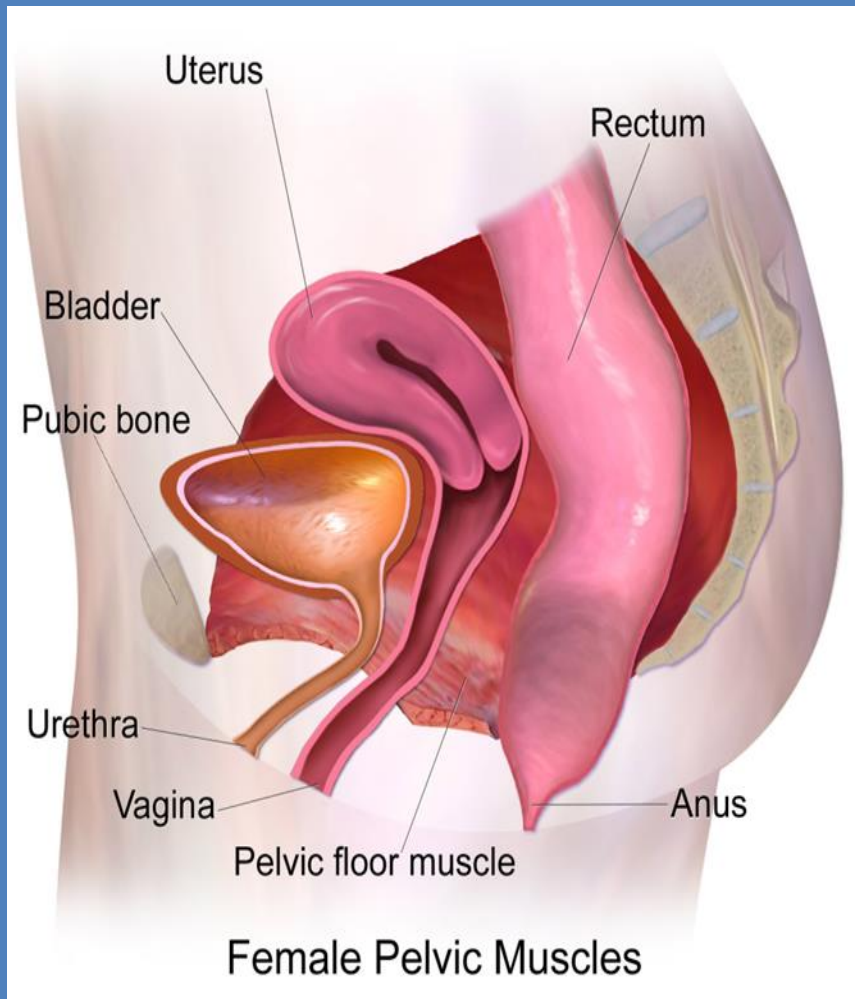
Carcinoma of rectum

Dr. Md. Ashek Mahmud Ferdaus
FCPS (SURGERY), MS (Colorectal Surgery), FISCP(India).
Fellow International Society of Coloproctology.
Assistant Professor (Colorectal Surgery)
Mymensingh Medical College.

The Rectum

- Rectum means straight.
- Straight in quadrupeds.
- Not in man.
- Curved A-P & side to side.
- Misnomer.
- 15- 18 cm length.

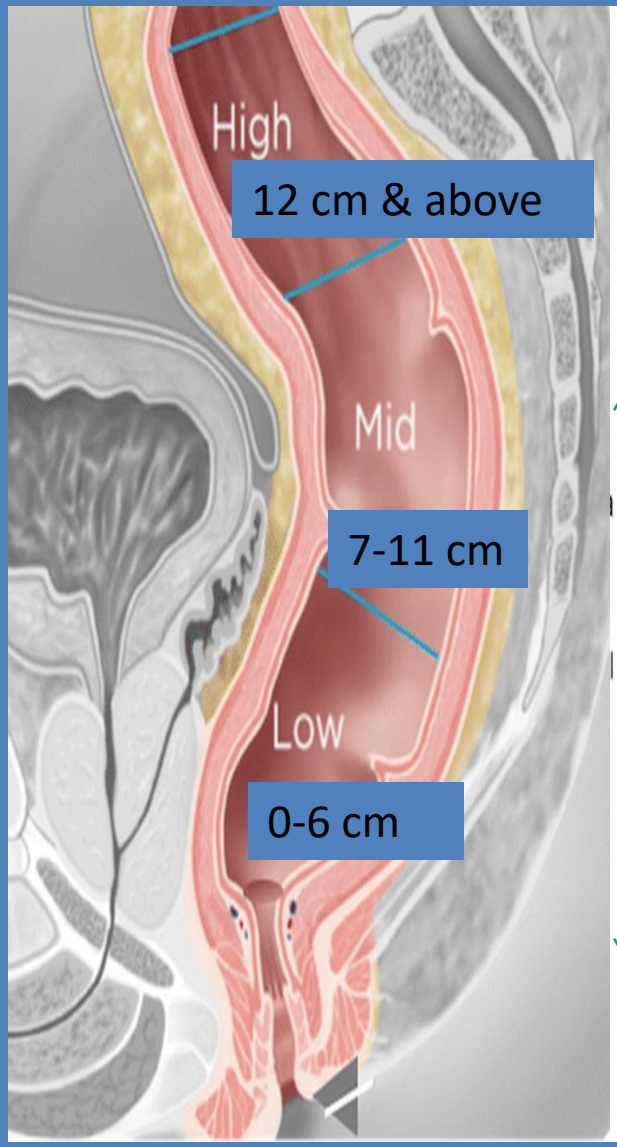


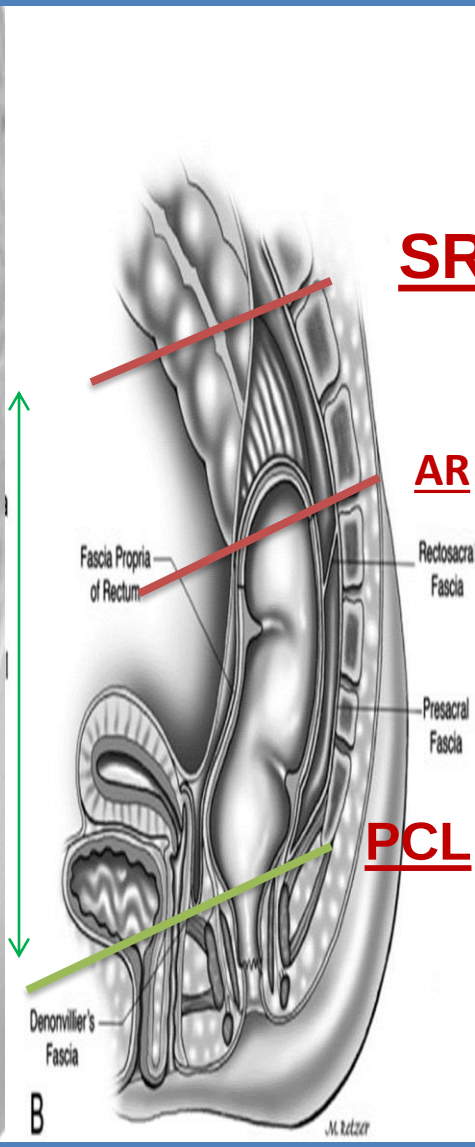
Anatomy of the Rectum

- Anatomical rectum.
- Surgical rectum-
  - Upper.
  - Mid.
  - Low.

