

Supports of uterus and Vagina



- Normal position of the uterus:

Anteverted and anteflexed.

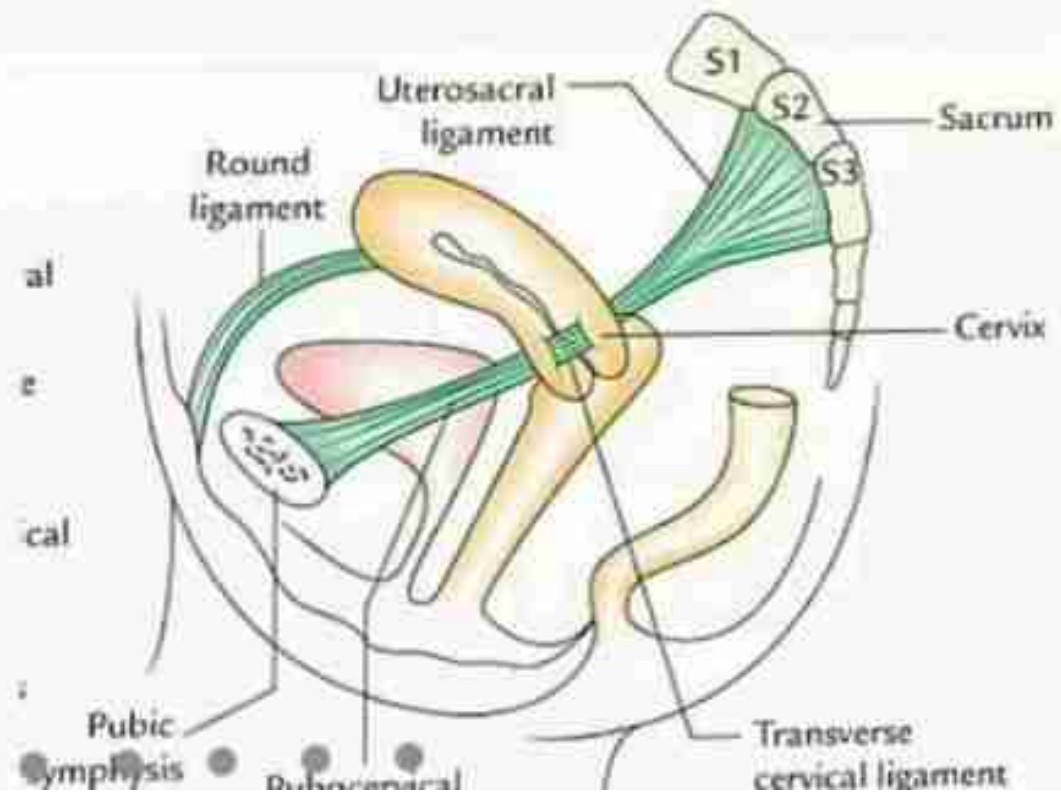
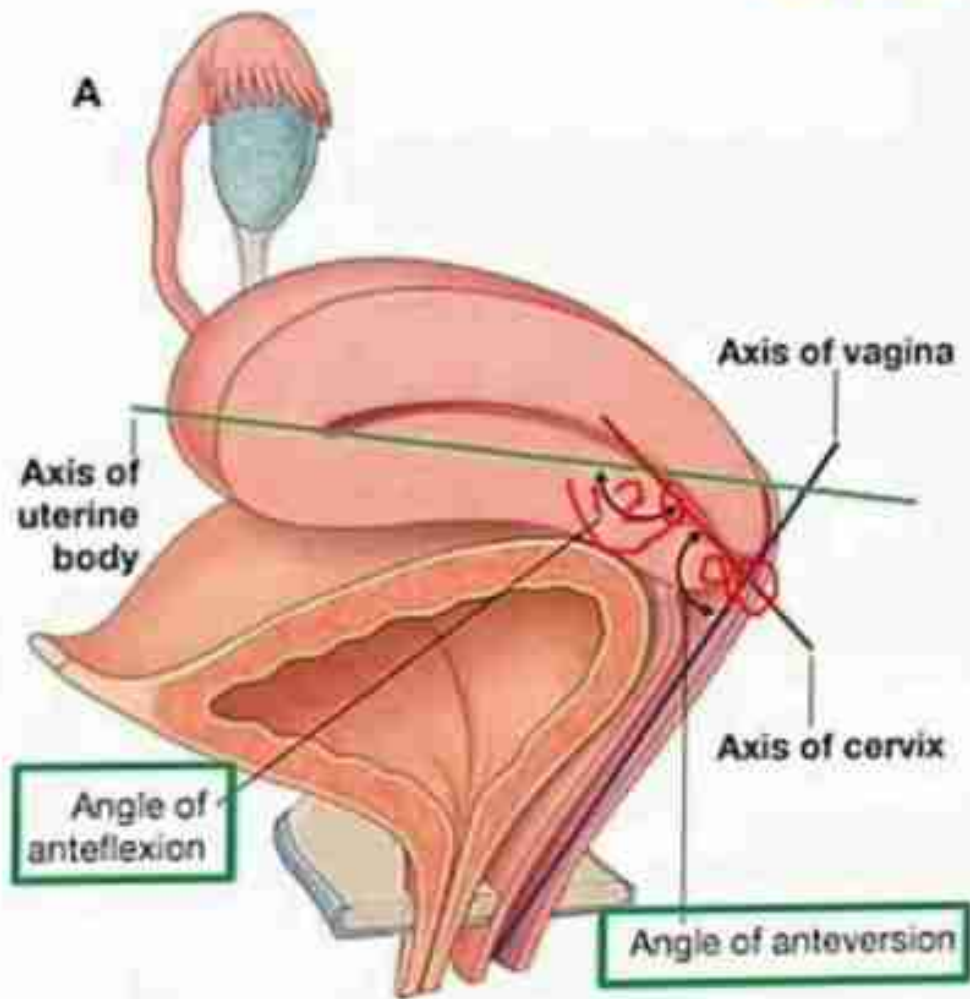
Between rectum posteriorly and urinary bladder anteriorly.

Cervix pierces the anterior vaginal wall at an angle of almost 90 degrees.

Normal position of the external os at the level of ischial spines.

