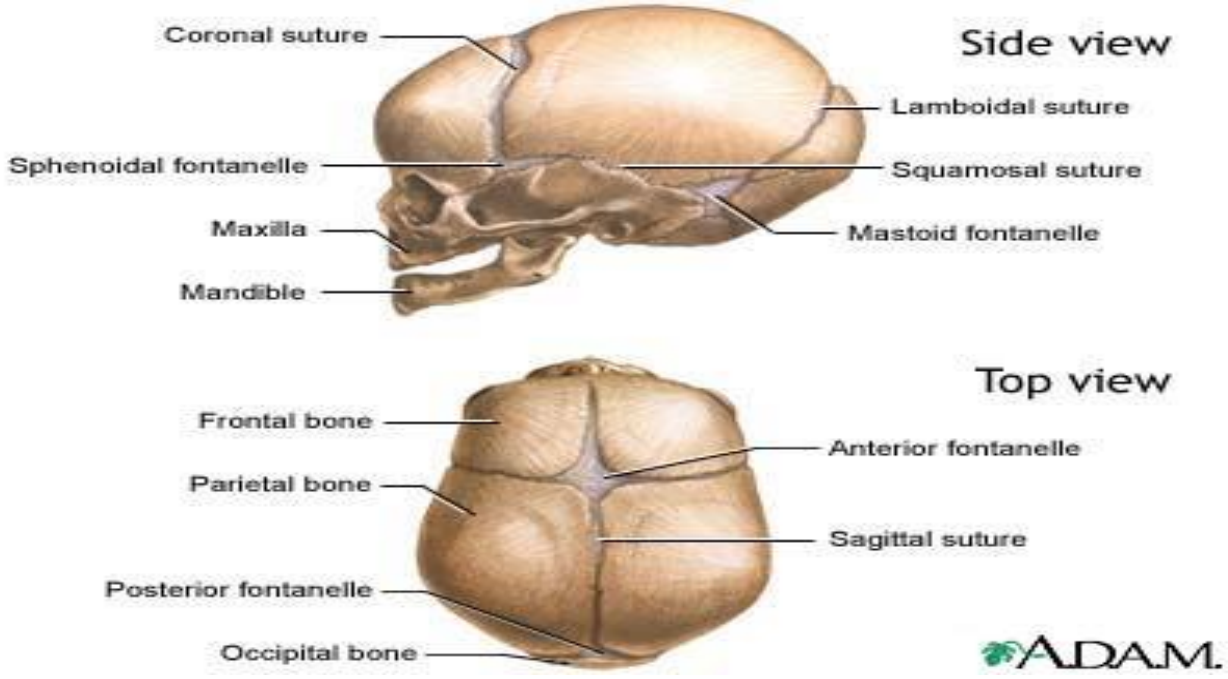
- ✓ It is formed by junction of three sutures, namely: -
    - Saggital suture anteriorly.
    - Lambdoidal suture on either side.
- ✓ It is triangular in shape.
- ✓ Its floor is membranous but become bony at 3months

- ✓ It is less pulsatile than anterior fontanelle.
- ✓ It denotes the position of the head in relation to maternal pelvic.