- Approximately 15-18 cm long.

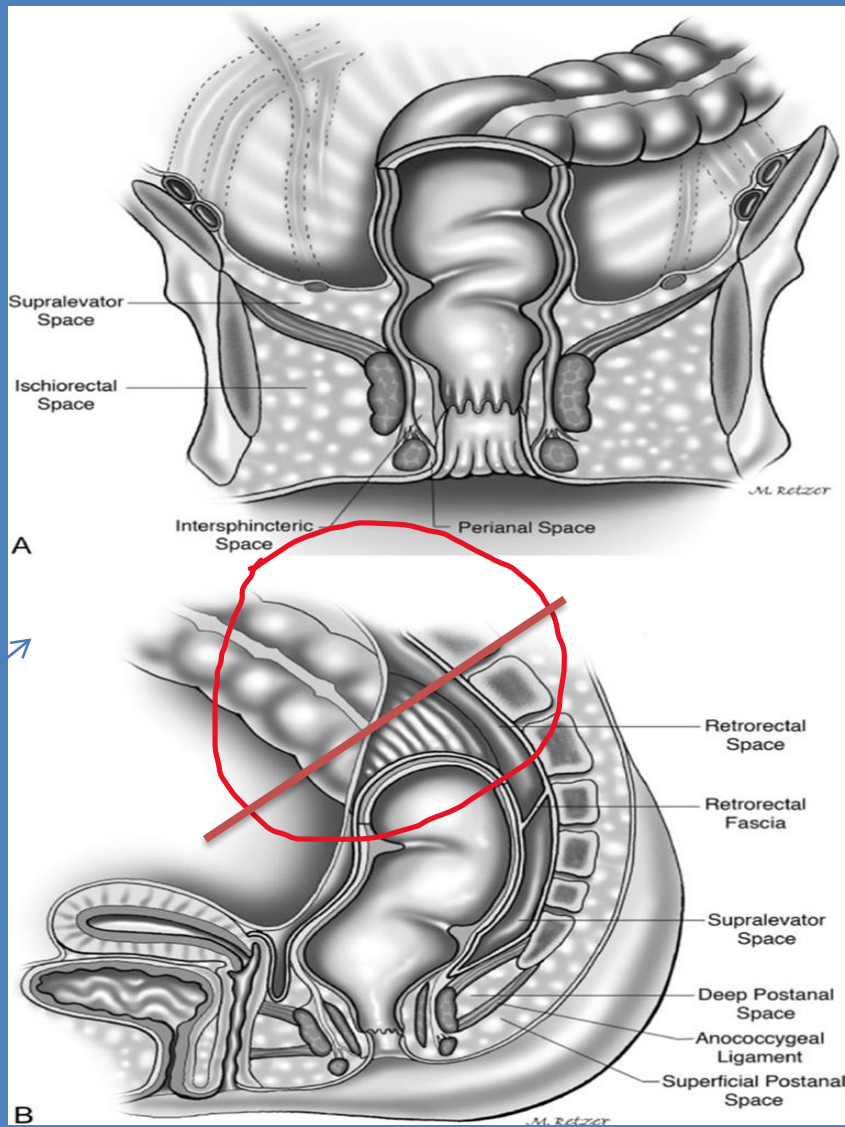
R-S junction -opposite the sacral promontory.





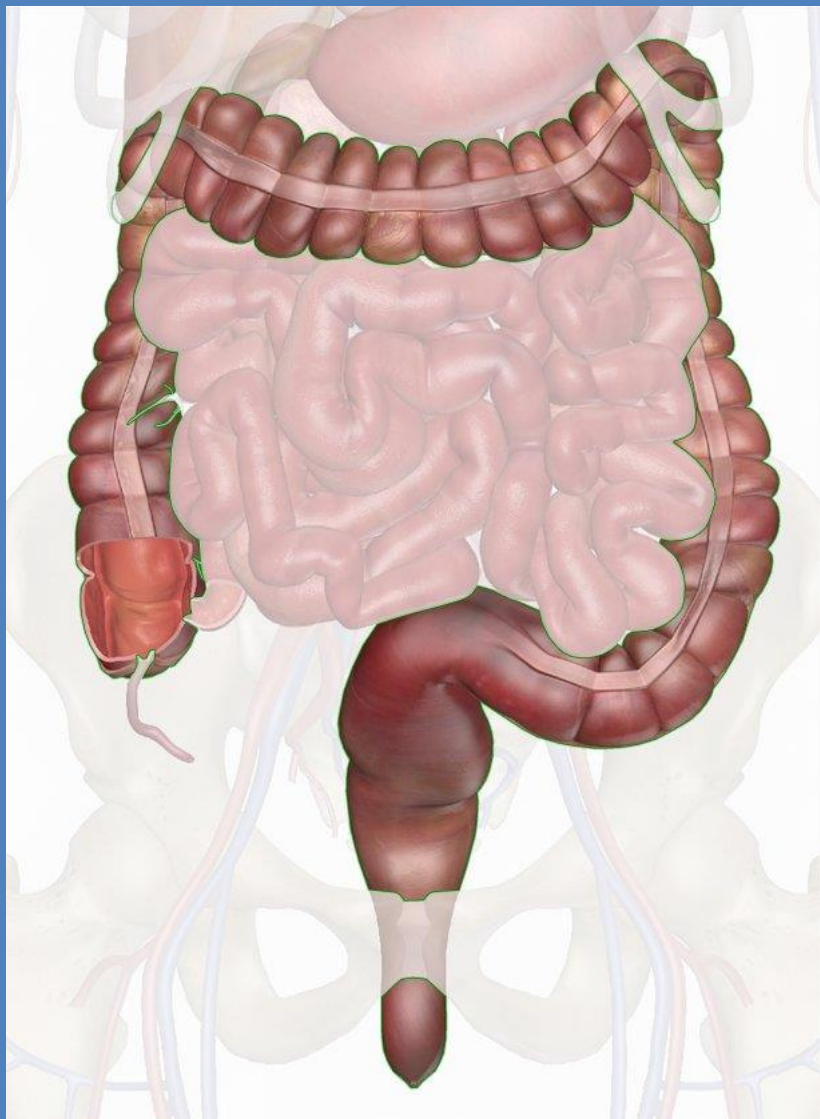
RS junction

- Indistinct zone.
- Last 5-8 cm of sigmoid & upper most 5 cm of rectum.
- Narrowest portion of large intestine.