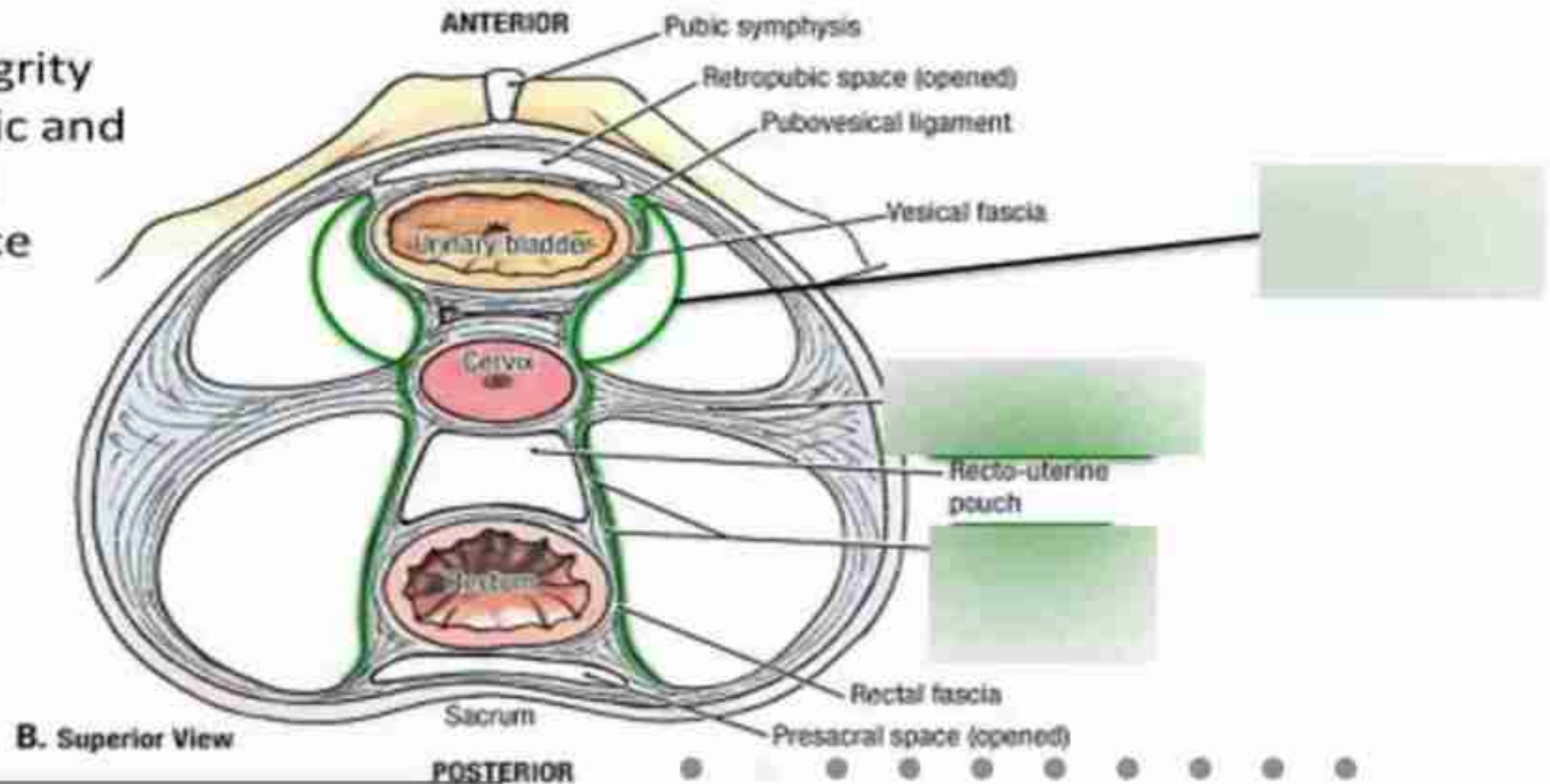


Uterine Axis



of pelvic fascia: ligamentous support for the uterus

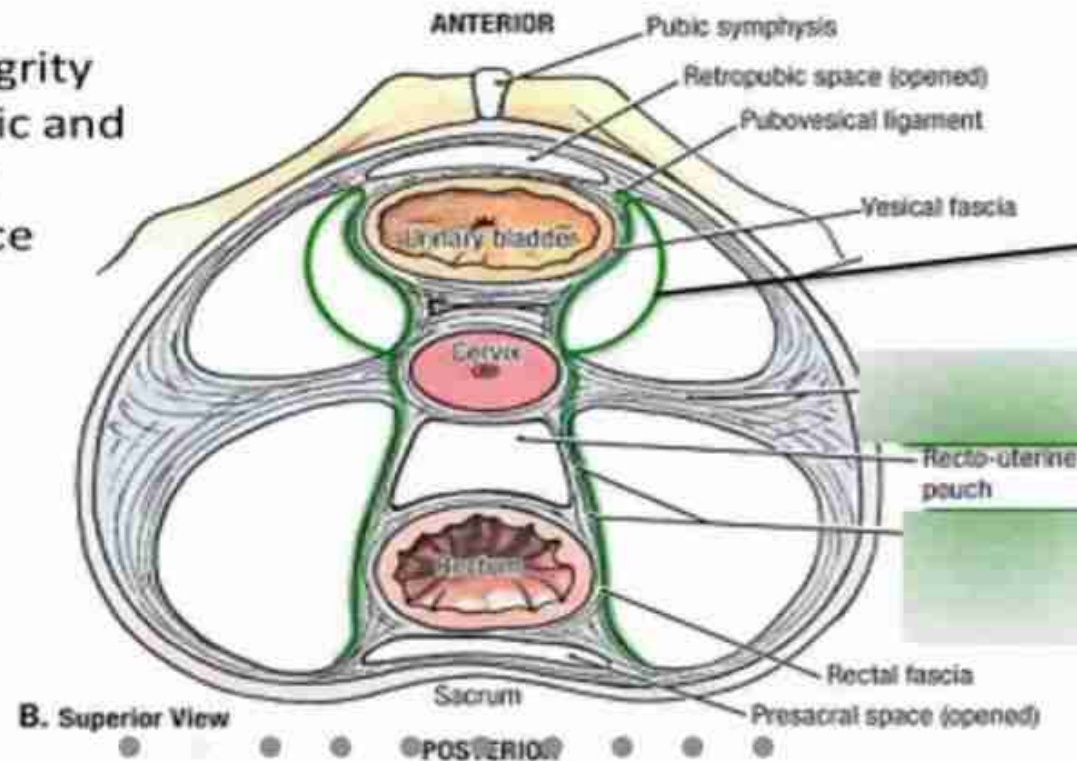
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Thickening of pelvic fascia: ligamentous support for the uterus

Functions:

- Supports and holds pelvic viscera, vasculature, nerves
- Preserves functional integrity
- Fixed framework for pelvic and perineal muscle function
- Helps maintain continence

