Anatomy Of Pelvic Floor

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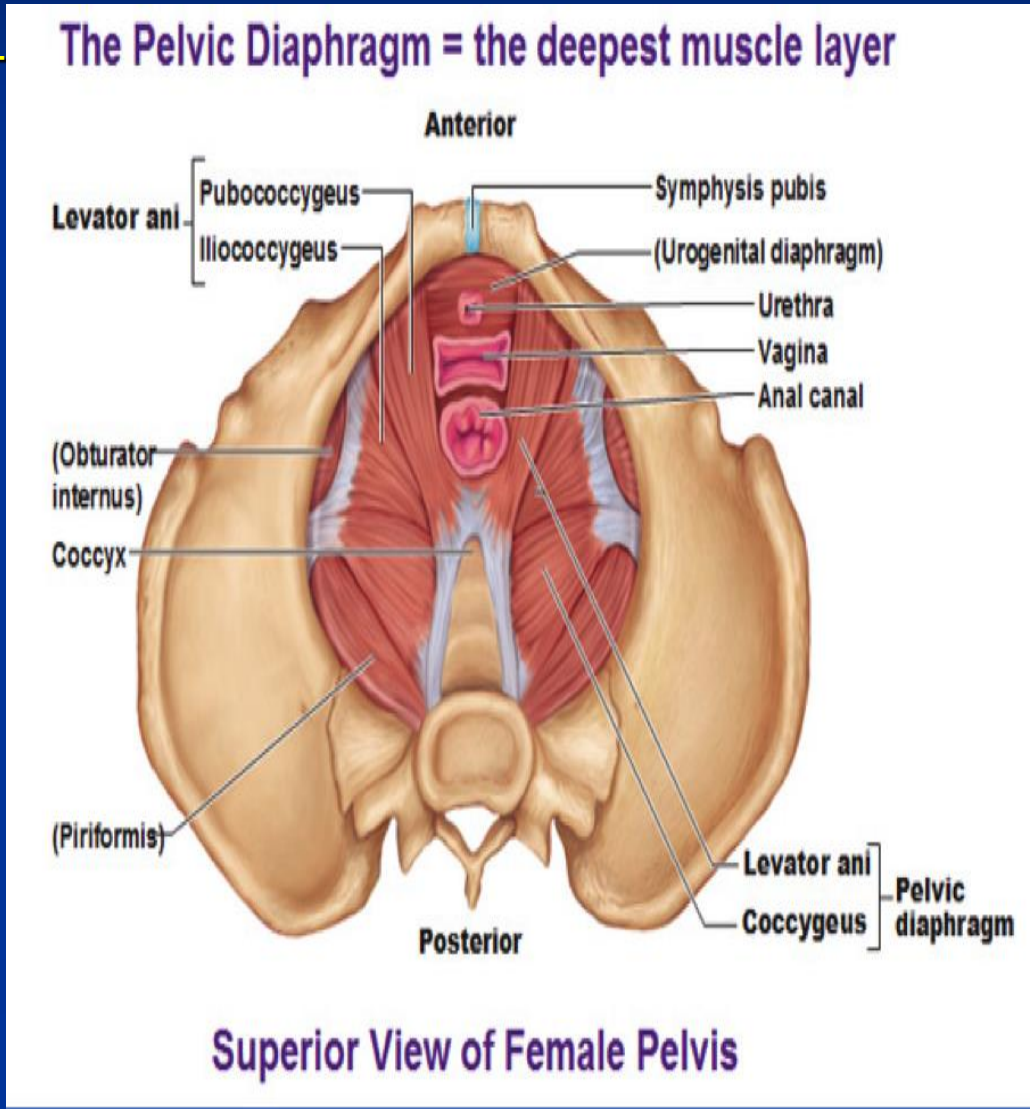
Pelvic diaphragm

Pelvic diaghragm/ levator ani muscle------

- 3 striated muscle-
  - Ileococcygeus.
  - Pubococcygeus.
  - Puborectalis.

Levator hiatus- btw 2 pubococcygeus-

  - Lower rectum.
  - Urethrae.
  - Dorsal v. of penis.
  - Vagina.



Perineum

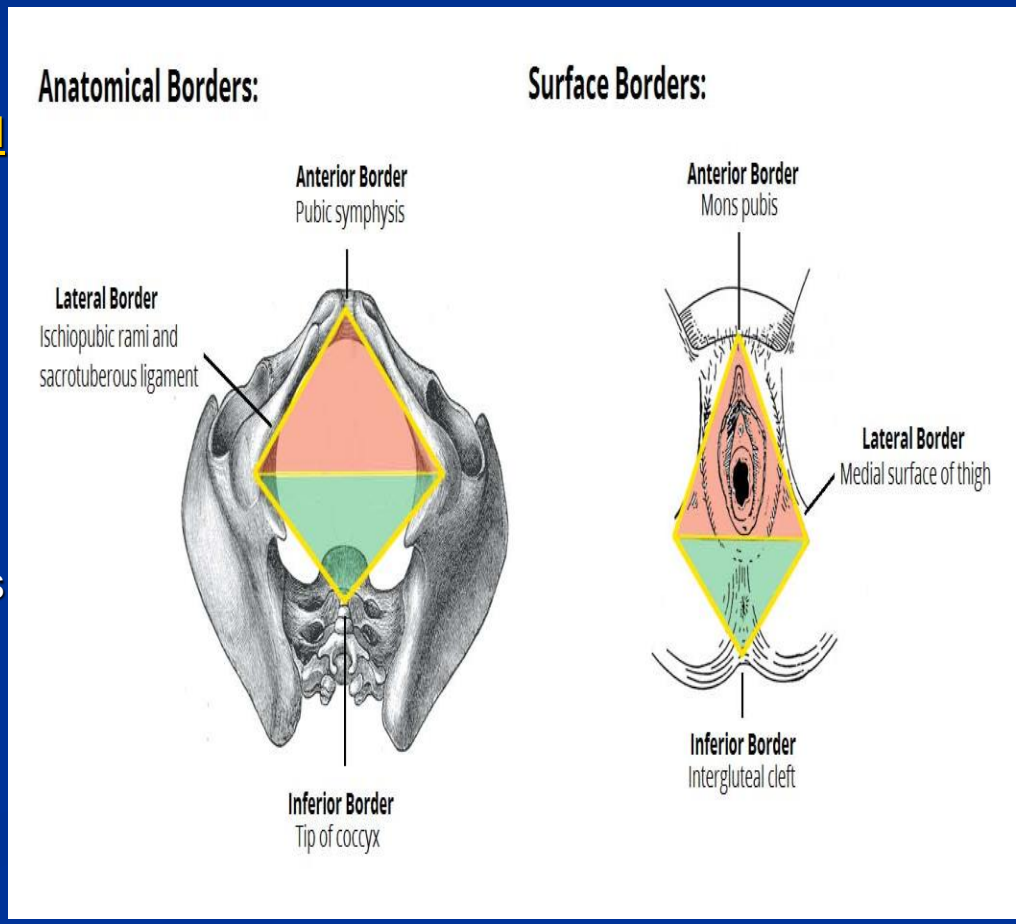
Region between the thighs inferior to the pelvic diaphragm.

- In front: pubic arch & arcuate ligament.
- Behind: tip of the coccyx
- Side: inferior rami of pubis and ischial tuberosity, & sacrotuberous ligament
- superiorly: pelvic floor
- inferiorly: skin and fascia.

Part:

Line connecting ischial tuberosities divides perineum into 2 triangles:

- Urogenital triangle -- penis or vagina.
- Anal triangle containing the anus.



The *perineal body* (or central tendon of *perineum*)

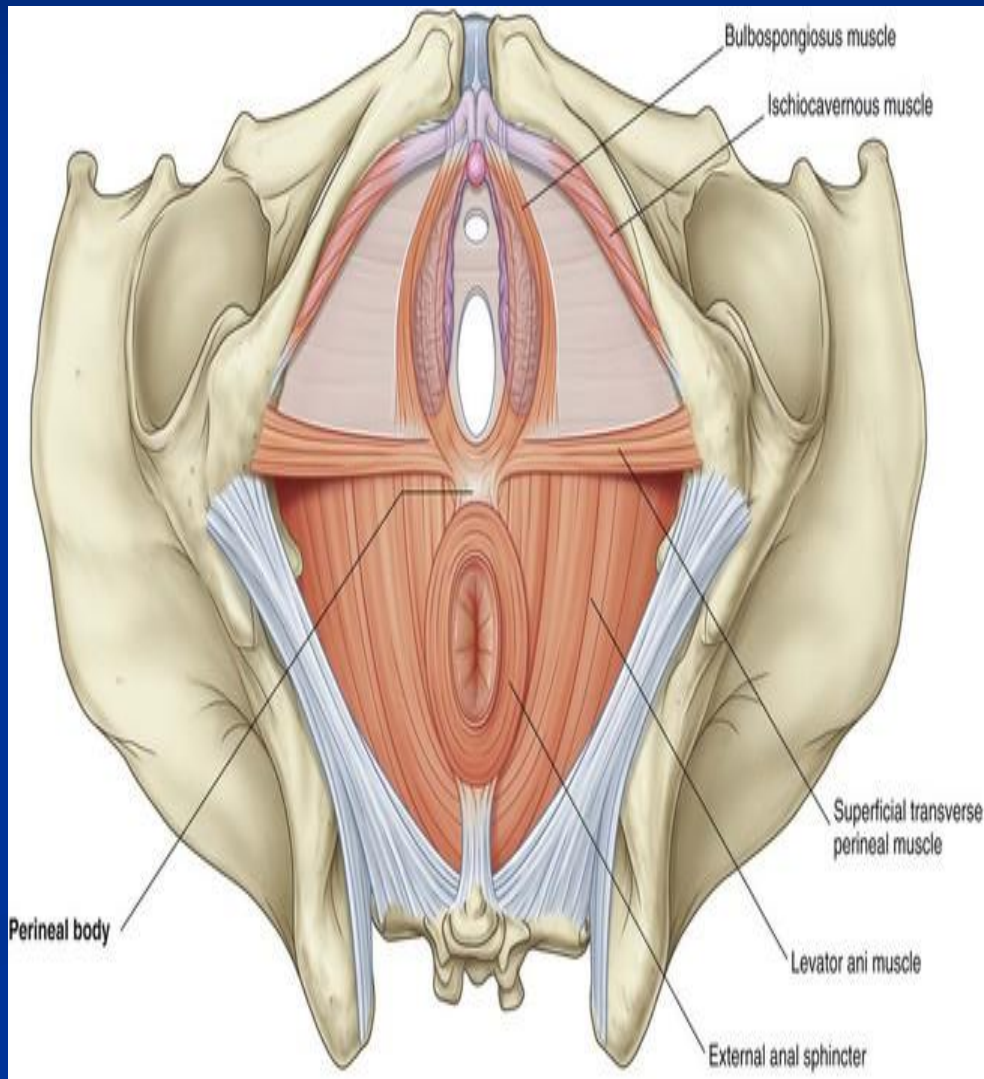
Pyramidal fibromuscular mass at the junction between the urogenital triangle and the anal triangle.

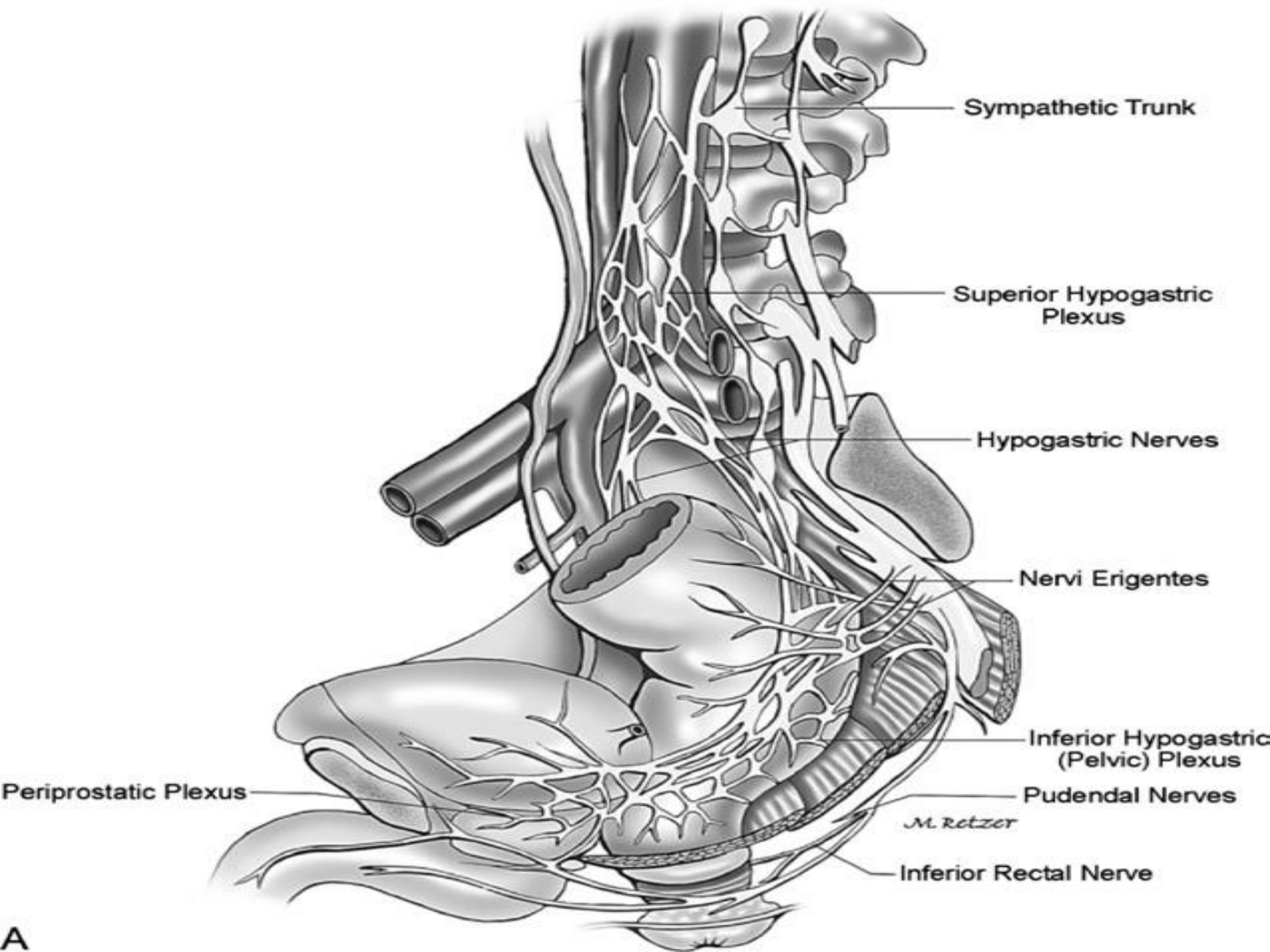
Location:

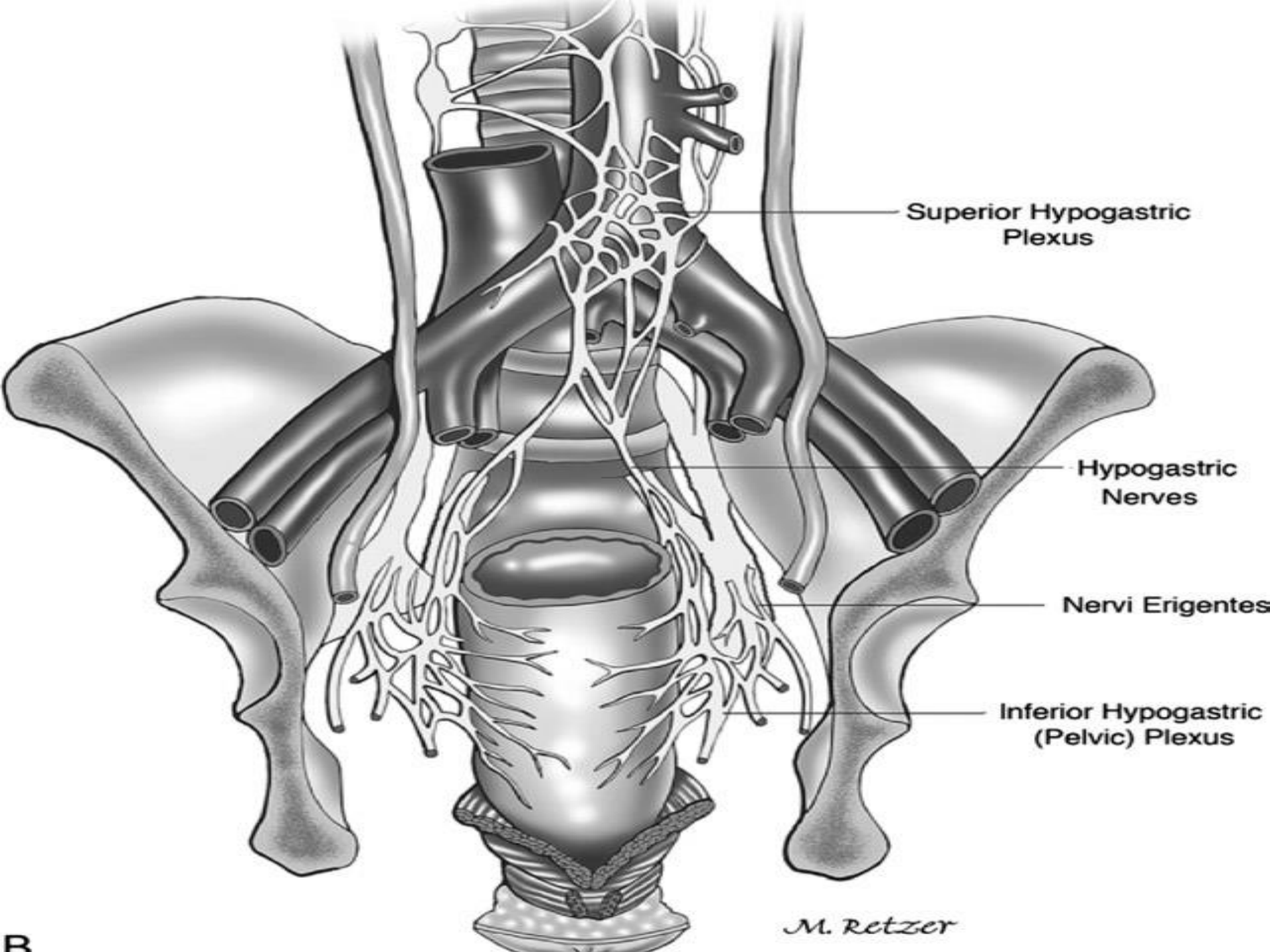
- In males--between the bulb of penis and the anus;
- In females--between the vagina and anus, & about 1.25 cm in front of anus.

Following muscles are attached:

- EAS.
- Bulbospongiosus muscle.
- Superficial transverse perineal muscle.
- Anterior fibers of the levator ani.
- Fibers from external urinary sphincter.
- Deep transverse perineal muscle.




Sympathetic Trunk
Superior Hypogastric Plexus
Hypogastric Nerves
Nervi Erigentes
Inferior Hypogastric (Pelvic) Plexus
Periprostatic Plexus
Pudendal Nerves
M. Retzer
Inferior Rectal Nerve
A


Superior Hypogastric Plexus
Hypogastric Nerves
Nervi Erigentes
Inferior Hypogastric (Pelvic) Plexus
M. Retzer
B

Trauma to the autonomic nerves may occur at several points-

During high ligation of the IMA-

- Close to the aorta.
- Sympathetic preaortic nerves.

At the level of sacral promontory or presacral region –

- Superior hypogastric plexus and hypogastric nerves.
- Sympathetic denervation with intact nervi erigentes -Retrograde ejaculation and bladder dysfunction.

Dissection of posterolateral aspect of pelvis-

- Nervi erigentes---posterolateral aspect of the pelvis,
- Completely abolishes erectile function.

The pelvic plexus may be damaged ---

- Excessive traction on the rectum, particularly laterally, or
- Division of lateral stalks close to the lateral pelvic wall.

Dissection near seminal vesicles and prostate----

- Damage periprostatic plexus,
- Leads to mixed parasympathetic and sympathetic injury.
- Result in erectile impotence as well as a flaccid, neurogenic bladder.
- Sexual complications are readily evident in men but probably under diagnosed in women.

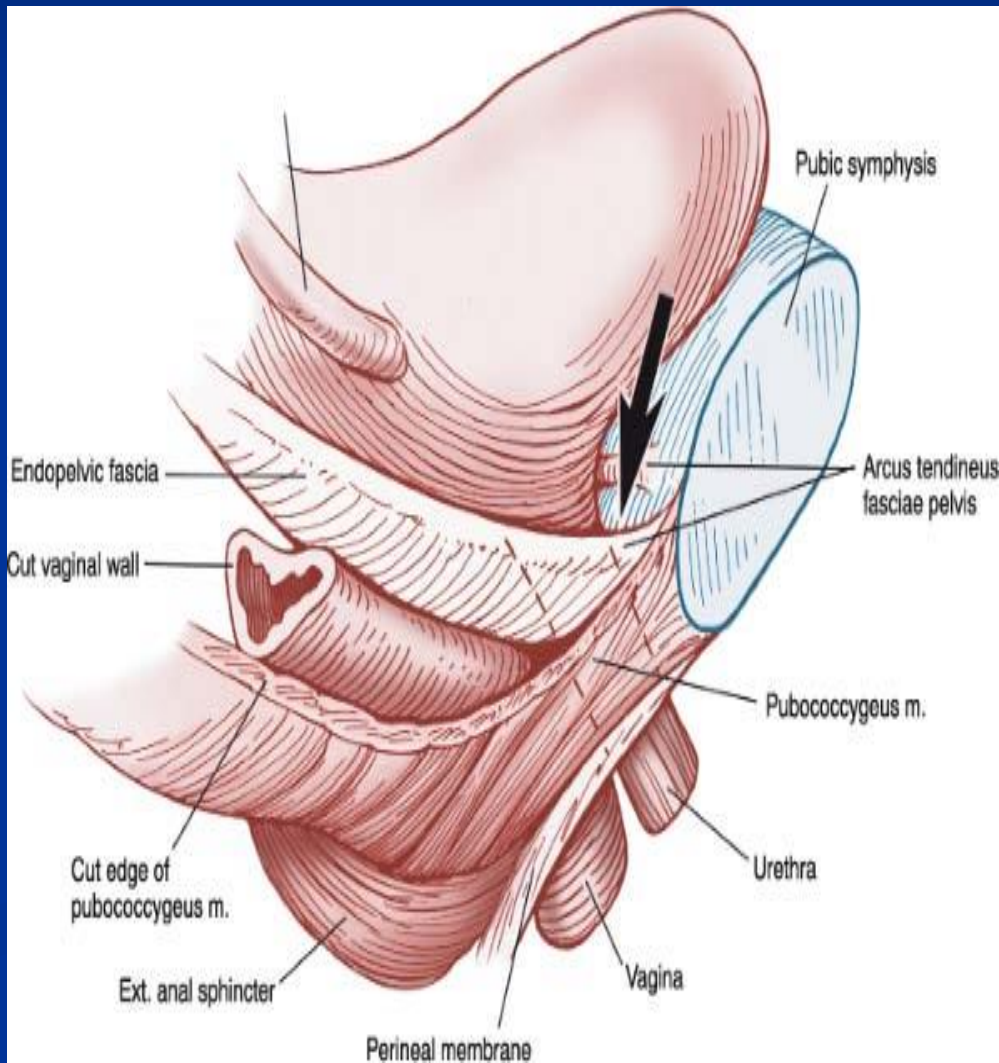
Fascial Relationships of the Rectum

Endopelvic or endovisceral fascia:

- More complex and controversial structure.
- Between visceral peritoneum and parietal fascia of the levator ani.
- Fibroareolar tissue containing neurovascular bundles, smooth muscles, collagen, and elastin.

Layers:

- Parietal endopelvic fascia lines the walls and floor of the pelvis and
- Continues as a visceral pelvic fascia.



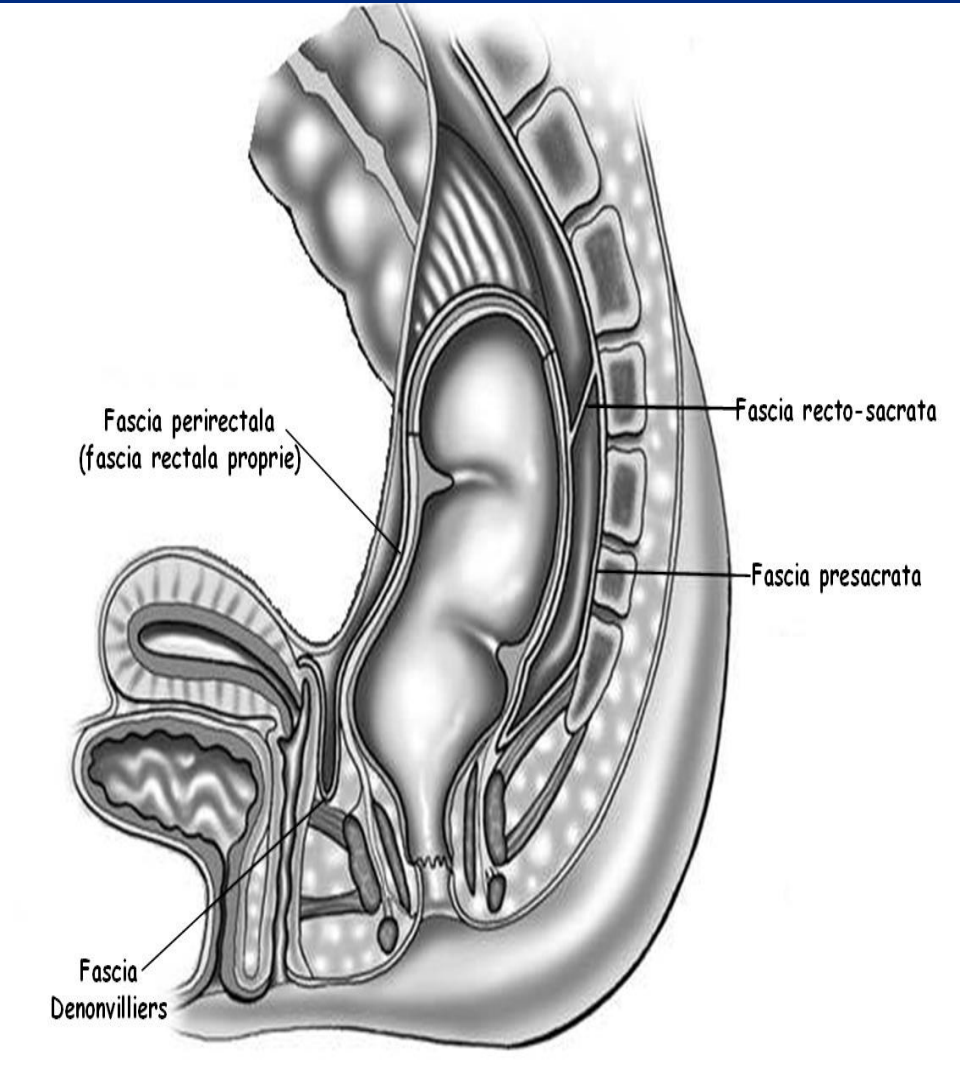
The presacral fascia

Thickened parietal endopelvic fascia.

- Covers the concavity of the sacrum and coccyx, nerves, the middle sacral artery, and presacral veins.

Extension:

- Postero-inferiorly it fuses with the mesorectal fascia, above the levator ani muscle, at the level of the anorectal junction.

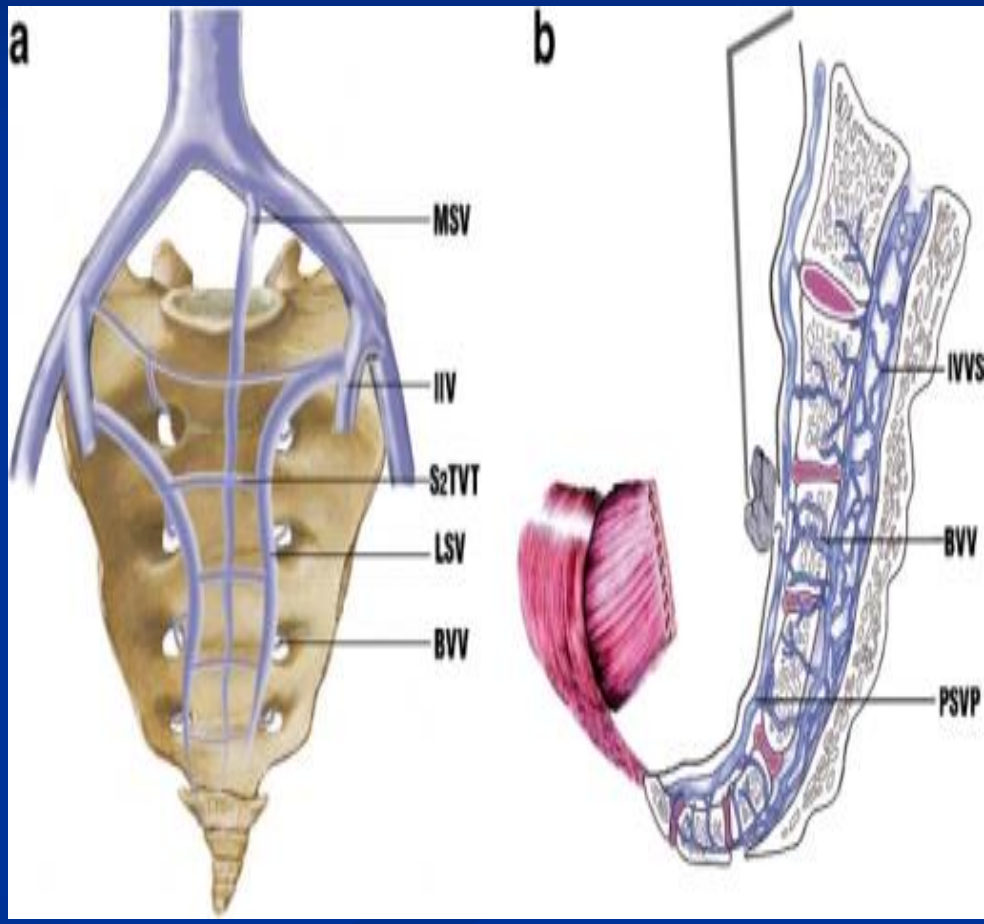


The presacral fascia

Inter fascial plane -- “Holy plane“- Heald RJ.