Rectosigmoid junction

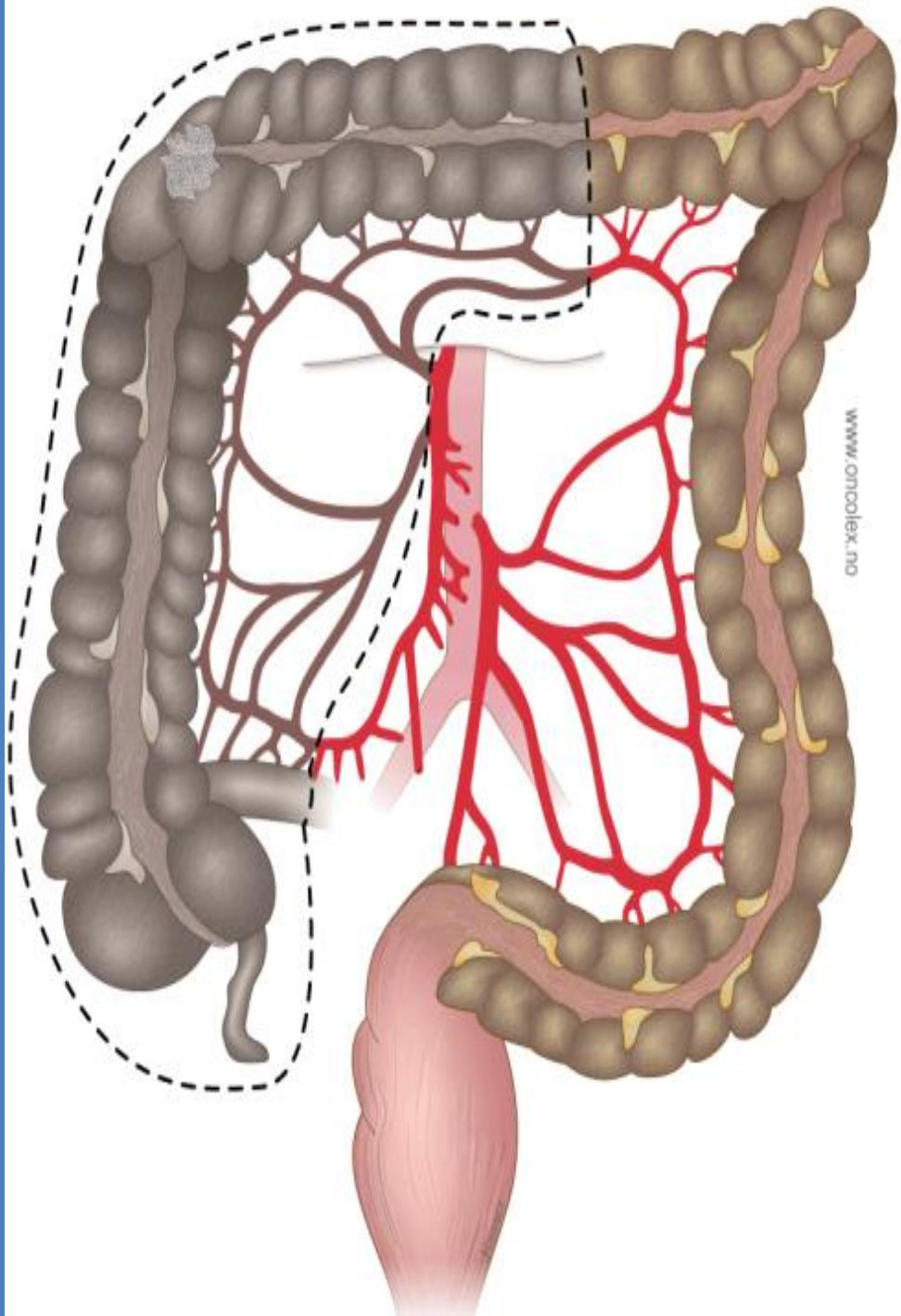
- Here taenia fuses to form single ant. Taenia.
- Haustra & mesocolon terminates.

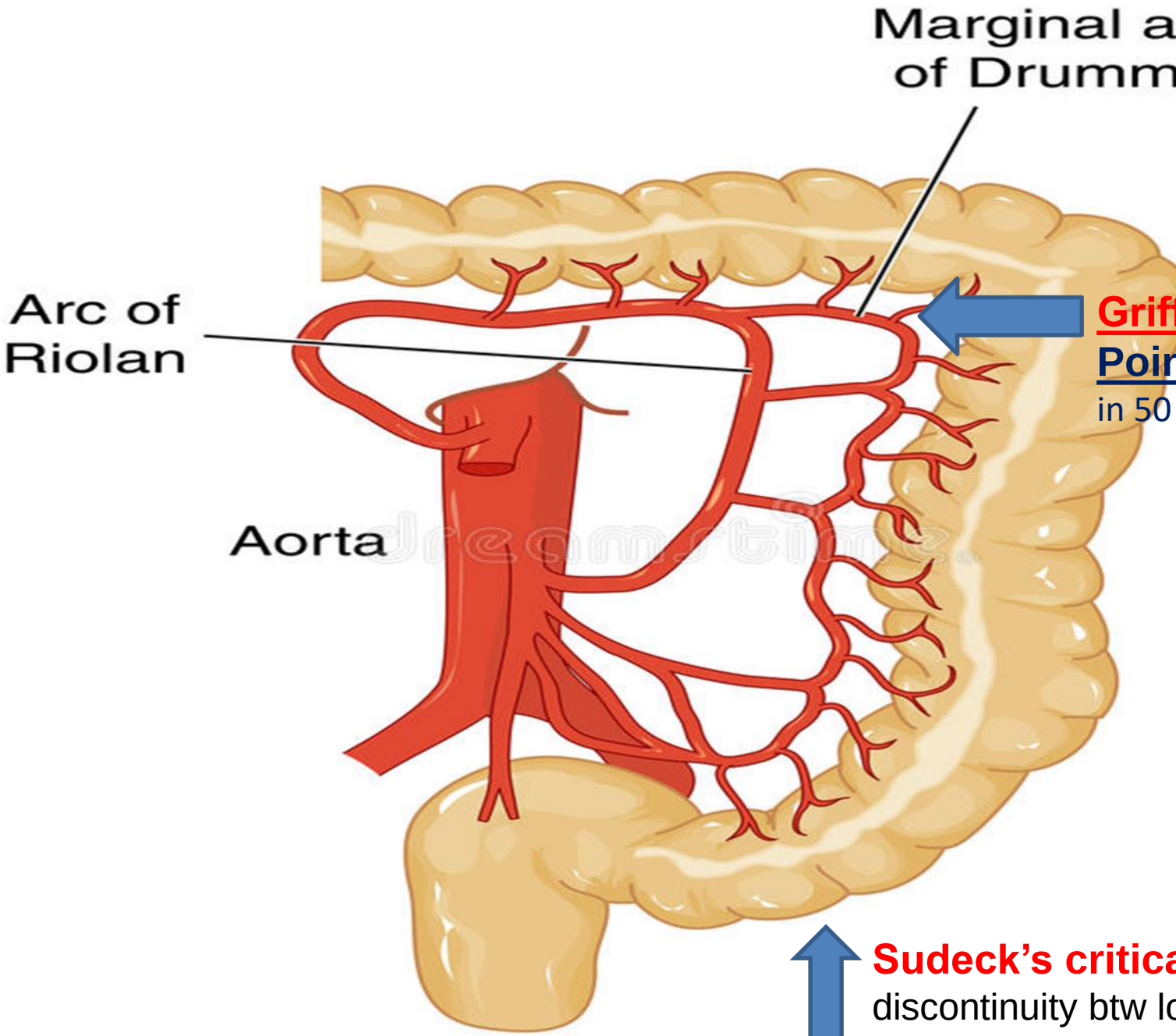


Constant vascular pedicle-

- Ileocolic
- Sigmoid
- SHA.

- RCA absent in -2-18%.
- MCA-4-20%.
- LCA-6%.
- MCA can be the main supply to splenic flexure in 33% case.