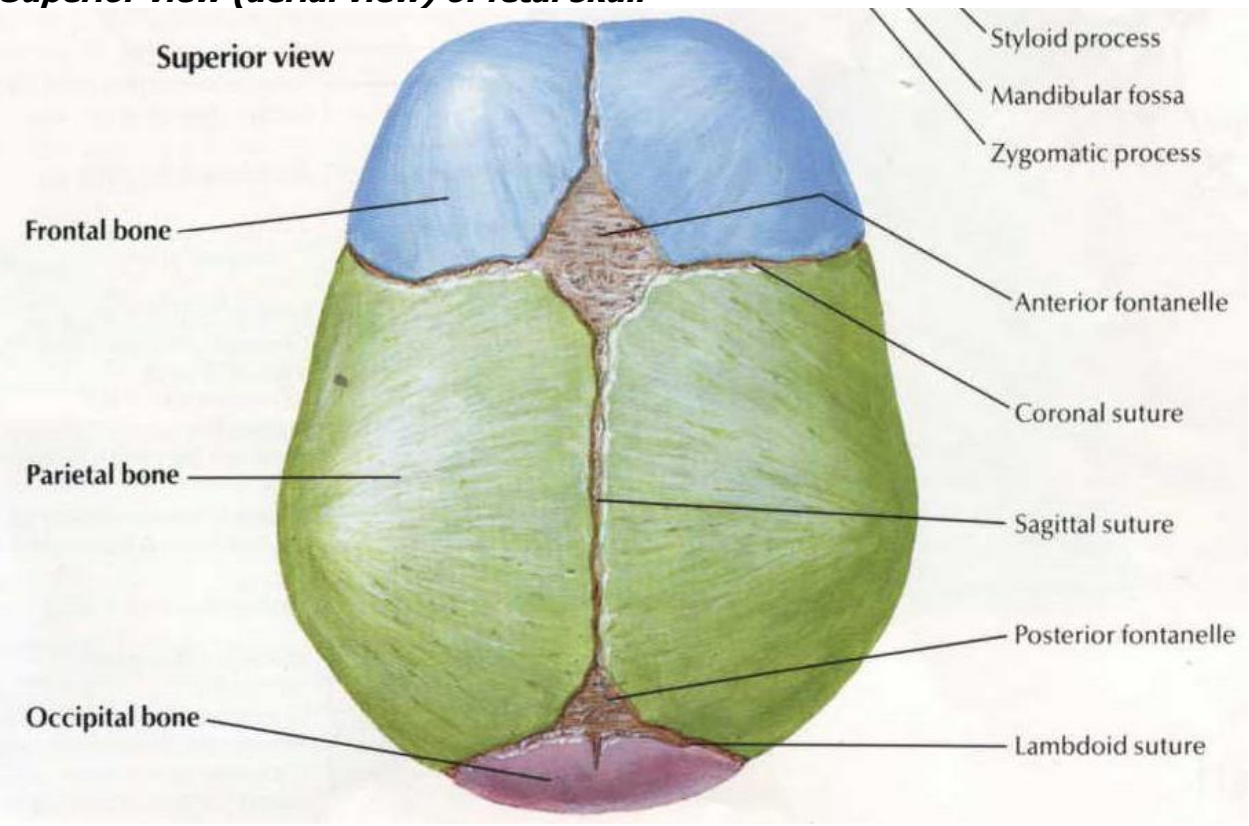
A diagram showing fetal skull bones



A diagram showing sutures and fontanelles



Superior view (aerial view) of fetal skull

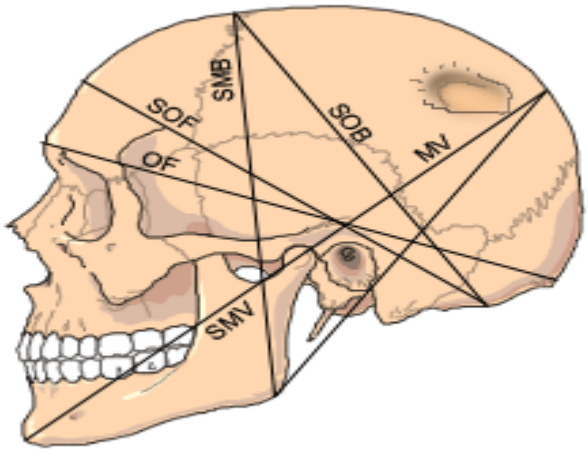


A diagram showing anterior fontanelle

Diameters of fetal skull: -

- **Suboccipital-Bregmatic Diameter = 9.5 cm:** Which follows a line drawn from the middle of the anterior fontanelle to the under surface of the occipital bone just where it joins the neck. In full flexion the suboccipito-bregmatic diameter presents. (Vertex presentation)
- **Occipital-Frontal Diameter = 11.5 cm:** A line extending from a point just above the root of the nose to the most prominent portion of occipital bone.
- **Submento–Bregmatic Diameter = 9.5 cm:** From below the Chin to the centre of the Anterior Fontanelle. (Bregma). (Face presentation).
- **Mento–Vertical Diameter = 13.5 cm:** From point of the Chin to the centre of the Posterior Fontanelle. (Brow presentation)
- **Suboccipito-frontal.** From below the occipital protuberance to the centre or the frontal suture**. = 10 cm**
- from below the occipital protuberance to the anterior end of the bregma.
- **Submento-vertical =11.5 cm**
- from the junction of the chin and neck to the vertical point which is a point on the sagittal suture midway between anterior and posterior fontanelles.
- **Biparietal Diameter = 9.5 cm:** The greatest transverse diameter of the head, which extends from one parietal eminence to the other.
- **Bitemporal Diameter = 8.2 cm:** The greatest distance between the two, (Left and Right) Temporal Sutures.

A diagram showing fetal skull diameters



KEY:

- ☐ SOB -Sub-occipitobregmatic. 9.5 cms
- ☐ SOF -Sub-occipitofrontal. 10.0 cms
- ☐ OF- Occipitofrontal. 11.5 cms
- ☐ MV-Mentovertical. 13.5 cms
- ☐ SMV- Sub-mentovertical. 11.5 cms
- ☐ SMB -Sub-mentobregmatic. 9.5 cms

Fetal skull moulding.

- ✓ Moulding is the process through which foetal skull bones come into contact with each other during delivery. This process is important in reducing fetal skull diameter to facilitate delivery. Though this process is important in assisting delivery, excessive moulding is an indicator of impeding danger associated with labour.

Fertilization, implantation, embryology and foetal development

Learning objectives

- By the end of the lesson the learner should be able to: -
    1. Explain the process of fertilization
    2. Describe the process of implantation
    3. Describe embryology and foetal development.
    4. Discuss foetal circulation
    5. Explain placenta at term and its variations.

Fertilization/ Conception

- Other terms used to describe this phenomenon are fertilization, impregnation or fecundation.
- **Definition** -Fertilization is the union of the ovum and spermatozoa. Fertilization must occur fairly quickly after release of the ovum because it usually occurs in the outer third of a fallopian tube, the ampulla portion. Since the ovum is a non-motile cell, the following mechanisms assist it to move along the fallopian tubes:
    - ✓ The action of cilia in the fallopian tubes
    - ✓ The fallopian tubes peristalsis effect
- The functional life span of a spermatozoon is about 48 hours; however, it may be as long as 72 hours or longer. Therefore, sexual coitus during this time may result in fertilization or pregnancy.
- During sexual intercourse, approximately 300 million sperms are deposited into the female reproductive tract. Once the sperms are in the female reproductive, they undergo chemical, physiological and morphological changes that make the sperm more hyperactive. These physiological changes that the sperm undergoes to be able to fertilize an ovum is called capacitation.
- Processes that leads to sperm capacitation include: -
    - ✓ Change in the cell membrane lipid composition (lowering sperm cholesterol)
    - ✓ Particular proteins and carbohydrates on the sperm are lost
    - ✓ Certain proteins are phosphorylated (meaning they are active)
    - ✓ Membrane potential of the sperm is lowered (from -30 Mv about -50 Mv)
- The sperm that have undergone capacitation, swim faster towards the ovum.
- Once the sperm reaches the ovum, it must penetrate through corona Radiata to reach the outer layer of the ovum, Zona pellucida.
- After reaching the zona pellucid, the sperm undergoes acrosomal reaction. The acrosome releases its digestive enzymes. The cell membrane of the spermatozoa

fuses with the outer membrane of the acrosome creating pores that enables acrosome to release its content.

- The acrosomal enzymes start to dissolve zona pellucida creating pathway for the spermatozoa to get inside the ovum.
- The major acrosomal enzymes that are released during acrosomal reactions are:
    a) Hyaluronidase
    b) Acrosin
    c) Esterases
    d) Neuraminidase
- Following penetration by the sperm past the zona pellucida, the sperm bind itself to the plasma membrane of the ovum. The content of the sperm is completely taken into the cytoplasm of the oocyte.
- Once the first sperm enters the cytoplasm of the oocyte, some changes occur in the membrane of the ovum that prevents further entry of sperms into the oocyte (to prevent polyspermy). These changes are called **zona reaction**.
- Zona pellucida hardens once the first sperm penetrates to prevent further entry of sperms. At the same time, the ovum releases chemicals that that push other sperms away and creating an impenetrable fertilization membrane. The entry of sperm past zona pellucida causes the ovum to complete its second meiotic division and female pronuclei is formed. In summary, the following events occur once the sperm penetrates zona pellucida: -
    - ✓ Polyspermy block is created
    - ✓ Hardening of zona pellucida takes place
    - ✓ Completion of second meiotic division of the oocyte
    - ✓ Un-packaging of male genetic material.
- Once the spermatozoon is inside the oocyte, it un-packages its genetic material (23 chromosomes) and they spread into the Ooplasm of the oocyte.
- The spermatozoon genetic material inside the oocyte re-organizes into male pronuclei (containing 23 chromosomes) with a membrane formed around it.
- Spindle threads called microtubules forms between the male and female pronuclei and start to pull them towards each other. Finally, the two pronuclei fuse together completing the fertilization process forming a single diploid cell called a **zygote**.