Dissection deep to presacral fascia-

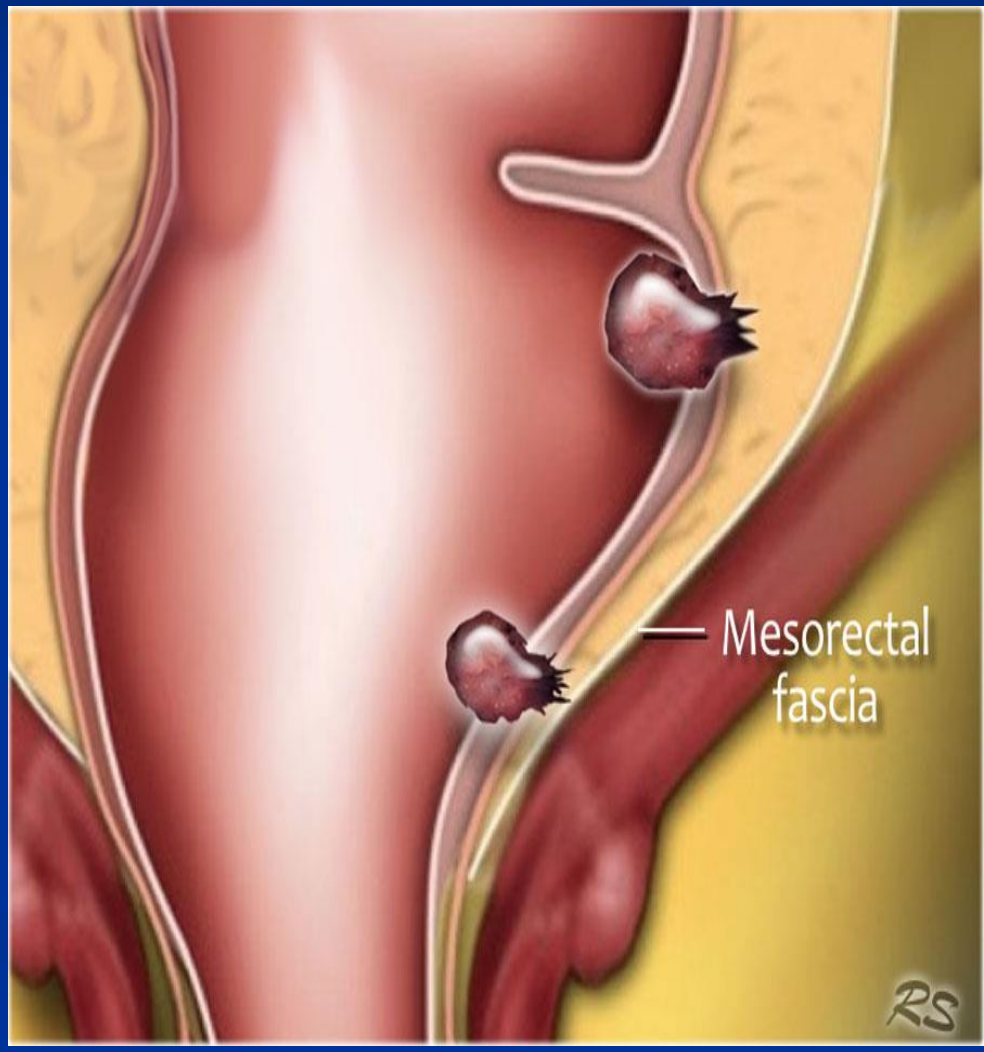
- Presacral hemorrhage--4.6–7.0%.
  - Difficulty in control as
    - Retraction.
    - High hydrostatic pressure--17–23 cm H2O, 2 -3 times the pressure of IVC.
  - Valveless veins communicate via basivertebral veins with the internal vertebral venous system.



Mesorectal fascia / fascia propria or the pelvic visceral fascia-

Extension of pelvic fascia, enclosing --

- The rectum.
- Fat, nerves, the blood, and lymphatic vessels.
- More evident in the posterior and lateral extraperitoneal aspects of the rectum.



Waldeyer's Fascia / Rectosacral fascia

Thick fascial reflection----

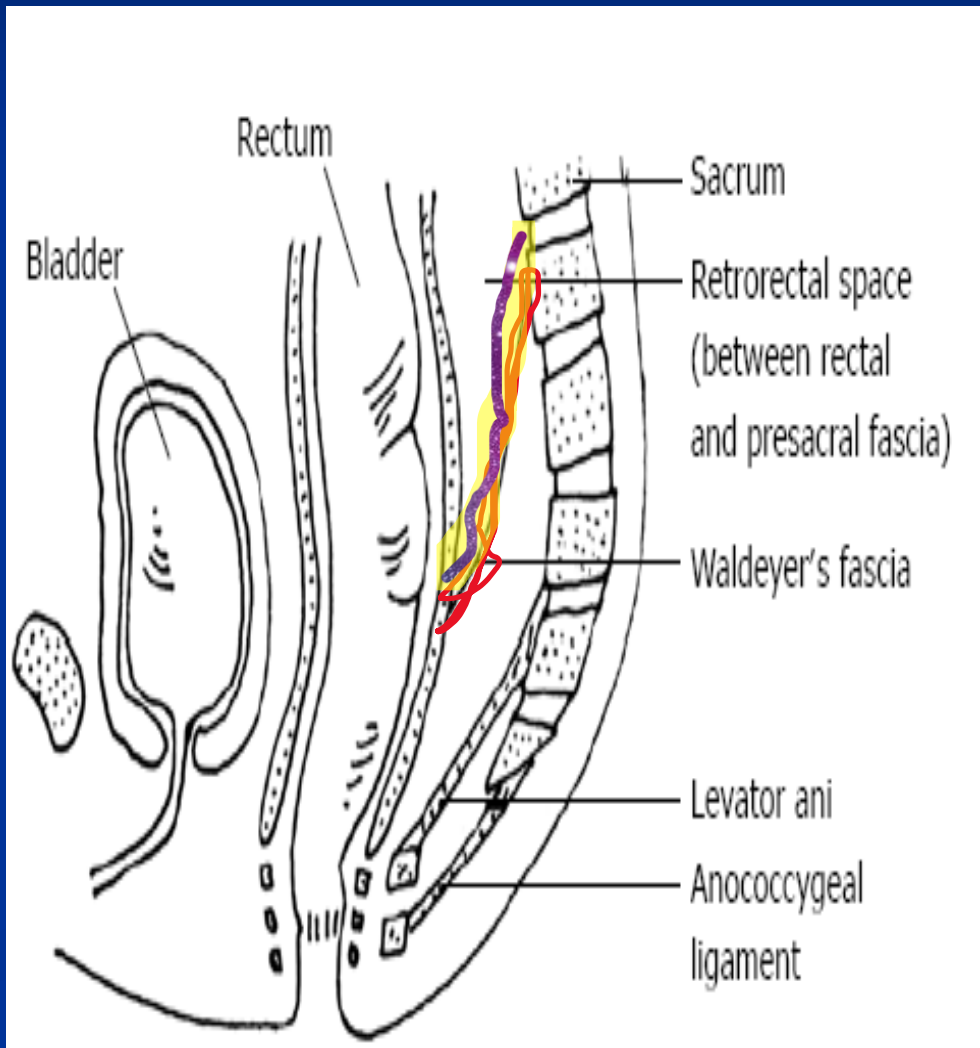
- From presacral fascia at S-4 level to fascia propria of the rectum just above the anorectal ring.
- Important landmark of posterior dissection.
- In 97% of cadaver dissections.

Contains-

- Branches of sacral splanchnic nerves arise directly from the sacral sympathetic ganglion.
- May contain branches of the lateral and median sacral vessels.

Importance:

- Sharply divided for full mobilization of the rectum.



Denonvilliers' Fascia

Anterior to the fascia propria----delicate layer of connective tissue.

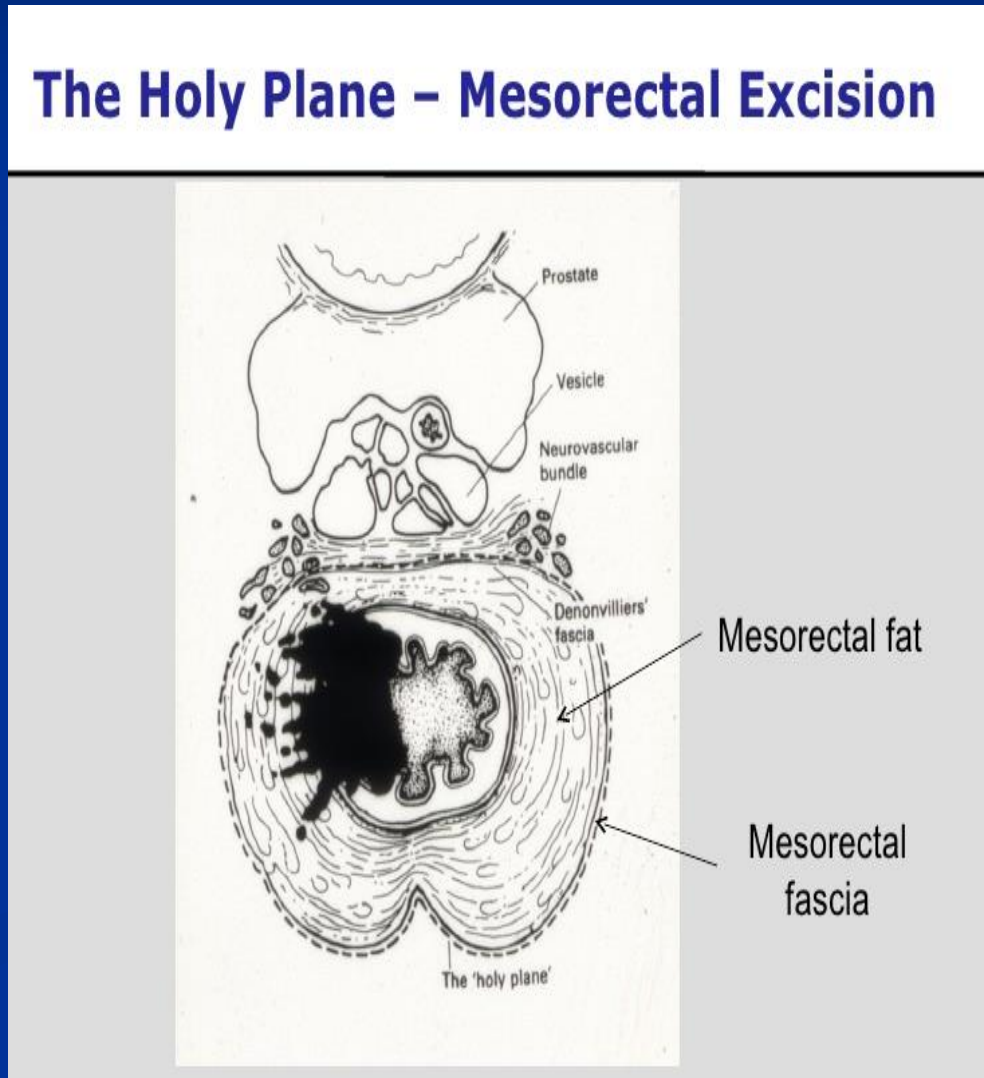
- It separates the rectum from the seminal vesicles and the prostate or vagina.

Morphology:

- No macroscopically discernible layers.

Histologically, composed of—

- dense collagen,
- smooth muscle fibers, and
- coarse elastic fibers.



Denonvilliers' fascia.

Its attachments have been surrounded by confusion and debates.

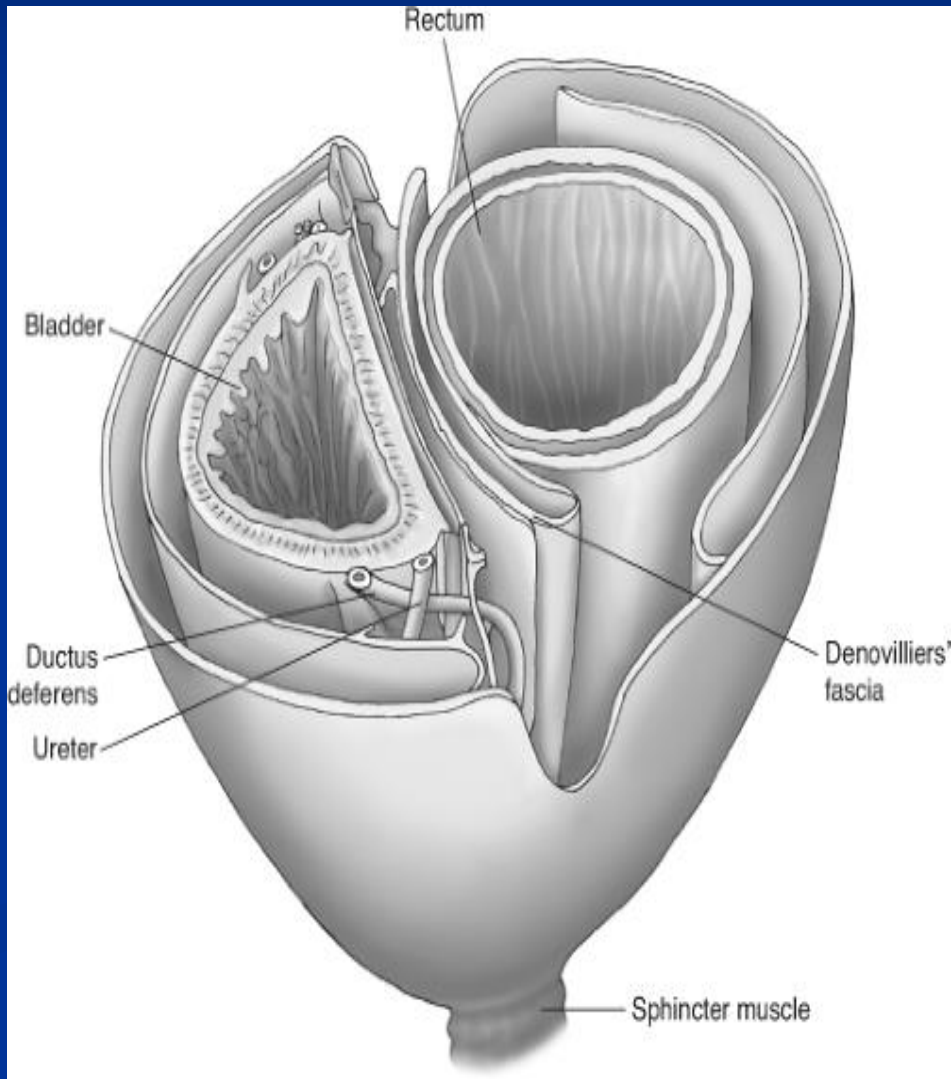
- Some believes it is adherent to the rectum,
- others note that it is applied to the seminal vesicles and prostate.

3 structures lie in front of rectal wall---

- Mesorectum
- Fascia propria and
- Denonvilliers' fascia.

Importance:

- Plane of anterior dissection is more controversial.
- Not necessarily follow the same plane of posterior and lateral dissection



Anterior plane of dissection—

Close rectal
Mesorectal
Extramesorectal.

Close rectal or perimuscular plane –

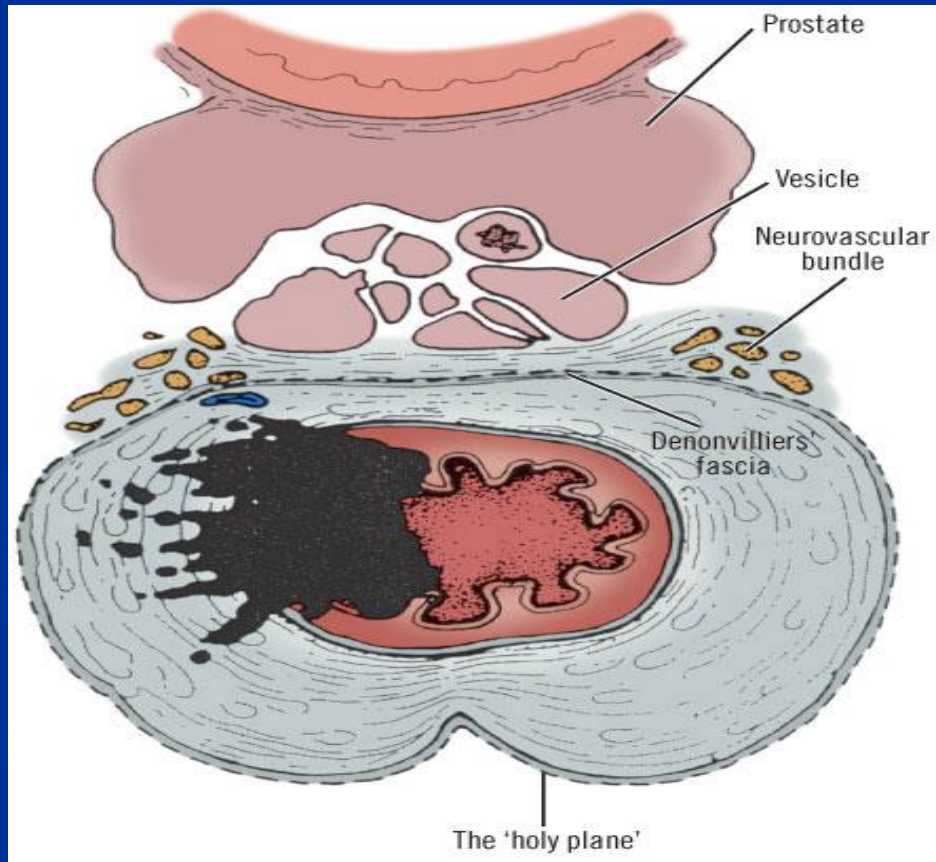
- Inside the fascia propria of the rectum,
- More difficult and bloody.

Mesorectal plane---

- Natural anatomic plane.
- More appropriate.

Extramesorectal plane---

- Resection of the DF with the exposure of prostate and seminal vesicles
- High risk of mixed nerve injury-- damage of the periprostatic plexus.

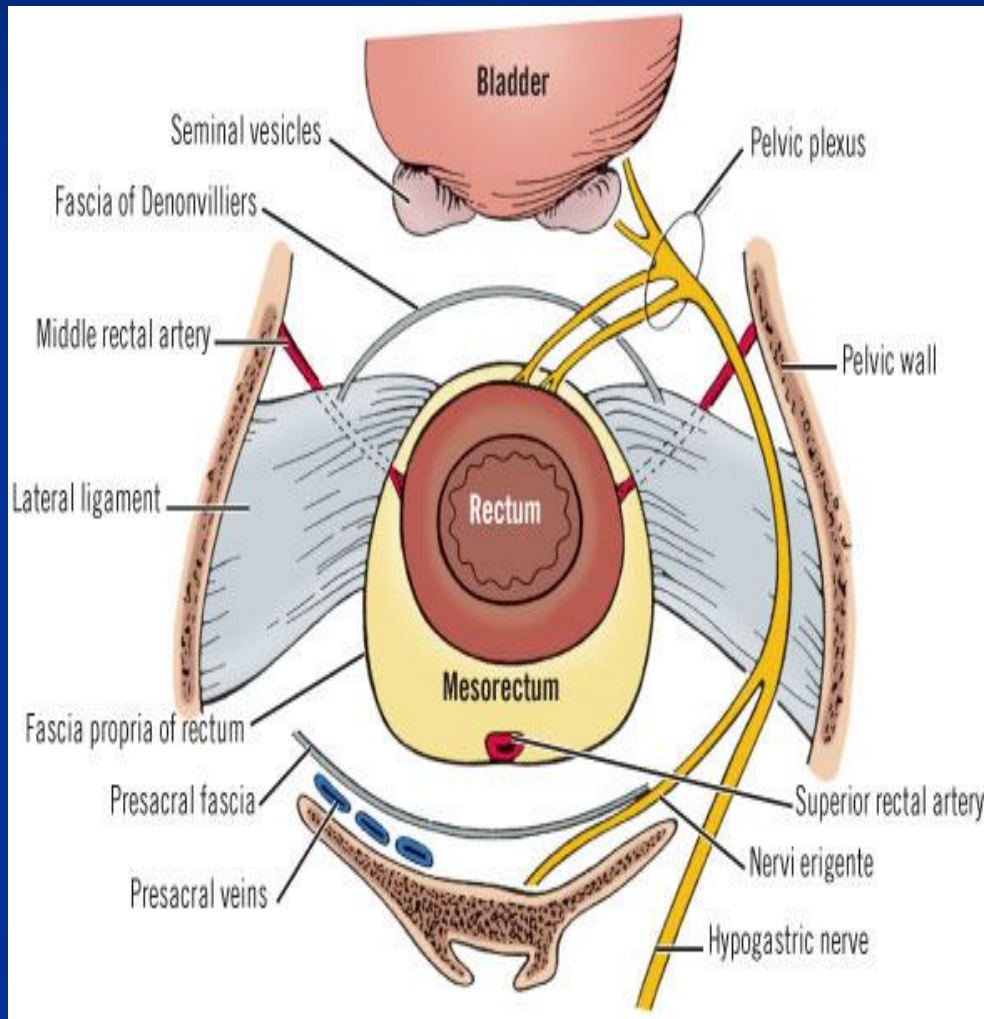


The lateral ligaments or stalks of the rectum—

- Distal condensations of the pelvic fascia.
- Roughly triangular .
- Base on the lateral pelvic wall and an apex to the lateral aspect of the rectum.

Importance:

- Do not contain important structures.
- MRA & pelvic plexus---closely related.
- Division --- 25% risk of bleeding.



Pelvic floor disorder

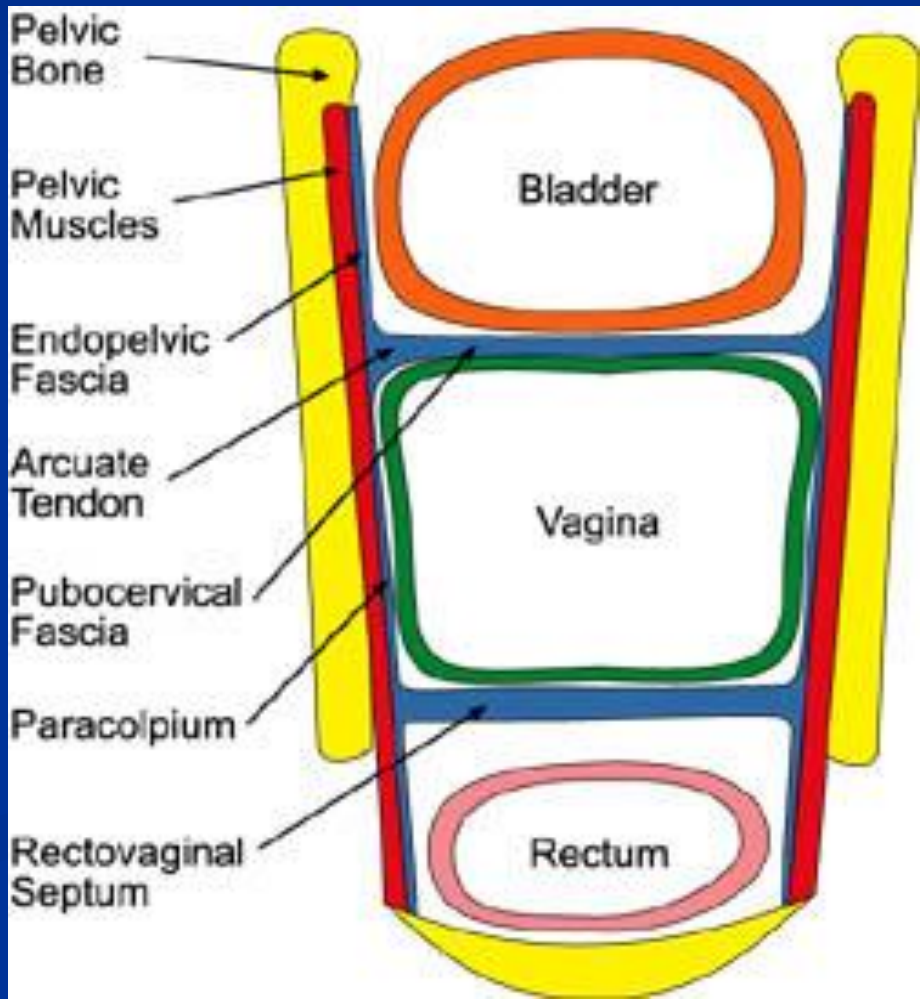
Results from loss of pelvic floor support.

Sex variation:

- Commonly women-
  - Anatomical differences in the size of the genital hiatus.
- More in aged person.

The exact etiology: unclear.

- Chronic stretching of the pelvic muscles leads to myopathic injury.



Pelvic floor disorder

Anterior compartment (urinary)----

- Cystocele.
- Hypermobile bladder neck.

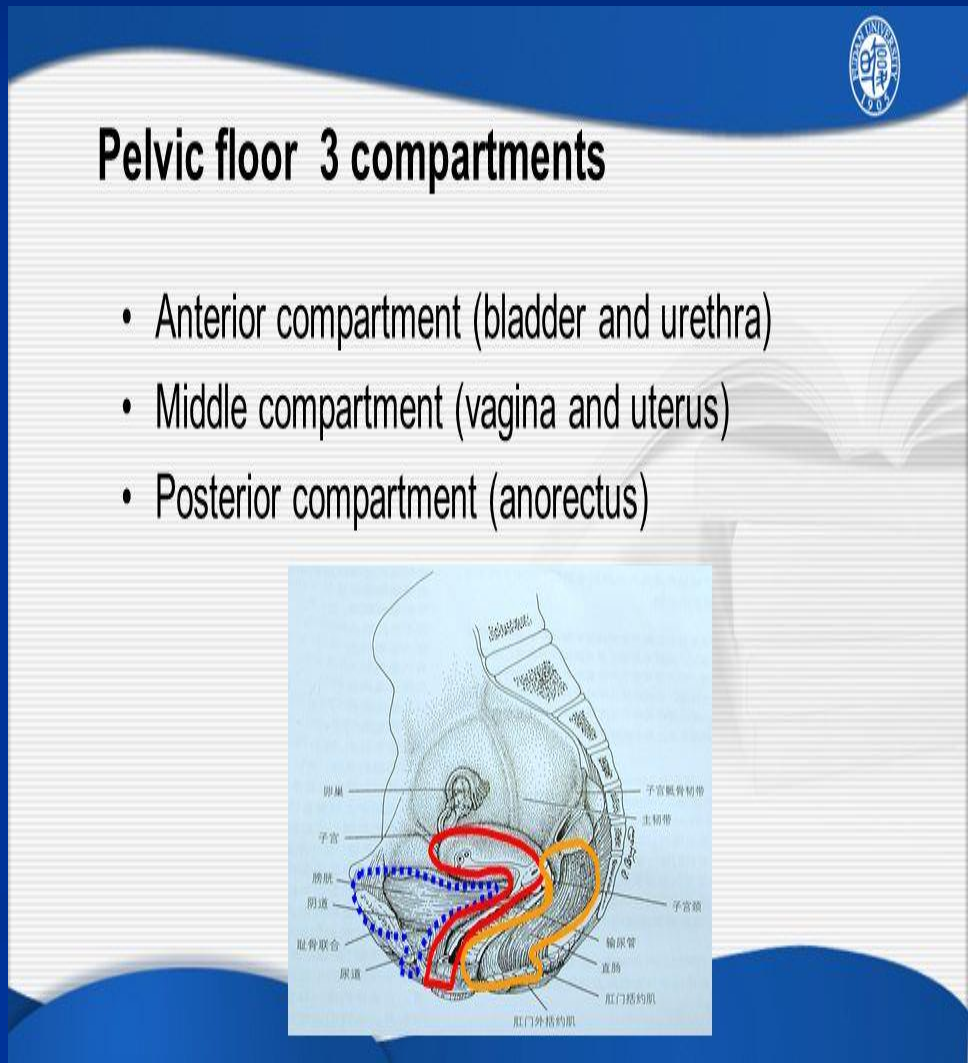
Middle compartment(genital)-----

- Vaginal vault prolapse.
- Uterine prolapse.

Posterior compartment (anorectal)---

- Rectocele.
- Enterocele.
- Rectal Intussusception.

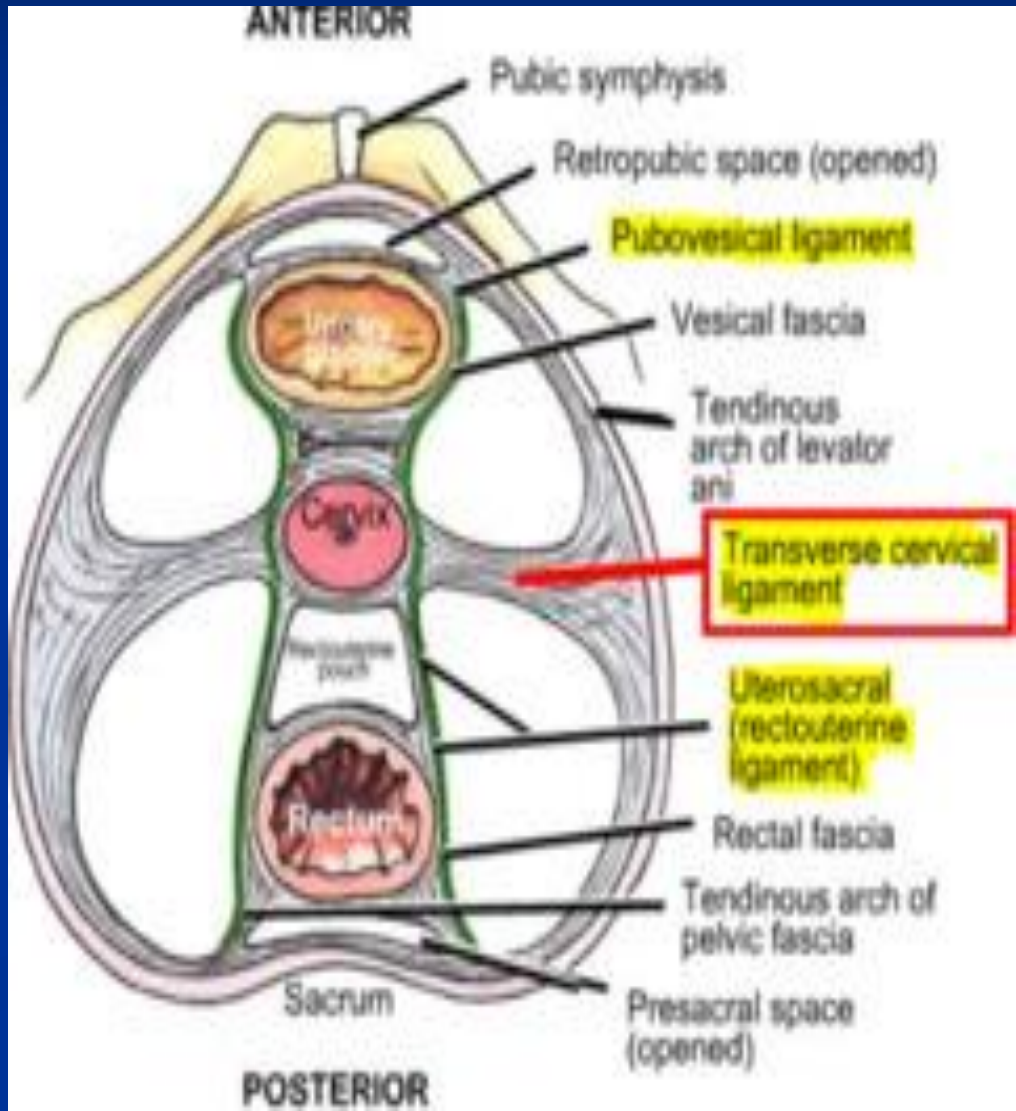
- 95% of the women with pelvic floor dysfunction had abnormalities of all 3 compartments.