Griffith's critical Point -discontinuity in 50 % cases

Sudeck's critical point- discontinuity btw lowest sigmoid & SHA

Ligation of IMA

Flush –

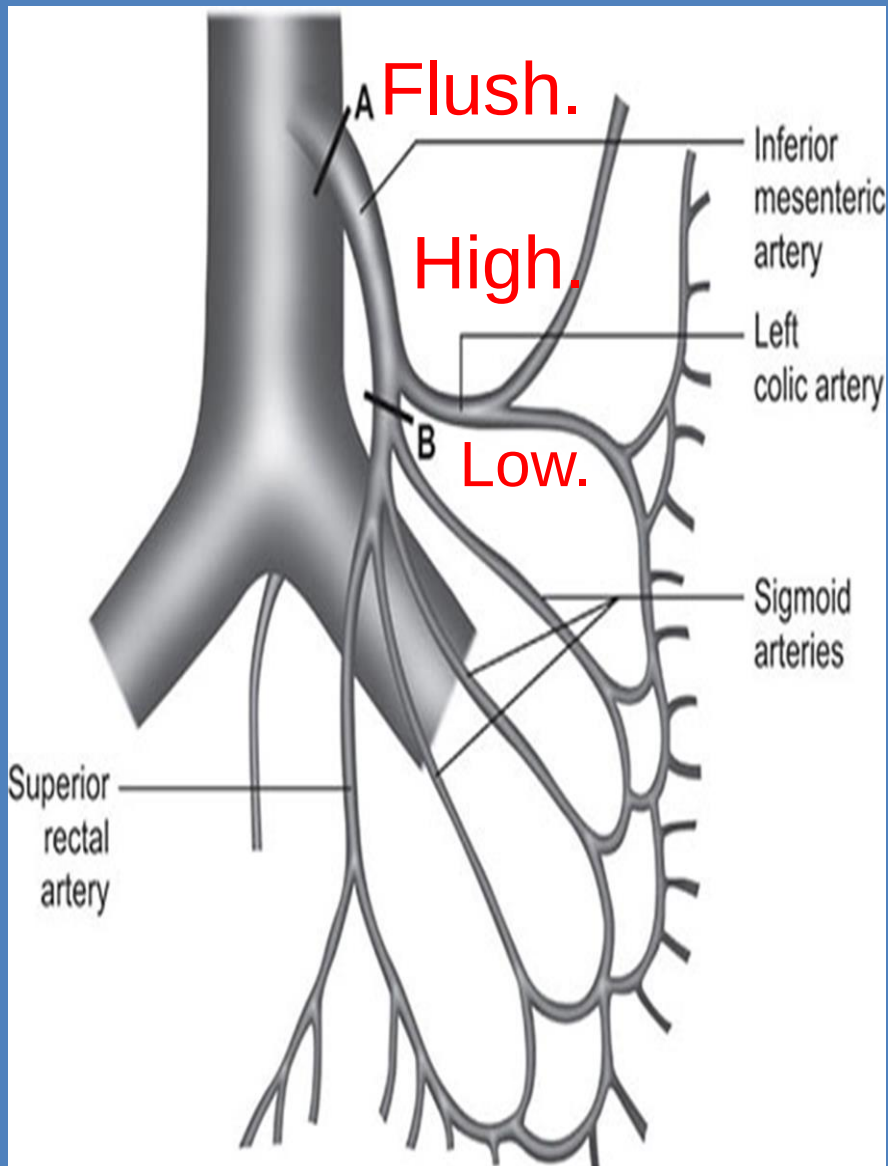
- At its origin.
- At the root of aorta.
- Not done to preserve sympathetic plexus.

High-

- 1-2 cm distal to its origin.
- If palpable nodes at the base of the vessels
- When max. length of left colon is required.

Low –

- Below the origin of the left colic artery.