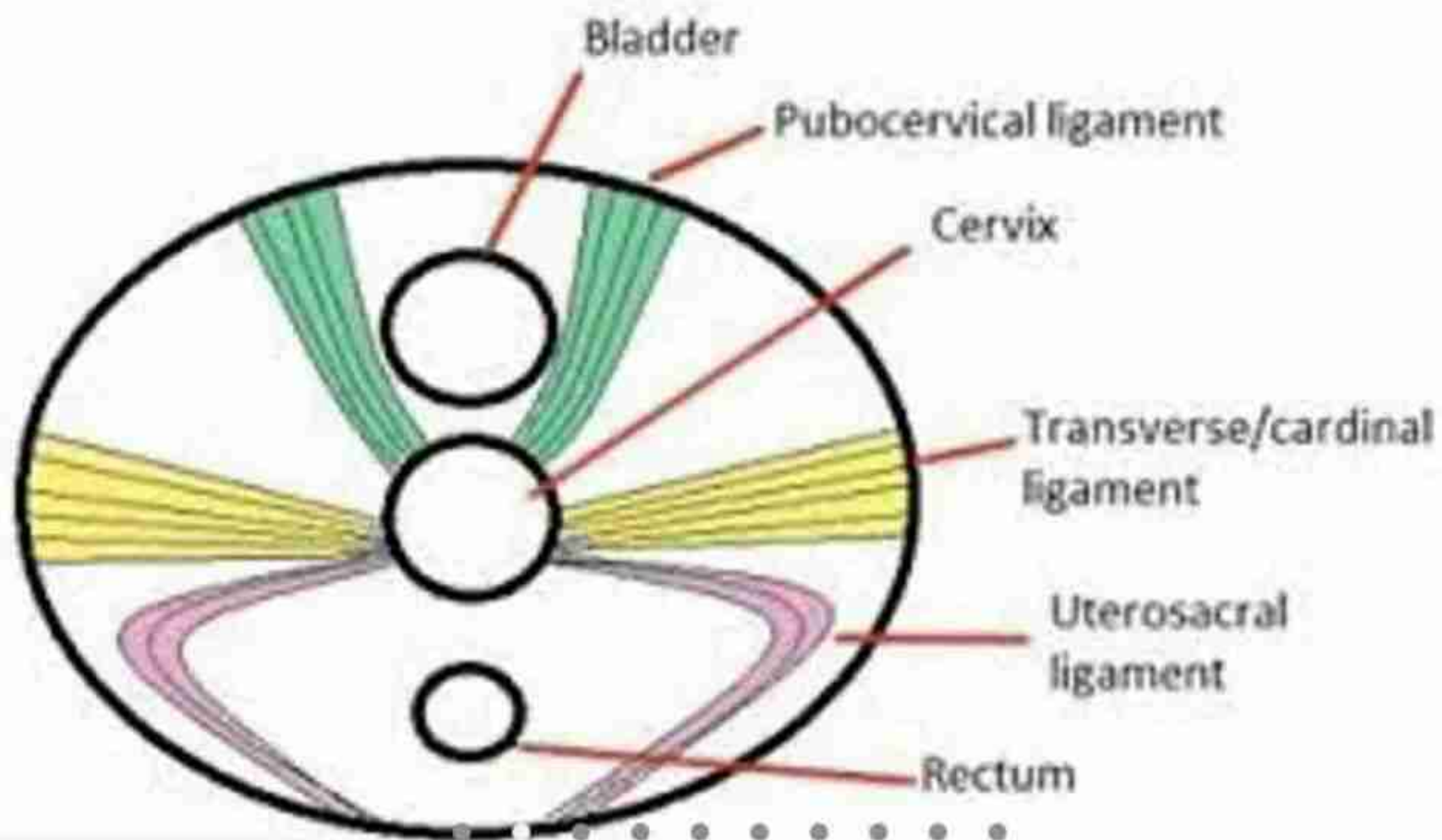


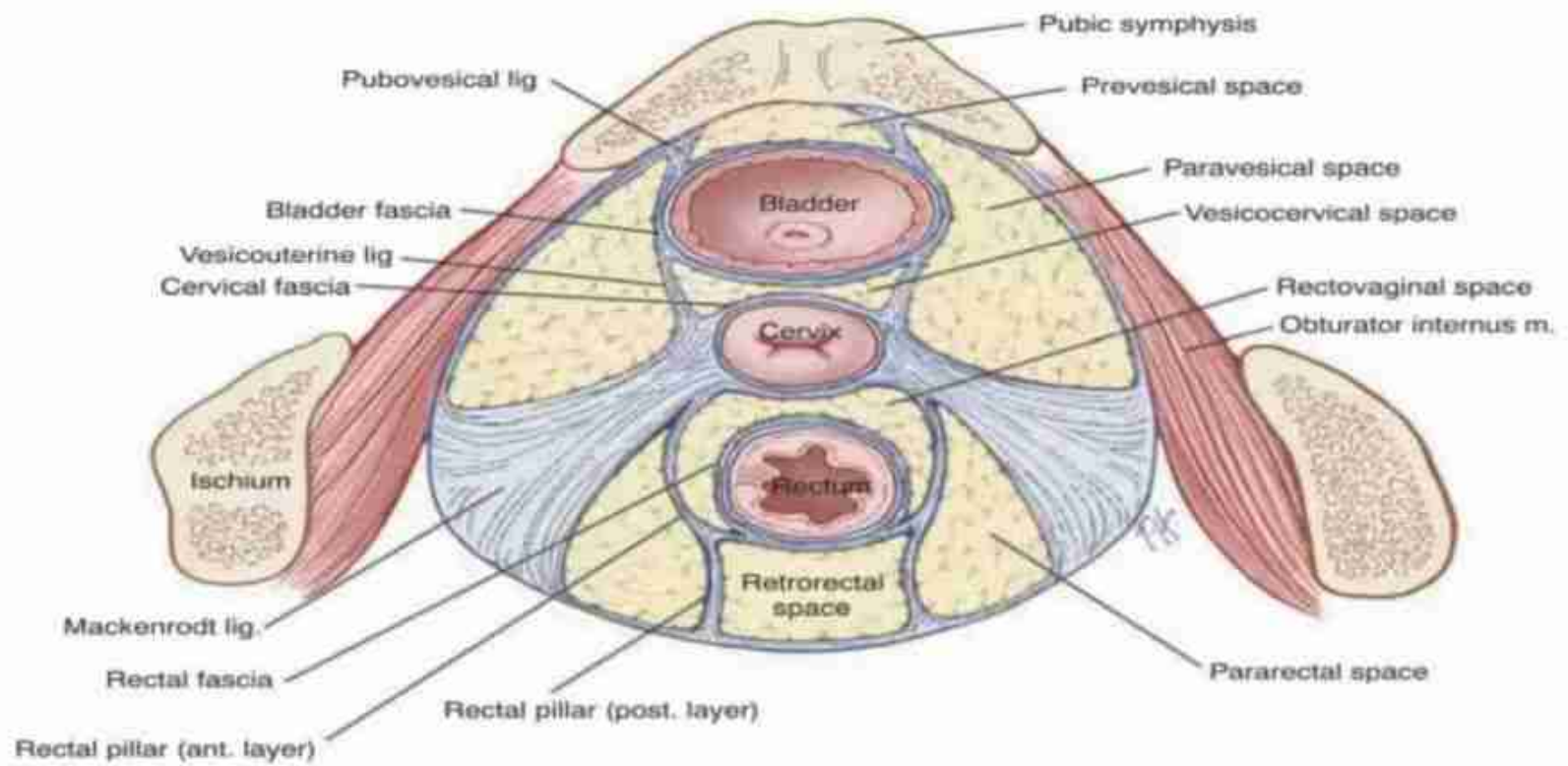
Supports of the Uterus

- Three tiers
- Upper tier
 - Endopelvic fascia covering the uterus
 - Round ligament
 - Broad ligament
- Middle tier(cardinal support)
 - Pericervical ring with pubocervical ligament and vesico vaginal septum anteriorly, Cardinal ligaments laterally, uterosacral ligaments posteriorly with rectovaginal septum and endopelvic fascia