Pelvic compartment

Investigation:

- Dynamic cystoproctography or cystodefecography
- 4 contrast study to outline—
  - SI ,
  - bladder
  - vagina,
  - rectum.



Pelvic Floor Descent/ Failure

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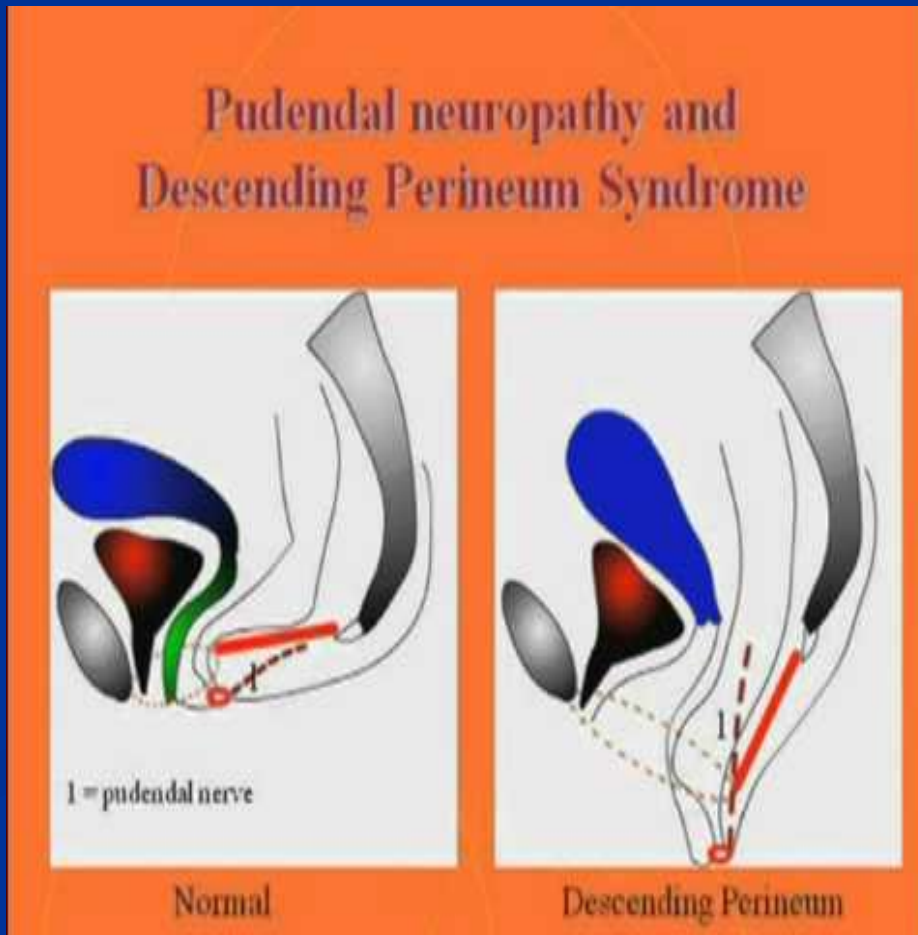
Excessive perineal descent -

- FI,
- Severe constipation,
- SRUS,
- anterior mucosal and full-thickness rectal prolapse.
- Urinary voiding problem.

Pathophysiology:

- Abnormal perineal descent, during straining, ----traction and damage to the pudendal & pelvic floor nerves---- neuropathy & muscular atrophy.
- Irreversible pudendal nerve damage occurs after a stretch of 12% of its length, and
- Descent of perineum of 2 cm, estimated to cause pudendal nerve stretching of 20%.



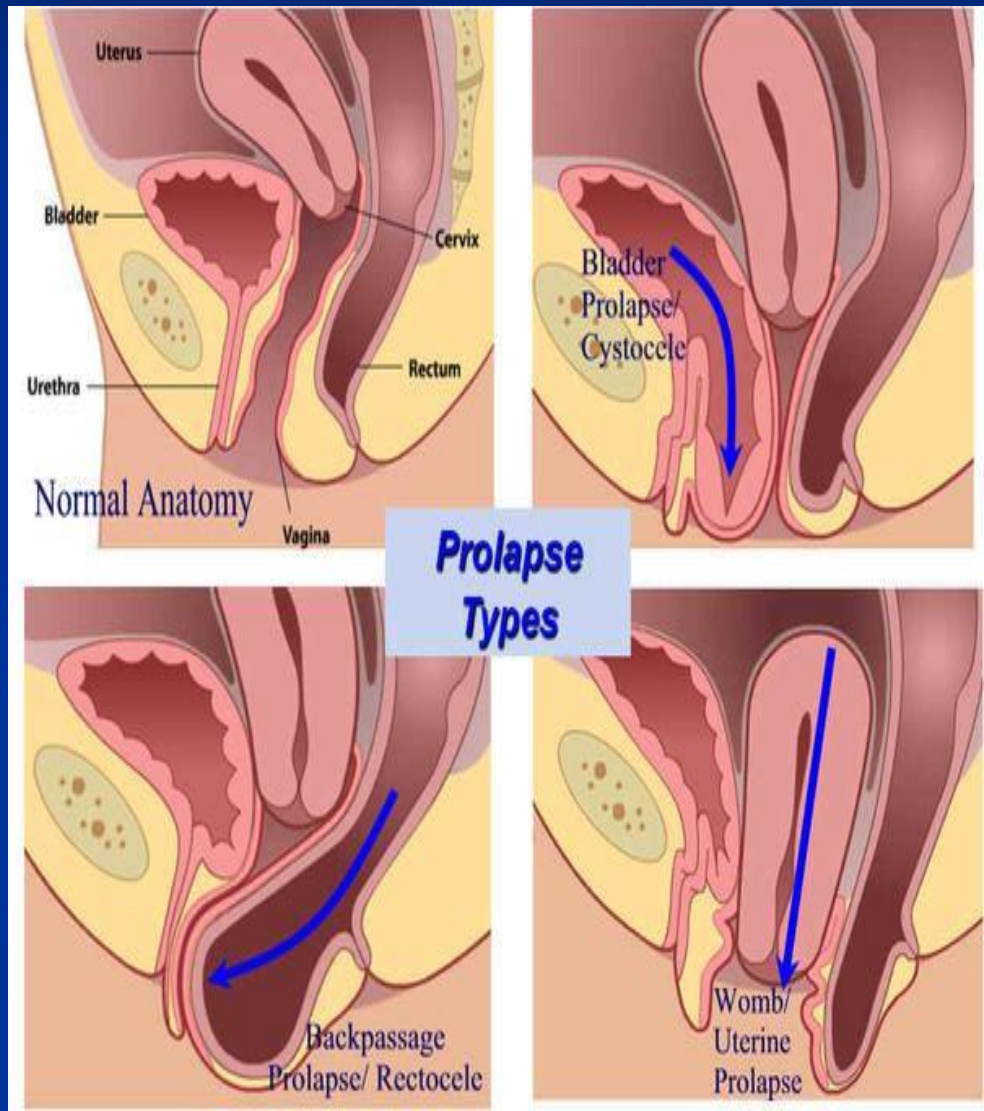
Diagnosis:

Precipitating factor :

- Chronic straining- 75% of subjects.
- Increased age
- Female.
- Neuropathy.
- **Chronic illness**
- **Malnutrition**
- **Internal prolapse**
- **Genitourinary & rectal prolapse.**

O/E-

- Obliteration of perineal concavity- outward ballooning of perineum.
- Genital or rectal prolapse.



Investigation:

St Mark's perineometer placed on the ischial tuberosities---movable latex cylinder on the perineal skin----The distance between the level of the perineum and the ischial tuberosities is measured at rest & straining.

Interpretation:

- **Negative- plane** of the perineum is above the tuberosities.
- Positive- descent below this level.
- The plane of the perineum at rest should be −2.5±0.6 cm, descending to +0.9±1.0 cm on straining.

Dynamic proctography- The anorectal angle normally lies on a PCL & descends by 2±0.3 cm on straining.

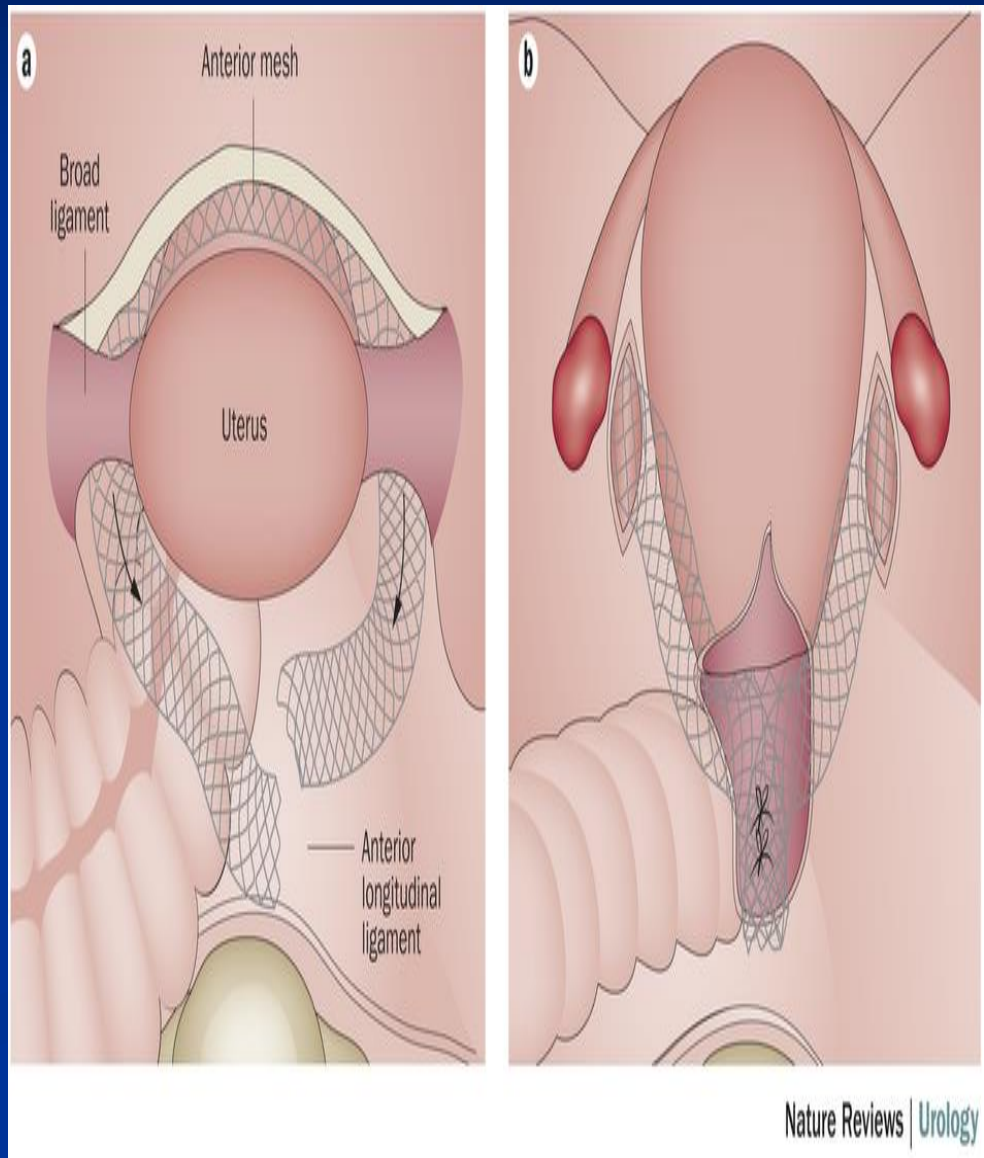
- In DPS----descends 5-6 cm from PCL.

Management:

- Dietary fibre
- Laxative.
- Bowel training----avoid straining.

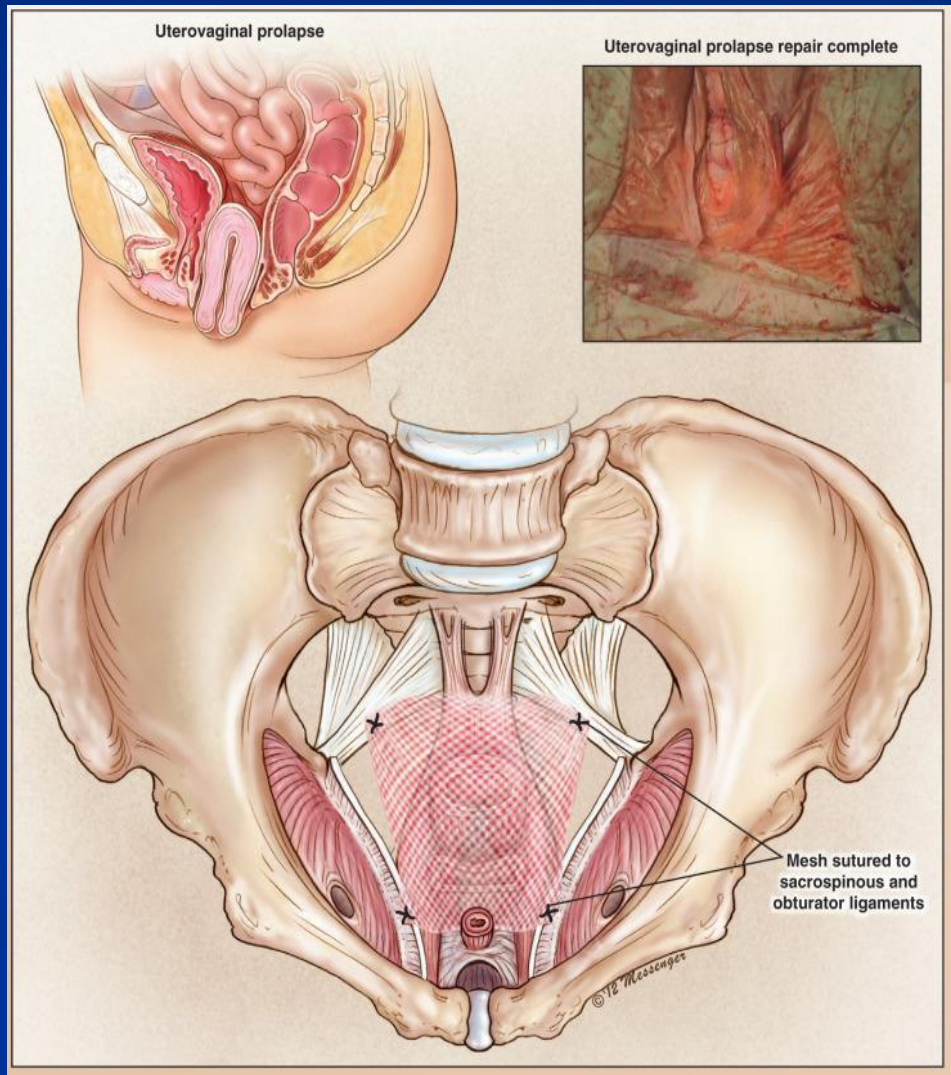
Surgery:

- Restoration of pelvic floor by
  - mesh &
  - suspension or
  - resection of rectum.
- Combined- abd. Colporectopexy with obliteration of Cul De sac.
- Combined abdominoperineal approach -colporectopexy with plication of levator & ant. Perineorrhaphy.



In pelvic floor laxity- cystocele rectocele enterocele-----

- Total pelvic Marlex mesh repair.



Rectocele

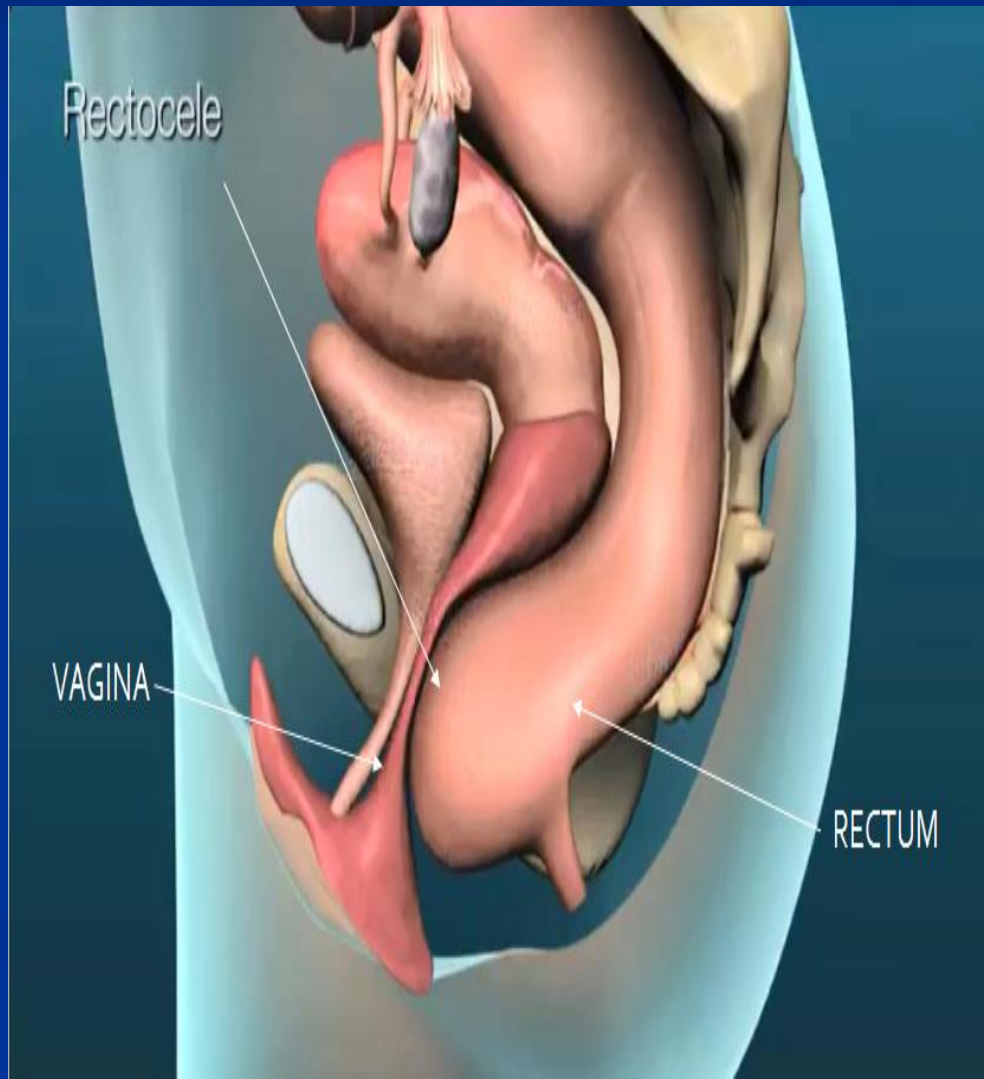
Herniation of the anterior rectal wall into the lumen of the vagina.

Pathogenesis:

- Chronic straining on a weakened rectovaginal septum both by-
  - obstetric trauma and
  - Progressive pelvic floor deficiency, as part of the aging process.
- Others believe that rectoceles ---ODS by trapping of feces---further straining ---aggravates the problem.
- 4^{th} or 5^{th} decade of life.

5 most common presenting symptoms---

- excessive straining,
- incomplete evacuation,
- manual assistance required,
- sense of fullness,
- Bowel movement <3/week.



Diagnosis:

- adequate history
- bimanual or rectovaginal palpation.
- **A hooked finger -** pocket-like defect.
- Defecography- <2 cm=insignificant.
  - >3 cm in depth- abnormal.

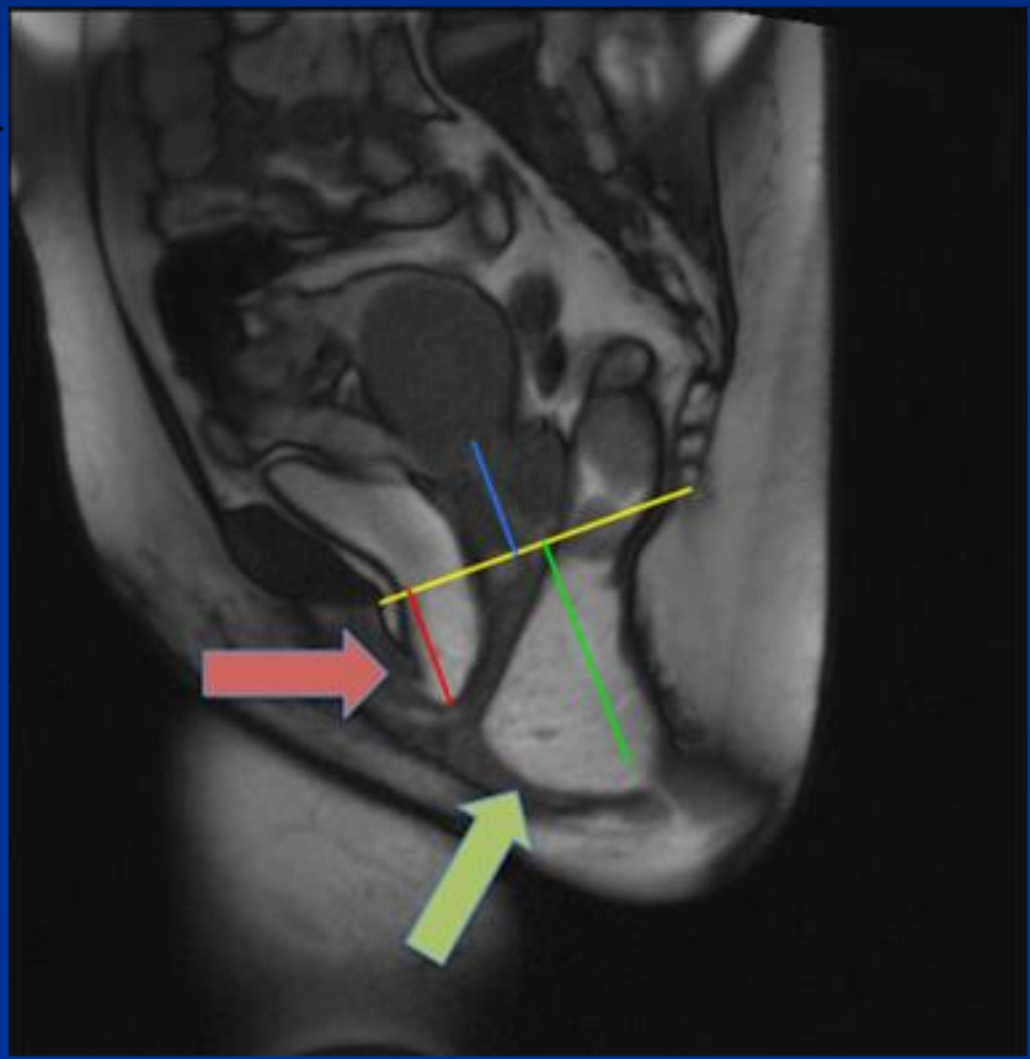
Investigation:

Defecography –

- Size,
- Barium trapping,
- Intussusception,
- evacuation, and perineal descent

Serves 3 major purposes:

- Preoperative presence and size,
- Additional pelvic floor abnormalities,
- Assessment of postop changes.



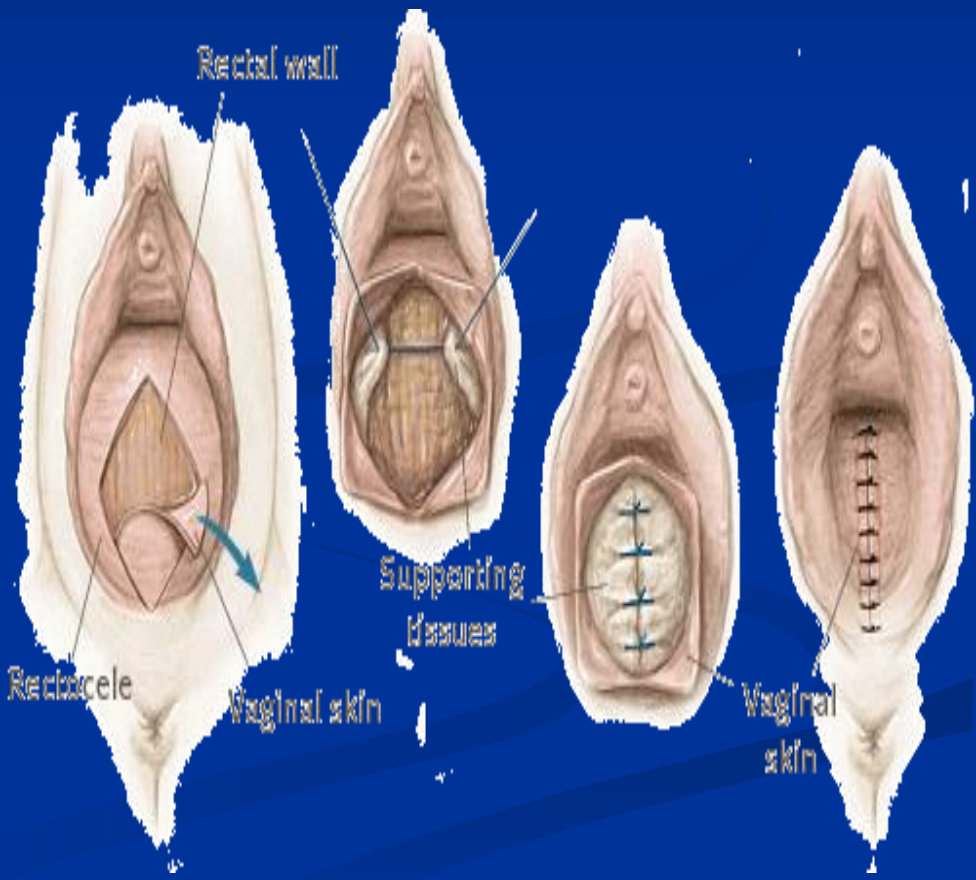
Rectocele Repair

- Transvaginal,
- Transanal
- Transperineal
- Abdominal.

Till now it is not known which treatment is the most optimal one.

Prognosis:

- Previous hysterectomy,
- Large rectocele on defecography,
- Preop. use of enemas & laxatives related to a poor outcome.



The supralevator space

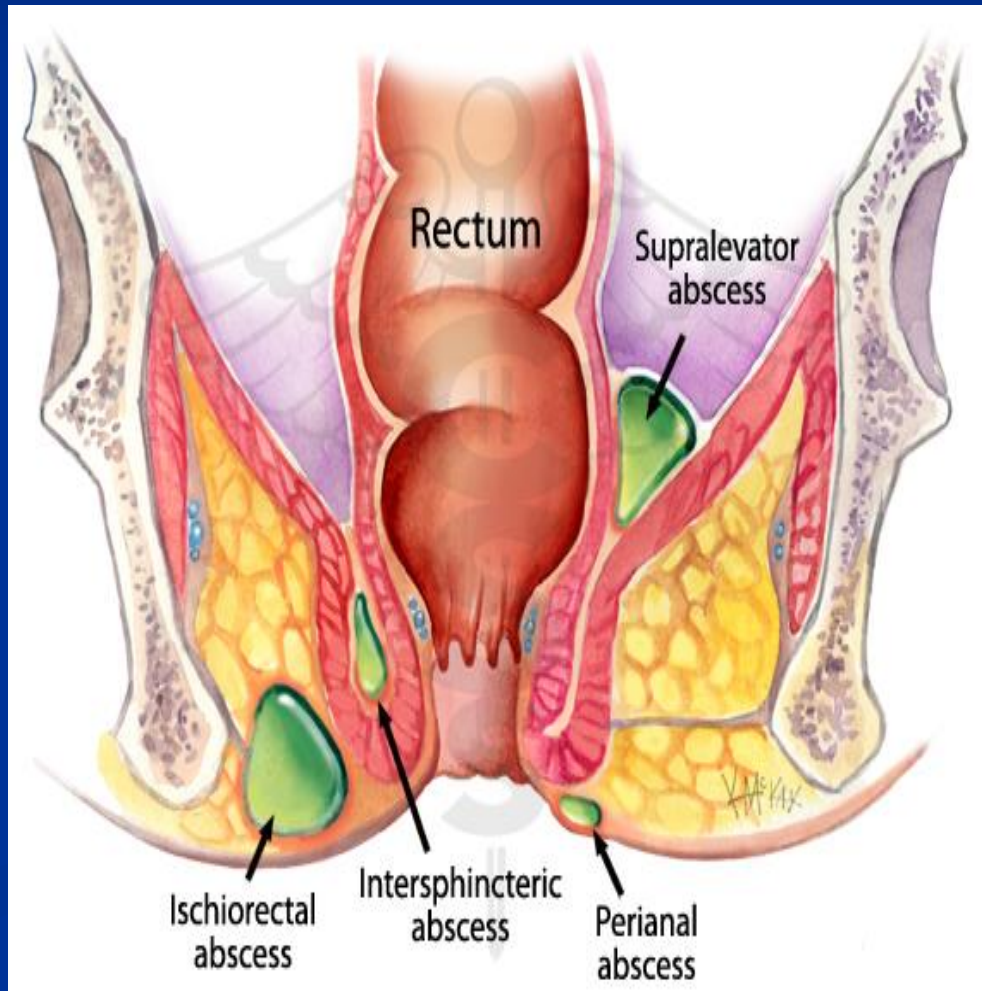
Bounded by---

- peritoneum superiorly
- levator ani inferiorly.
- Medially rectum and
- laterally obturator fascia.