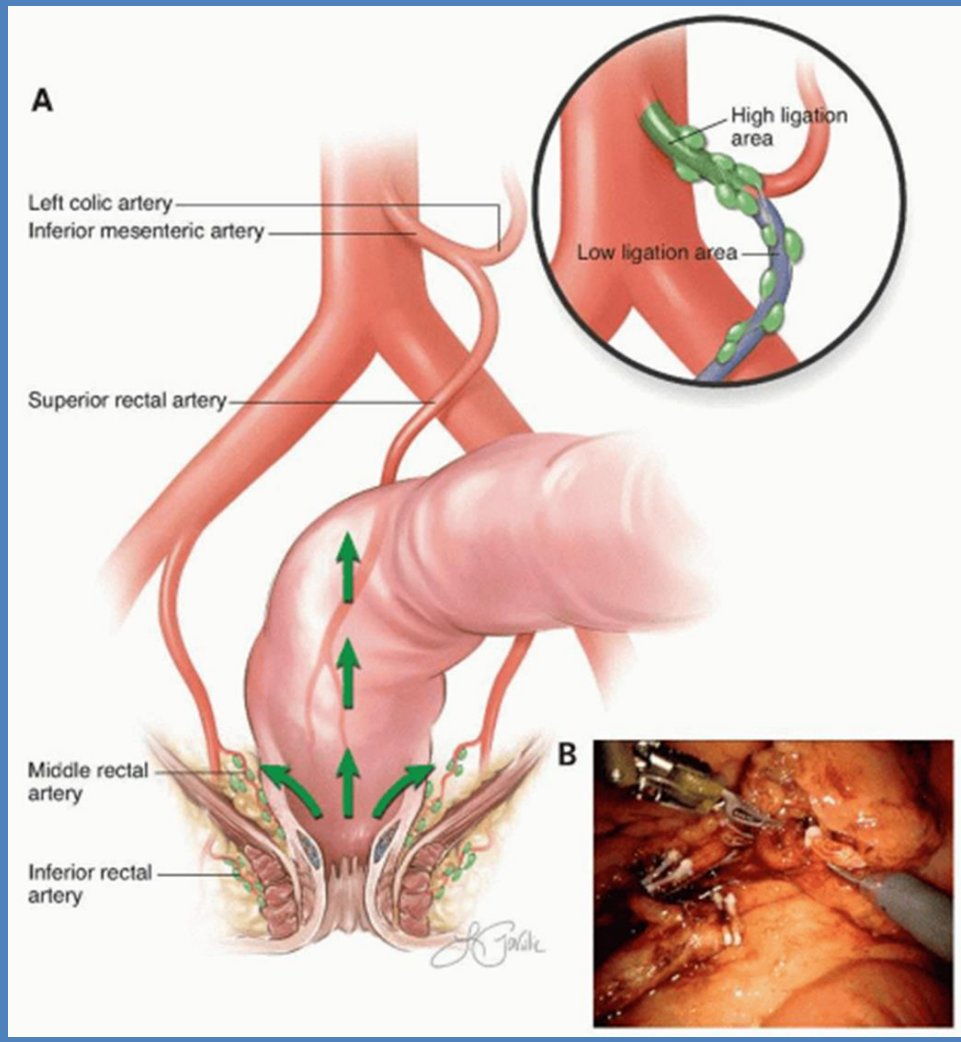
High ligation

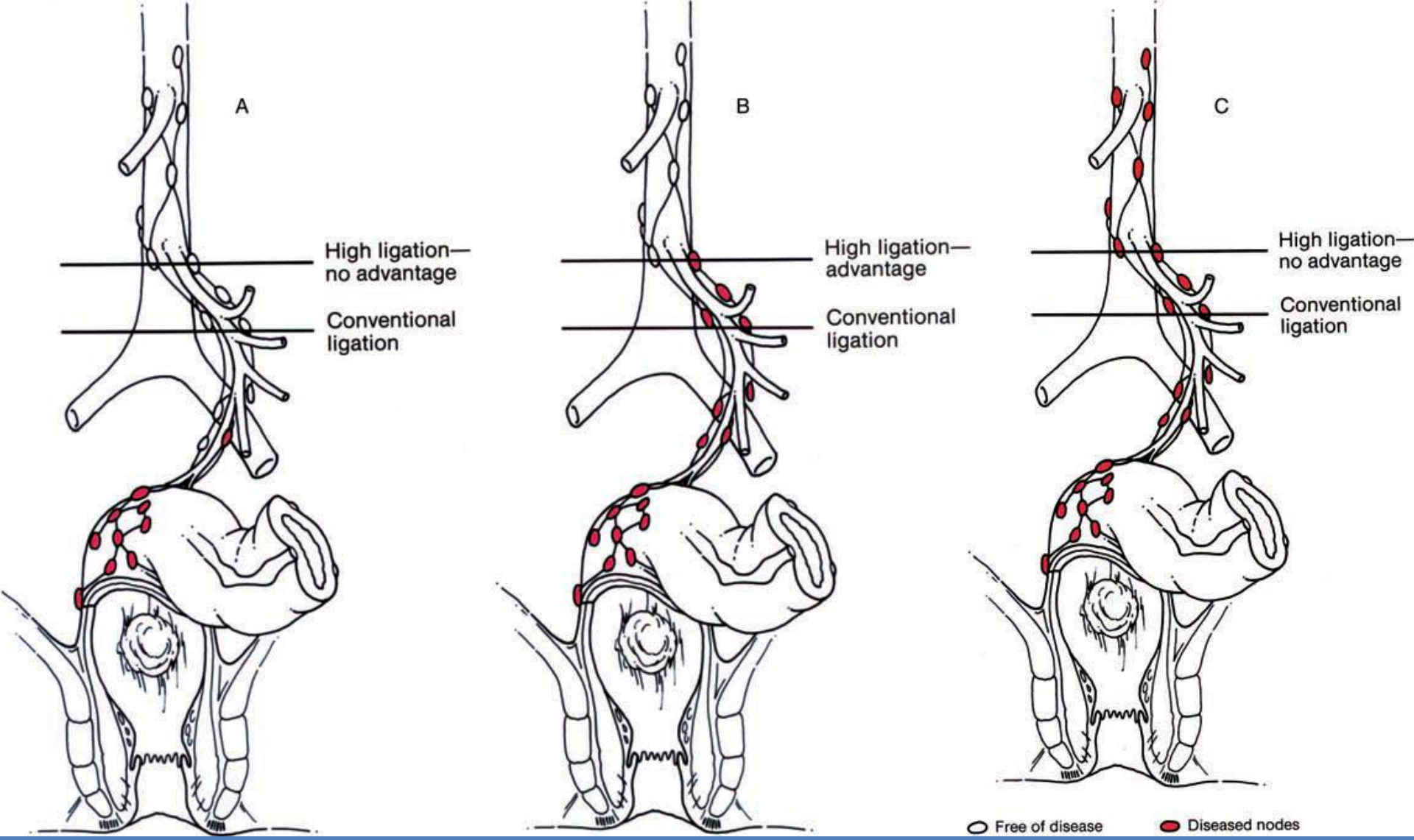
No value in case of-

- Dukes' A and B.
- Metastasis.

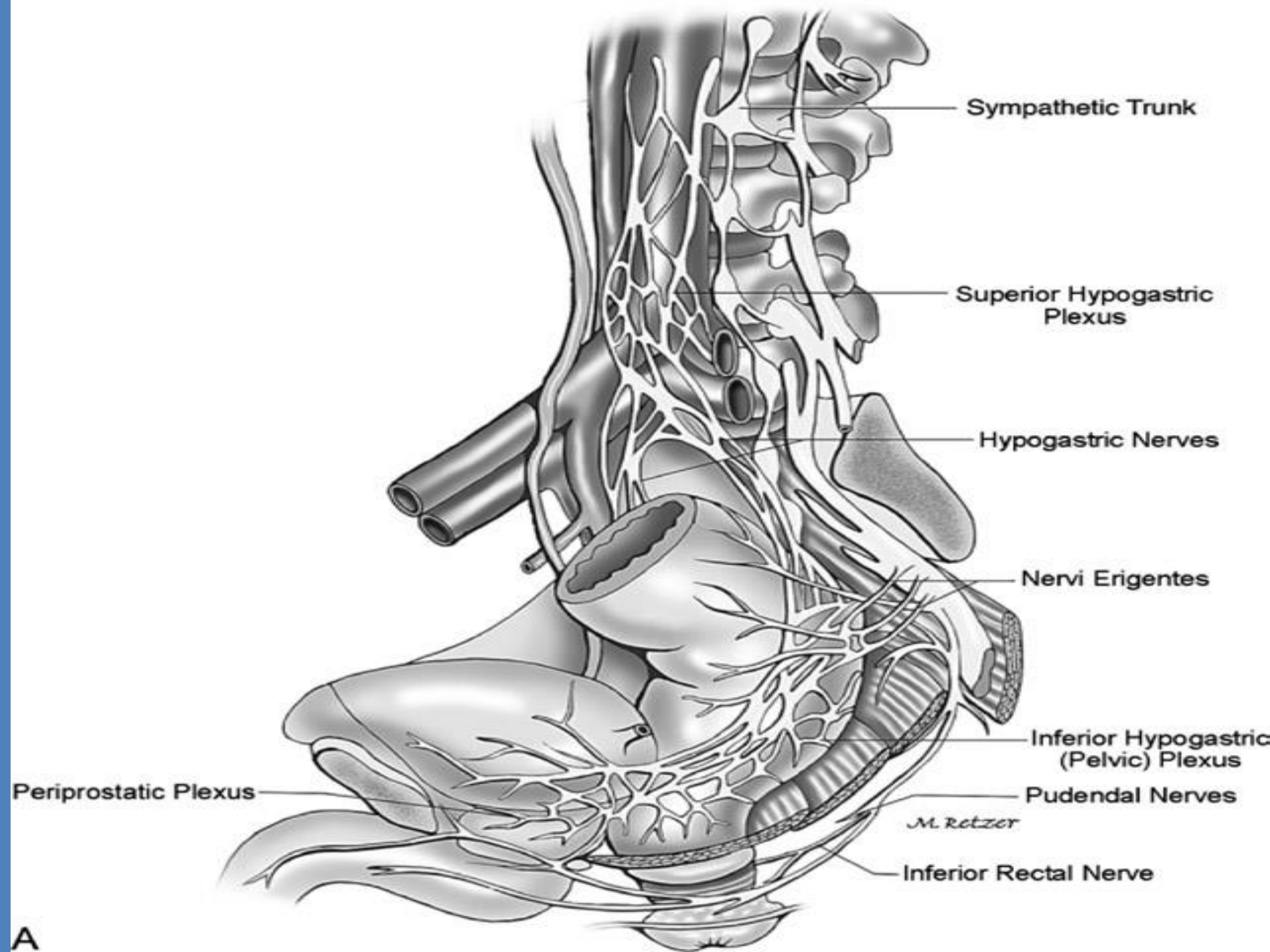
Potential benefit in-

- Dukes' C lesion.
- Only when nodal metastasis spread to a level proximal to the left colic artery.
- But not spread to the origin of the IMA.