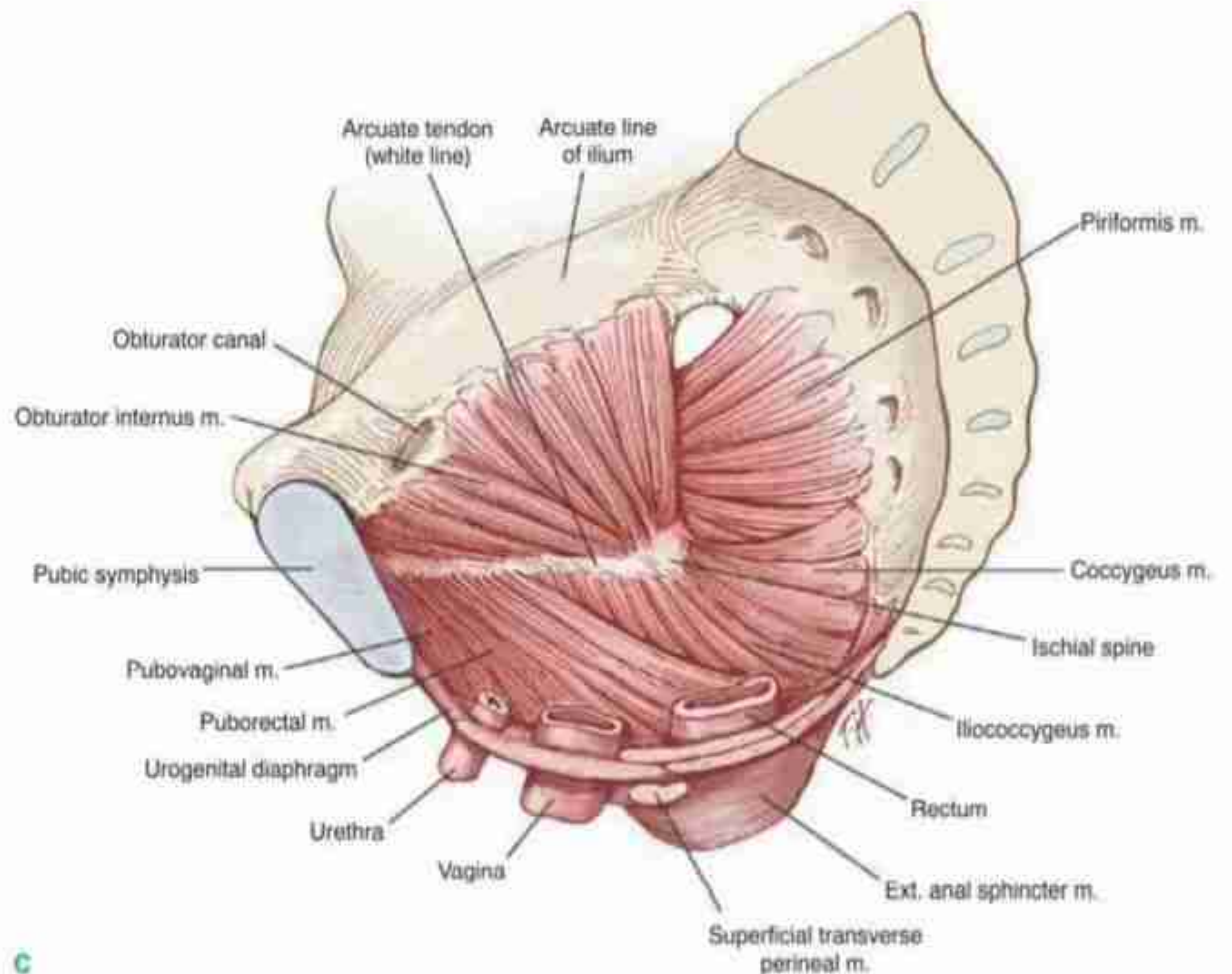
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- Inferior tier principally by
 - Pelvic floor muscles (levator Ani Muscle)
 - Endopelvic fascia
 - Levator plate
 - Perineal body
 - Urogenital diaphragm





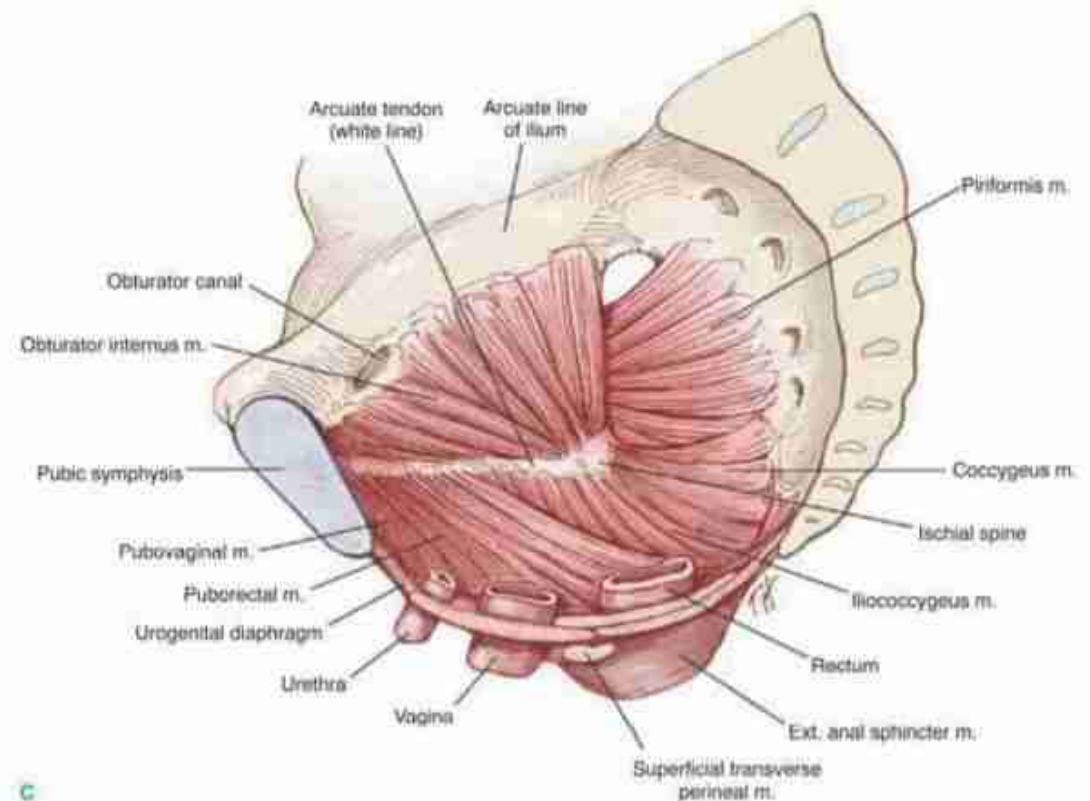
PELVIC DIAPHRAGM

- Consists of LEVATOR ANI MUSCLE covered by pelvic fascia.
- The levator ani muscles are composed of the pubococcygeus (including the pubovaginalis, pubourethralis, puborectalis, and the iliococcygeus).
- The muscle covers the space from pubic bone to coccyx and from one pelvic side wall to another, forming funnel shaped support.



Origin of levator ani

- From arcus tendinous fascia pelvis or white line, which is a thickening of the fascial covering of the obturator internus and extends from pubic bone to ischial spine.
- The fibres pass backward and medially and fuse in midline forming levator plate.
- Urogenital hiatus –space between levator ani muscles enclose the urethra, vagina and anal canal.
- Fibres of puborectalis arise from pubic bone, form a sling around vagina and rectum and are inserted into perineal body, rectal wall and anococcygeal raphe.



Anatomically and physiologically, the pelvic diaphragm can be divided into two components—the internal and external components.

- The external component originates from the arcus tendineus. It gives rise to fibers of differing directions, including the pubococcygeus, the iliococcygeus, and the coccygeus
- The internal component originates from the pubic bone above and medial to the origins of the pubococcygeus and is smaller but thicker and stronger. Its fibers run in a sagittal direction and are divided into the following two portions: Pubovaginalis and Puborectalis.