Importance:

- Abscess may occur in 1of 3 ways:
  - From upward extension of
    - Intersphincteric abscess,
    - Ischioanal abscess, or
  - from a pelvic disease such as
    - perforated diverticulitis,
    - Crohn's disease, or
    - Appendicitis.

- Difficult to distinguish the exact mechanism of origin.



Postanal Space

Superficial postanal space-

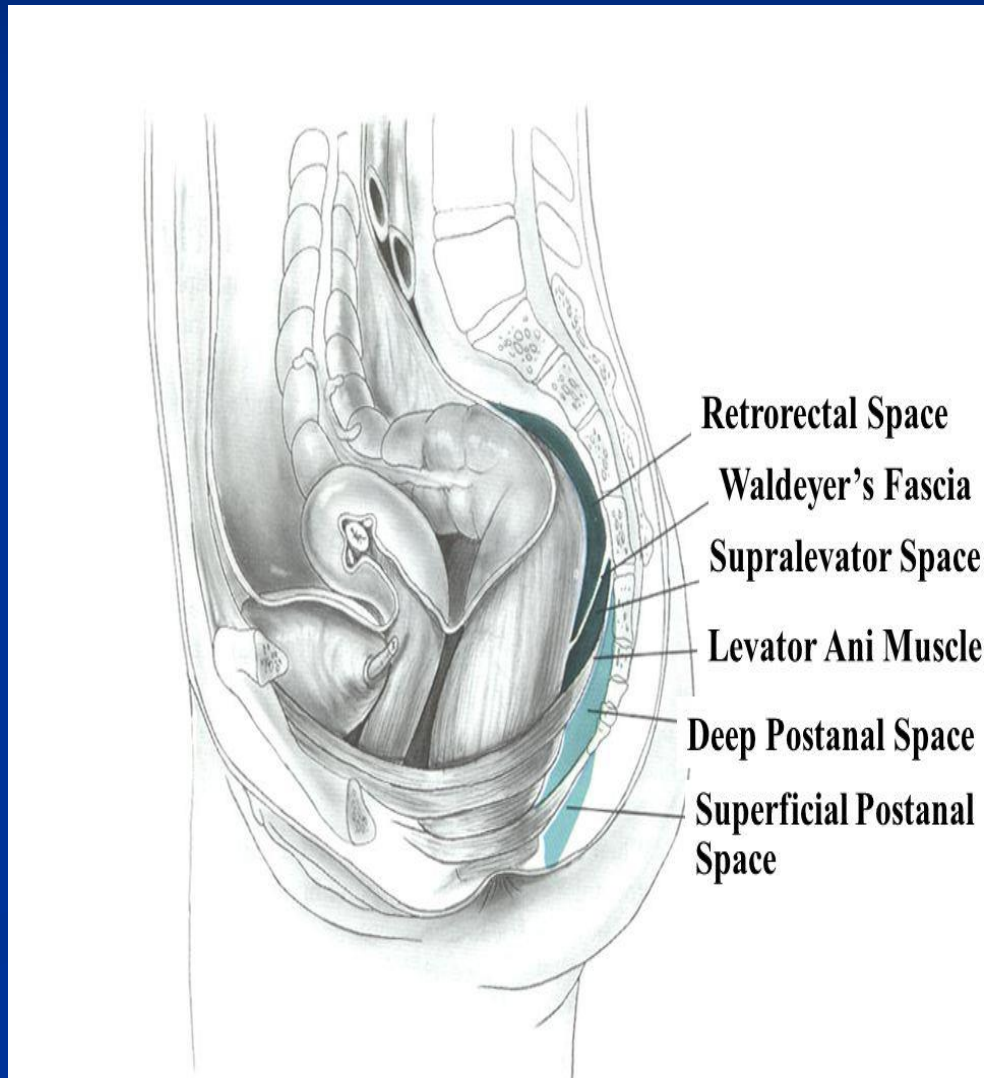
- between the anococcygeal ligament and the skin.

Deep postanal space –

- between the anococcygeal ligament and the anococcygeal raphe.

Clinical importance:

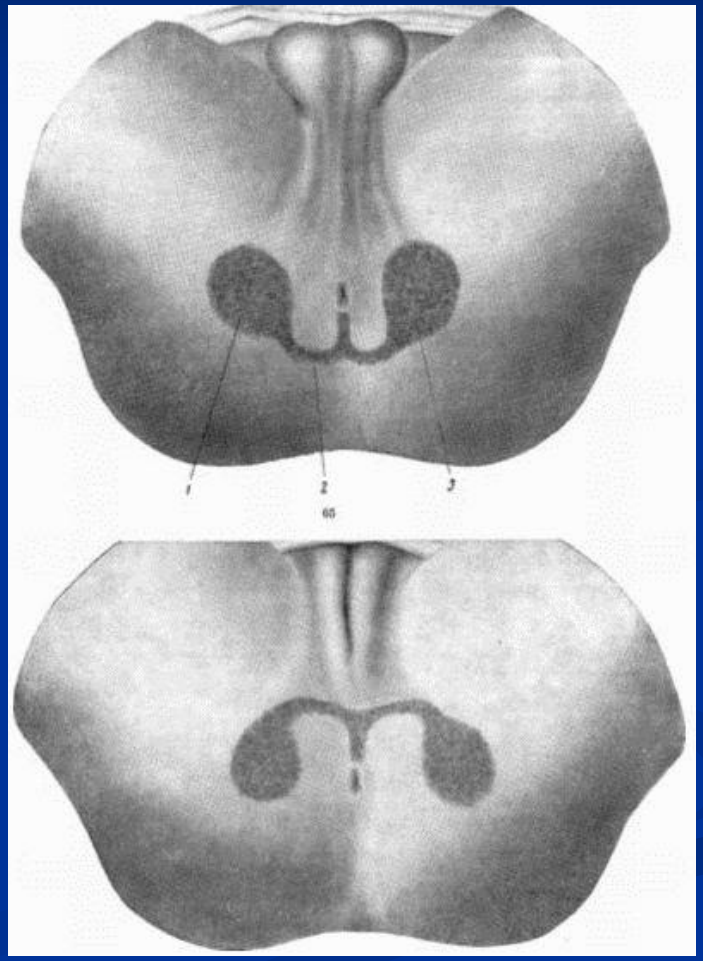
- Communicate posteriorly with the ischiorectal fossa and
- sites of horseshoe abscesses.



Horseshoe abscesses

Obstructed postanal gland may propagate into 1 of 4 posterior spaces:

- Superficial post-anal space
- Deep post-anal space
- Supralevator space
- Retro-rectal space



Procedure:

- Exploration of the post-anal space.
- Incision –from posterior midline crypt to the tip of coccyx--exposes the superficial post-anal space.

3 ways to access into deep post-anal space:

- Transanal division of IAS & subcutaneous portion of EAS.
- Horizontal sectioning of ACL
- Vertical sectioning of ACL in midline.

Classic Hanley method

Transanal division of IAS & s/c EAS---

Disadvantage –

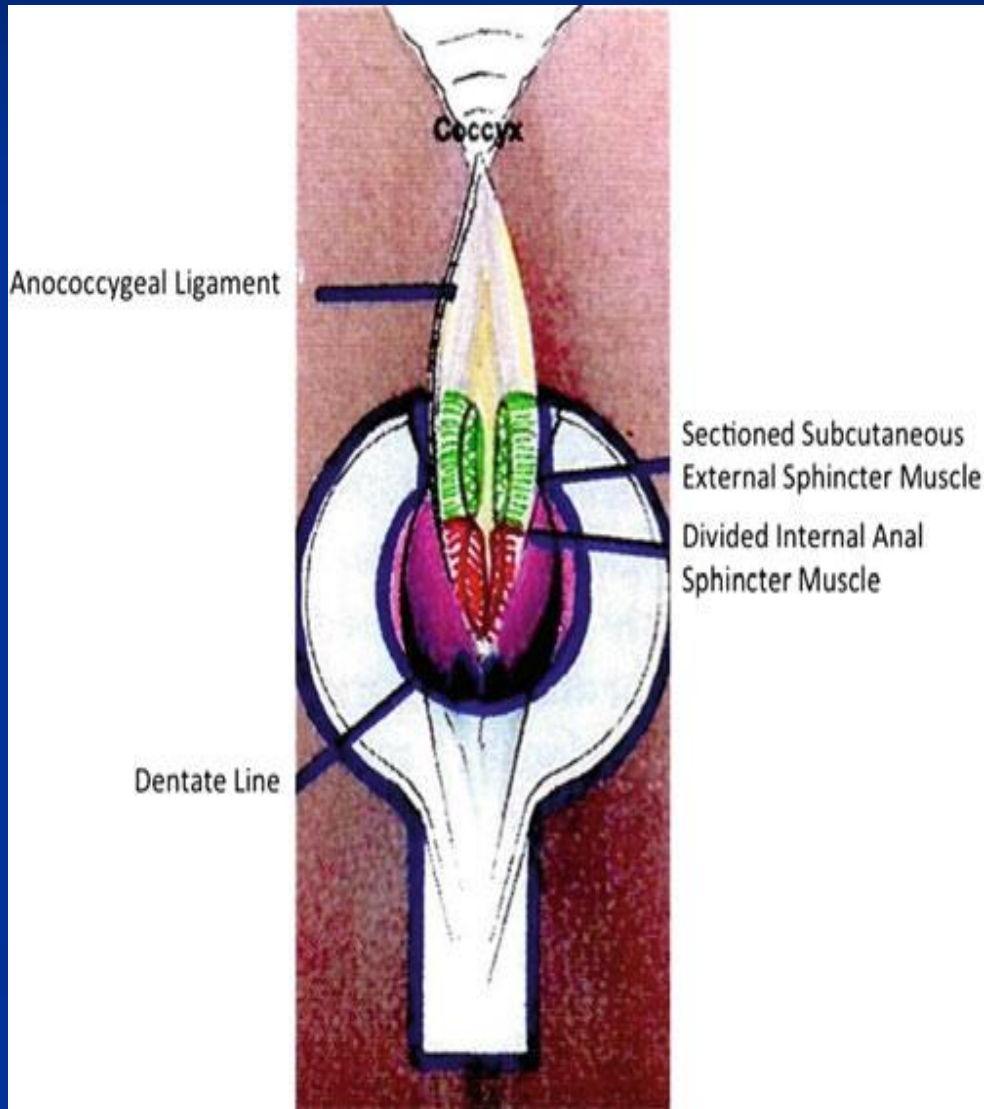
- FI is the rule and not the exception
- Relatively short-lived.
- Long-term keyhole deformity.

Transverse sectioning-

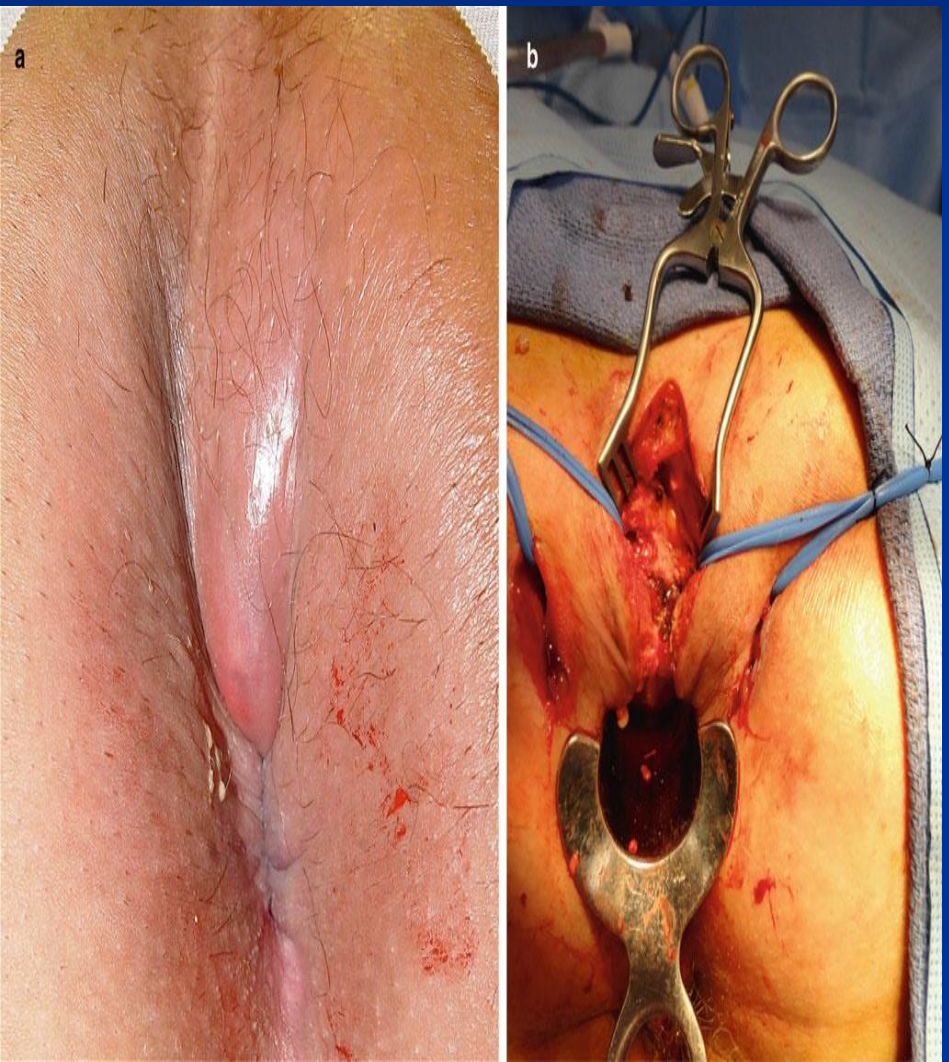
- In short term---well tolerated.
- long-term effect not precisely known.

Vertical division-

- Theoretically maintains the stability of the sphincter complex.



Modified Hanley



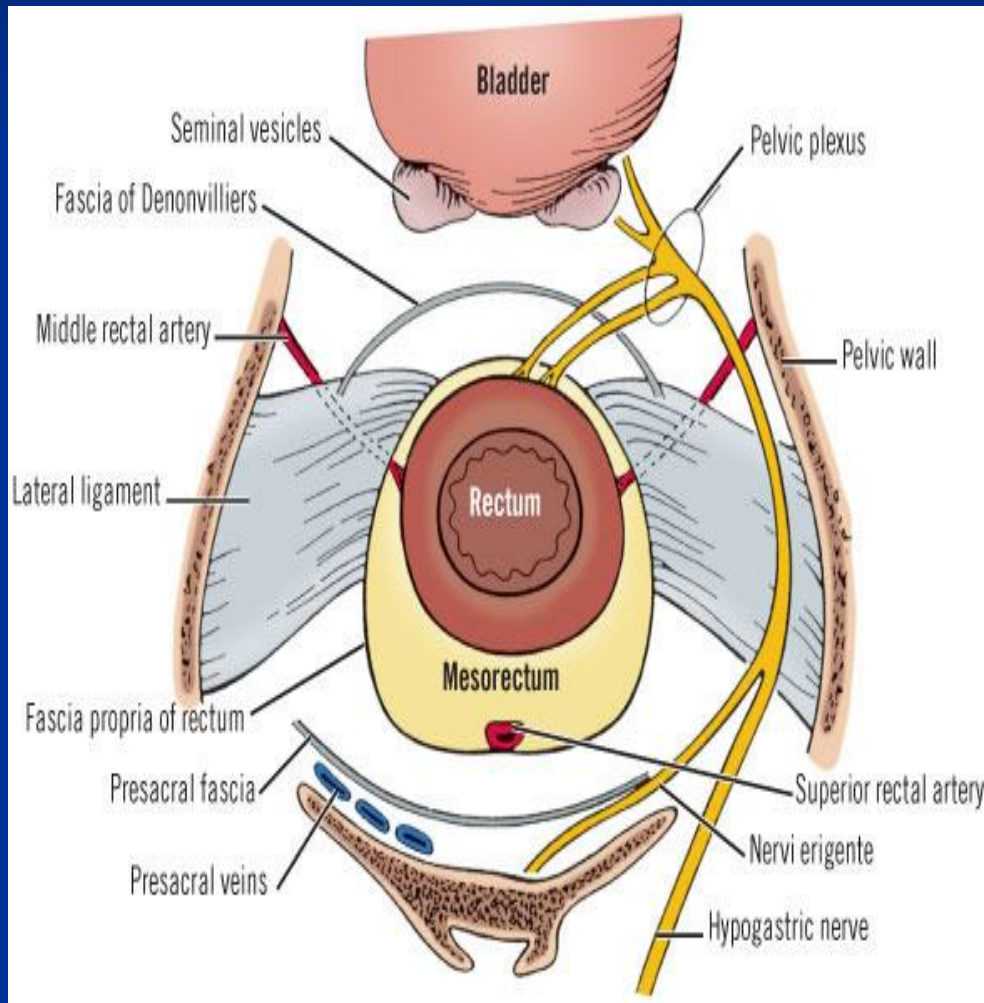
- Infection in the superficial post-anal space in continuity with both ischioanal fossa (**a**) is drained via a posterior midline incision and bilateral radial counter incisions with draining setons .

- If pus is encountered in either fossa, a radial counter incision is made either unilaterally or bilaterally

Distribution of mesorectum

- Assymetrical distribution.
- Main bulk posteriorly identified by 2 protruding bulges(the mesorectal cheeks).
- Ant. & laterally –mesorectum & mesorectal fascia is thinner.
- Laterally – sometimes incompletely covered by fascia & is traversed by MRV & autonomic nerves from inf. Hypogastric plexus.

Mesorectal excision = surgical removal of this soft tissue envelope dissecting through the potential avascular plane (“holy plane”) between the visceral and parietal pelvic fascia.

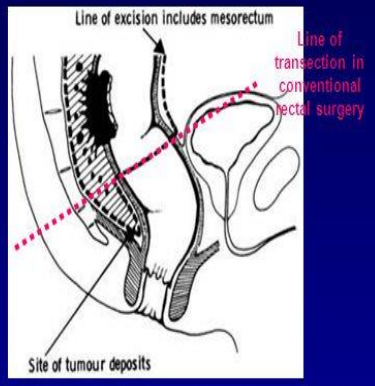


Importance:

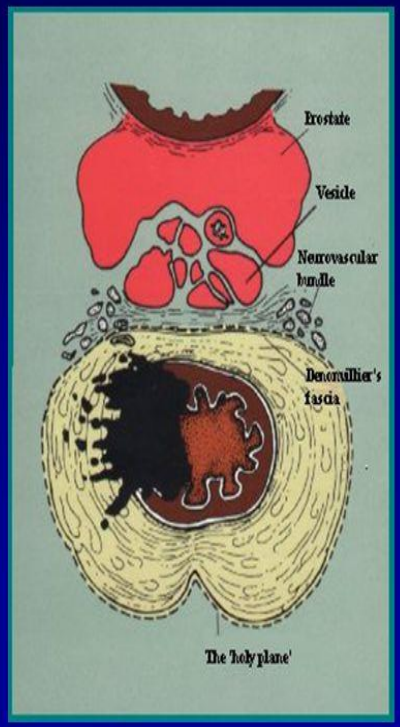
- May be metastatic site for rectal cancer.
- Inaccurate dissection –
  - injury to vessels nerves &
  - chance of local recurrance.
- Most distal part of rectum it thins out & virtually absent in last 1 cm of rectum. So distal rectal cancer--- > chance of invading surrounding structures----
  - Pelvic floor,
  - Vagina,
  - EAS,
  - Prostate.

The mesorectum in rectal cancer: the clue to pelvic recurrence

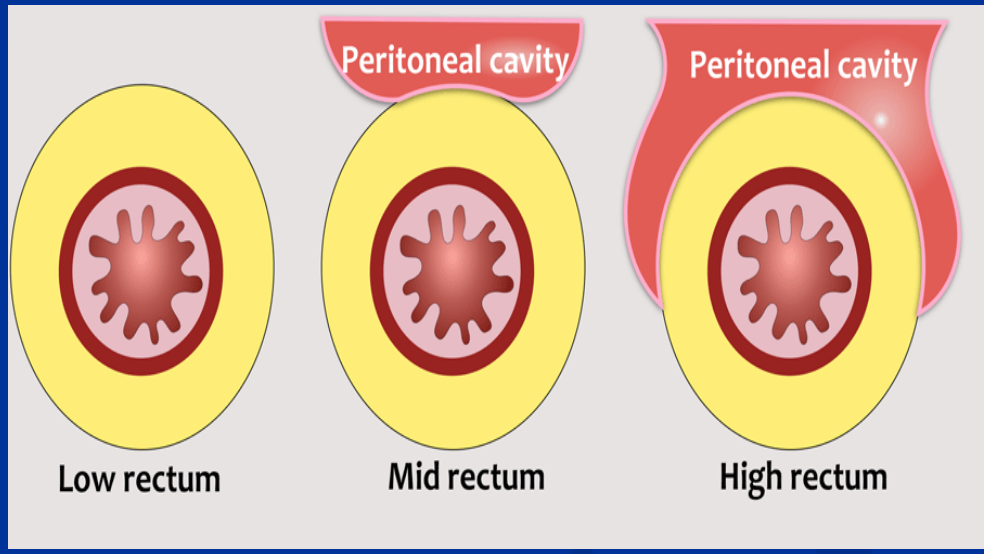
Heald et al. Br J Surg 1982; 69: 613-616.



- Isolated tumour deposits can be found within the mesorectum up to 3-4 cm distal to the main tumour



- Mesorectum is removed during surgery for rectal cancer without neurologic sequelae because no functionally significant nerves pass through it.
  - Upper 1/3rd of the rectum is anteriorly and laterally invested by peritoneum;
  - Middle 1/3rd is covered by peritoneum on its anterior aspect only.
  - Lower 1/3rd of the rectum is entirely extraperitoneal because the anterior peritoneal reflection occurs at
    - 9.0–7.0 cm from the anal verge in men



TME

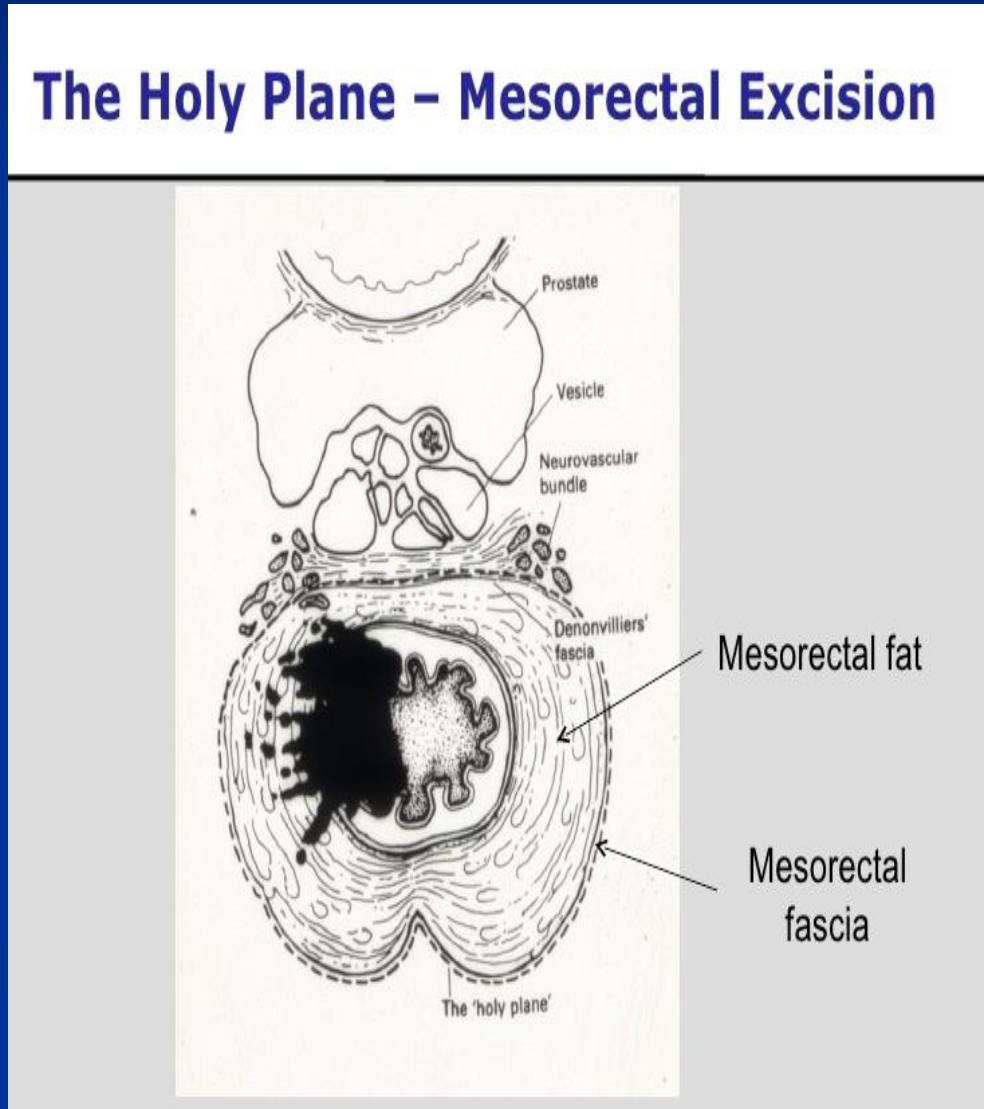
Complete excision of the mesorectum down to the pelvic floor.

Indications: Optimal therapy for

- low & mid rectal cancer
- TME for upper rectal cancer is debatable & now considered unnecessary.

The rationale for advocating TME is

- local recurrence due to spread into the mesorectum.
- local recurrences after radical resection --(3–36%)
- but on TME --0% to 13% with most in the 6% to 9% .



The salient components-

- Dissection through avascular plane between the FP and PF.
- The excised specimen includes the entire posterior, distal and lateral mesorectum out to the plane of the inferior hypogastric plexuses that have been carefully preserved.
- Anteriorly the specimen includes intact Denonvilliers' fascia and the peritoneal reflection.

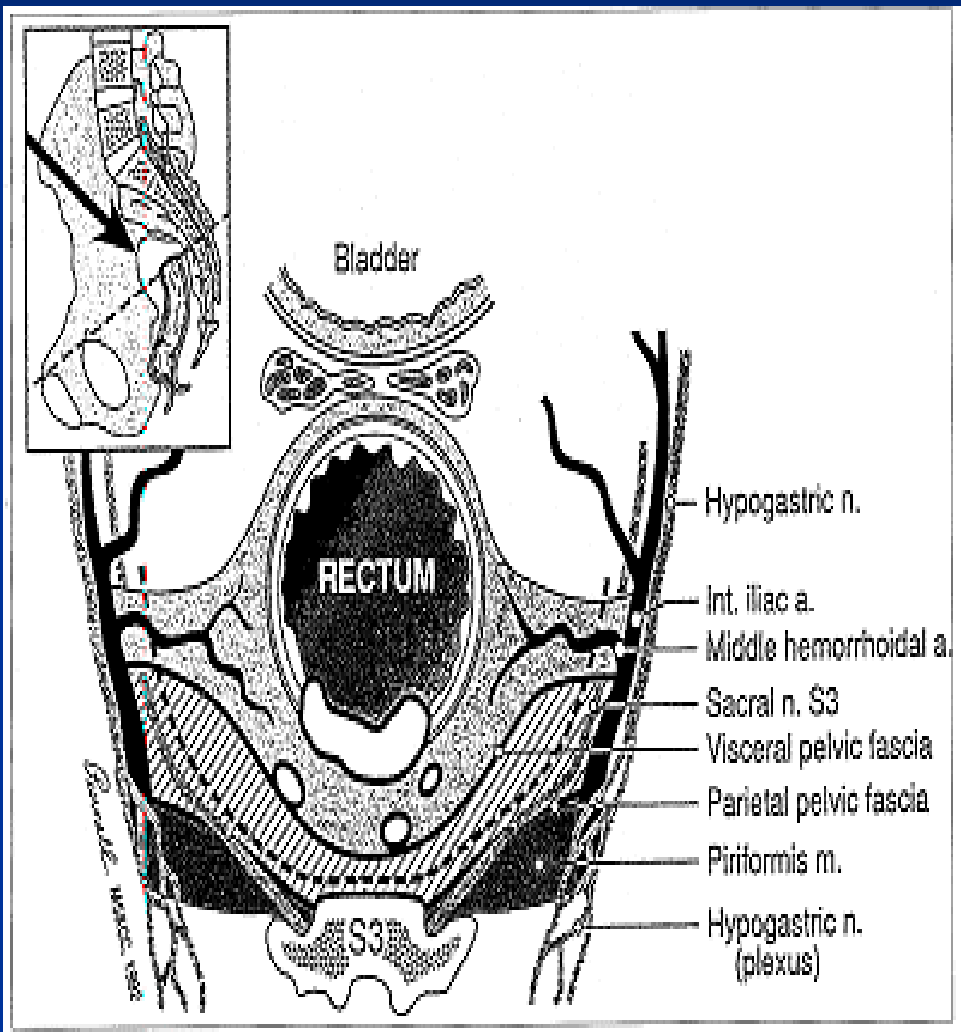
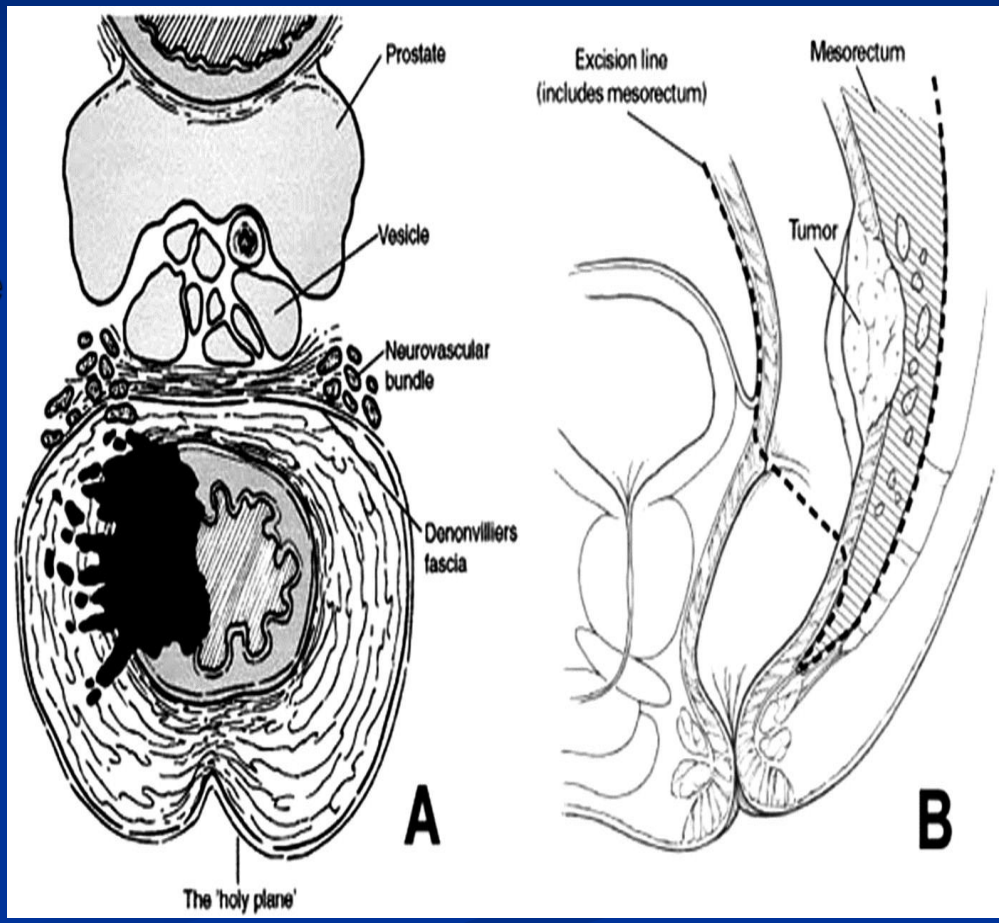


Figure 1: Sharp dissection of the plane between the visceral and parietal layers of the fascia.