Development of the Fertilized Ovum

- Immediately after fusion of male and female pronuclei, the resultant single diploid cell is now termed as a **zygote**. Zygote is the first diploid cell to form following fertilization.
- Conceptus becomes the term used to refer to all materials derived from the fertilized zygote. It includes both embryonic and non-embryonic tissues. (i.e. placenta and fetal membranes).

- The next stage after zygote formation is the **cleavage** of the zygote. Cleavage of the zygote results into two blastomeres. (Blastomeres are small cells that arise from early cell division). This cell early cell division is due to early mitosis which is promoted by mitosis Promoting Factor (MPF).
- The next stage after cleavage is the Morula stage. At about third day, a cluster of about 16 cells is formed and this is what is now referred to as **morula**. After morula is formed, blastomeres becomes adherent to each other to form tight adherence and tight junction-this process is called **compaction**.
- At around the 5^{th} day, blastocyst in now formed. Blastocyst has got two identifiable cell types: -
    - ✓ Outer cell layer/mass (**trophoblast**)- Around the outside of the blastocyst there is a single layer of cell known as the trophoblast that will form the placenta, placental membranes and the chorion. The Trophoblast later differentiate into two distinct layers namely: - **cytotrophoblast** (inner layer) and **syncytiotrophoblast** (syncytium) and below this layer lies mesoderm or primitive mesenchyme. The syncitiotrophoblast is composed of nucleated protoplasm which is capable of breaking down tissue as in the process of embedding. The cytotrophoblast is a well-defined single layer of cells which initially produces a hormone known as human chorionic gonadotrophin (HCG), However later large amount of HCG is produced by **syncytiotrophoblast.**
    - ✓ Inner cell mass (**embryoblast**)-This is a mass of rounder cells that forms the entire embryo i.e. Fetus, umbilical cord and the amnion. Embryoblast further develops into hypoblast and Epiblast where a cavity called amniotic cavity emerges. This amniotic cavity lies on the side of the ectoderm. The yolk sac lies on the side of the endoderm and provides nourishment for the embryo until the trophoblast is sufficiently developed to take over. Embryoblast later forms the bilaminar embryonic disc.
- A fluid filled cavity called **blastocoel** is formed between embryoblast and trophoblast.
- It should be noted that the all these processes are occurring within the enclosure of the zona pellucida. The main reasons for maintaining zona pellucida up to the blastocyst stage are: -
    - ✓ To keep blastomeres together (Necessary for compaction)
    - ✓ To prevent premature implantation.
- The last stage of the fertilized ovum before implantation is the stage of **blastocyst hatching**. During this stage, the zona pellucida is lost. Trophoblast produces enzymes that digest zona pellucida and this is what leads to blastocyst hatching. The blastocyst hatching prepares blastocyst for implantation.

- In general, the functions of zona pellucida are: -
    - ✓ Species-species sperm penetration/recognition.
    - ✓ Permanent block to polyspermy
    - ✓ Act as porous selective filter
    - ✓ Act as an Immunological barrier
    - ✓ Keeps blastomeres together
    - ✓ Prevents premature implantation.

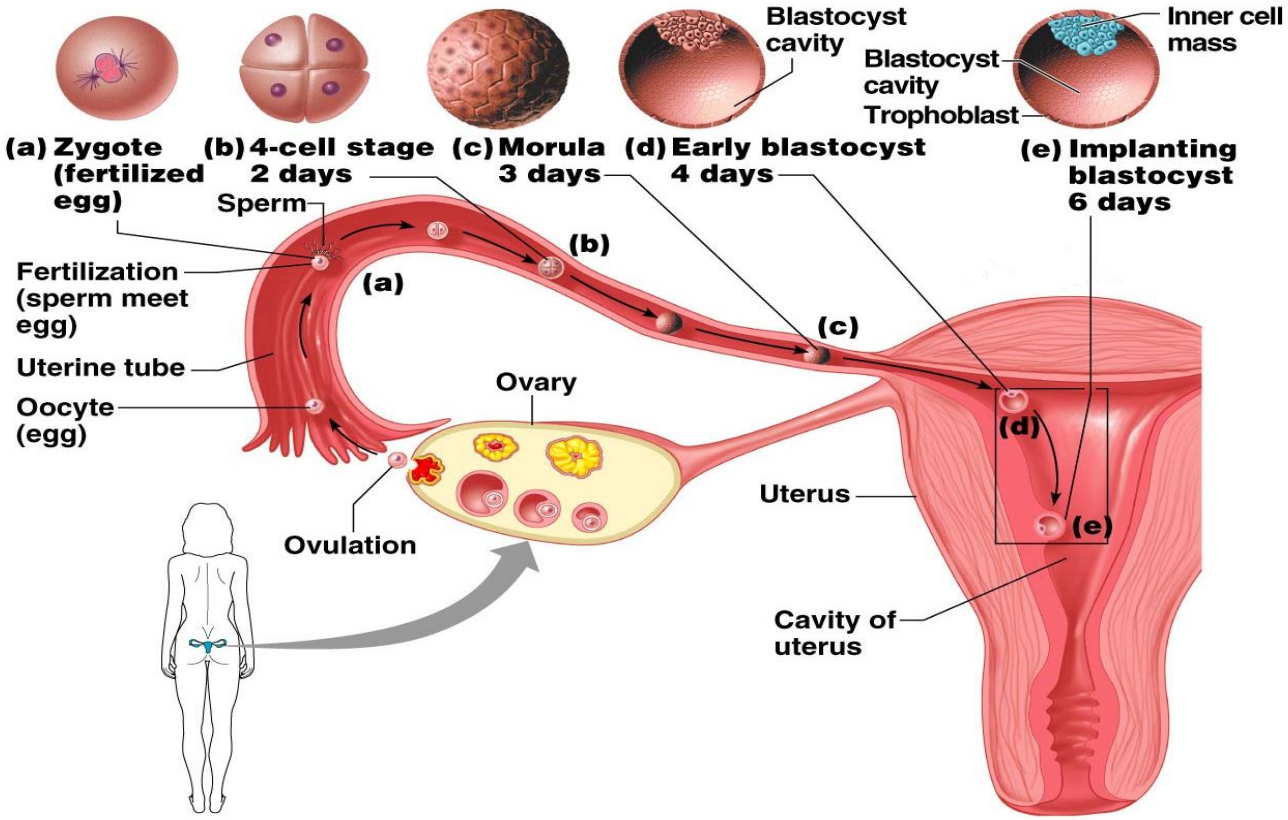
Implantation

- Implantation takes place between 6-7th day after fertilization. The initial stage of implantation is adhesion of the blastocyst to the endometrial epithelium.
- After fertilization:
    - ✓ Decidua develops
    - ✓ The implanted embryo continues to develop.
- The fertilized ovum rolls and embeds itself onto the wall of the endometrium with embryoblast close to the endometrial layer. The trophoblastic tissues secrete hydrolytic enzymes that enables the blastocyst to bury itself deep into the functional layer of the endometrium.