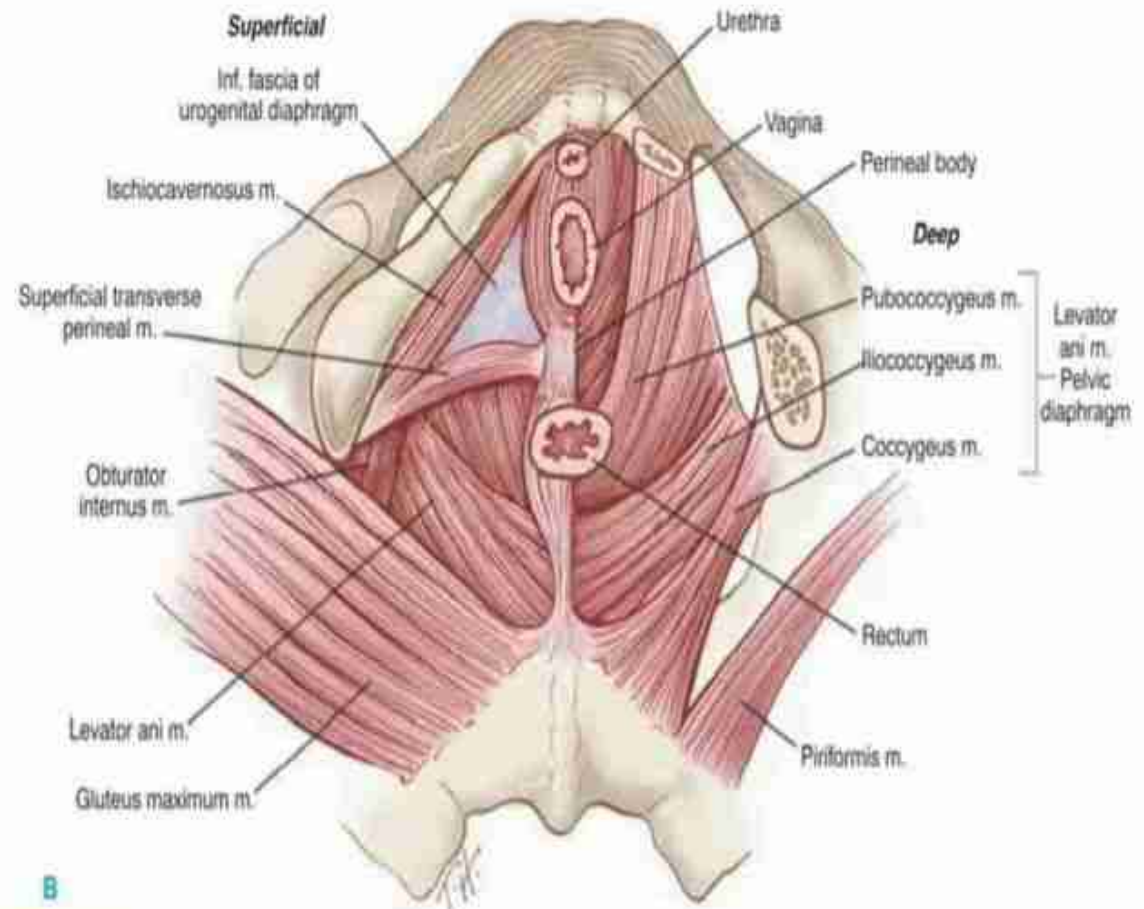


Figure 5.3 The pelvic diaphragm. A: A view into the pelvic floor that illustrates the muscles of the pelvic diaphragm and their attachments to the bony pelvis. B: A view from outside the pelvic diaphragm illustrating the divisions of the levator ani muscles (superficial plane removed on the right). C: A lateral, sagittal view of the pelvic diaphragm and superior fascia of the urogenital diaphragm. The muscles include the deep transverse perineal and sphincter urethrae.

• **Clinical implications**

- The levator ani assists the anterior abdominal wall muscles in containing the abdominal and pelvic contents.
- Levator ani muscle has a resting tone that keeps the pelvic floor closed and prevents herniation of uterus and cervix.
- It supports the vagina, facilitates defecation, and aids in maintaining fecal continence.
- During parturition, the levator ani supports the fetal head while the cervix dilates.
- The levator ani is innervated by S3 to S4, the inferior rectal nerve
- Ischiococcygeus ,not a part of levator ani forms the posterior part of pelvic wall and pelvic support.



Fascial components of the pelvic diaphragm

- The pelvic diaphragm is covered superiorly by fascia, which includes a parietal and a visceral component and is a continuation of the transversalis fascia .
- The parietal fascia has areas of thickening (ligaments, septae) that provide reinforcement and fixation for the pelvic floor.
- The visceral (endopelvic) fascia extends medially to invest the pelvic viscera, resulting in a fascial covering to the bladder, vagina, uterus, and rectum.
- Musculofascial elements (the hypogastric sheath) extend along the vessels originating from the internal iliac artery. Following these vessels to their respective organs, the hypogastric sheath extends perivascular investments that contribute to the formation of the endopelvic fascia so critical for the support of the pelvic organs.

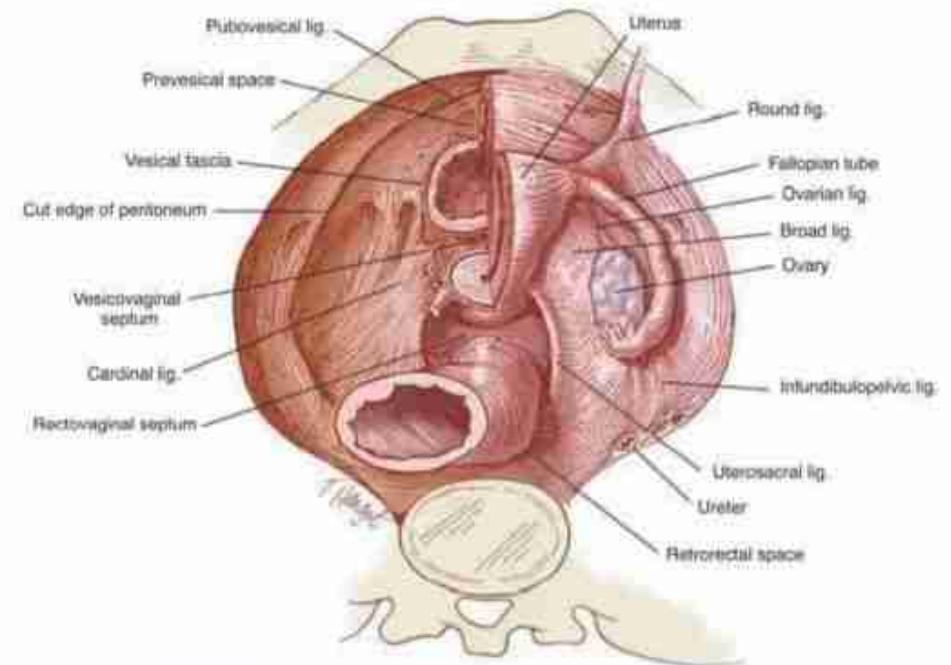


Figure 5.25 The fascial components of the pelvic diaphragm.

Double layered muscular support

- the pelvic floor relies on the complementary role of the pelvic diaphragm and its fascia resting on the perineal fibromuscular complex for support.
- It is composed of the perineal membrane (urogenital diaphragm) anteriorly, and the perineal body joined to the anococcygeal raphe by the external anal sphincter posteriorly. This double-layered arrangement, when intact, provides optimal support for the pelvic organs and counterbalances the forces pushing them downward with gravity and with any increase in intraabdominal pressure .
- Dynamic imaging techniques, such as MRI, CT, and ultrasonography, are increasingly used to provide additional information in the evaluation of pelvic floor problems by visualizing anatomic landmarks during different functional phases.