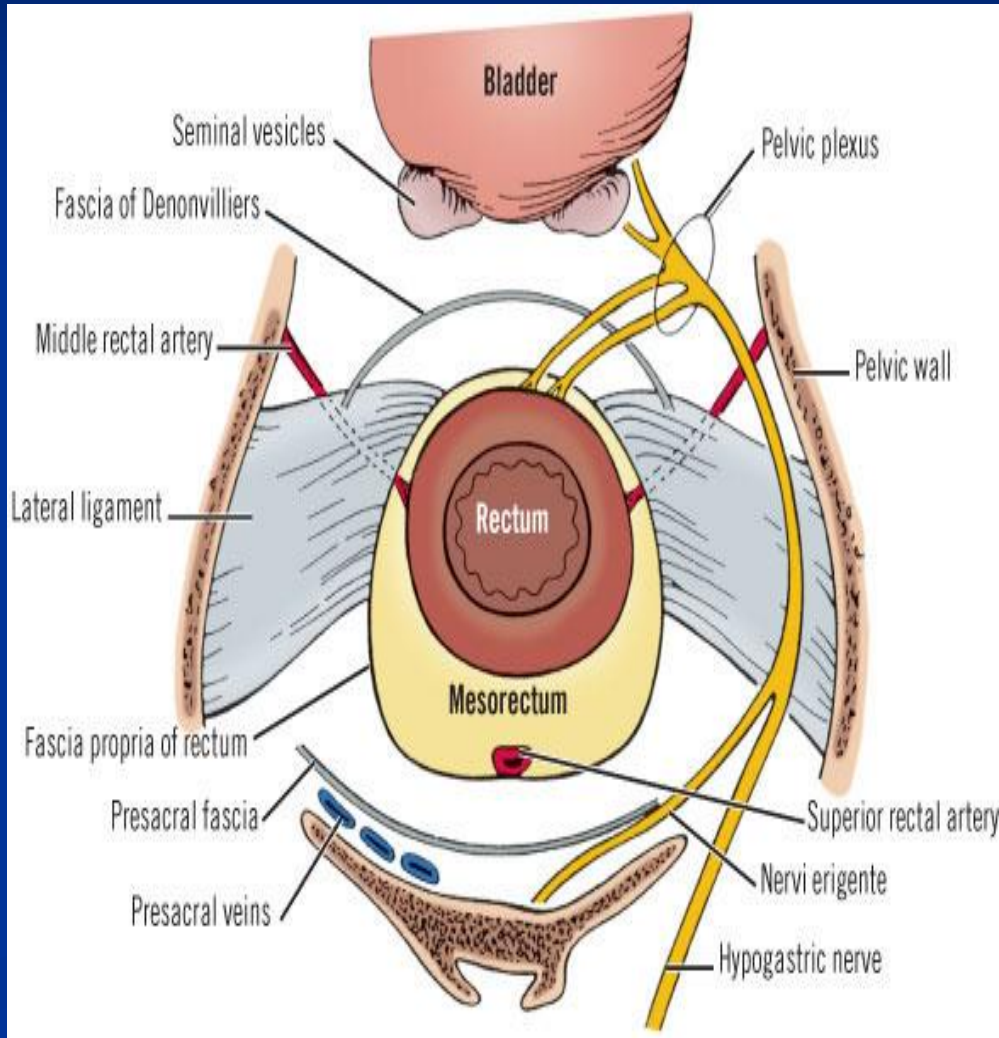
Procedure:

- Proper ligation of the SHA or IMA.
- Dissect down toward the sacral promontory,
- Dissection plane is just anterior or medial to these Sympathetic nerve trunks.
- Dissection starts posteriorly and then at each level proceeds laterally and then anteriorly.

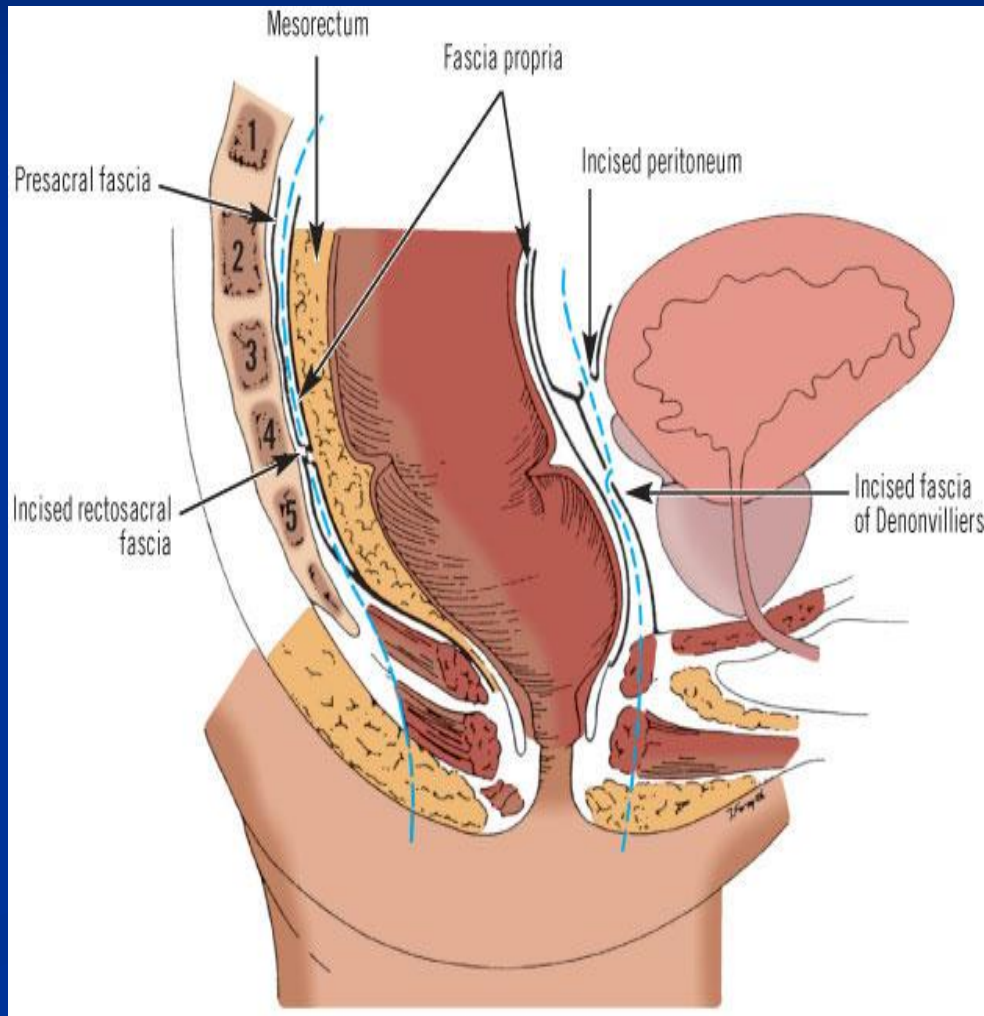


- In the mid rectal area, the parasympathetic nerves tracing anteriorly toward the hypogastric plexus.
- The plexus is usually on the anterolateral sidewall of the pelvis, just lateral to the seminal vesicles in the man and the cardinal ligaments in the woman.

- There is often a tough “ligament” that traverses the mesorectum at this point. It theoretically contains the MRA present about 20% of the time.

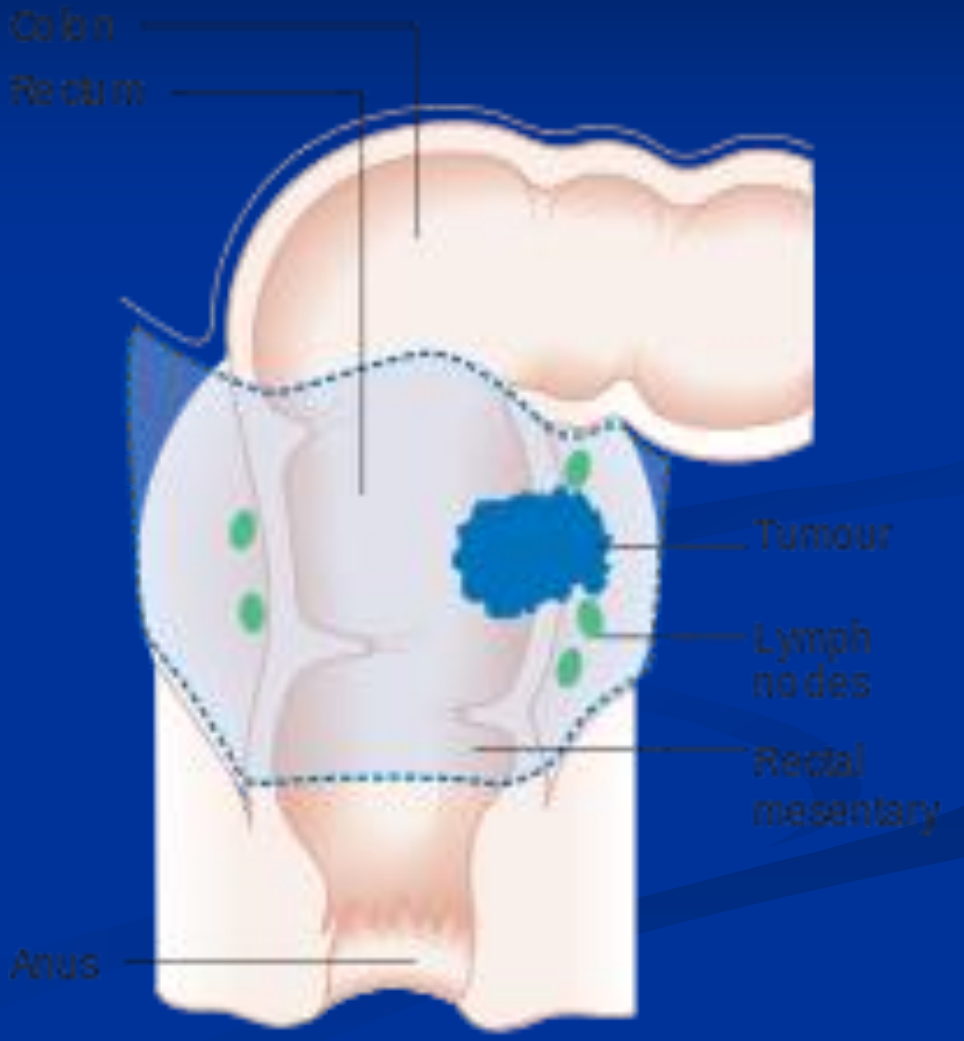


- The anterior dissection is most difficult. In men, try to include the two layers of Denonvillier's fascia.
- In woman, the peritoneum at the base of the pouch of Douglas is incised, and the rectovaginal septum is then separated.
- As one progresses distally beyond the mid rectum, the mesorectal fat begins to attenuate. At the pelvic floor, there is often only a thin layer of mesorectal fat around the bowel.



Demerits:

- More operating room time,
- Transfusion requirements
- Anastomosotic leak upto 17.4
- TME may Causes-
  - Erection problem
  - Penetration inability
  - Retrograde ejaculation
  - Sexual desire and overall satisfaction were greatly decreased.
  - Urinary dysfunction due to pelvic autonomic nerve damage-20-30%.



Mesorectal treansection:

- Heald et al described distal mesorectal spread upto 4 cm.
- Thus a mesorectal clearance of 5 cm below the lower edge of tumor by mesorectal transection would seem adequate.

Indication:

- upper rectal cancer.

The reason for considering mesorectal transection-

- Reduce anastomotic leakage.
- Better function when part of mesorectum & distal rectum is preserved.

Selective TME

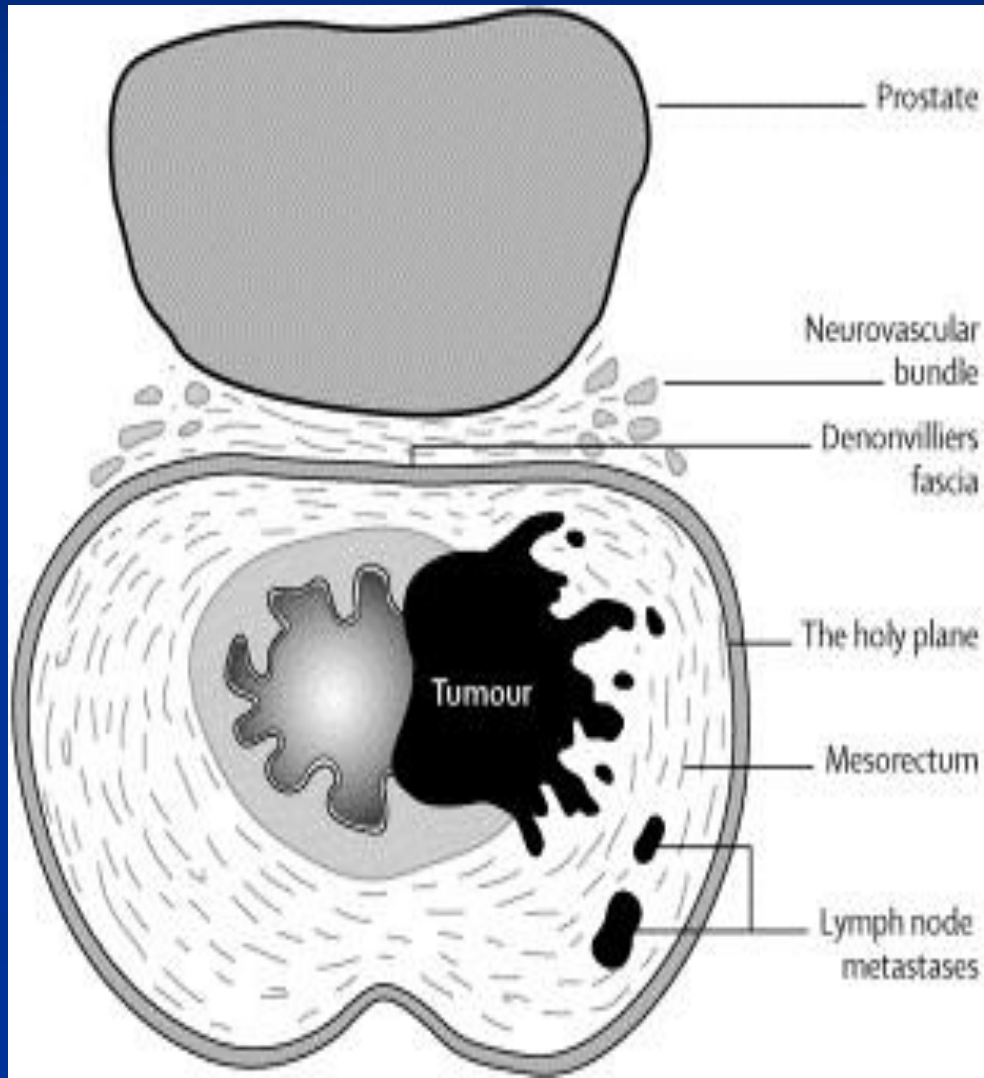
Definition:

- Circumferentially same as TME, but mesorectum transected at a right angle to the rectal wall at a distance of 5 cm beyond the gross distal edge of tumor.

Rationale:

- Routine TME in rectal cancer at all levels has been challenged as-
  - increased morbidity.
  - Anastomotic leakage--high
  - Poor bowel function in low colorectal or coloanal anastomosis.

- Thus, selective TME according to the level of tumor appears to be a reasonable approach.



Partial mesorectal excision

Indication:

- Upper rectum or rectosigmoid cancer.

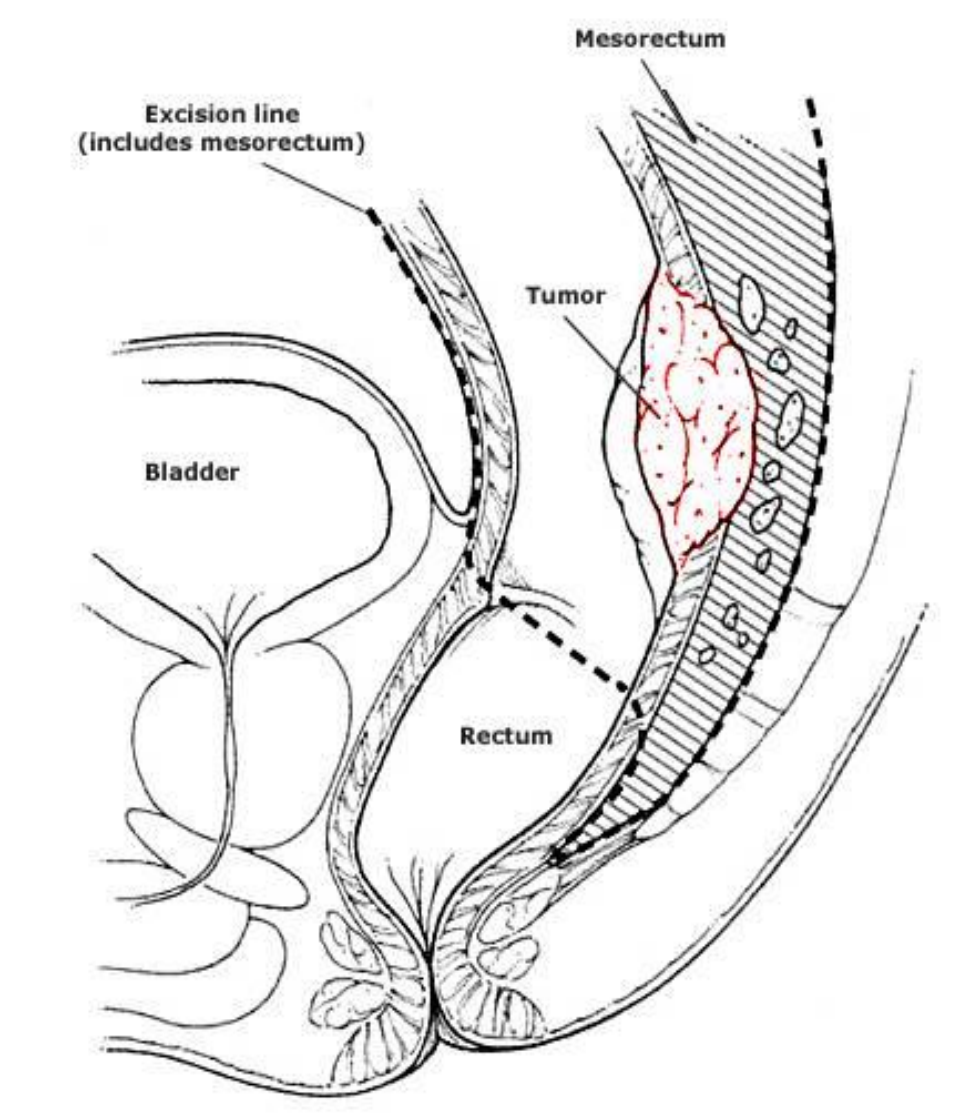
Result:

- Similar with TME for mid and low rectal cancer in terms of local recurrence and survival.

However, TME

- is a more complex operation.
- longer operating time,
- more blood loss,
- longer hospital stay,
- higher leakage rate, and
- higher stoma rate.

- Thus, selective approach using PME for upper rectum or rectosigmoid cancer is more appropriate and reasonable approach.



TaTME

New procedure to solve difficulties in pelvic dissection.

Indications: precise indications have yet to be defined.

- In obese
- Male with bulky mesorectum.
- Narrow pelvis

Route:

- Purely transanal
- Hybrid with transabdominal assistance.

Advantages:

- Avoids most cumbersome phase of lap.distal mesorectal dissection.
- More visual control of distal resection margin.
- Equally appropraiate to perform sleeve mucosal &/ partial intersphincteric resection (ULAR).
- Allow single stapled anastomosis.
- Sig. improvement in the quality of mesorectal dissection when combines with lap. Colonic mobilization.
- NOSE.
- Eliminate the need for conversion to laparotomy esp. in obese & male pt.
- In lap. > 2 staple firing > Risk of leakage. TaTME avoids it.

Merges 3 different recent concept-

- Lap. TATA(transanal abdominal transanal resection).
- TEM/ TES.
- NOSE

Instruments:

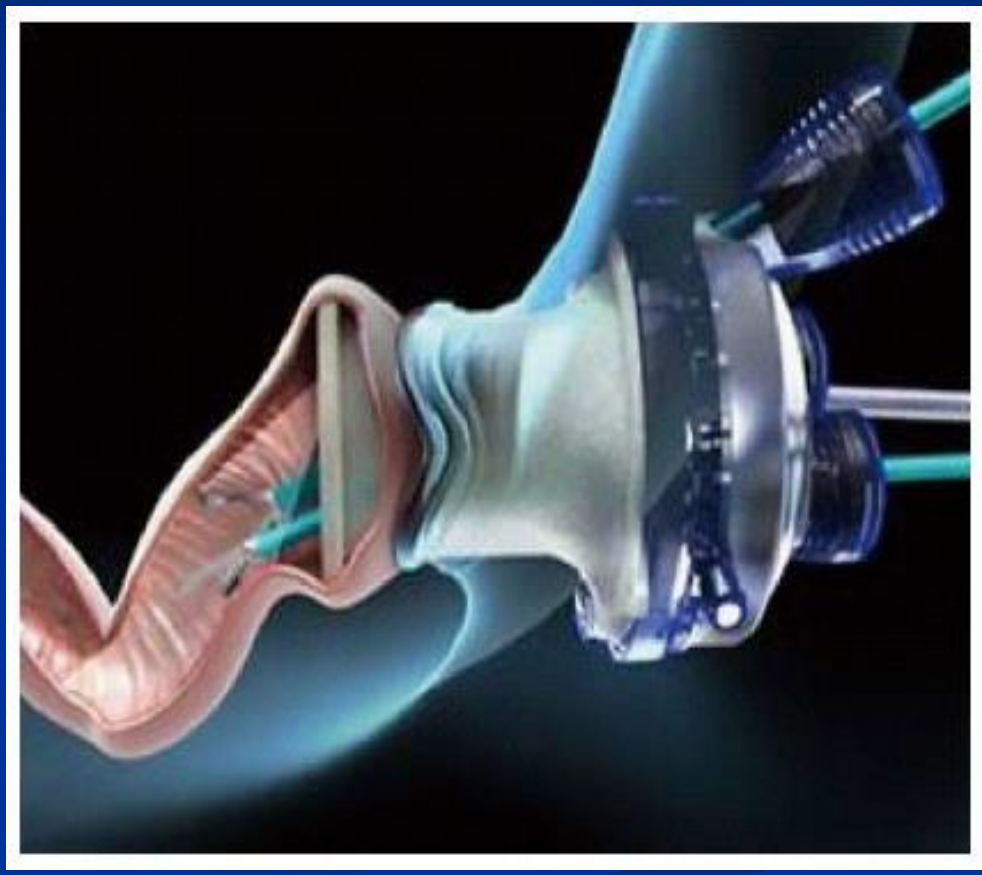
- Transanal platform
- Telescope-10mm,
- Monocurved grasping forceps
- Coagulation hook
- Needle holder
- Scissors
- Suction & irrigation canulla.

Steps

- Intramural suture few cm down the lesion.
- Rectal wall is perforated full thickness.
- Extraluminal dissection
- Bottom up dissection upto sacral promontary posteriorly.to pouch of doglas ant.
- NOSE
- Colorectal anastomosis by circular stapler/ hand sewen under abdominal view.

Conclusion:

- Combines lap. + NOSE+ TES
- Potential to overcome limitations of lap. TME.



- All pelvic nerves between peritoneum and endopelvic fascia and are in danger of injury during rectal dissection

  - Permanent bladder paresis in 7–59% after APR
  - impotence -15 to 45%
  - ejaculatory dysfunction-32 to 42%.
  - overall incidence of sexual dysfunction after proctectomy-100% when wide dissection for malignancy; and for benign conditions, such as IBD (0–6%).

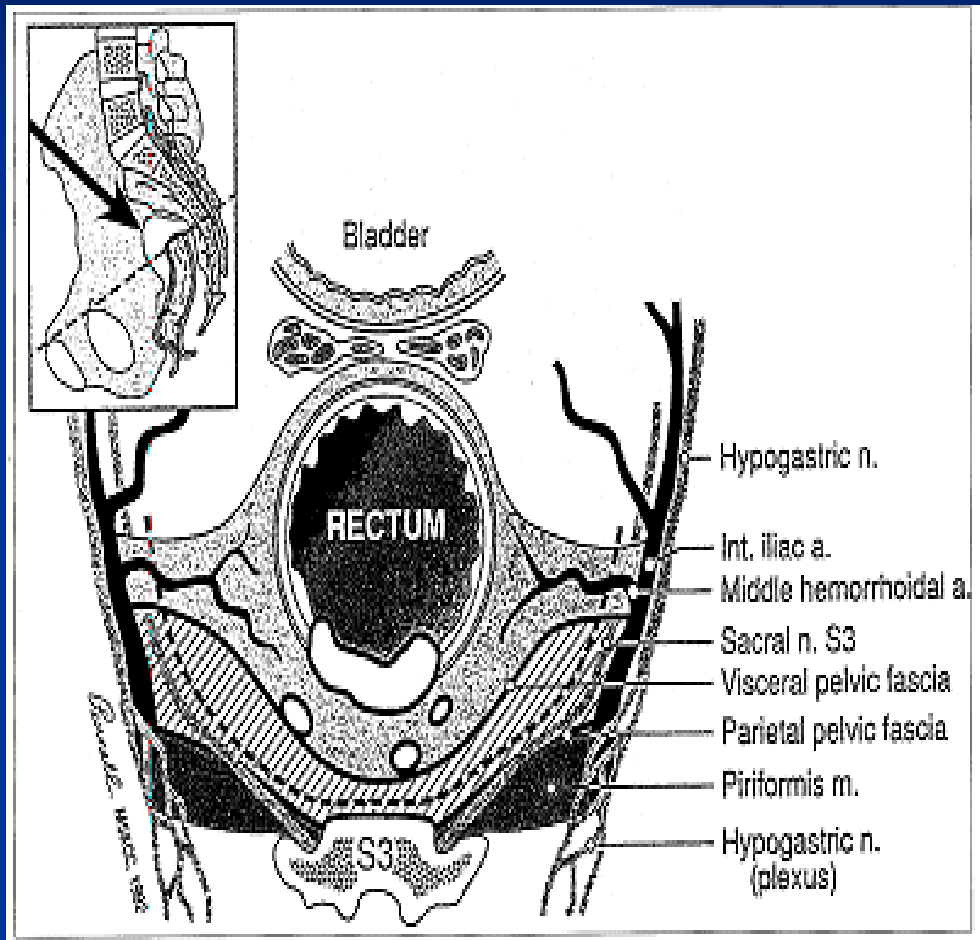


Figure 1: Sharp dissection of the plane between the visceral and parietal layers of the fascia.