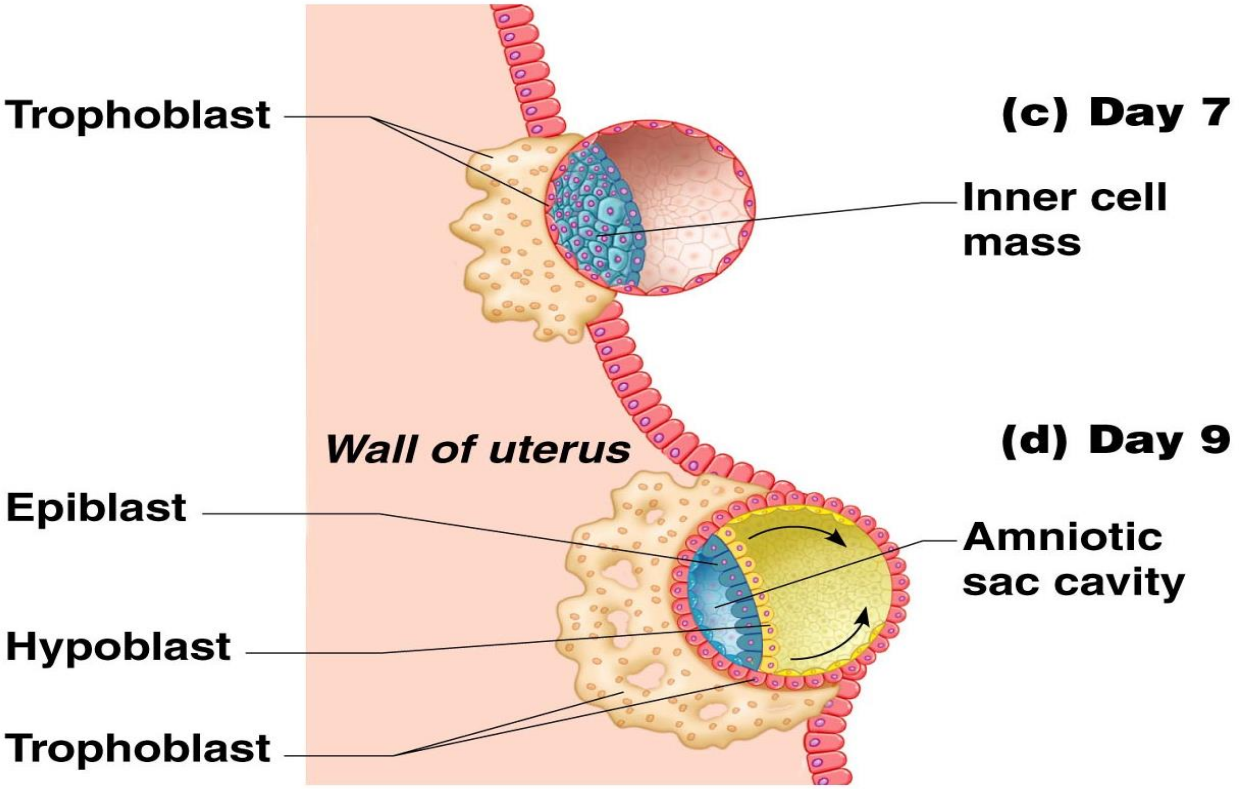
The Decidua

- This is the name given to the endometrium during pregnancy.
- After implantation, the rest of the endometrial layer becomes the decidua. There are three layers found in decidua, namely: -
    - ✓ **Decidua basalis-** This the part of the conceptus that forms at the base or point of implantation. It is the one that forms the maternal component of the placenta.
    - ✓ **Decidua capsuralis**- It is the part of the endometrial layer that grows to enclose the conceptus. It envelops the embryo during pregnancy. It diminishes as chorionic vesicles enlarge.
    - ✓ **Decidua parietalis**-It is the part of the endometrial tissues that fills the uterine cavity during pregnancy. It is the layer of the endometrial tissue that grows to fill the cavity of a pregnant uterus.

