Kenya Medical Training College
Department of Clinical Medicine
Homa-Bay Campus

Module	:	Human Anatomy
Topic	:	The Pelvic Floor Muscle
Year of Study	:	First Year
Semester	:	Two (2)
Date	:	04th November 2019
Time	:	10:30-12:30 Hours
Facilitator	:	James Okuku

Objectives

By the end of this lesson you should be able to:

- Describe structures of the pelvis
- Illustrate functions of the PFM
- Explain factors leading to dysfunction of PFM
- Describe the Origin, Insertion, Action & Nerve supply

The Functions of Muscles

Movement

Move from place to place, movement of body parts and body contents in ***breathing, circulation, feeding and digestion, defecation, urination, and childbirth***

Communication: speech, writing, nonverbal communications

Stability

- Maintain posture by preventing unwanted movements
- Antigravity muscles: resist pull of gravity and prevent us from falling or slumping over
- Stabilize joints

Control of openings and passageways

- Sphincters: internal muscular rings that control the movement of food, bile, blood, and other materials within the body

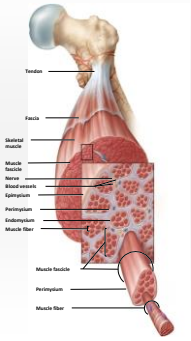
Heat production by skeletal muscles

- As much as 85% of the body heat

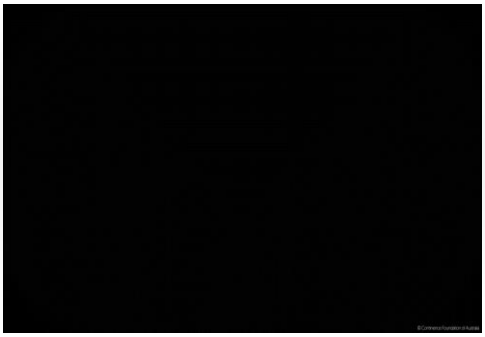
Glycemic control

- Regulation of blood glucose concentrations within its normal range

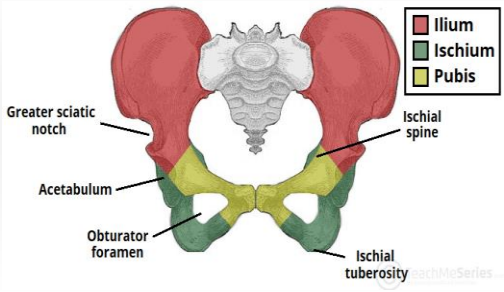
Connective Tissues of a Muscle

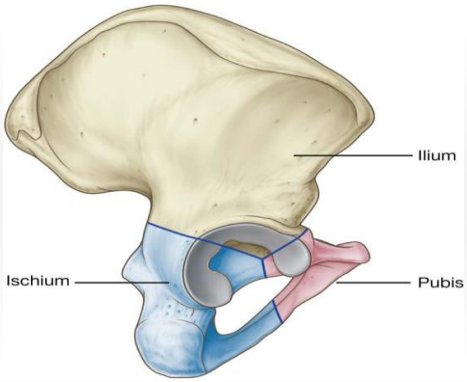


Video On PFM

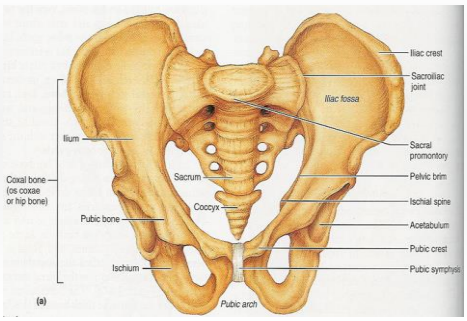


The Pelvic Bones

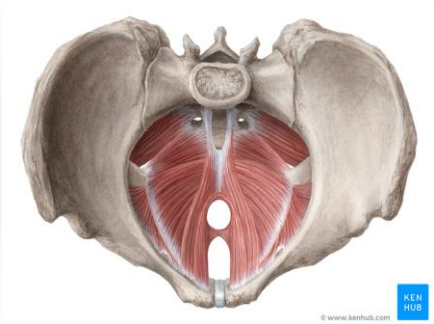




Structure of the Hip Bones



Anatomy of the Pelvic Floor



What is the pelvic floor?