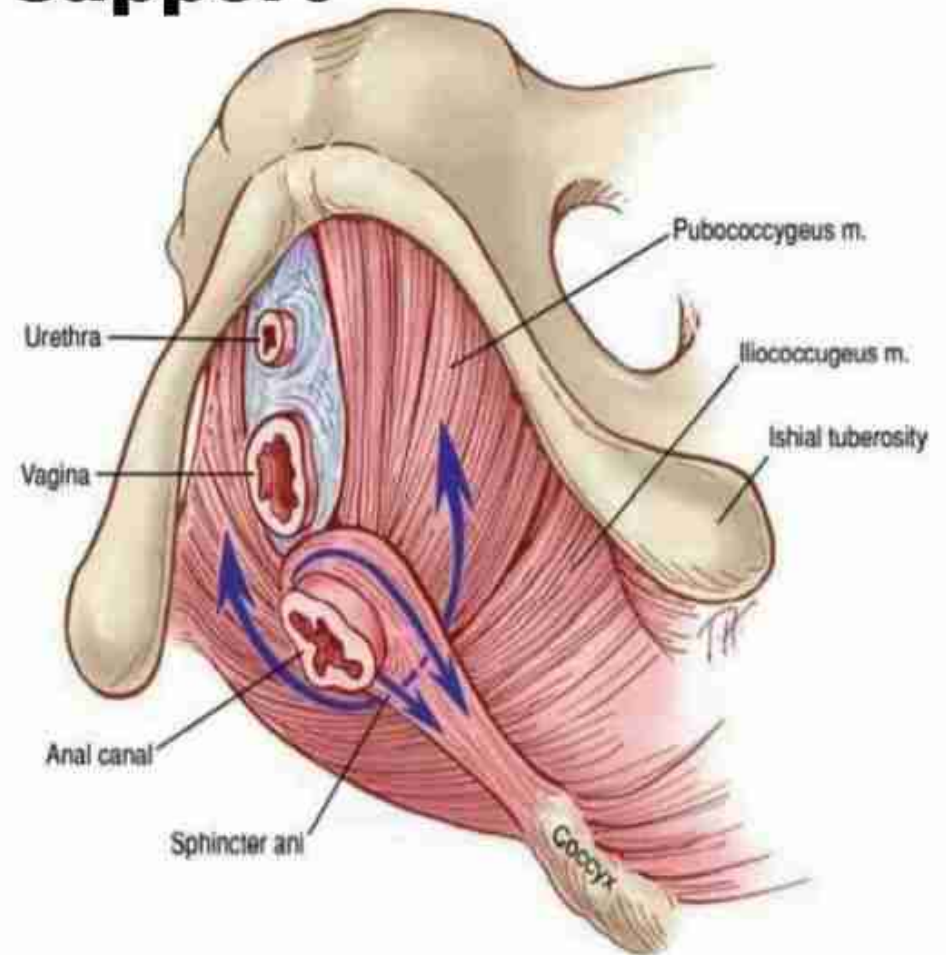


Figure 5.25 The double-layered muscular support of the pelvic diaphragm.

LIGAMENTS OF THE UTERUS

Cardinal or Mackenrodt's ligaments or transverse cervical ligament

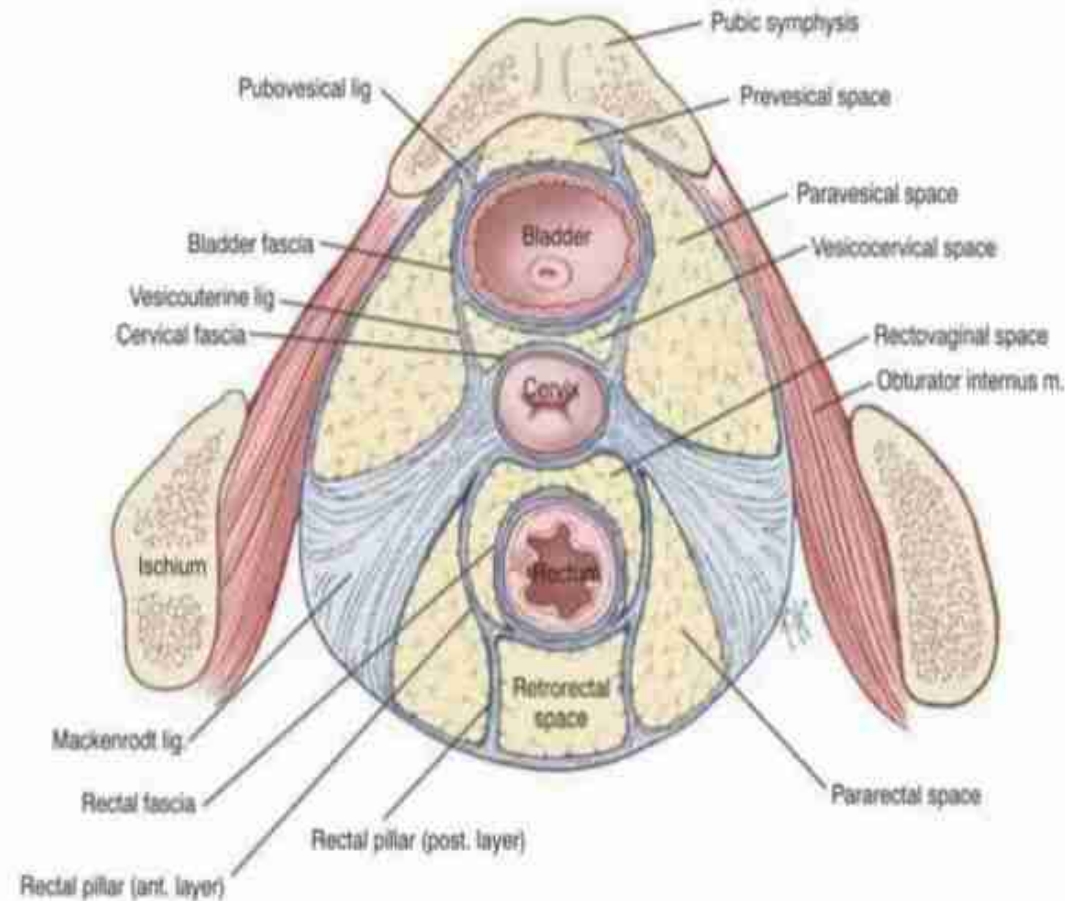
These extend from the lower part of the uterus, supravaginal cervix and lateral vaginal fornix to the lateral pelvic wall. The loose cellular tissue in this area is referred to as parametrium.

Ureter, before entering the bladder, traverses this ligament and is encased in a fascial sheath called ureteric tunnel which lies 2 cm lateral to the cervix.

The uterine artery crosses to the uterus above the ureter at this point.

The descending cervical branch of the uterine artery courses through this ligament.

Forms lateral boundaries of pouch of Douglas.



Pubocervical ligaments

- This condensation of the pubovesicocervical fascia passes from the anterolateral aspect of the cervix to the posterior surface of pubic bone.
- Some fibers extend from the bladder and the pubis and form the bladder pillars.
- Pubocervical ligaments merge posterolaterally with the cardinal ligaments

Uterosacral ligaments

- These ligaments extend from the posterior part of the supravaginal cervix to the sacrum.
- They lie on either side of the rectosigmoid. Anterolaterally
 - they merge with cardinal ligaments.
- Frankenhauser's plexus of nerves are located mainly along these ligaments

Round ligaments

- These are vestiges of the gubernaculum and are made of fibromuscular tissue.
- They extend laterally from the uterine cornu extraperitoneally, enter the inguinal canal, and finally merge with the skin and connective tissue of the mons pubis and labia majora.
- It originates somewhat below and anterior to the origin of fallopian tube.
- Clinically this orientation can aid in fallopian tube identification during puerperal sterilization.
- This is important if pelvic adhesions limit tubal mobility and limit fimbrial visualisation
- Sampson artery, a branch of uterine artery runs within this ligament.
- Non pregnant -3 -5 mm in diameter and is composed of smooth muscle bundles separated by fibrous tissue septa.
- During pregnancy hypertrophies.