A diagram showing events occurring after fertilization



A diagram showing implantation

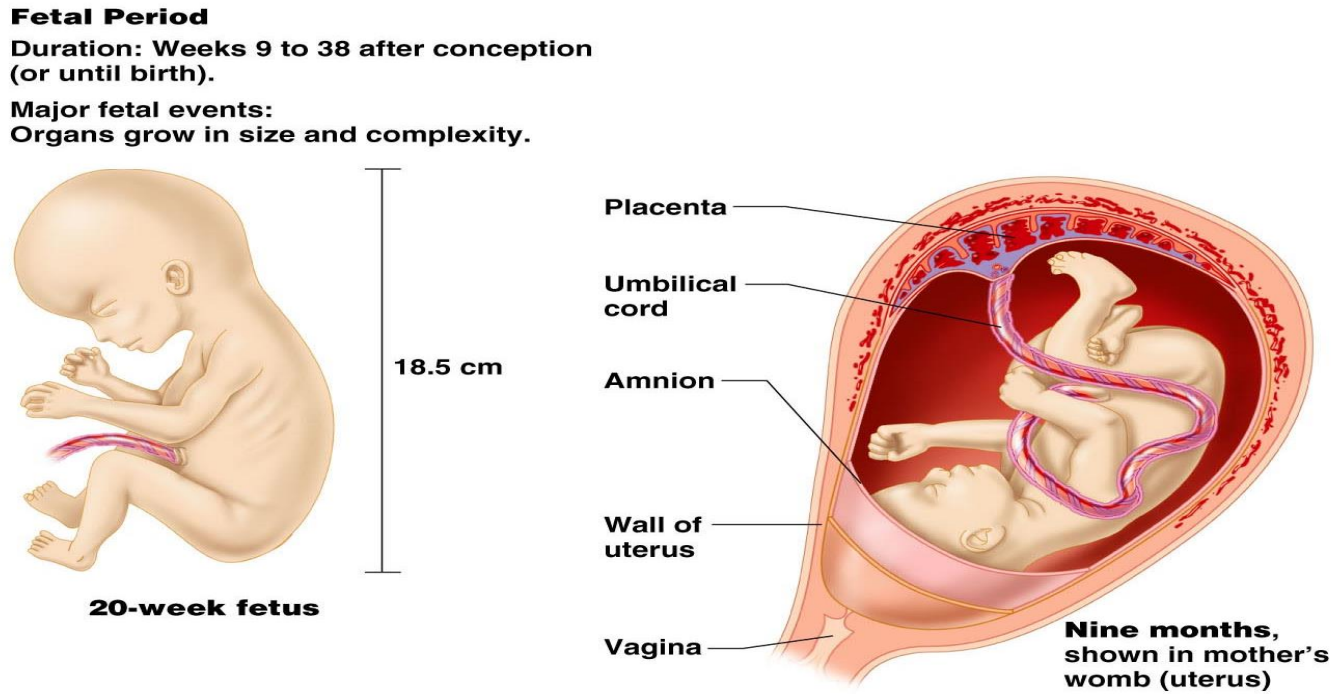


Embryo

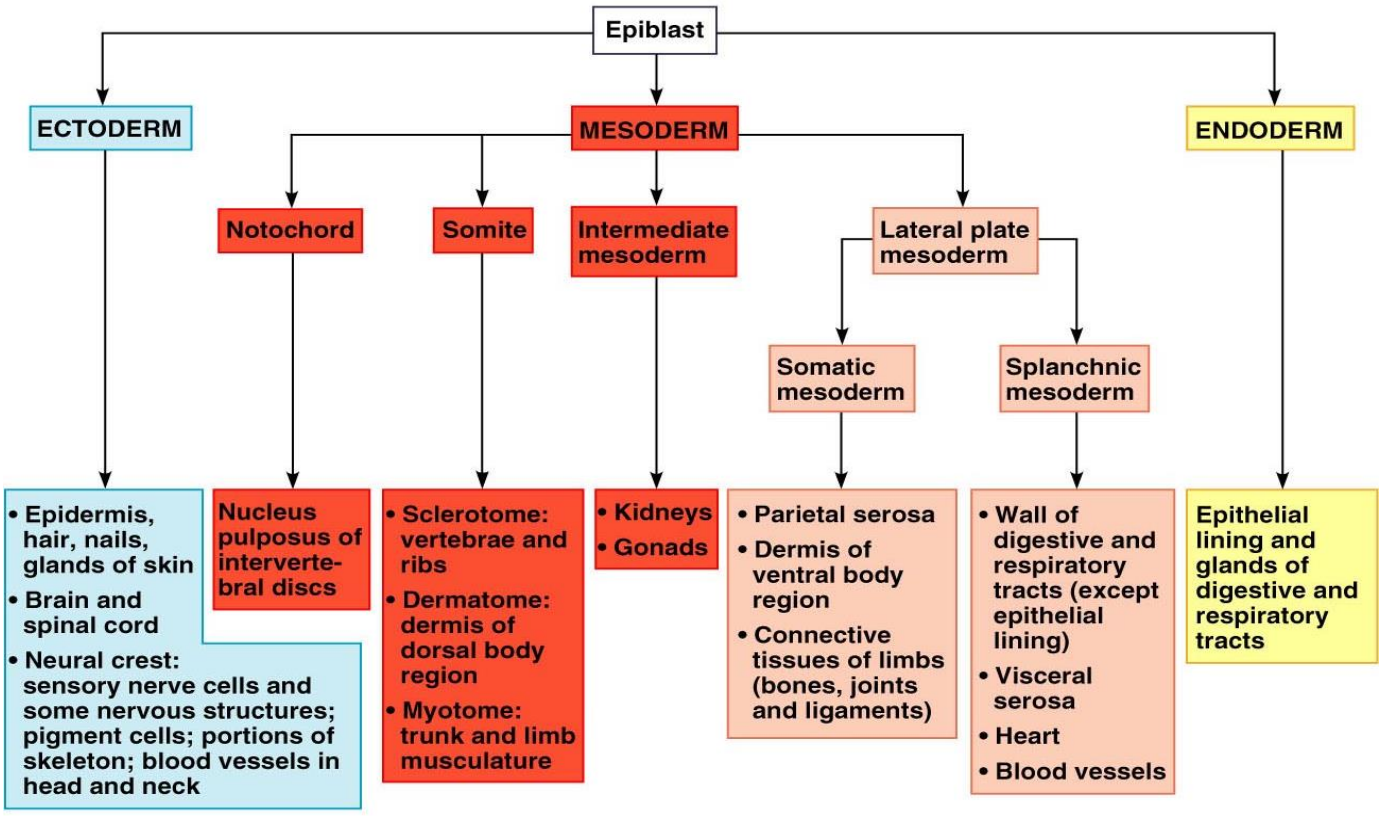
- Embryo is the term used to describe the period from fertilization to 8th week after fertilization.
- Embryonic period is characterized by development of structures (organogenesis).
- After fertilization Implantation the conceptus continues with erosion of maternal blood vessels creating pool of blood known as chorionic villi(Vacuoles). This creates the initial fetal-maternal blood exchange. Later this will form utero-placental circulatory system.
- As the embryo is developing, at around 11th-13th day after implantation, cytotrophoblast cells penetrates syncytiotrophoblast forming primary trophoblast villi. The embryo Completes emersion into endometrium of uterus in the first 2 weeks after implantation.
- Around the same time of 2nd week, the epiblast will form the **Amniotic sac** with the outer membrane forming the **amnion** and the inner membrane forming the **amniotic sac cavity and** the cavity will be filled with amniotic fluid.
- At around 3rd week after implantation, there is gastrulation (Gastrulation is the process through which the developing embryo forms three germinal layers, namely:
    a) The **ectoderm** is formed from migrating cells that replace the hypoblast and mainly forms the skin and nervous system
    b) The **mesoderm** is formed between epiblast and endoderm and will later develop to form bones and muscles and also the heart and blood vessels, including those which are in placenta.
    c) The **endoderm** is formed from epiblast cells that stay on dorsal surface and later develops into mucous membranes and glands.
    - NB:
        - The three germinal layers are developing from epiblast.
        - The events of forming germinal layers begins with formation of primitive steak on the surface of the epiblast.
- At around 16th week after implantation, extra embryonic mesoblast (Derived from epiblast and will later form placenta and other appendage organs) grows into primary trophoblast villi forming secondary villus.
- From 5-8 week, Embryo start to develop all structures of a human being and by the end of 8th week, the embryo has all structures that of an adult.
- From 9th week until birth, this period is referred to as foetal stage.
- Fetal stage is characterized by growth of formed structures.
- In summary, the following events occur during embryo and fetal development: -
    - ✓ **0 – 4 weeks**: Primitive central nervous system forms. The heart develops and begins to beat and limb buds form.