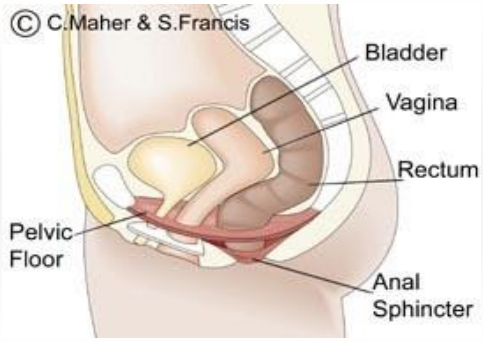
"A complex web of muscle, fascia and fibrous tissue that helps support the pelvic organs"

Note: It is not just muscle!!!! Fascia and fibrous tissue are important too.

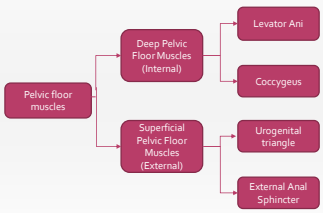
Muscular Components of the Pelvic Floor

Can be split into 2 layers:

1. Deep pelvic floor muscular layer (internal)
   - Levator Ani
   - Coccygeus
2. Superficial pelvic floor muscular layer (external)
   - Urogenital triangle
   - External anal sphincter



Muscular Component of the Pelvic Floor



Muscles of the Pelvic Floor

Three layers or compartments of the perineum

Superficial perineal space: three muscles

1. Ischiocavernosus
2. Bulbospongiosus
3. Superficial transverse peritoneal

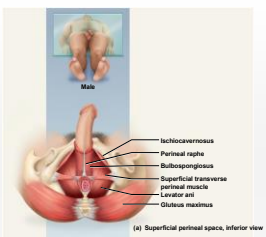
Middle compartment: spanned by urogenital diaphragm

Composed of a fibrous membrane and two or three muscles

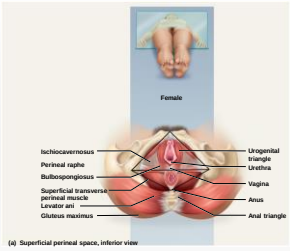
1. Deep transverse perineal muscle
2. external urethral and anal sphincters
3. Compressor urethrae in females only

Pelvic diaphragm: deepest layer consists of two muscle pairs

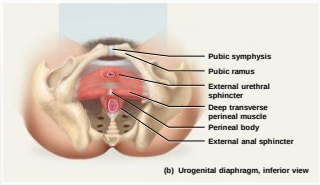
- **Levator ani** and **Coccygeus**



- **Superficial perineal space**
- Three muscles found just deep to the skin
- **Ischiocavernosus**—maintains erection
- **Bulbospongiosus**—aids in erection, expels remaining urine
- **Superficial transverse perineal**—not always present



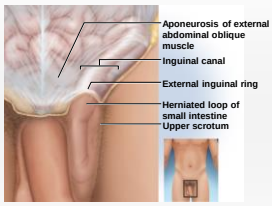
- **Middle compartment**
- **Urogenital triangle**—middle layer of pelvic floor; contains **urogenital diaphragm: deep transverse muscle** and **external urethral sphincter**
- **Anal triangle**—external anal sphincter



- **Pelvic diaphragm**
- Deepest compartment of the perineum
- Two muscle pairs
  - **Levator ani:** supports viscera and defecation
  - **Coccygeus:** supports and elevates pelvic floor

Hernias

Any condition in which the viscera protrudes through a weak point in the muscular wall of the abdominopelvic cavity