Potential value of high ligation of IMA. (A) Conventional low ligation would be sufficient. (B) High ligation provides potential benefit. (C) Proximal lymphatic spread is beyond confines of even high ligation.[1]


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

Lymphatic drainage

Upper & mid rectum-

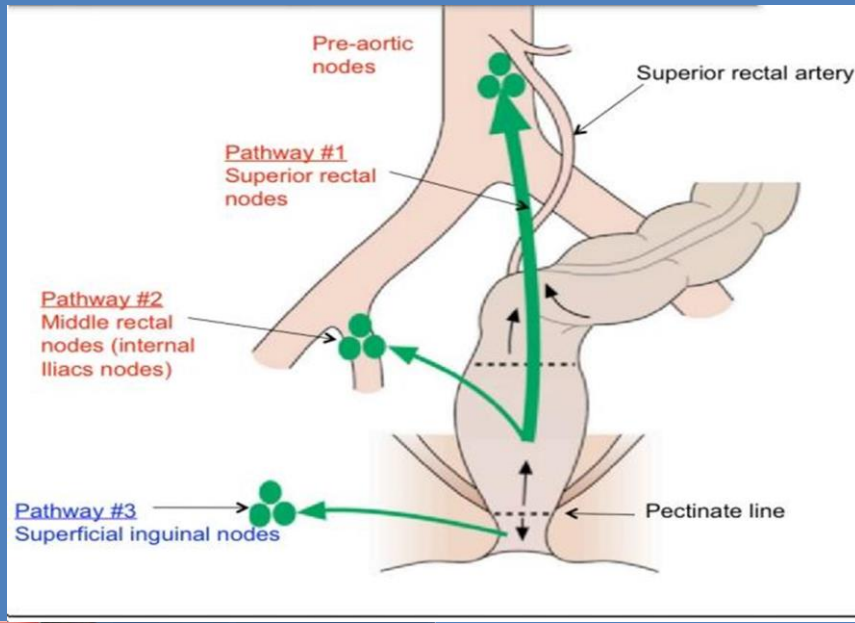
- Pararectal(over muscle layer).
- Intermediate.
- Principal.

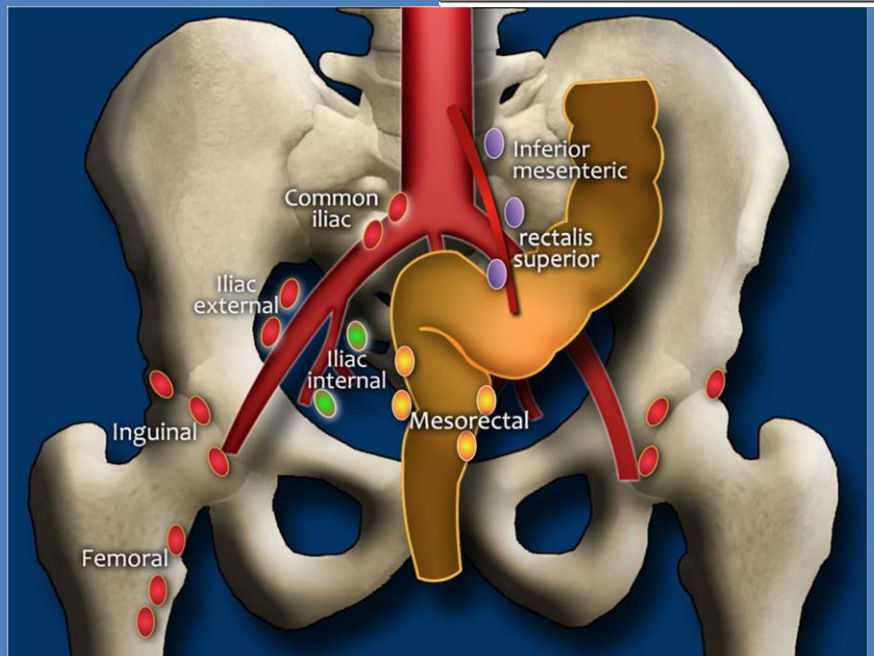
Lower rectum-

- Sacral group.
- Internal iliac.

Below dentate line-

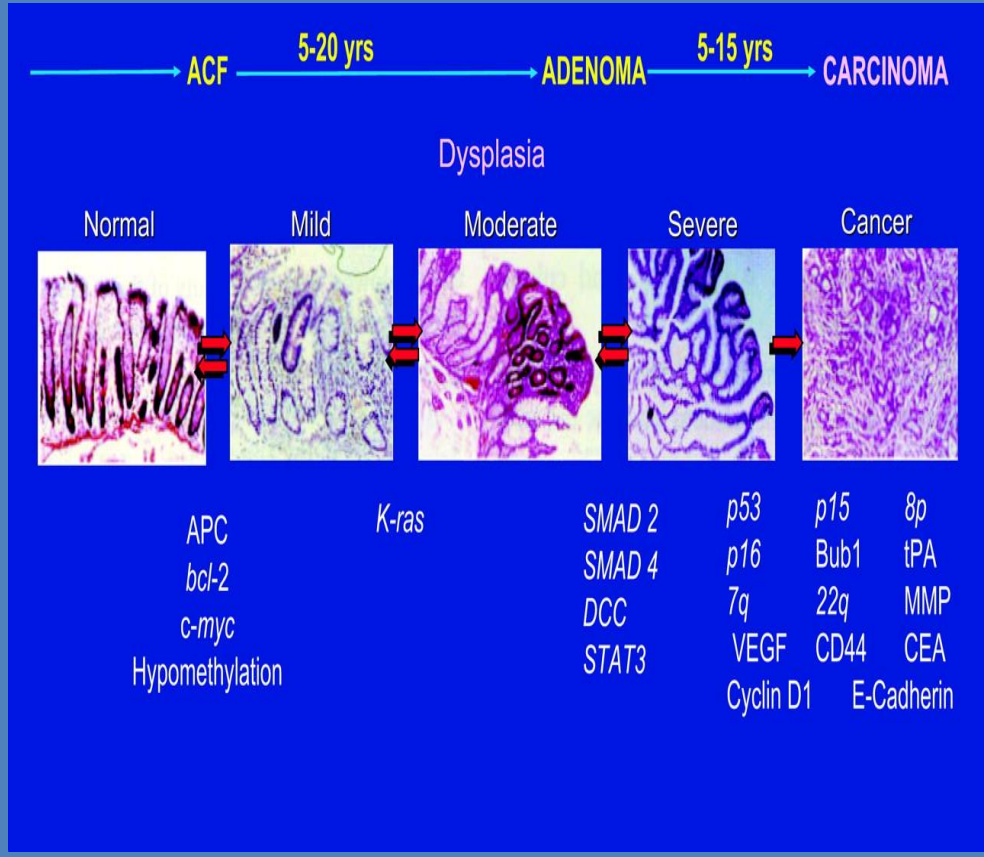
- Inguinal.
- External iliac.