- ✓ **4 - 8weeks**: There is very rapid cell division. Head and facial features develop and all major body organs are in place in primitive form. Early movements are visible on ultrasound.
- ✓ **8 – 12 weeks**: Eyelids fuse and kidneys begin to function. From 12 weeks the foetus begins to pass urine. Lanugo appears
- ✓ Circulation functions properly and sucking and swallowing begin. External genitalia present
- ✓ **12 – 16 weeks**: There is rapid skeletal development and meconium is present in the gut. Nasal septum and palate fuse.
- ✓ **16 – 20 weeks**: Mother feels foetal movements or quickening. Foetal heart is heard on auscultation.
- ✓ **20 - 24weeks**: Most organs are able to function and foetus responds to sound. The skin is red and wrinkled.
- ✓ **24 – 28 weeks:** May survive if born at this stage. There is respiratory movement and eyelids open.
- ✓ **28 – 32 weeks**: The testes descend into the scrotum. Foetus begins to store fat and iron. Skin becomes less wrinkled.
- ✓ **32 – 36 weeks**: The body is more rounded because of increased fat deposit and head hair is grown, nails reach finger tips and ear cartilage is soft.
- ✓ **36 – 40 weeks**: Skull is firm and contours rounded. Birth is due.

A diagram illustrating foetal stage



A diagram showing derivatives of the three germinal layers



Assignment

1. Read and make short notes on the following: -
    a) Notochord formation
    b) Neurulation (formation of neural plate, neural groove, neural tube, neural crest and cell induction).
2. Explain the importance of folic acid (Vitamin B9)
3. State six functions of amniotic fluid.
4. Differentiate between amnion and chorion
5. State at least four derivatives from each of the three germinal layer.

Development of placenta

- Placental development begins at 6 weeks and is completed by 12th week.
- Human placenta develops from two sources:
    a) Fetal component- Chorionic frondosum
    b) Maternal component- decidua basalis
- As the pregnancy progresses the trophoblastic tissues and those from decidua basalis unites to form the placenta. Blood vessels develops forming hypogastric arteries that enters to the foetus through the umbilical cord as two arteries and there is one vein that also enters to the fetus through the same umbilical cord.

Umbilical cord (also known as funis)

- Umbilical cord is a flexible tube like structure that connects the foetus to the placenta.
- The umbilical cord begins to develop at around 5th week from the yolk sac and allantois.
- It has an average length of about 50cm. A cord is considered to be short when it measures less than 40cm centimeters long and it is considered long if it measures more than 60 centimeters long
- It has a diameter of 1-2 centimeters at term.
- It has two arteries and one vein.
- Vein carries oxygenated blood to the foetus
- Arteries carry deoxygenated blood away from the foetus body.
- The whole cord is covered in a layer of amnion continuous with that covering the placenta.
- It has an outer smooth layer made up smooth muscles and an inner layer made up gelatinous substance(jelly) known as Wharton's jelly that encloses the blood vessels.
- The functions of Wharton's jelly include: -
    - ✓ To protect umbilical blood vessels from injury
    - ✓ To insulate the umbilical blood vessels
    - ✓ It has immunological function

Functions of Placenta

a) **Respiration -** As pulmonary exchange of gases does not take place in the uterus the fetus must obtain oxygen and excrete carbon dioxide through the placenta

b) **Nutrition -** Food for the fetus derives from the mother's diet and has already been broken down into forms by the time reaches the placenta site. The placenta is able to select those substances required by the fetus, even depleting the mother's own supply in some instances.

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

d) **Excretion -**The main substance excreted from the fetus is carbon dioxide; bilirubin will also be excreted as red blood cells are released relatively frequently.

e) **Protection -** It provides a limited barrier to infection with the exception of the treponema of syphilis and, few bacteria can penetrate. Viruses, however, can cross freely and may cause congenital abnormalities as in the case the rubella virus and HIV virus.

f) **Endocrine function:**

- ✓ Human chorionic gonadotrophin (HCG) is produced by the cytotrophoblastic layer of the chorionic villi.
- ✓ Oestrogen as the activity of the corpus luteum declines, the placenta takes over the production of oestrogen, which are secreted in large amounts throughout pregnancy.
- ✓ Human placental lactogeni (HpL) has a role in glucose metabolism in pregnancy.
- ✓ Progesterone

Appearance of the Placenta at Term

- ✓ The placenta measures about 20 cm in diameter
- ✓ It is about 2.5cm thick from its center.
- ✓ It weighs approximately one sixth of the baby's weight at term.
- ✓ It has two surfaces, namely: -
  - The maternal surface maternal blood gives this surface a dark red colour and part of the basal decidua will have been separated with it. The surface is arranged in about 20 lobes which are separated by sulci.
  - The fetal surface. The amnion covering the fetal surface of the placenta gives it a whitish, shiny appearance. Branches of the umbilical veins and arteries are visible and spreading out from the insertion of the umbilical cord which is normally in the center.
- ✓ **The amniotic sac** consists of a double membrane., namely: -
  a) Chorion
  b) Amnion

a) **Chorion**

- ☑ It is the layer adherent to the uterine wall.
- ☑ It peels up to the edge of the placenta.
- ☑ It is fragile and easy to tear
- ☑ It is opaque

b) **Amnion**.

- ☑ It is the membrane on the fetal side.
- ☑ It gives give the placenta its typical shiny appearance.
- ☑ Protects the fetus from any infection.
- ☑ It peels up to the insertion of the cord
- ☑ It is thin but tough and hard to tear.
- ☑ It is translucent
- ☑ It contains the amniotic fluid.
- ☑ Amniotic fluid:
  - It is a clear and pale straw in colour.

- It constitutes 99% water and the remaining 1% is dissolved organic maters including substances and waste products.
- It secreted by the amnion and fetal urine also contributes to the volume from the 10th weeks of the gestation onwards.
- The total amount of amniotic fluid is about 1 litter and diminished to 800ml at 38 weeks of gestation (term). I
- If the total amount exceeds 1500 ml, the condition is known as polyhydramnios
- If less than 500mls it is known as oligohydramnios.