Inguinal hernia

- Most common type of hernia (rare in women)
- Viscera enter inguinal canal or even the scrotum

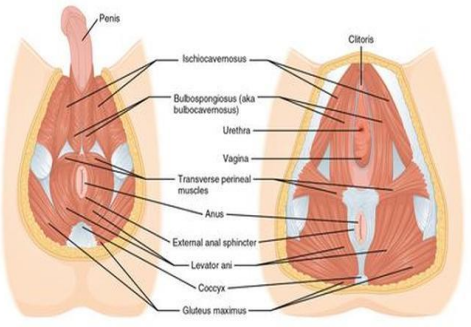
Hiatal hernia

- Stomach protrudes through diaphragm into thorax
- Overweight people over 40

Umbilical hernia

- Viscera protrude through the navel

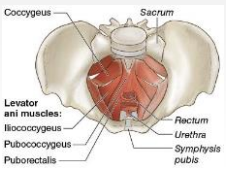
Levator Ani



Deep PFM: Levator Ani

Levator Ani (lifts Anus)

- ***Action:*** Lifts to support the pelvic organs, removing strain on the endopelvic fascia.
- 3 separate muscles:
  1. Iliococcygeus
  2. Pubococcygeus
  3. Puborectalis



Deep PFM: Levator Ani

Puborectalis

- PR creates a U-shaped sling around the anorectal junction. PR pulls the anorectal junction forward acting as a 'kink'.
- When it relaxes it lengthens allowing for widening of the anorectal angle for bowels to open.

Origin

Inner surface of lesser pelvis from pubis through tendinous arch of obturator internus to spine of ischium

Insertion

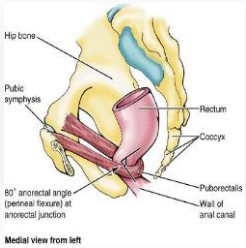
Coccyx via anococcygeal body; walls of urethra, vagina, and anal canal

Action

- Compresses anal canal and reinforces external anal and urethral sphincters
- Supports uterus and other pelvic viscera
- Aids in the falling away of the feces vertical movements affect pressure differences between abdominal and thoracic cavities and thus aid in deep breathing

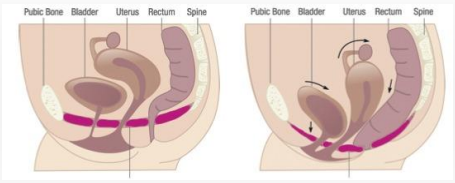
Puborectalis

- Therefore it is important in maintaining faecal control (by contracting) and allowing defecation (by relaxing).
- Can cause chronic constipation if overactive.



Deep PFM: Levator Ani

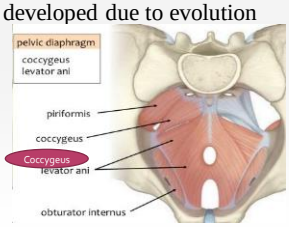
- Levator ani (all together) = Lift function

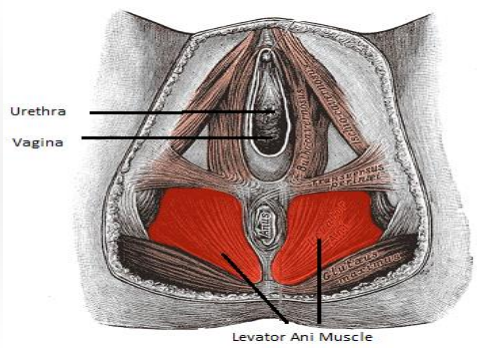


- ***Clinical Note:*** If someone has an overactive Levator Ani you won't feel much 'lift' on your internal examination as they're already fully contracted.

Deep PFM: Coccygeus

- Would control the tail if we had one.
- Doesn't elevate the anus.
- Is thin and under developed due to evolution





The **Levator Ani Muscle** is a muscle that makes up much of the pelvic floor.