Rectal dissection

- Close rectal
- Mesorectal
- Extramesorectal

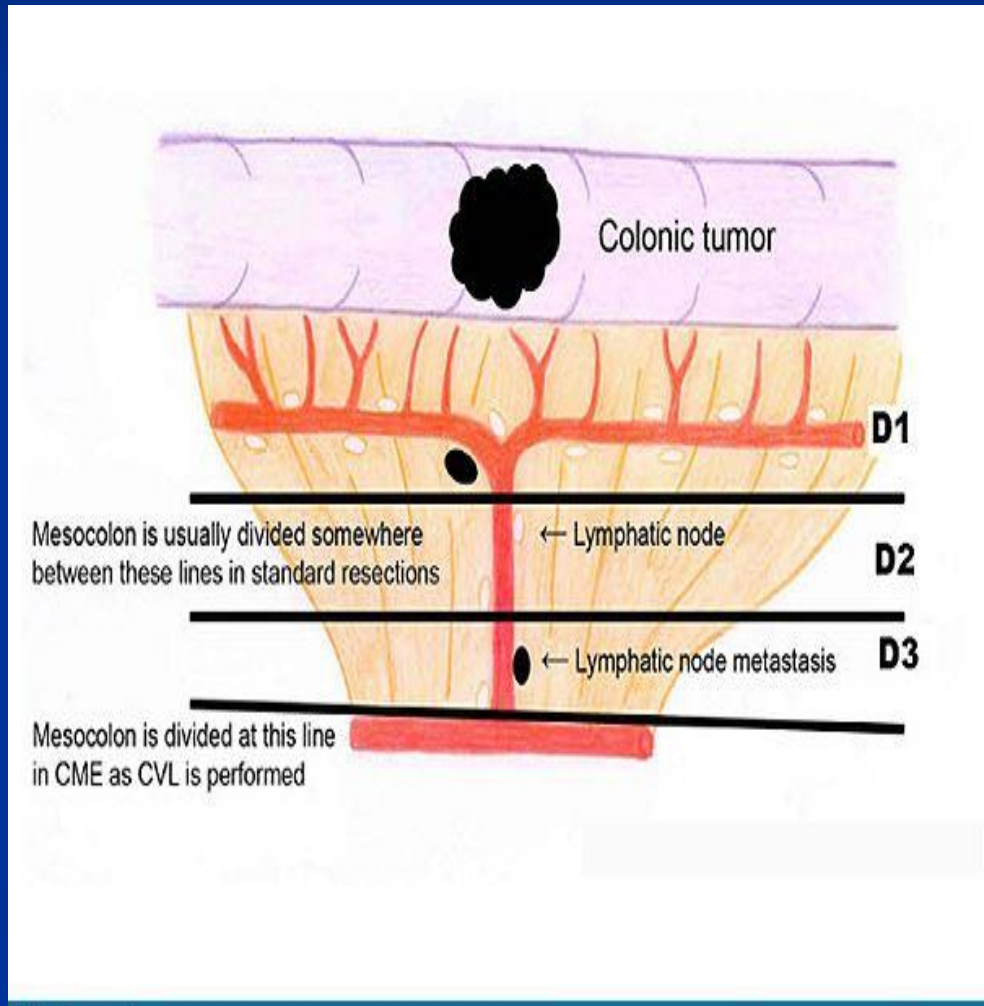
- Dissections for benign conditions closer to the bowel wall, thus reducing the possibility of nerve injury.

CME WITH CVL

Radical central dissection of mesocolon which includes central vascular ligation.

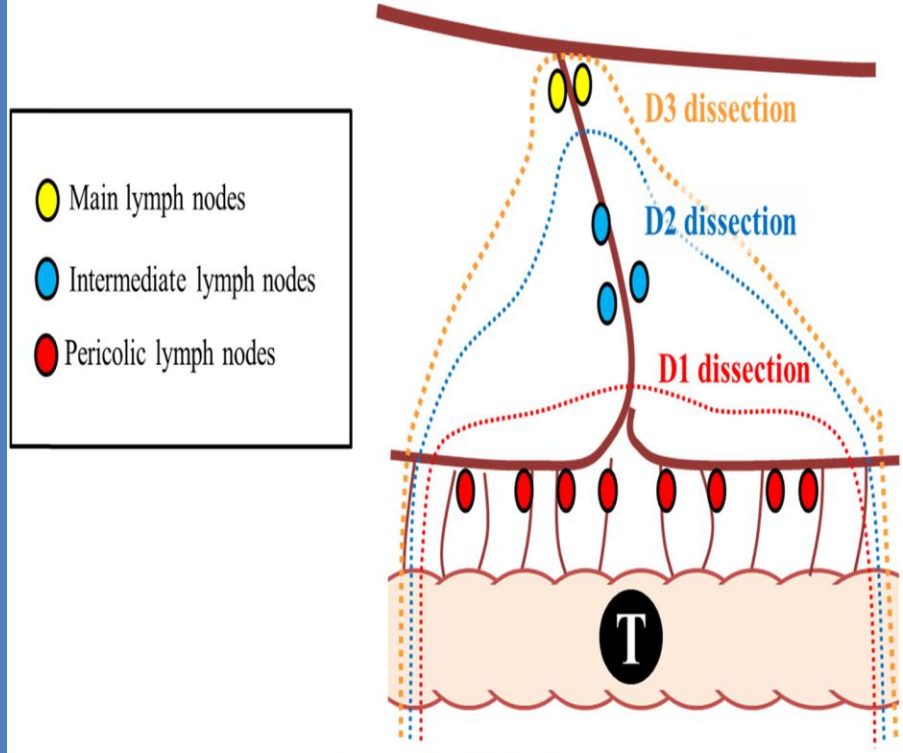
Principle:

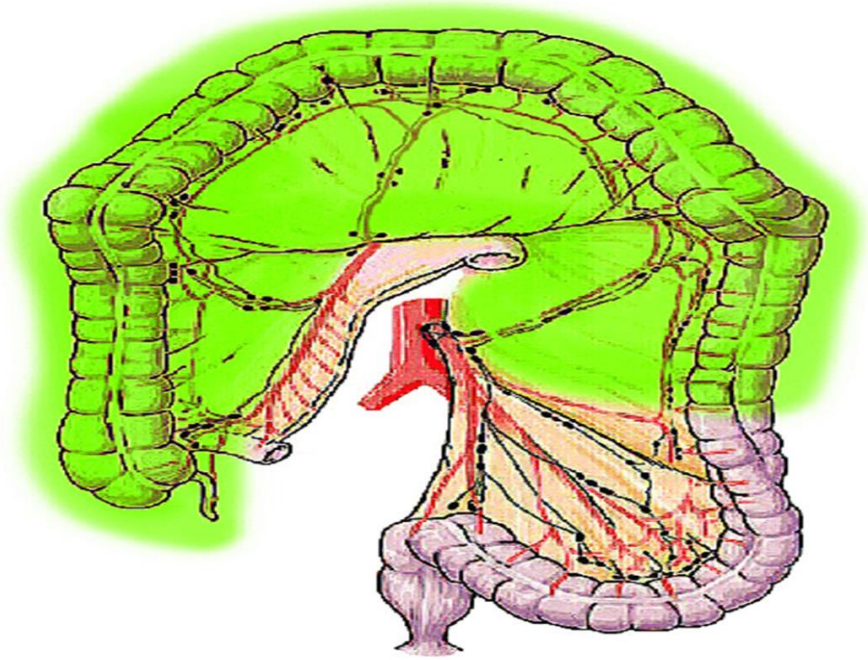
- more radical excision of the lymphatic drainage & the mesocolon.
- resection with near & distal resection of at least 10 cm.
- Removes arterial supply to the affected segment at its origin from SMA, IMA Aorta.
- Includes all LN in D3 area



CME with CVL

- Adequate length of colonic resection.
- Remove all LN(D1,D2,D3).
- High vascular tie at its origin.



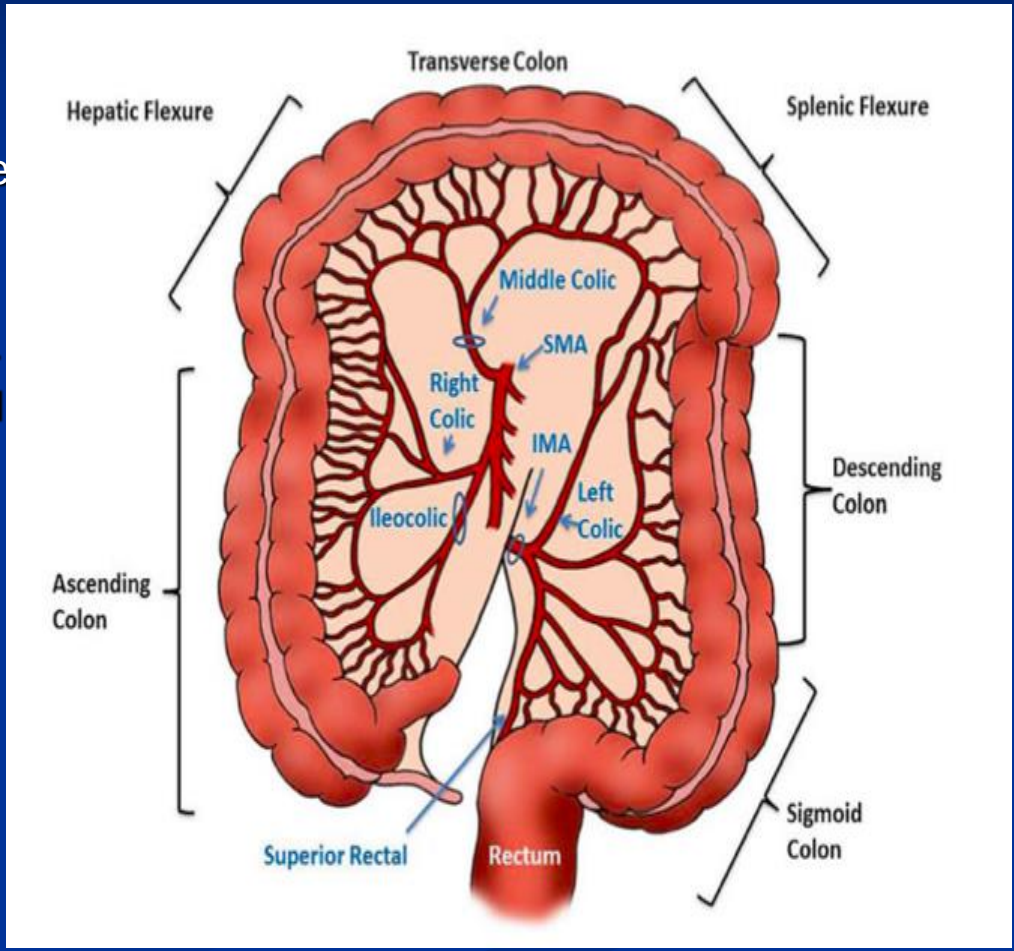


Advantages:

- Large amount of resected mesocolon.
- Resected colon segment might be larger
- More nb. Of LN .
- Oncologically superior specimen .
- More accurate staging as high LN yield.

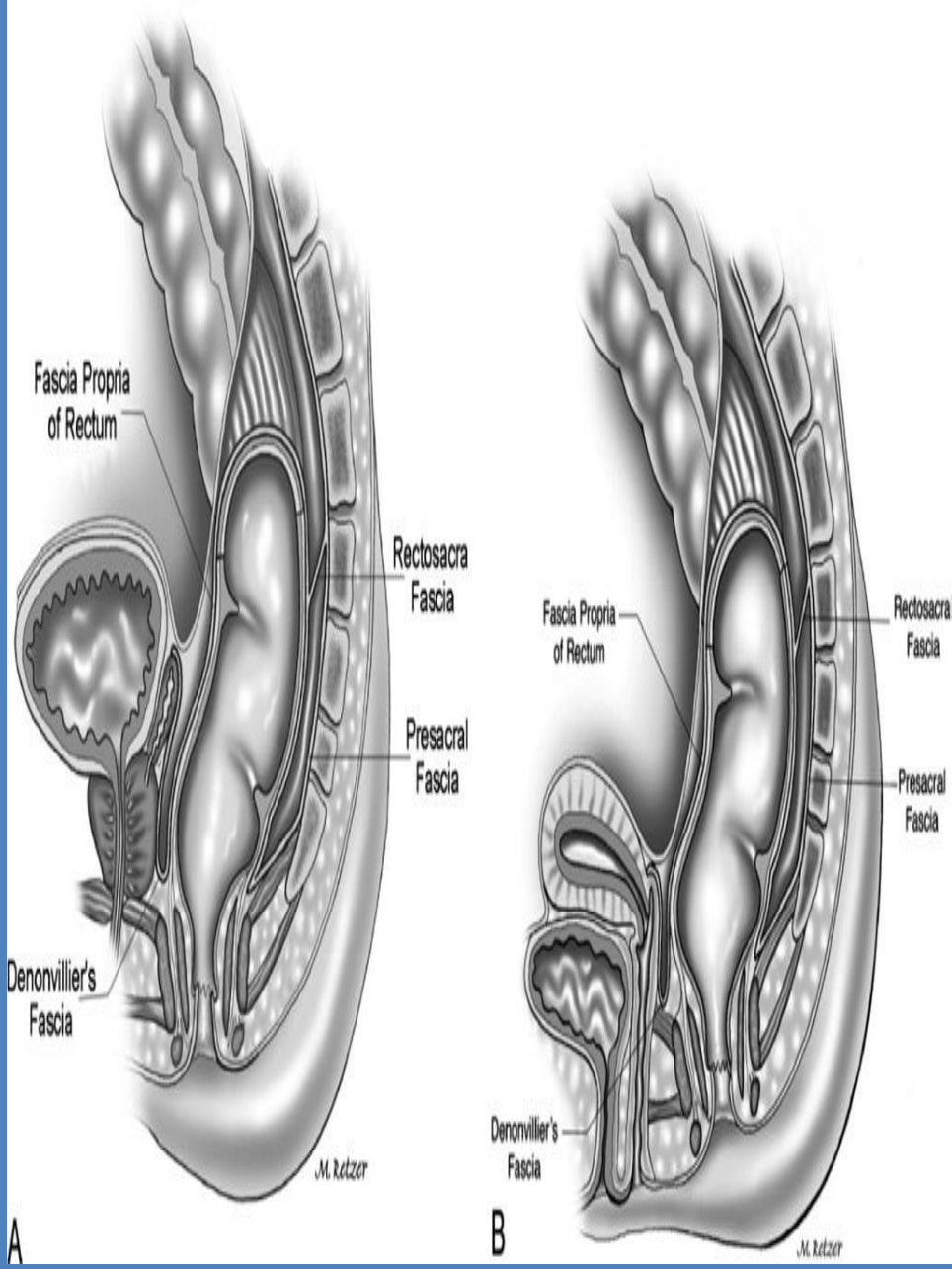
Disadvantages:

- Potential risk injury to
  - major vessels
  - nerves &
  - organs specially pancreas.



TME principle

- Total excision of the mesorectum.
- Direct division.
- Sharp dissection.
- Avascular plane.
- Ensure intact fascial envelope.
- Nerve preservation.
- Sphincter preservation when possible.



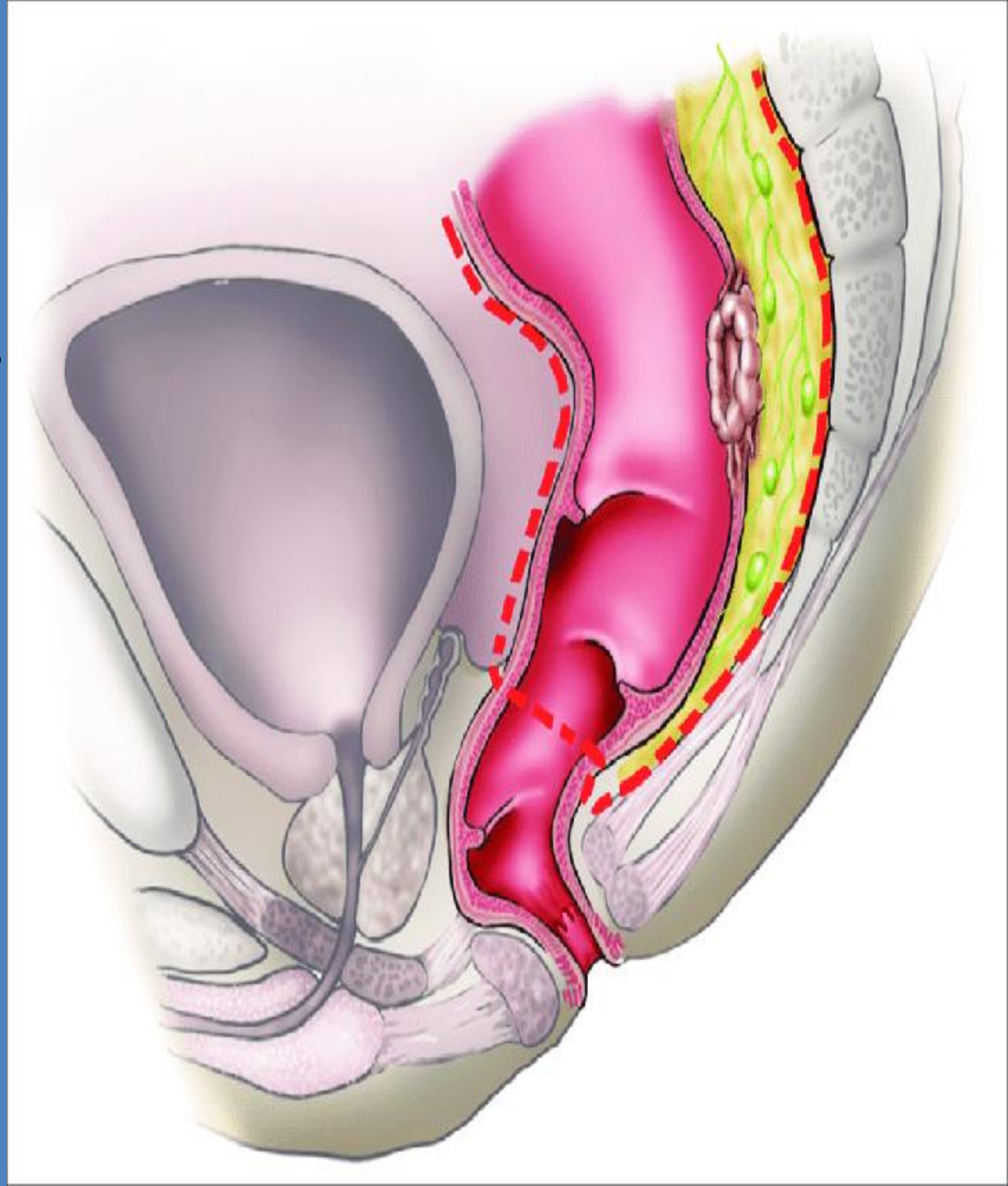
Fascial relationships of the rectum:

Indication-

- Mid rectal cancer.
- Low rectal cancer.

Good TME specimen-

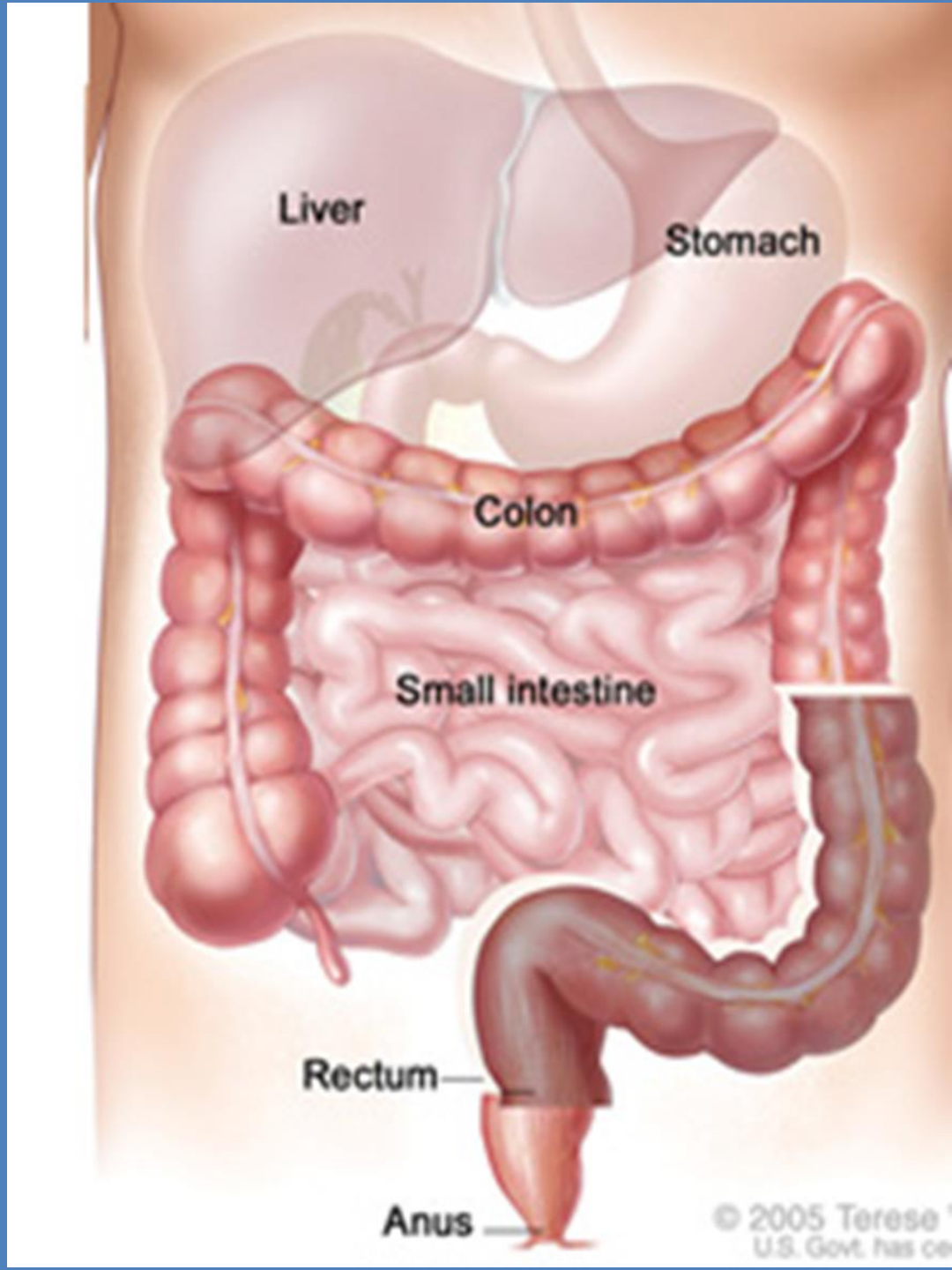
- Intact mesorectal fascia.
- Avoid coning.
- Adequate DRM, PRM,CRM.
- No perforation.



PME / SSME / Tailored TME

Indication-

- Upper rectal cancer.
- Rectosigmoid cancer.



DRM

Maximum distal mesorectal spread upto 2-3 cm.

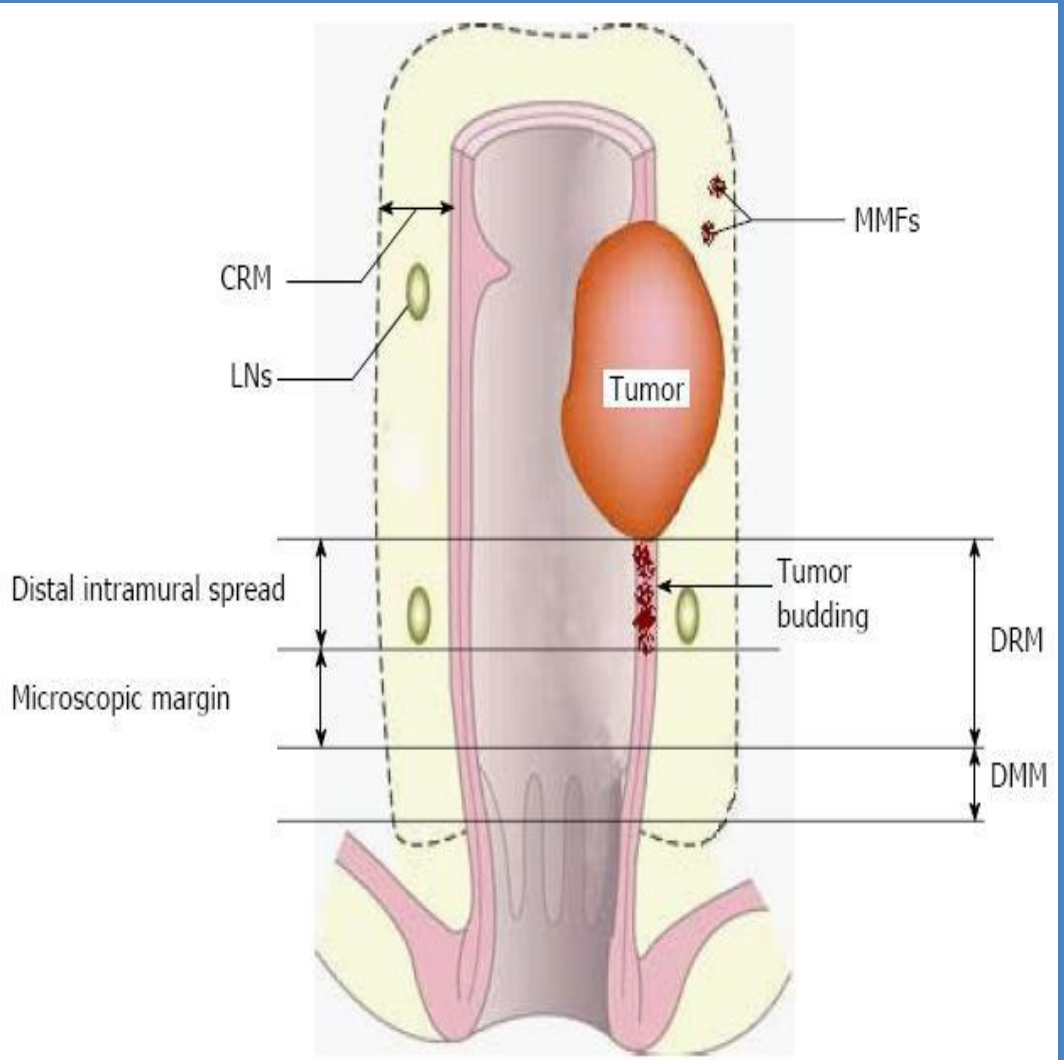
- DRM should be 5 cm where possible.

Standard for low rectal cancer

- At least 2 cm.

SSS-

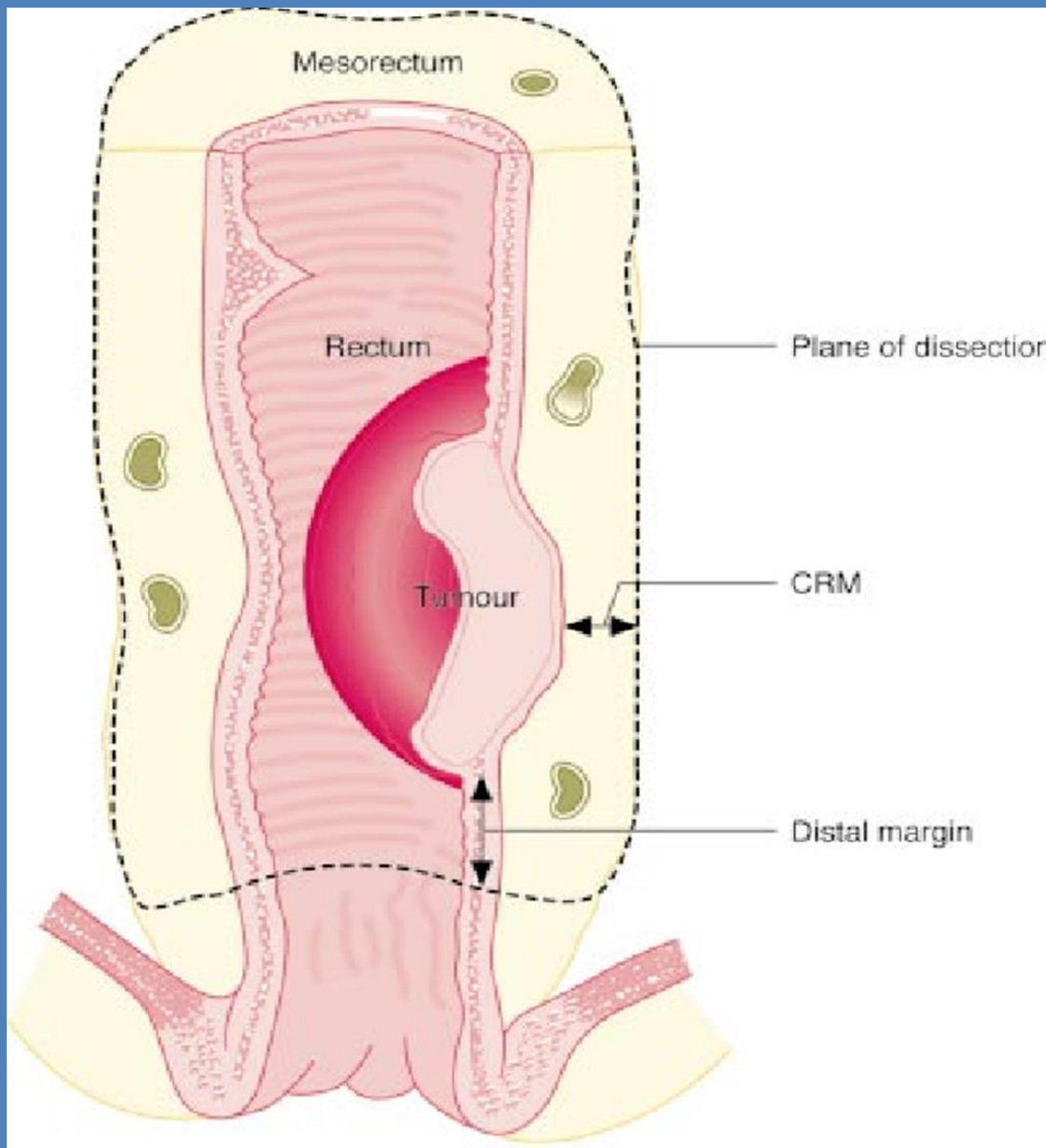
- Well diff-0.5 cm
- Mod diff-1 cm
- Poorly diff- 2 cm



CRM

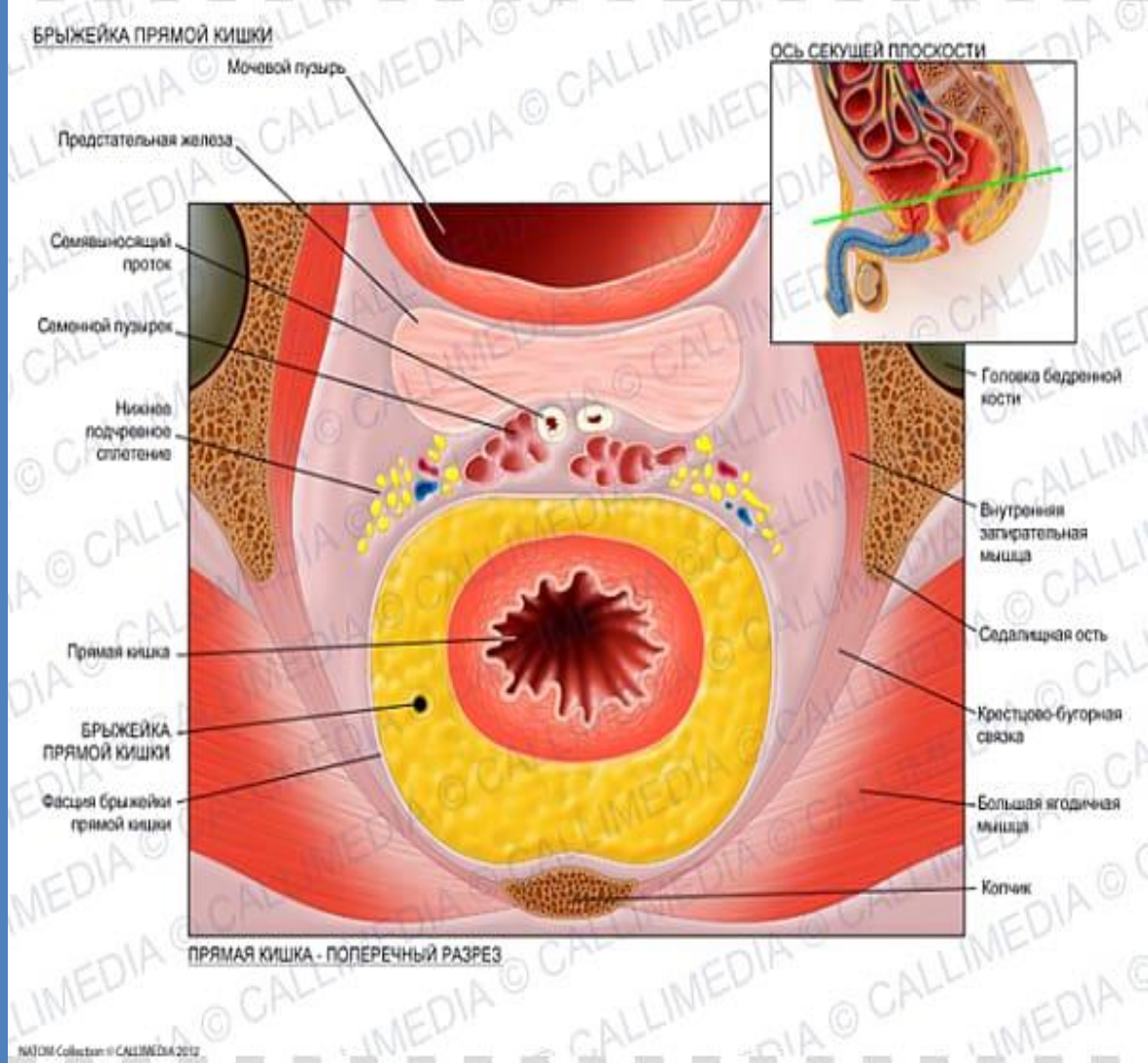
CRM positive

- Tumor cell deposit within 1 mm of CRM.
- Bad prognostic sign
- High chance of recurrence.