✓ **Function of the amniotic fluid:**

a) Provides nutrients to the developing foetus.
b) Allows for free movement of the fetus
c) Protects the fetus from injury (Act as shock absorber)
d) Maintains a constant temperature for the fetus
e) During labour it protects the placenta and umbilical cord from the pressure of uterine contraction
f) Aids effacement of the cervix and dilation of the cervical Os.
g) Promotes fetal lungs development
h) Promotes development of foetal gastro-intestinal system.
i) Promotes bone and muscle development.
j) Provides lubrication of foetal parts. This prevents body part adhesions and webbing.
k) It has immunological function (Prevents infection to the foetus)

Anatomical Variations of the Placenta and the Cord

a) Succenturiate lobe of placenta (extra lobe/ accessory lobe)

☑ A small extra lobe is present, separate from the main placenta and joined to it by blood vessels which run through the membrane to reach it.
☑ **The danger** is that this small lobe may be retained in utero after delivery, and if it is not removed it may lead to hemorrhage and infection.
☑ **Identification:** It is noted on inspection, the placenta will appear torn at the edge, or torn blood vessels may extend beyond the edge of the placenta.

b) Circumvallate placenta

☑ In this situation an opaque ring is seen on the fetal surface. It is formed by a doubling back of the chorion and amnion.
☑ **Danger** may result in the membranes leaving the placenta nearer the center instead of at the edge as usually.

c) **Battledore insertion of the cord. (Marginal insertion of the cord).**

- ☑ The cord in this case is attached at the very edge of the placenta in the manner of the table tennis bat.
- ☑ **Danger** Likely it is detached up on applying traction during active management of the third stage of labour.

d) Lateral cord insertion

- ☑ This when the cord is inserted at some distance from the edge of the placenta. Perhaps midway between the central point of the placenta and the edge of the placenta.
- ☑ **Danger**: it leads to fetal blood flow decrease.

e) Central insertion of the cord:

- ☑ In this the cord is inserted at the middle of the placenta.

f) Velamentous insertion of the cord

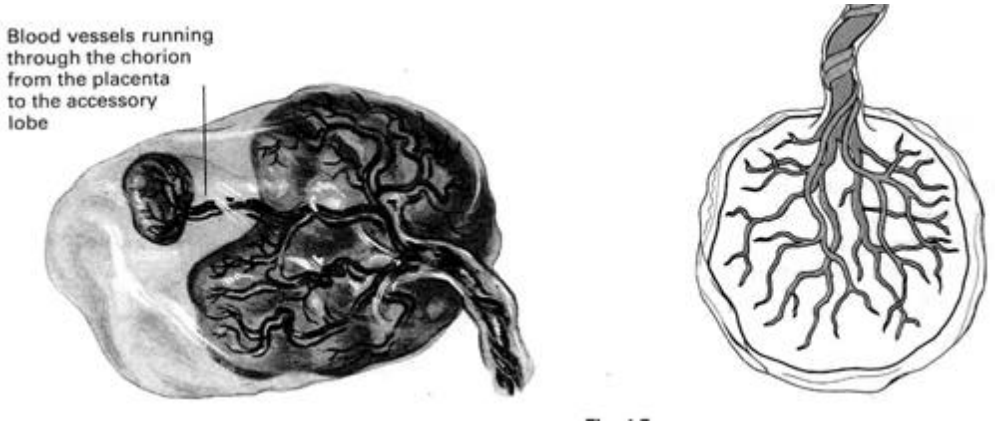
- ☑ It is inserted into the membranes some distance from the edge of the placenta. The umbilical vessels run through the membranous from the cord to the placenta.
- ☑ **Danger** The vessels may tear with cervical dilatation and would result in sudden blood loss.

g) Bipartite Placenta

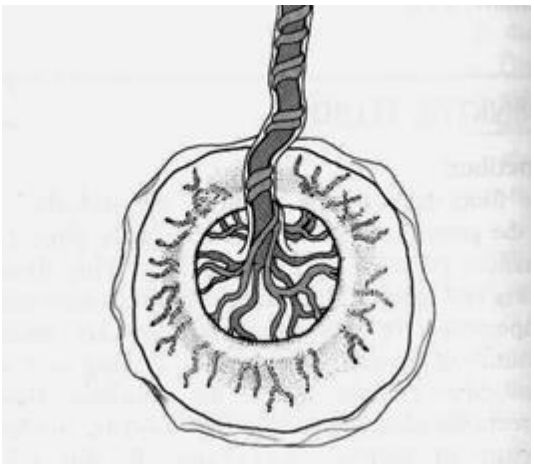
- ☑ Two complete and separate lobes are present, each with a cord leaving it.
- ☑ The bipartite cord joins a short distance from the two parts of the placenta.
- ☑ **Danger**-The extra lobe may be retained during delivery.

h) Tripartite placenta

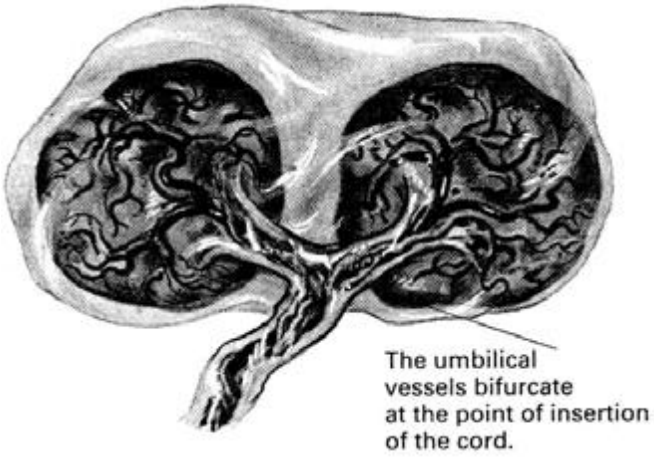
- ☑ Three complete and separate lobes are present, each with a cord leaving it. The tripartite cord joins a short distance from the three parts of the placenta.
- ☑ **Danger**-The extra lobe may be retained during delivery.



Succenturiate lobe of placneta Battledore inseration of the cord



Circumvallate placenta Velamentous insertion of the cord



Bipartite Placenta

g) Placenta infarction

- ☑ Placental infarction occurs when the blood supply to an area of the placenta is blocked and tissue necrosis results. It appears most commonly on the maternal surfaces.
- ☑ It is mainly associated with vascular disease of the utero- placental unit secondary to maternal hypertension.
- ☑ As the infarct at area becomes necrotic, fetal circulation is reduced because blood flow through the placenta will decrease. However, if the circulation

through the rest of the organ is sufficient, a fetus may survive when as much as 20% to 30% of the placenta is infracted.

h) Placental tumors (Hemangiomata of the Placenta)

- ☑ These tumors are relatively common, being found in approximately 1 percent of all placentas.
- ☑ Most tumors are small and without clinical significance but a few are large and associated with polyhydramnios, antepartum hemorrhage and premature labour.
- ☑ Most of these tumors are benign.

i) Placental calcification

- ☑ Placental calcifications occur due to deposition of calcium on the maternal placental surface.
- ☑ This deposition of calcium on the maternal surface of placenta makes the placenta to have white patches due to formation of fibrous tissue.
- ☑ Major causes of placental calcifications include: -
  - Post-datism
  - Maternal disorders eg DM, Vascular diseases etc
  - Cigarette smoking during pregnancy
  - Rh sensitization
  - Placental infections

j) Other pathologies of the placenta include:

- ☑ Syphilitic placenta- Due to congenital syphilis
- ☑ Edematous Placenta-It is the accumulation of fluid within the placental tissue.