Broad ligaments

- Winglike structures that extend from lateral uterine margins to pelvic side walls
- With vertical sectioning through this ligament proximal to uterus ,triangular space can be seen,uterine artery and ureter at its base.
- Broad ligament divides pelvic cavity into anterior and posterior compartments.
- Each broad ligament is a fold of peritonium-peritoneum overlying fallopian tube is called mesosalpinx
- Round ligament –mesoteres
- Uteroovarian ligament-mesoovarium
- The round ligaments, tubes, and ovarian ligaments are covered by the peritoneum of the broad ligament and are contained in its upper part

Ovarian ligament

They pass from the medial pole of the ovaries to the uterine cornu posterior to the attachment of the tubes

Infundibulopelvic ligaments

These are lateral extensions of the broad ligaments between the ovary and pelvic wall. They contain the ovarian vessels and nerves, which during pregnancy enlarges.

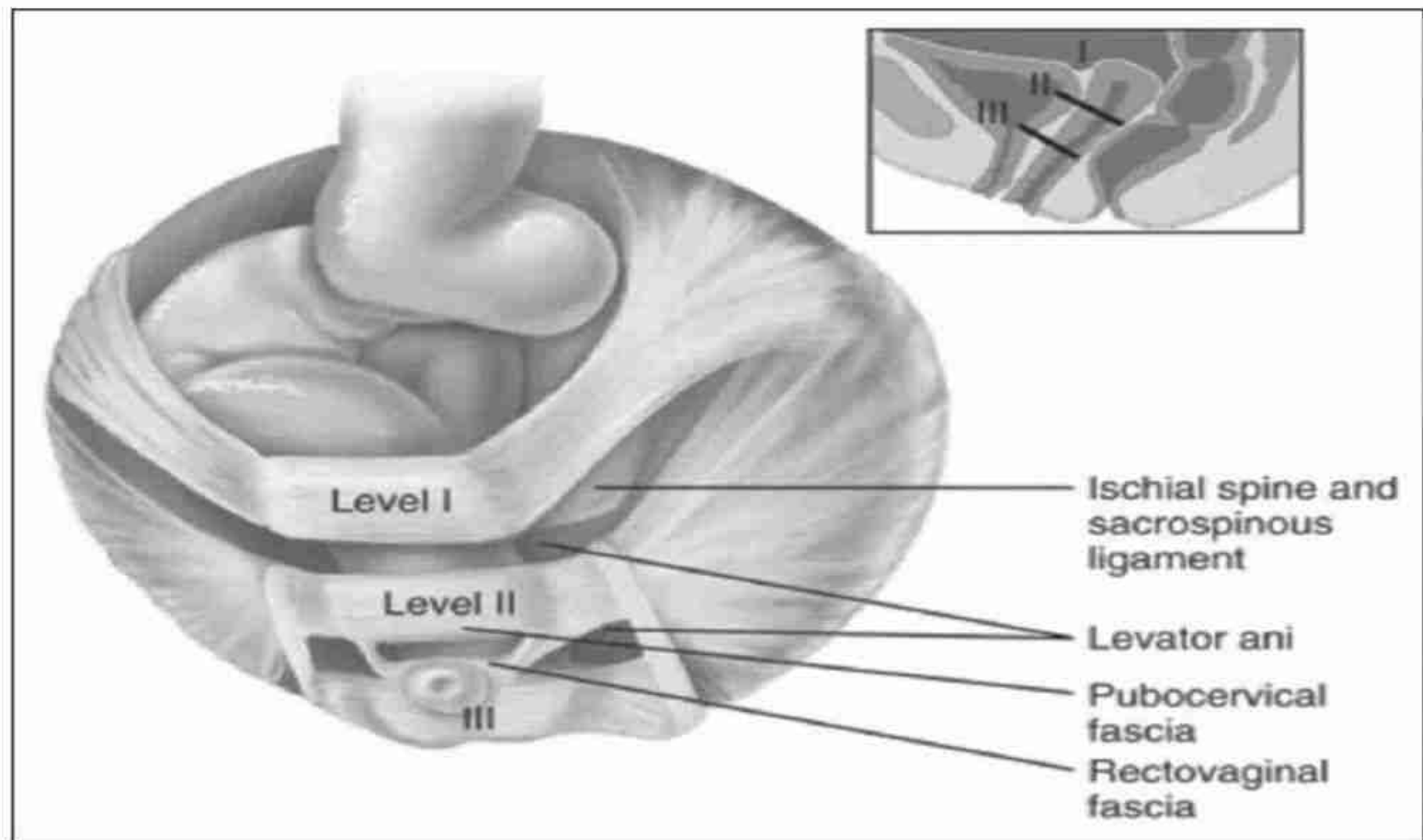
Diameter of the ovarian vascular pedicle increases from 0.9 to 2.6 cm at term.



Supports of vagina

- Positional , upper part horizontal, lower part makes an angle of 45 degrees.
- Endopelvic fascia