Adenoma carcinoma sequence

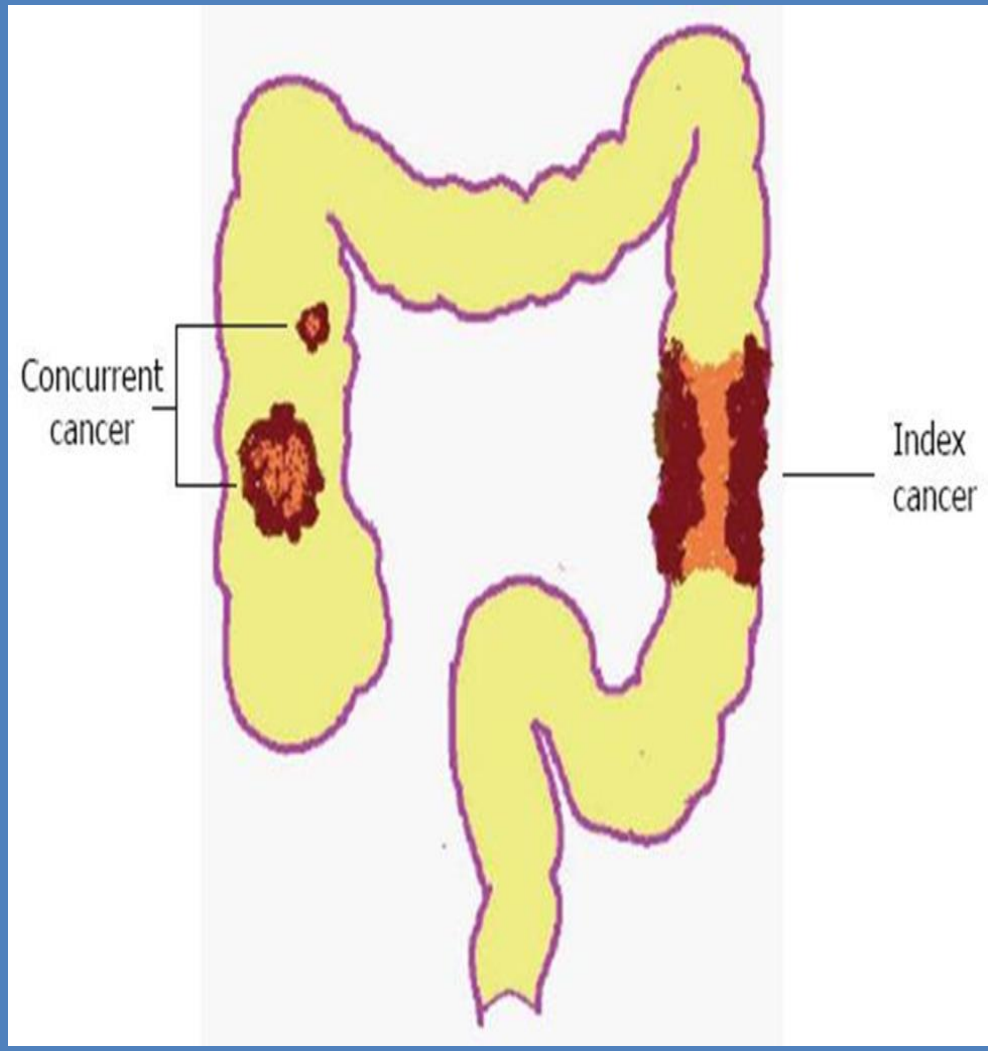
- Slow process.
  - 2–3 years for an adenoma <5 mm to grow to 1 cm.
  - Another 2–5 years– for 1 cm to cancer.
  - Mean age of adenoma to carcinoma is 7 years.



ACF--Aberrant crypt foci

Synchronous lesion

- Presence of 2 or more cancer at the time of diagnosis of index case.
- Incidence -2-8%.
- Treatment-
  - 2 resection anastomosis.
  - Subtotal colectomy.
  - ?



Metachronous colon cancer-

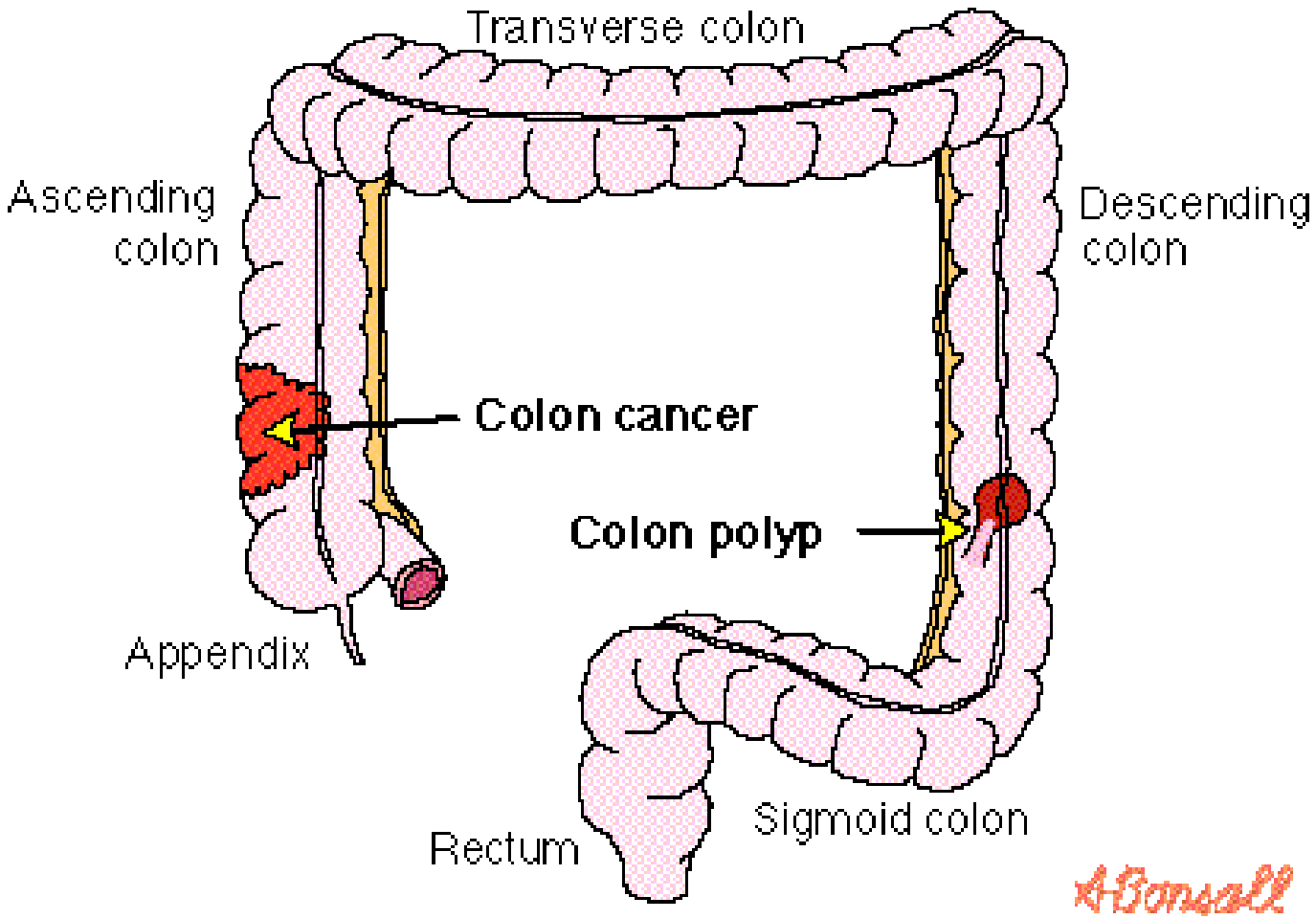
- 2nd ary CRC occuring >6 months after the index cancer.
- 4%.