Dissection-

- Close rectal.
- Mesorectal.
- Extramesorectal.



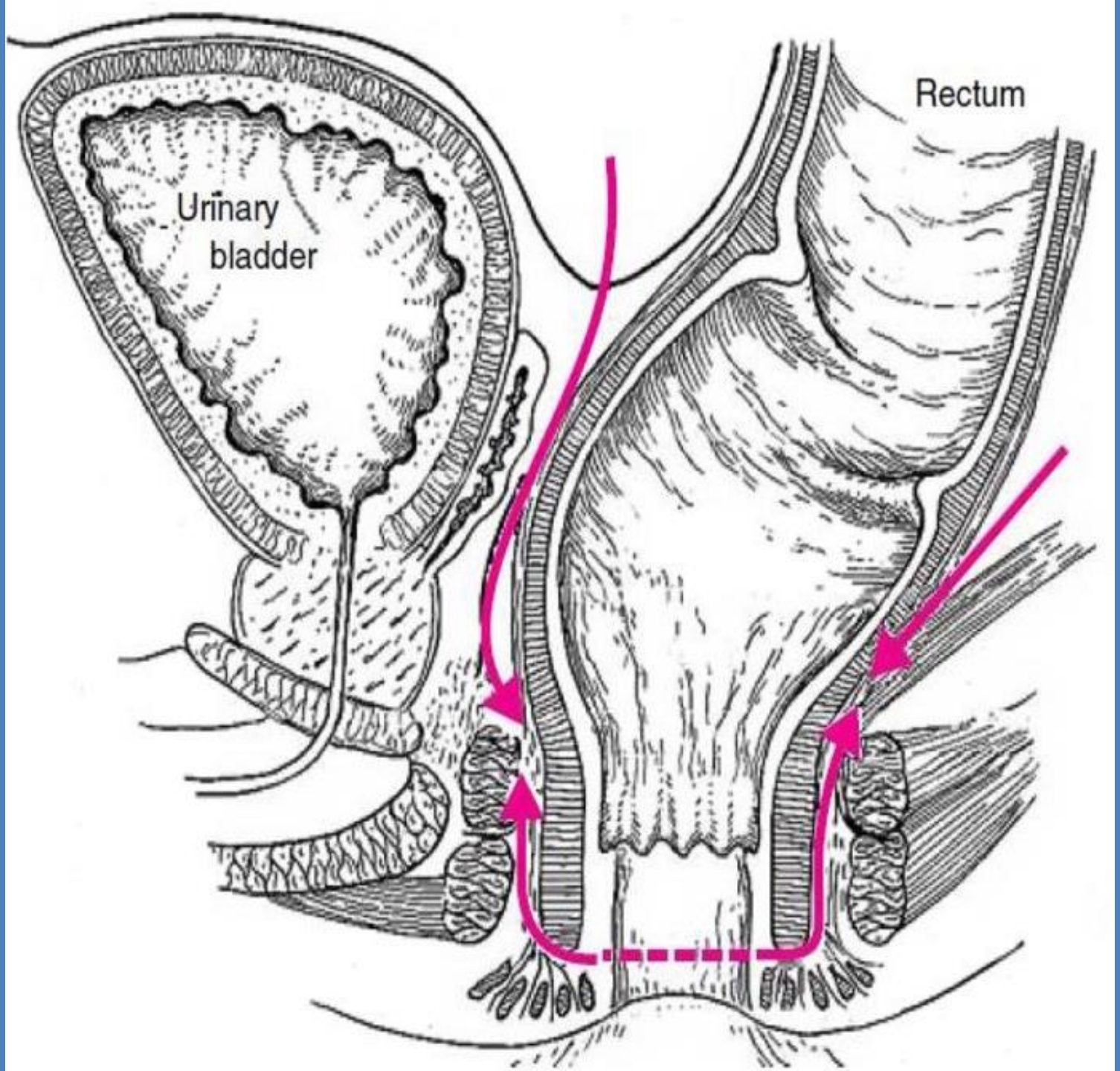
For early lesion

- Polypectomy.
- EMR.
- SMD.
- TAE.
- TEM.
- TAMIS.

Operative procedure

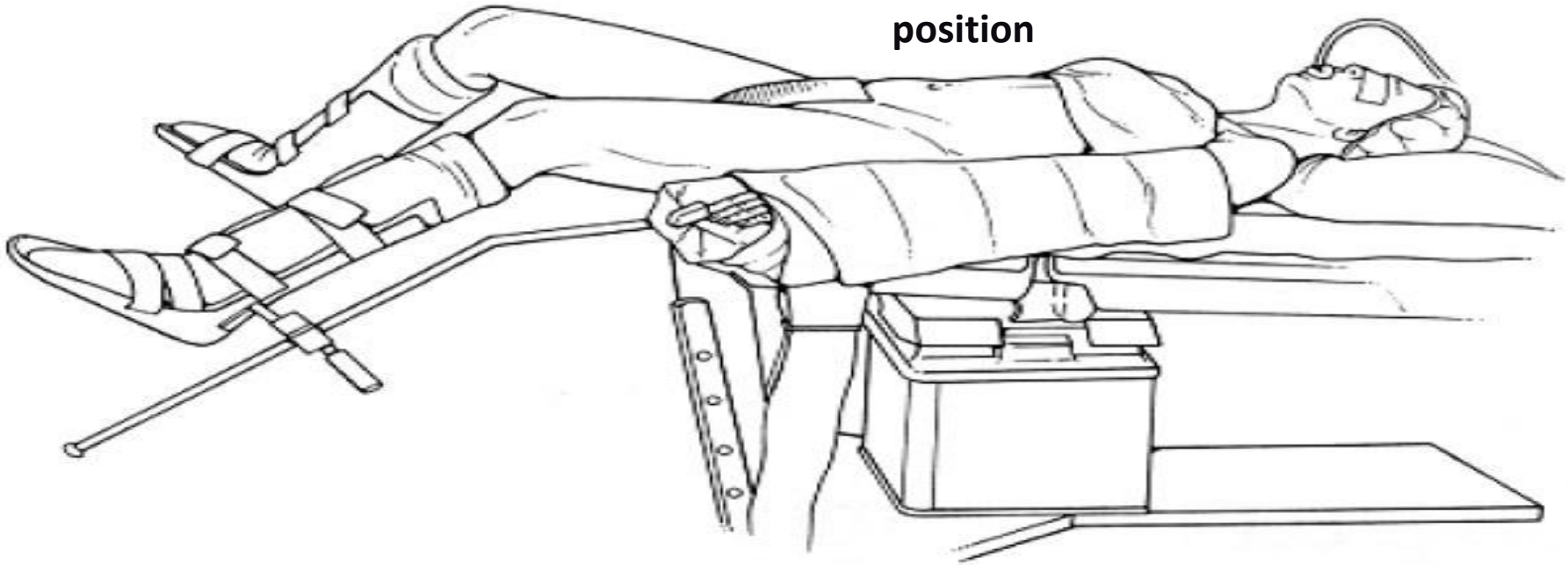
- AR-
  - High-above peritoneal reflection.
  - Low-below peritoneal reflection.
  - ULAR within 2 cm of dentate line.
  - Intersphincteric ULAR.
  - Coloanal anastomosis-at or below dentate line.
- APR/APER/SCAPER.
- ELAPR.

Compulsory for all resecting procedure- TME.


Rectum
Urinary
bladder

Lithotomy position

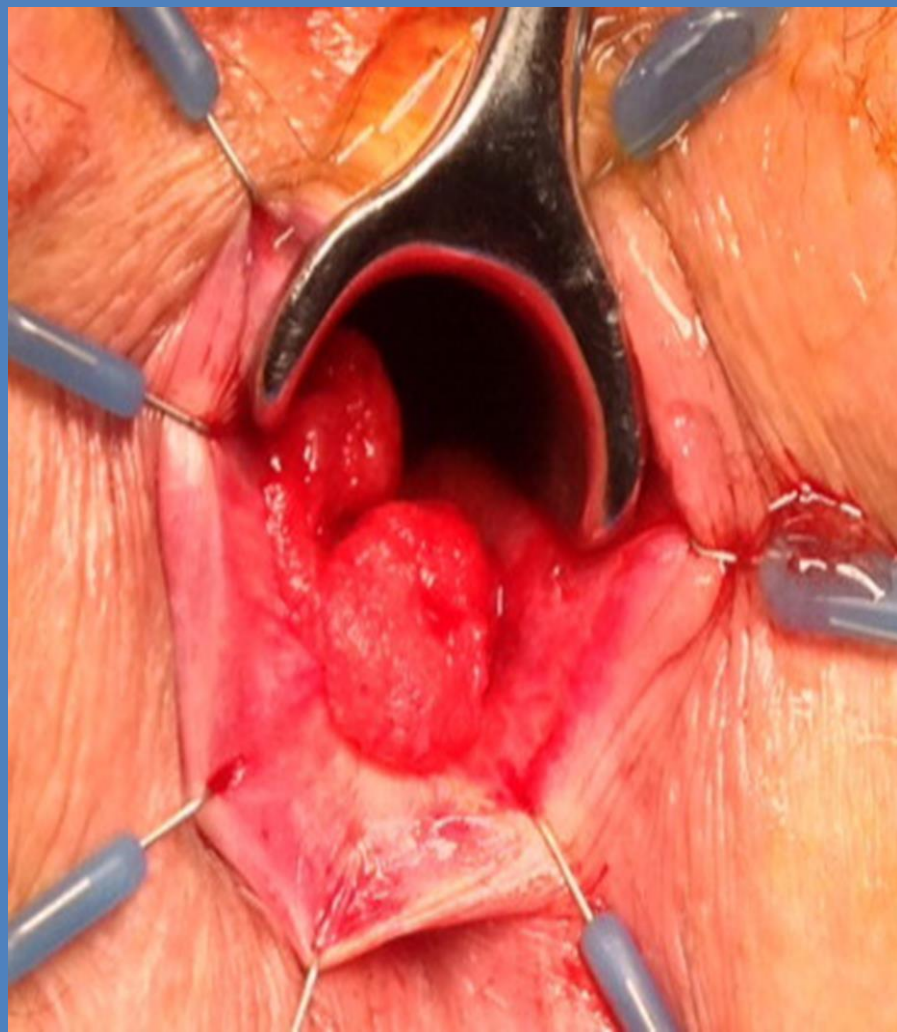
Modified Lithotomy position



TAE

Indications-

- Within 10 cm from anal verge.
- < 3 cm in diameter.
- < 1/3rd circumference.
- T_1 T_2 $N_{o.}$
- Well differentiated.
- No clinical or radiological evidence of LN involvement.
- Especially for unfit or who will not accept colostomy.

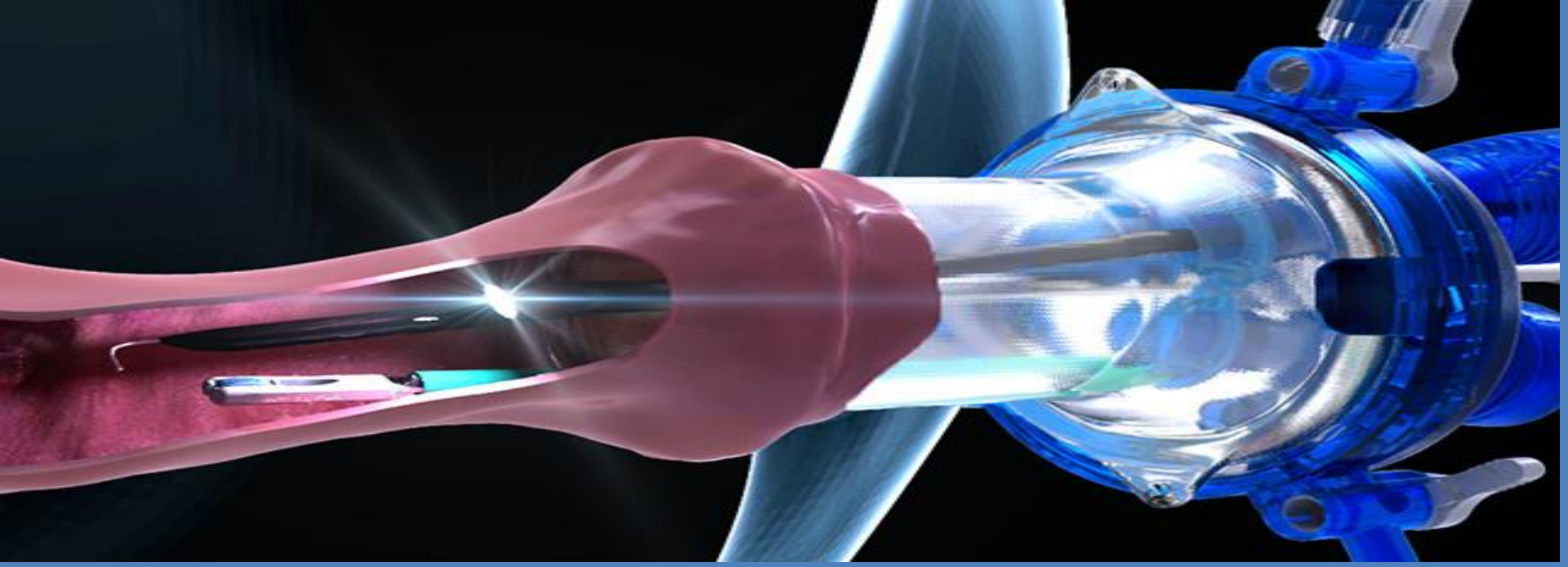


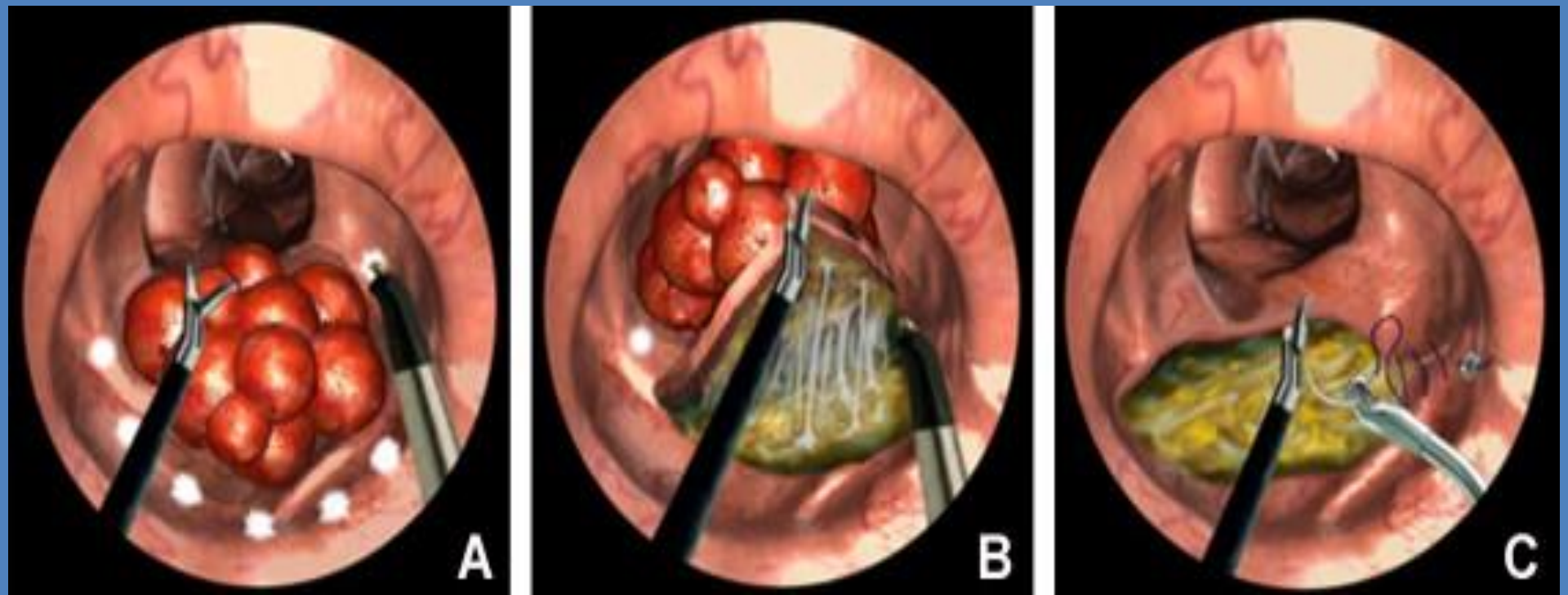
Full thickness excision Recurrance-

- **T_1- 4-18%.**
- **T_2- 27-67%.**

TEM

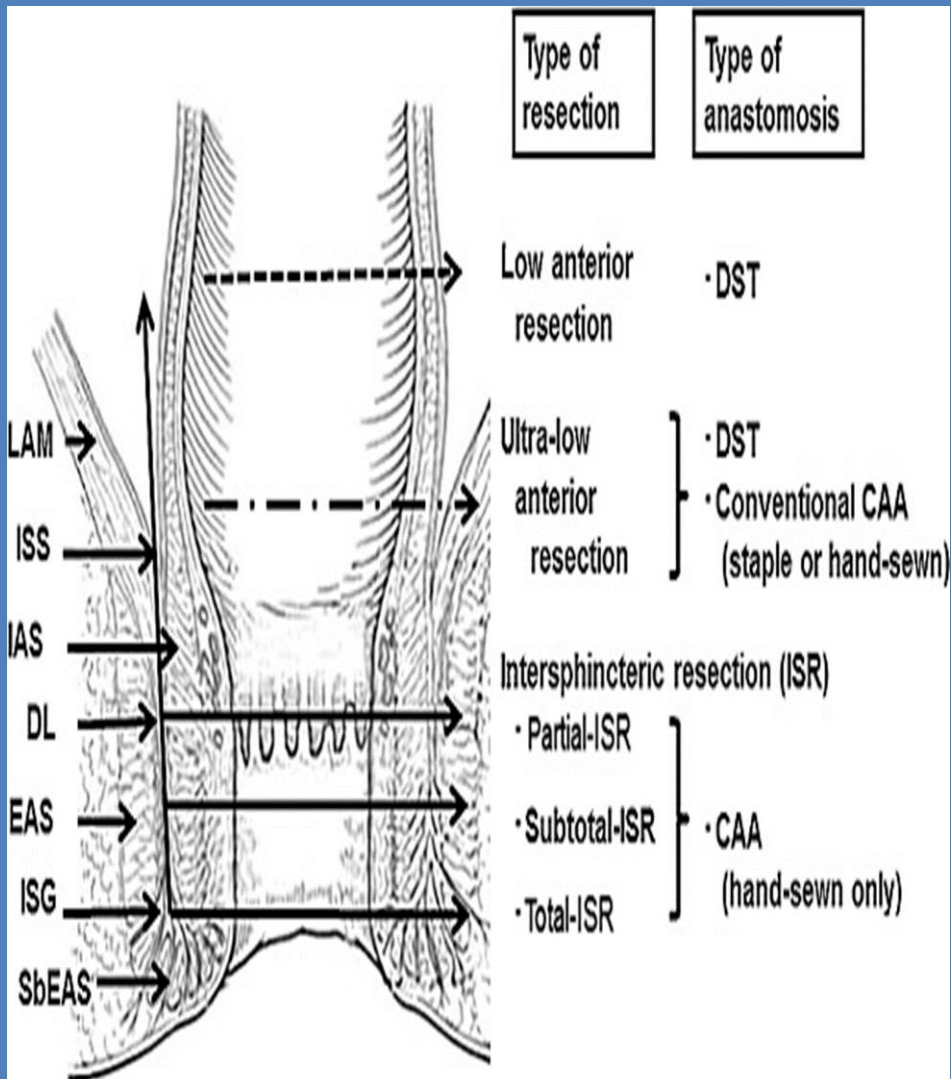
- Indication-
  - Sessile polyp.
  - T 1 lesion.
- Site-
  - Upper & mid rectum.
  - Lower sigmoid up to 20 cm.
- Position-
  - Prone.
  - Lateral.
  - Lithotomy.
- Limitations-
  - >10 cm only adenoma.
  - Only for T1.
  - Most difficult.
  - Finger & wrist are prime mover.




A
B
C

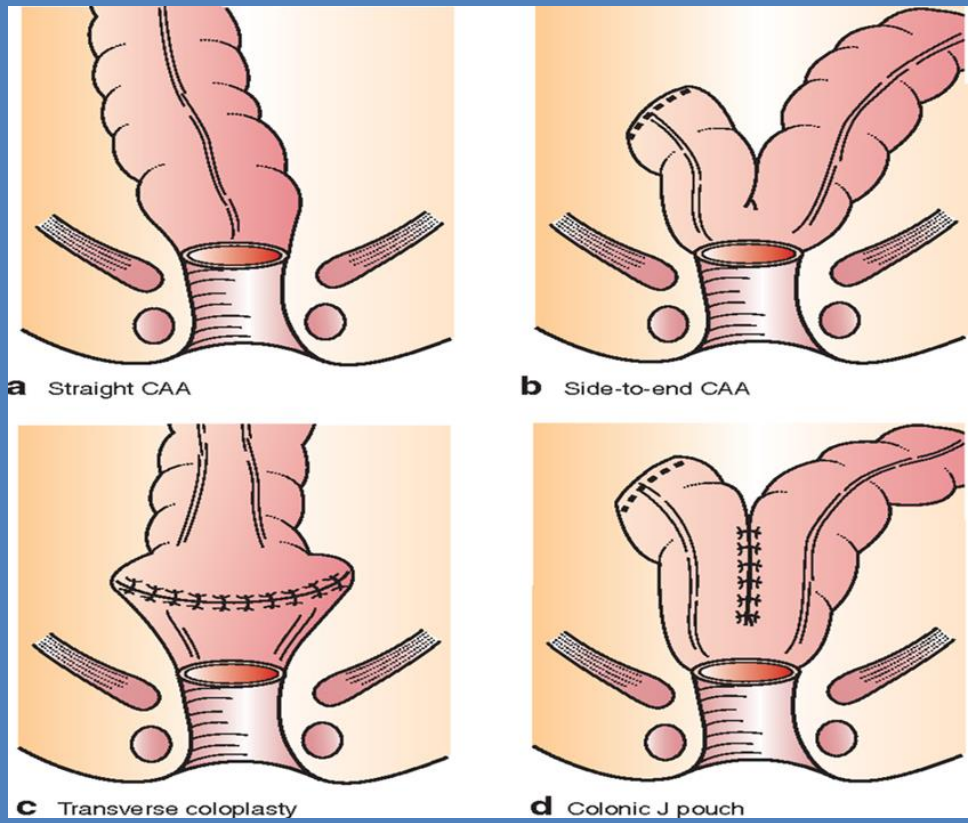
Sphincter sparing surgery

- AR .
- LAR.
- ULAR.
- Intersphincteric ULAR
  - Partial.
  - Subtotal.
  - Total.



Reconstructive option

- Straight colorectal anastomosis.
- Straight coloanal anastomosis.
- Colonic pouchanal anastomosis.
- Coloplasty.



LAR Syndrome

- 10-20% in sphincter saving surgery.
- 30% in ULAR with straight anastomosis.
- In reality symptoms varies.
    - Urgency.
    - Loose stool.
    - Frequency.
    - Altered stool consistency.
    - Obstructed defecation.
    - Incontinence.
    - Segmentation.
    - Night time defecation.
- If present at 1 yr after surgery or stoma closure likely to be present at 10 yrs.

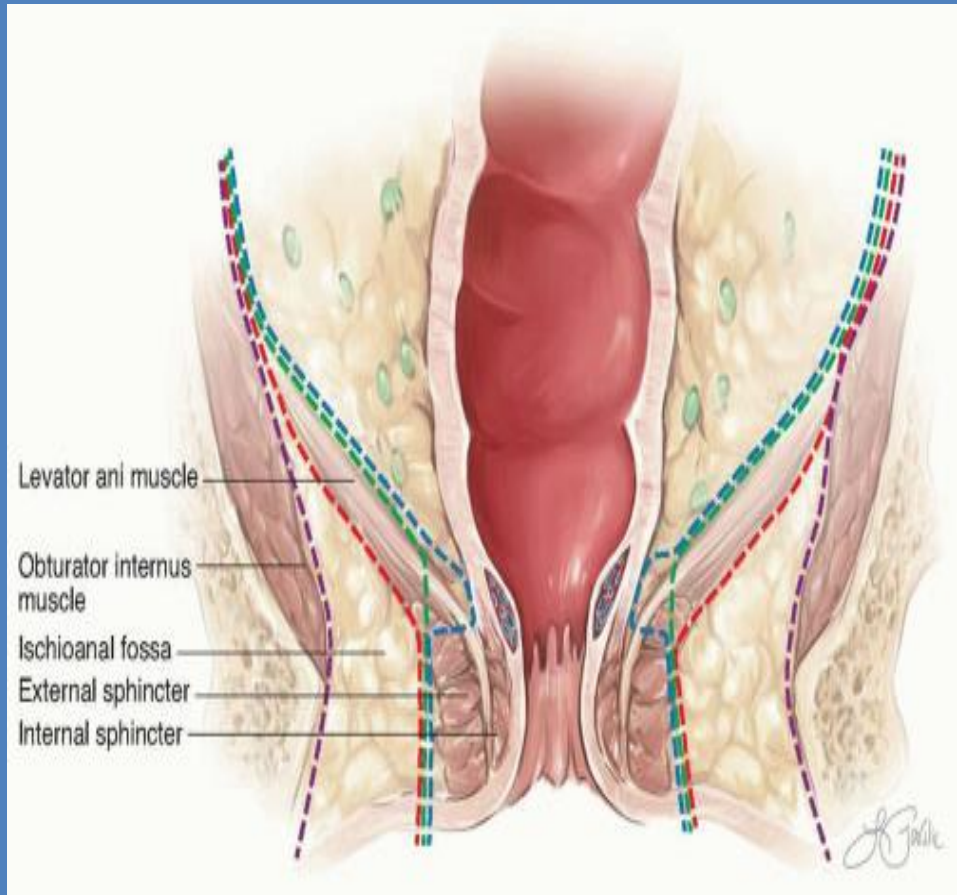
Indicatin of APR

- Very low rectal ma-
  - Invading EAS
  - Levator ani
- Rectal ma with poor continence
- Poorly diff low rectal ma
- Bulky tumor showing minimal response
  or no response or progression on neoadjuvant.
- Intractable FI.