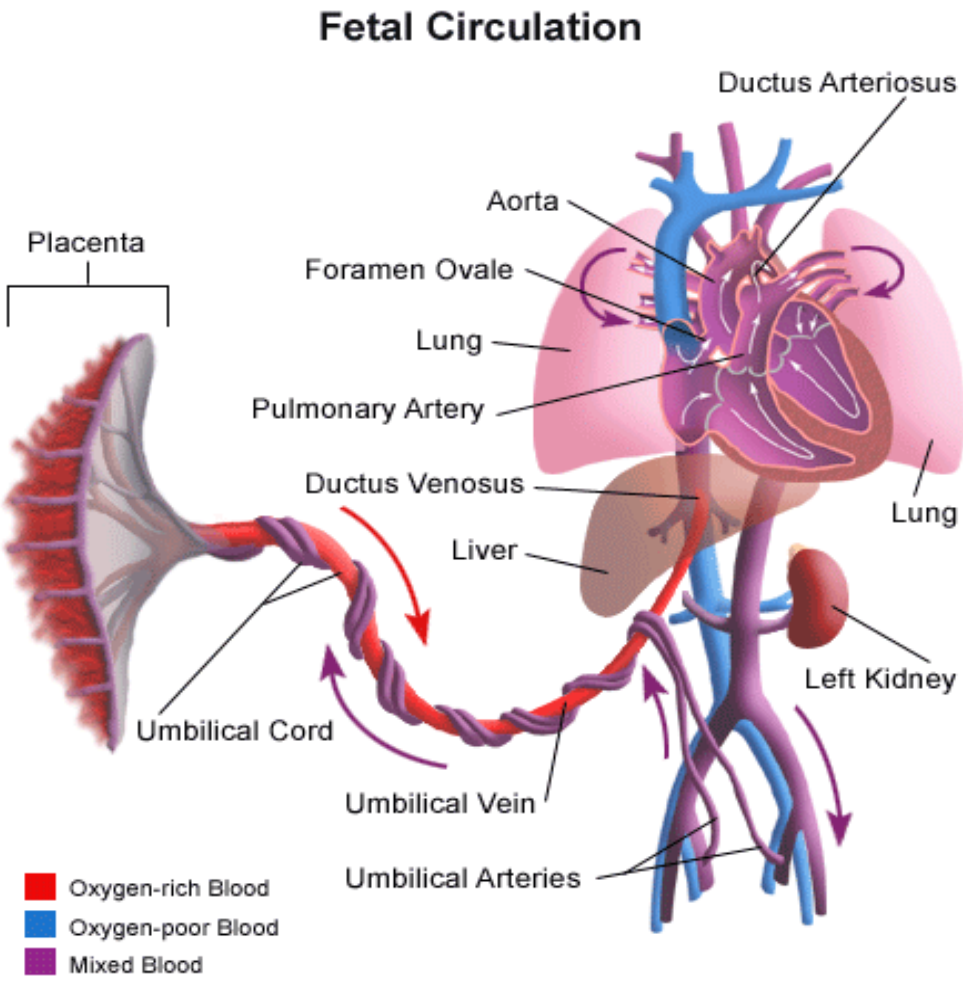
The Fetal Circulation

- ✓ During intrauterine foetal life, foetal lungs are not mature and are therefore not able to oxygenate blood. This fact therefore, calls for modification of intrauterine fetal circulation.
- ✓ To enable this, happen, there are temporary structure present in foetal circulation. They include: -
  a) Placenta
  b) Hypogastric arteries
  c) Umbilical cord and its blood vessels (Two arteries and one vein).
  d) Ductus venosus
  e) Ductus arteriosus
  f) Foramen ovale.
- ✓ **The Umbilical Vein:** Leads from the umbilical 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 venosus** (from a vein to a vein). This is a structure within the fetal liver and it connects the umbilical vein to the inferior venacava from the portal

vein. 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): It is a temporary opening between the atrium which allows the majority of blood entering the foetal heart from the inferior venacava 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 bifurcation of the pulmonary artery to the descending aorta, entering it just beyond the point where the subclavian and carotid arteries leave. It connects the pulmonary artery with the aorta.
- ✓ **The hypogastric arteries:** These arteries branch off from the internal iliac arteries and become umbilical arteries when they enter the umbilical cord. They return blood to the placenta. This is the only vessel in the fetus which carries unmixed blood.

A diagram showing foetal circulation



Description of foetal circulation

- ✓ Placenta forms the utero-placental unit through which foetal circulation is centered and because foetal lungs are not functional, placenta forms a unit in which maternal side help to oxygenate foetal blood.
- ✓ Oxygenated blood from the placenta passes through umbilical vein through the liver. In the liver, it connects with ductus venosus. Ductus venosus connects the blood into the inferior venacava. The blood mixes with deoxygenated from other parts of the body.
- ✓ Then blood gets into the right atrium. Once the blood is in the right atrium, majority of this blood flows directly into the right atrium via foramen ovale.
- ✓ Once in the right atrium, then blood is pumped to the entire foetal body.
- ✓ Some small amount is pumped through pulmonary artery; however, this blood does not reach foetal lungs but it is shunted to the aorta through ductus arteriosus.
- ✓ Finally, the blood from the foetal body system, will flow back to the placenta for further oxygenation through the umbilical arteries.

Adaptation to extra Uterine life

- ✓ At birth the baby takes a breath and blood is drawn to the lungs through the pulmonary arteries. It is then collected and returned to the left atrium via the pulmonary veins resulting in a sudden inflow of blood.
- ✓ The placental circulation ceases soon after birth and so less blood returns to the right side of the heart. In this way the pressure in the left side of the heart is greater while that in the right side of the heart becomes less. This results in the closure of a flop over the foramen ovale which separated the two sides of the heart and stops the blood flowing from right to left.
- ✓ Delivery of the placenta during child birth causes cessation of the placenta circulation resulting into the collapse of the umbilical vein, the ductus venosus and the hypogastric arteries.
- ✓ These vessels after collapsing, changes and becomes the following structures.
    a) The umbilical vein becomes the **ligamentum teres**
    b) The ductus venosus becomes the **ligamentum venosum**
    c) The ductus arteriosus becomes the **ligamentum arteriousm**
    d) The foramen ovale becomes the **Fossa ovalis**
    e) The hypogastric arteries become the **obliterated hypogastric arteries**

Assignment

1. Discuss the following placental abnormalities.
    i. Placenta Accreta
    ii. Placenta increta
    iii. Placenta percreta