The pelvic floor consists of various muscles, ligaments, and tendons that support the pelvic organs such as the bladder and rectum.

Is made up of three smaller muscles, which include:

1. Puborectalis muscle
2. Pubococcygeus muscle
3. Iliococcygeus muscle

Innervation

1. **Pudendal nerve** innervates the levator ani muscle is the , which is the main nerve of the perineum (the area between the anus and the vagina/scrotum).
2. Additionally, ***sacral spinal nerve III (S3)*** and the ***sacral spinal nerve IV (S4)*** innervate it

Function

- Support bladder control by helping to prevent urinary incontinence.
- Urinary incontinence refers to the accidental release of urine through the urethra, or 'wetting the bed' or 'wetting yourself'.
- Bowel control.

- Have you ever heard of someone laughing or coughing so hard that they accidentally wet their pants?
- When this occurs, the hard laughter or cough can increase the intra-abdominal pressure which can put pressure on the levator ani muscle.

This added pressure on the levator ani muscle cause it to momentarily lose its function, possibly leading to shorts periods of incontinence.

Additionally, pregnancy, vaginal births, and obesity can also damage or weaken the levator ani muscle, leading to problems with incontinence

Coccygeus

Origin

Spine of ischium

Insertion

Coccyx and adjacent border of sacrum

Action

Aids levator ani

Innervation: Spinal nerves S3-S4

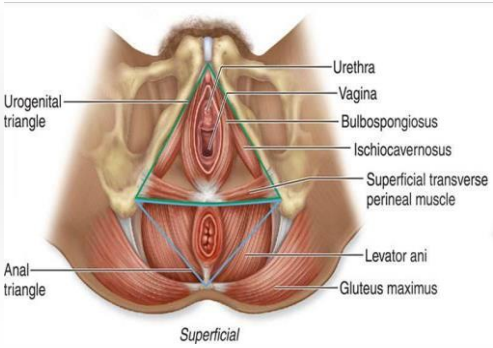
Superficial PFM: Urogenital triangle

Anterior half: Urogenital triangle

1. Ischiocavernosus
2. Bulbocavernosus
3. Transvere Pereneii

Function: Provide added closure to vagina

Superficial PFM: Urogenital triangle



Superficial PFM: External Anal Sphincter

Posterior Half:

External Anal Sphincter

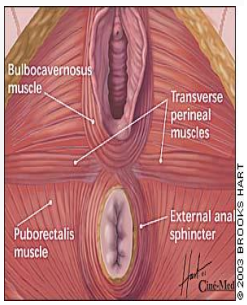
- Encircles the anus
- Skeletal muscle
- Voluntary control

Function: Provide added closure to anus

Provides 30% of resting anal closure pressure

External Anal Sphincter

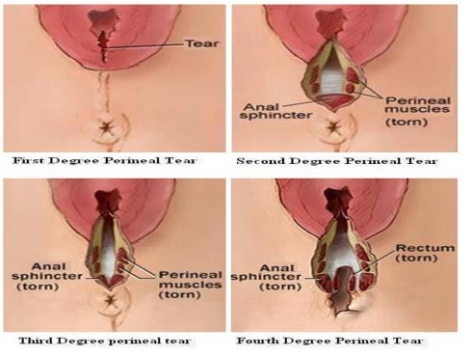
- Internal Anal Sphincter (IAS) provides 70% of resting anal pressure (not under voluntary control)



Clinical Note!!

Tears during vaginal deliveries

- 1st degree tear: Vaginal skin only
- 2nd degree tear: Vaginal skin + perineal muscles(superficial)
- 3rd degree tear: Vaginal skin, Perineal muscles (superficial) + Anal sphincters (EAS +/- IAS)
  - 3a: < 50% of EAS torn
  - 3b: >50 % EAS torn (IAS intact)
  - 3c: both EAS and IAS torn
- 4th degree tear
  - EAS, IAS and mucosa torn



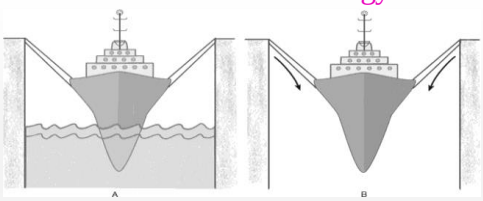
Clinical note!!