APR

3 different procedures-

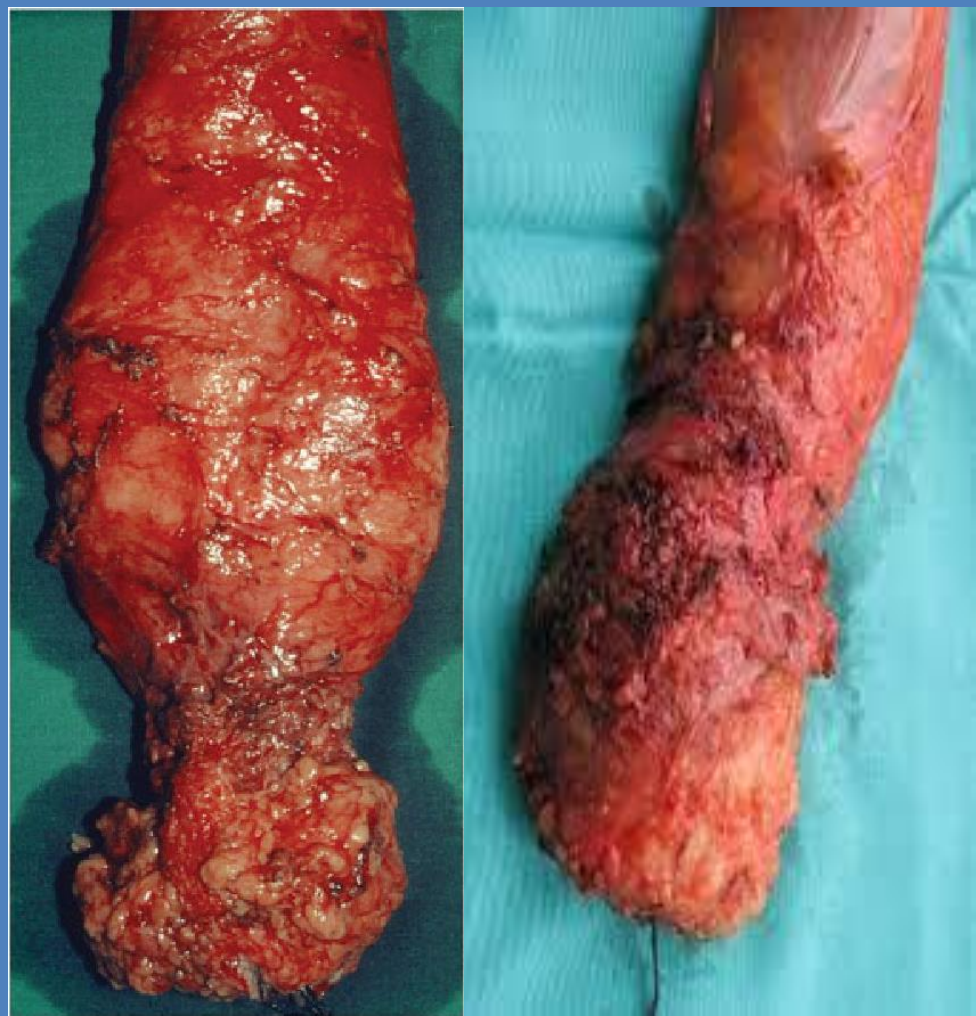
- Intersphincteric-
  - T1 cancer.
  - Adenoma.
- Extralevator-
  - T2-T4 cancer.
  - Tumor threatening CRM.
- Ischioanal.



ELAPR

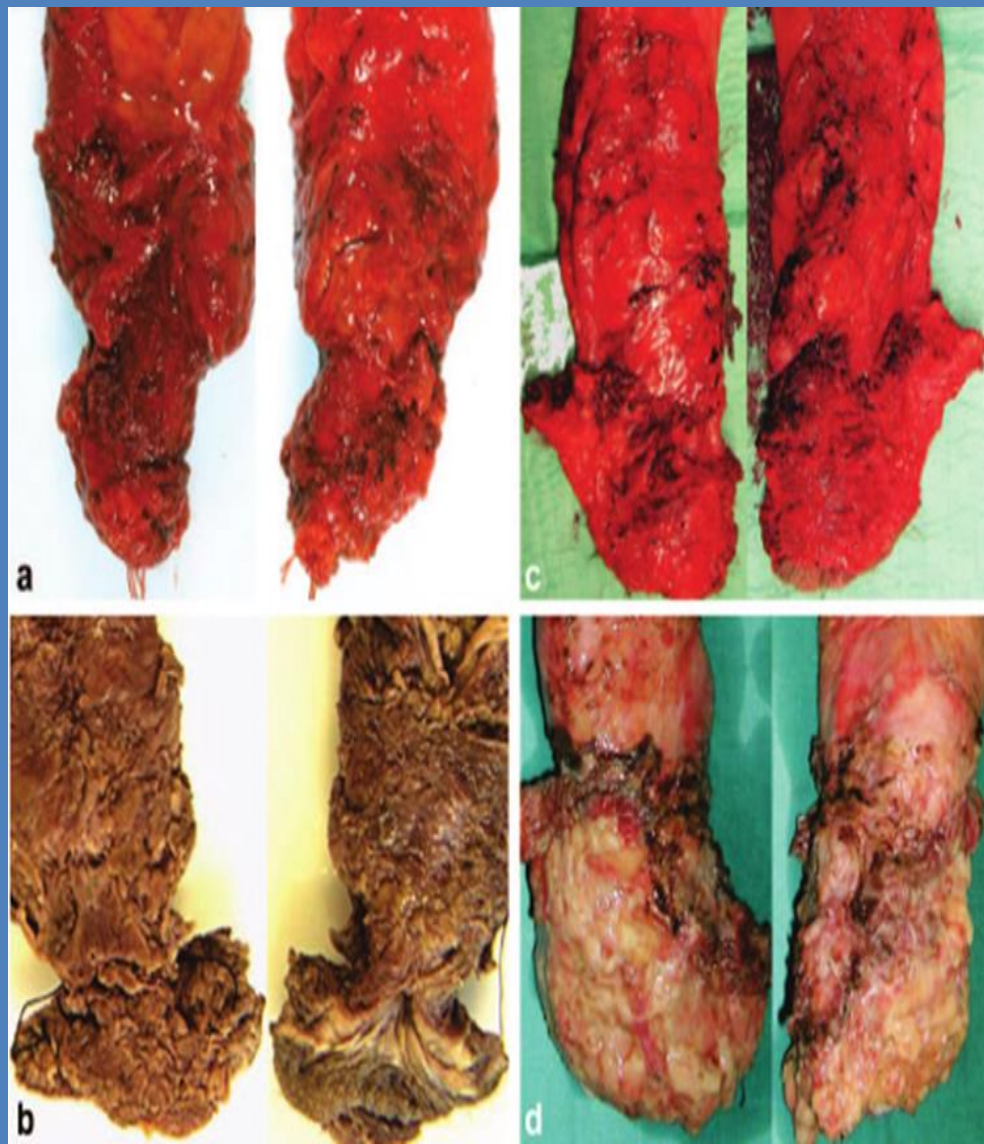
Benefits-

- More cylindrical specimen.
- Avoidance of coning.
- Reduce risk of perforation.
- Less chance of positive CRM.



Ideal specimen of APR

- TME
- Avoid coning
- Adequate proximal & distal resection margin
- CRM should be negative
- Avoid perforation
- Adequate lymphovascular clearance(at least 12 LN)



Histological query

- Tissue diagnosis.
- Type of malignancy.
- Grading.
- PRM.
- DRM.
- CRM.
- Nb. Of LN.
- Nb. Of positive LN.
- Immunohistochemistry
- Tumor biology & molecular profiling.

LAR with TME

Specific complications-

- Impotence(10-28%).
- Retrograde ejaculation.
- Urinary incontinence.

SYMPATHETIC HYPOGASTRIC NERVES(L1,L2,L3)

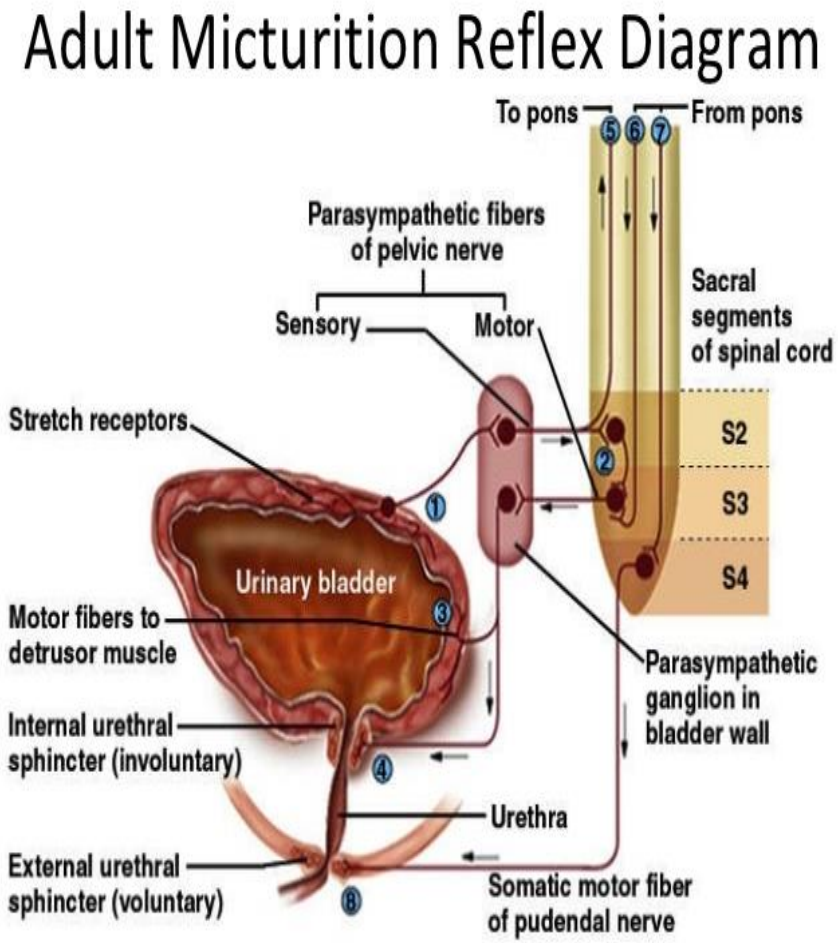
Motor to IUS,
Inhibitory to detrusor
No significant role in micturition;
Along with IUS prevent reflux of semen into the bladder during ejaculation

PARASYMPATHETIC PELVIC NERVES (S2,S3,S4)

- motor to detrusor
- inhibitory to IUS.

SOMATIC PUDENDAL NERVES (S2,S3,S4)-

- Voluntary control of EUS.
- Tonic contractions of the skeletal muscle fibers of the EUS.
- During micturition this nerve is inhibited, causing relaxation of the external sphincter and voiding of urine.

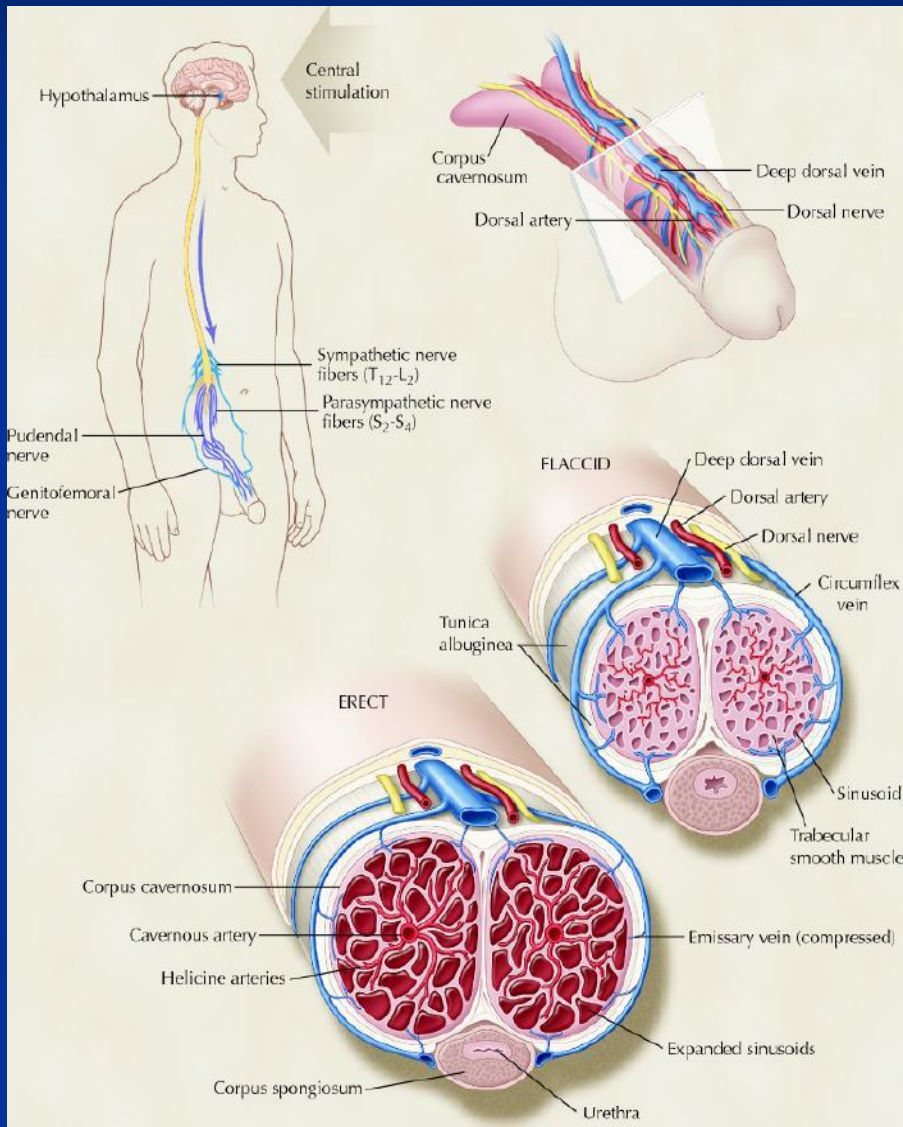


Penile erection is mediated by a coordinated -

Neurologic –

- Parasympathetic (nervi erigentes)- vasodialtion.
- Somatic (pudendal nerve) –maintain penile rigidity.
- Dorsal nerve of the penis trigger bulbo-cavernosus reflex. Contraction of the ischiocavernosus muscle compresses the proximal corpora cavernosa and further increases the intracavernous pressure resulting in the penile rigidity .

Vascular---increased inflow of blood to the corpora cavernosa, dilatation of venous sinusoids within the pelvis, and decreased outflow from the corpora cavernosa.

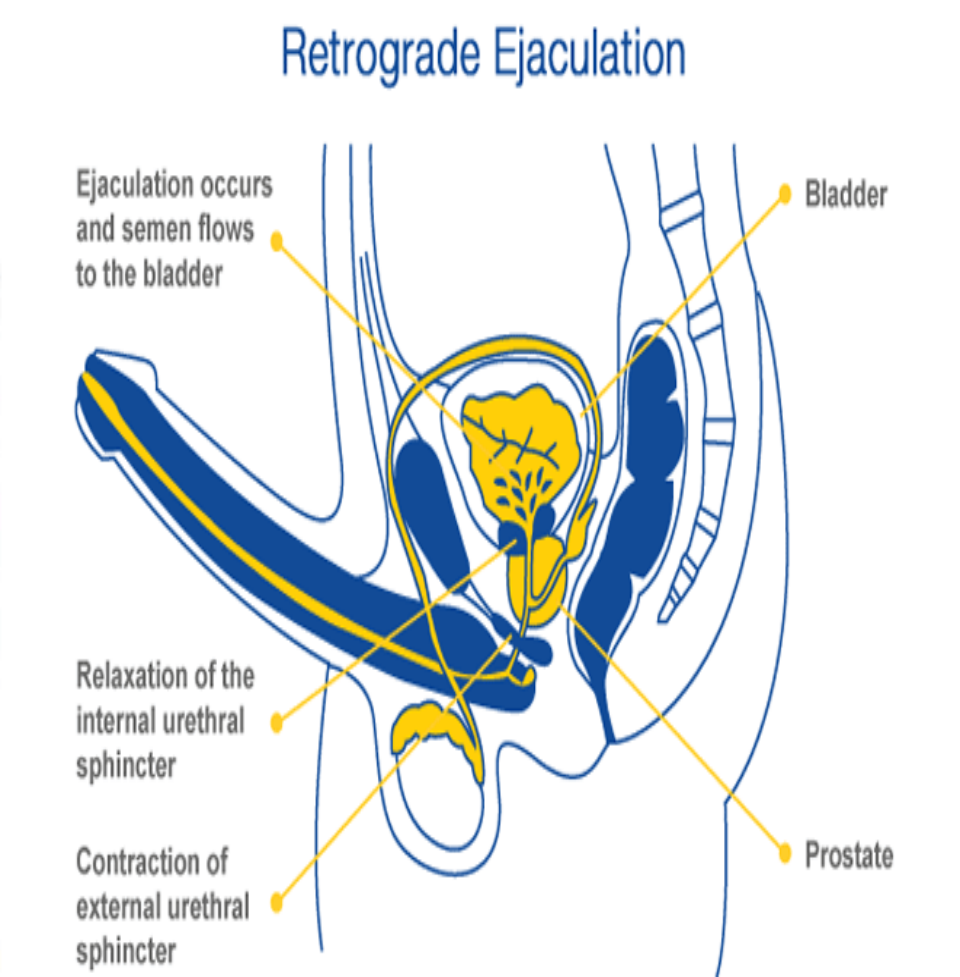


•Ejaculation takes place in two phases:

Emission stage-- sperm are moved to the beginning of the urethra,

Ejaculation proper—semen is expelled from the body.

- Sympathetic denervation with intact nervi erigentes--retrograde ejaculation and bladder dysfunction.
- Injury to nervi erigentes & pelvic plexuses completely abolishes erectile function.



Site of Nerve Injury

During high ligation of the IMA-

- close to the aorta, the sympathetic preaortic nerves may be injured.

At the level of sacral promontory or in the presacral region -

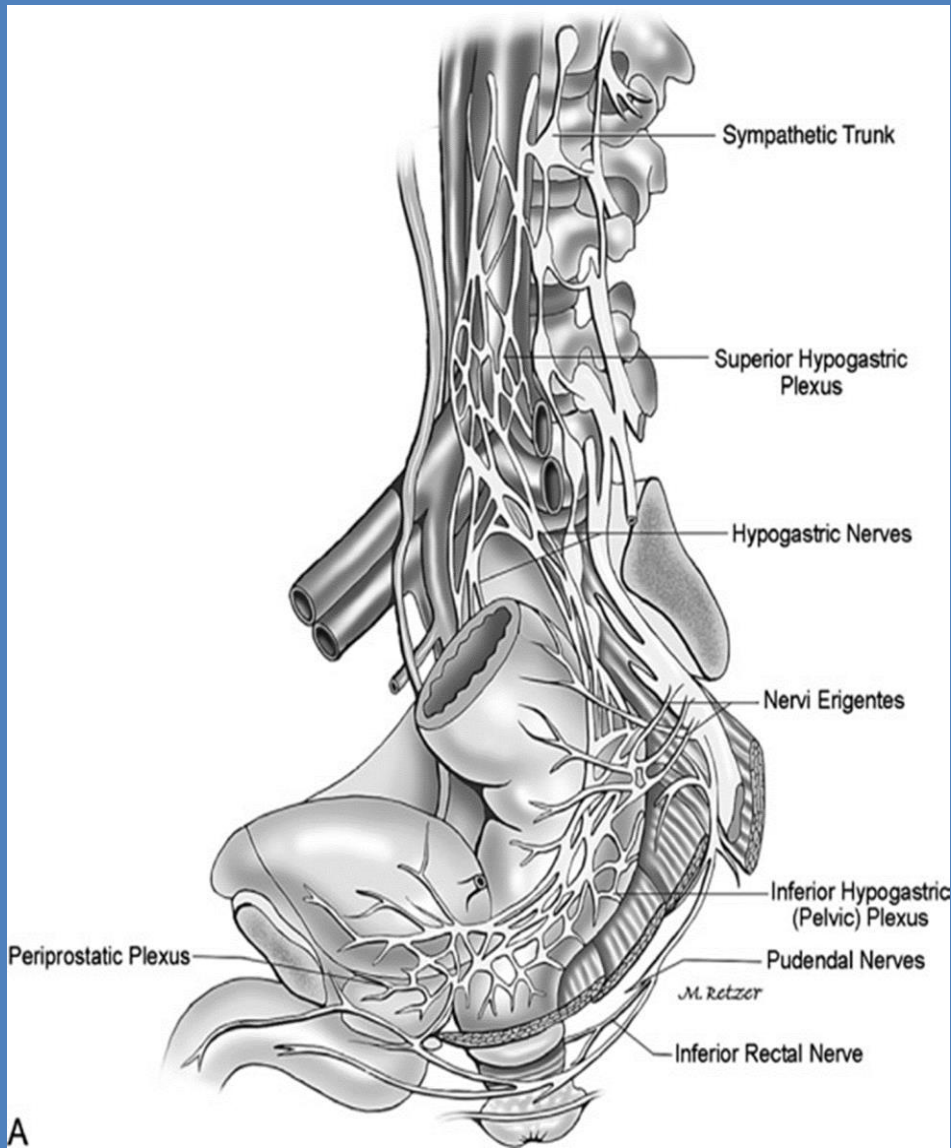
- Division of both superior hypogastric plexus and hypogastric nerves- sympathetic denervation with intact nervi erigentes -retrograde ejaculation and bladder dysfunction.

During dissection of posterolateral aspect of pelvis-

- The nervi erigentes are located in the posterolateral aspect of the pelvis, Injury to these nerves completely abolishes erectile function.

The pelvic plexus may be damaged -

- either by excessive traction on the rectum, particularly laterally, or
- during division of the lateral stalks when this is performed close to the lateral pelvic wall.



Male sexual dysfunction

- Retrograde ejaculation.
- Erectile dysfunction.

Female sexual dysfunction

- Hard to quantify.
- 10-20%.

Dyspareunia.

❑ Inability to produce vaginal lubricant & orgasm.

Postoperative infertility

– Exceed 50%.
– 2ndary to pelvic adhesion.
– Prevented by

  - Tacking ovary to ant.abd. Wall.
  - Wrapping adnexa in antiadhesion barrier.

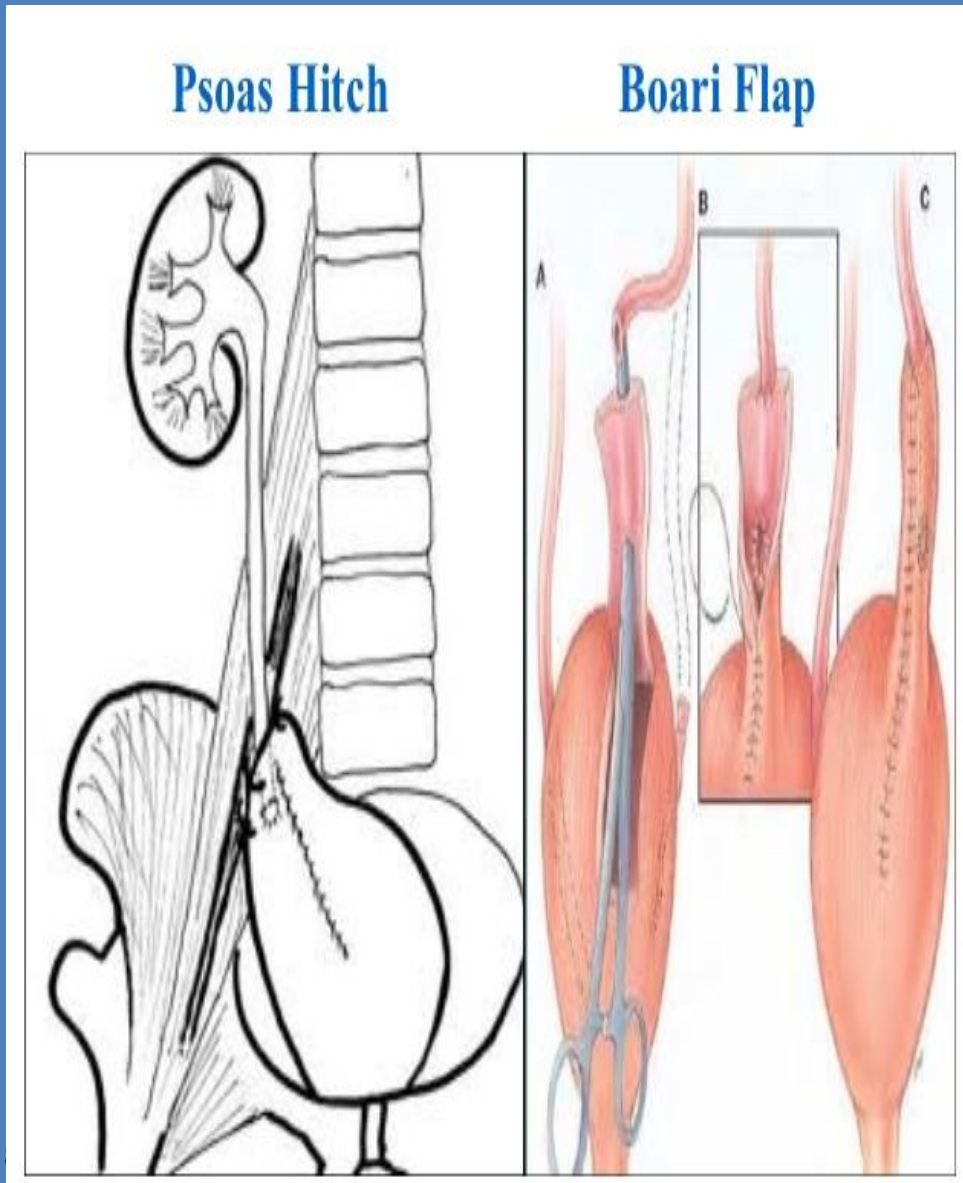
Ureteric injury

During high ligation IMA.

- Btw upper & middle 1/3rd of lt ureter.
- Usually transection-repair over a stent.

2nd at sacral promontory

- Tangential
- Stent help recognition but not prevent it.
- Primary repair/ligation of distal stump & create ureteroneocystostomy by BOARi flap / psoas hitch repair.



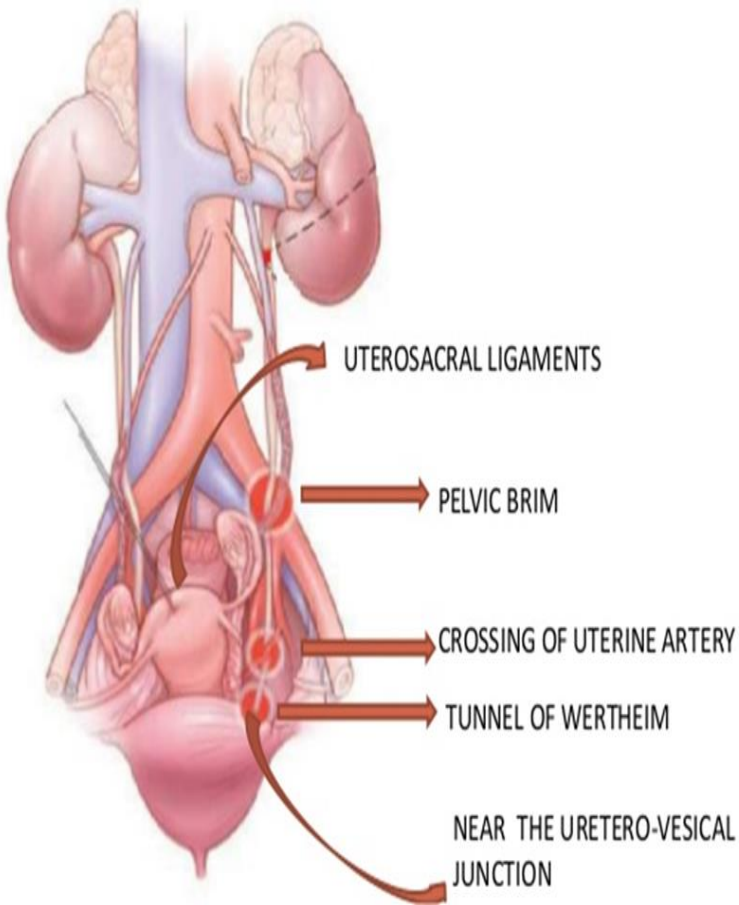
<50% identified during surgery.

Anterolateral dissection of lower rectum.

- At ureterovesical junction.

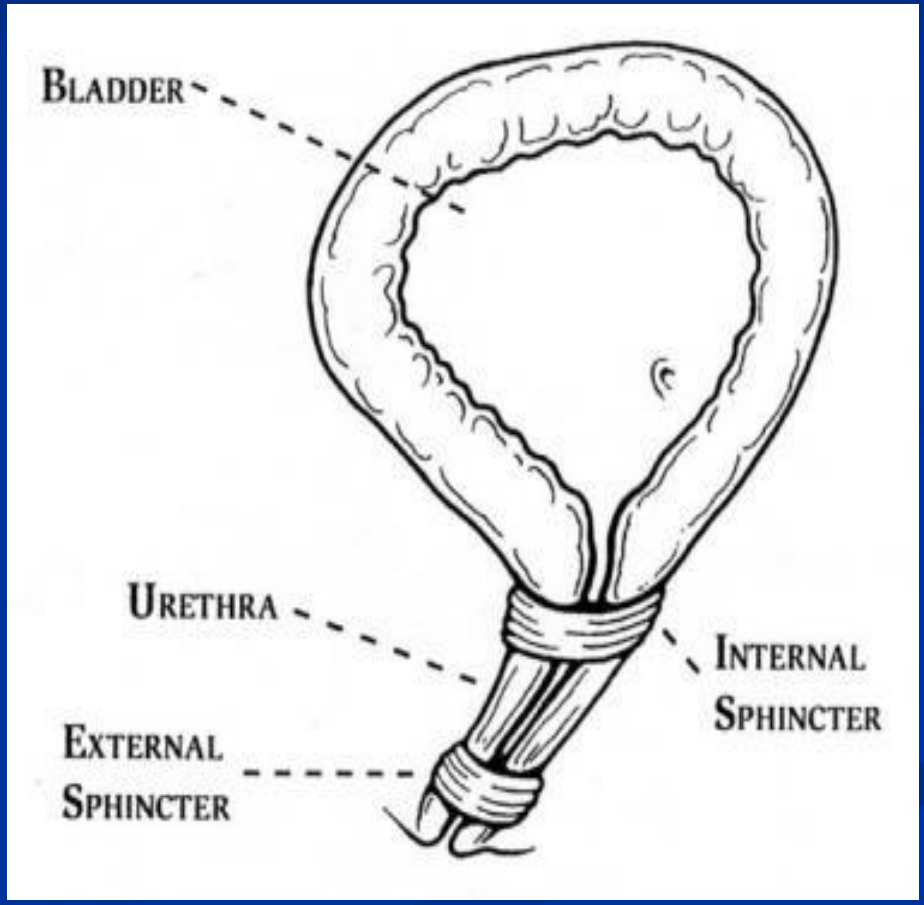
Most cephalad portion of perineal dissection.

- At ureterovesical junction.
- Requires reimplantation by ureteroneocystostomy.



Female US

- IUS in females is functional rather than anatomic.
  - The bladder neck and proximal urethra constitute the female IUS.
- EUS has the most prominent effect on the female urethra.
  - This occurs at the urogenital triangle,
  - located approximately 1.8 cm distal to the bladder neck, and
  - affects approximately 1.5 cm of urethral length.



Bladder dysfunction

Temporary –universal after APR-5-7 days.

Permanat –in small nb.of pt.

- Prostatectomy / CISC.

- Injury to sup. Hypogastric plexus & hypogastric nerve & intact nervi erigentis-
  - **spastic bladder.**

- Injury nervi erigentis –
  - **urinary retention-overflow incontinence**.