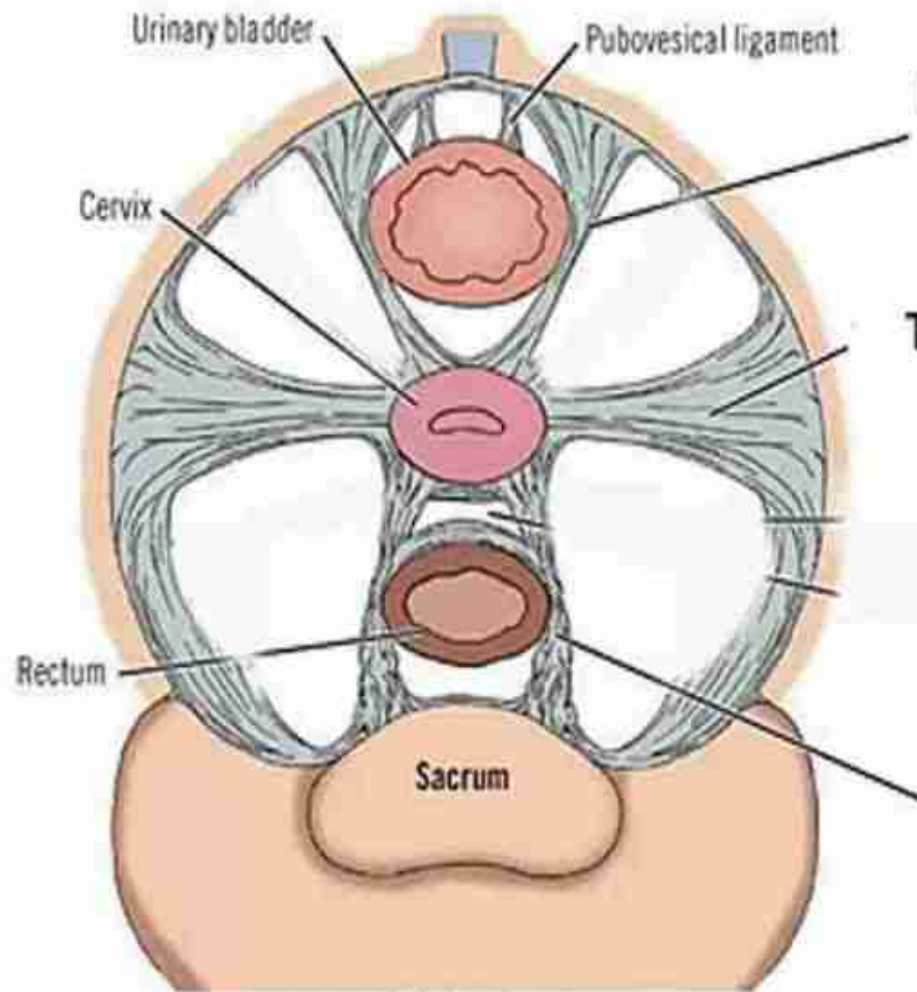
SUPPORTS OF UTERUS – DeLancey- 3 levels

LEVEL	MUSCLES/LIGAMENTS	DAMAGE CAUSES
I	UTEROSACRALS AND CARDINAL LIGAMENTS- UTERUS AND VAGINAL VAULT CERVIX-LEVEL OF ISCHIAL SPINES	UTERINE DESCENT, ENTEROCOELE, VAULT DESCENT
II	PELVIS FASCIA AND PARACOLPOS- vagina to white line on lateral pelvic wall through arcus tendinous fascia pelvis- PUBOCERVICAL FASCIA(antly) RECTOVAGINAL FASCIA AND SEPTUM POSTERIORLY	CYSTOCOELE, RECTOCOELE
III		

III

LEVATOR ANI – LOWER ONE
THIRD OF VAGINA- PLATFORM
AGAINST WHICH PELVIC
ORGANS GET COMPRESSED
DURING STRAINING

URETHROCOELE
GAPING INTROITUS
DEFICIENT PERINEUM

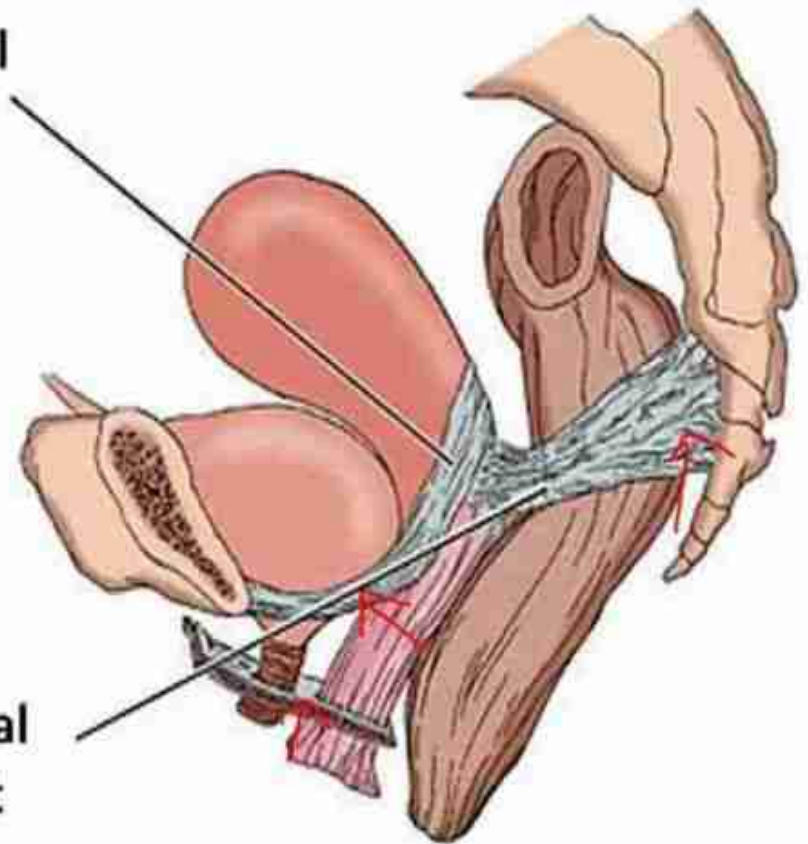


Inferior view

Pubocervical
Ligament

Transversal
Cervicall
Ligament

Uterosacral
Ligament



Lateral view

- **Level 1: Suspension axis uterus and vaginal vault(uterosacral, cardinal)**

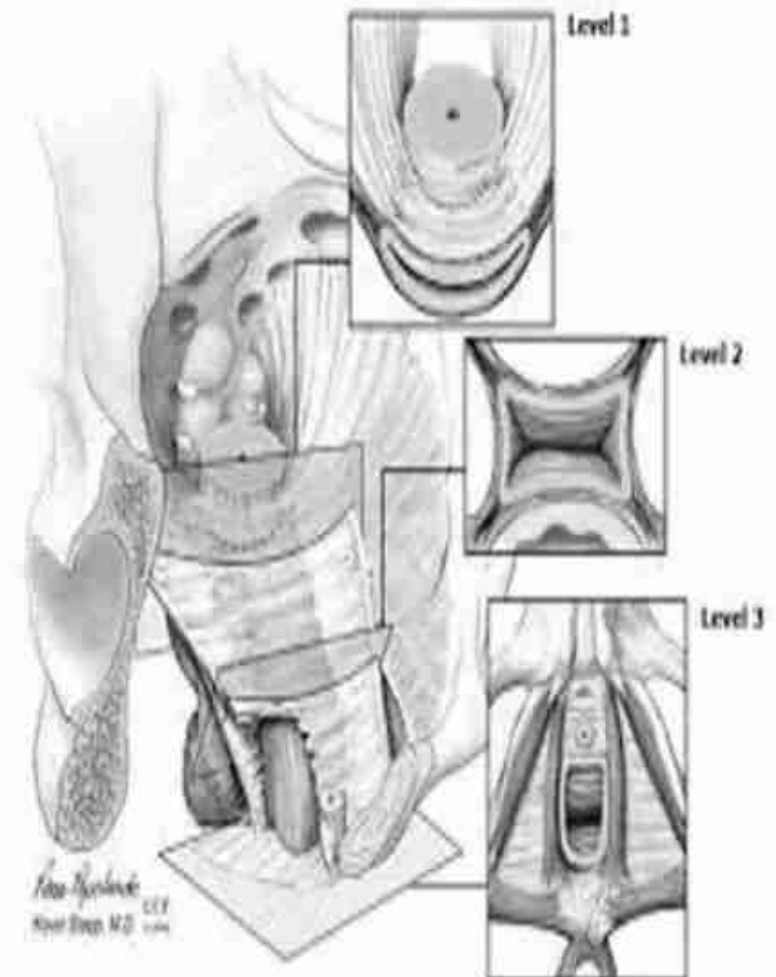
Loss of this support causes uterine and vault prolapse, enterocele

- Level 2: attachment axis bladder and rectum (pubocervical and rectovaginal fascia)

Loss of this support
result in cystocele and
rectocele, paravaginal,
pararectal,

- Level 3: Fusion (urogenital diaphragm/perineal body)

Causes laxity of perineum and patulous introitus, incontinence, cystocele, rectocele



Primary Supports

- Muscular
 - Pelvic diaphragm
 - Perineal body
 - Urogenital diaphragm
- Visceral
 - Urinary bladder
 - Vagina
 - Uterine axis
- Fibromuscular
 - Transverse cervical ligaments (of Mackenrodt)
 - Pubocervical ligaments
 - Uterosacral ligaments
 - Round ligaments of uterus



Secondary supports

- Broad ligament
- Uterovesical fold of peritoneum.
- Rectovaginal fold of peritoneum.