- 3c and 4th degree tears are the primary risk factor for faecal incontinence.
- Very poor outcomes once IAS is torn.
- Pelvic floor muscle training will only increase strength of EAS (skeletal muscles), not IAS (sympathetic)

Fistula

- An abnormal passageway or tube between two or more body parts not normally joined together.
- Can occur in the digestive, urinary and reproductive tracts, and in the circulatory system.
- Can be a ***congenital condition***, meaning that they develop in utero, or they ***can be acquired*** through disease, infection, surgery, or injury.

Boat in the dock analogy



Boat = pelvic organs

Ropes = fascia/ ligaments suspending the organs within he pelvis

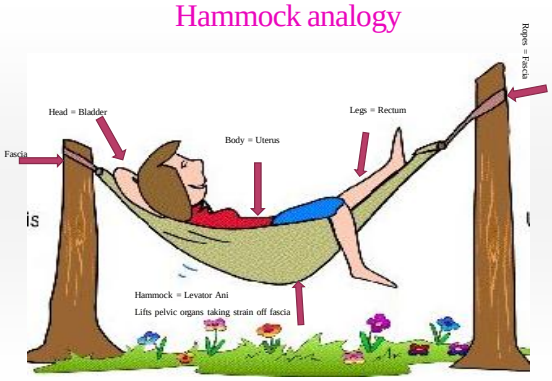
Water = Pelvic floor muscles (levator ani) supporting the pelvic organs from the bottom up

Note: If the pelvic floor is weak there is increased strain on the fascia

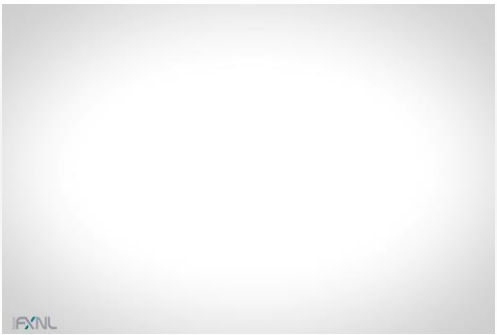
If the fascia is torn/ stretched during child birth there is increased pressure on pelvic floor

Both may result in prolapse

Hammock analogy



Video on Functions of PFM



Functions of the PFM

The pelvic floor or pelvic diaphragm is important in;

- Providing support for the pelvic organs (urinary bladder, intestines, and uterus)
- Maintain continence as part of the urinary and fecal
- Facilitating movement of the fetus towards the pelvic girdle results in fetuses being born headfirst
- Maintaining optimal intra-abdominal pressure
- Aiding in sexual performance (orgasm)
- Stabilizing connecting joints
- Acting as a venous and lymphatic pump for the pelvis.

Factors likely to change PFM

- Structures Pregnancy-Hormonal changes and fetal weight
- Childbirth-damages muscles and bladder nerves
- Old age-decrease bladder's capacity to store urine.
- Hysterectomy-removal of uterus damage PFM Neurological disorders
- Family history of pelvic floor dysfunction
- Weight
- Chronic coughing (from a lung disorder)

References/Further Readings

Jean M. Irion and Glenn L. Irion, (2009). Women Health in Physical Therapy. 1 st Edition, Lippincott Williams & Wilkins

Ruth, S.,Joanne, B. and Sue M.(1997). Women Health: A text book for Physiotherapists. 1st Edition, saunders

R. Barnitharan, V. Kokila and V. Mahalakshmi, (2010). Physiotherapy care for women health.Jaypee


Thanks
for
just
listening