Missed synchronous CRC-

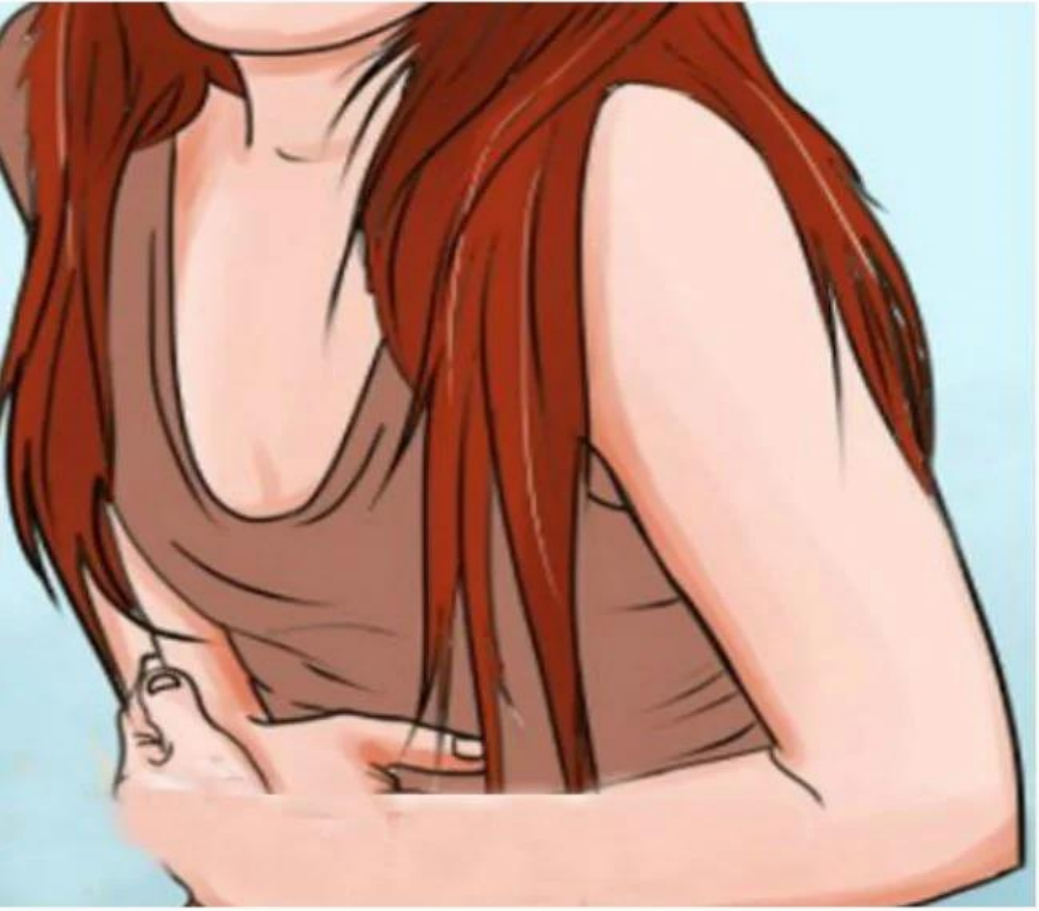
- Diagnosed within 6 months following Sx for index case.

Carcinoma associated polyp

10-20%



Colon Cancer and Polyp



Carcinoma with impending obstruction

- Partial or complete obstruction- 8-29%.
- Left sided- 77%.
- Right sided- 23%.

Alteration of bowel habit

- Frequency.
- Composition.
- Consistency.
- Timing.

Tenesmus

Painful fruitless effort of defecation.

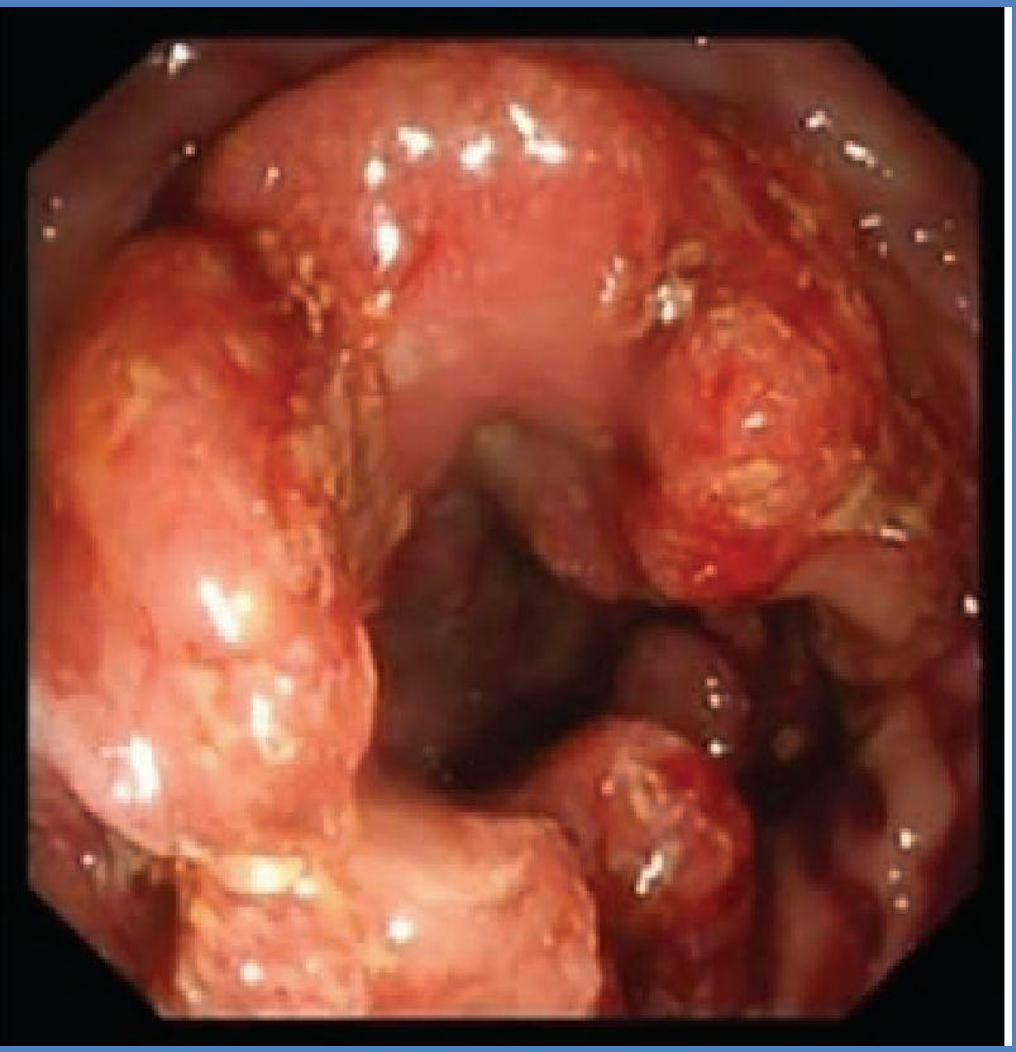
Spurious diarrhoea

- Tries to empty the rectum several times a day.
- Passage of flatus & little bloodstained mucus (bloody slime).
- No stool at all.

Early morning diarrhoea

- Normal perception of filling-10-20 ml.
- Urge to defecate-60ml.
- Discomfort-230 ml.
- Rectal distension by secretion, blood, & mass itself.

Sense of incomplete evacuation



- Normal perception of filling-10-20 ml.
- Urge to defecate-60ml.
- Discomfort-230 ml.

Carcinoma of rectum with pain

- Obstruction.
- Sphincter involvement.
- Nerve entrapement.

GI bleeding
is it normal?

- Normal up to 10-15 ml/day.
- 15- 50 ml- occult bleeding.
- >50 ml- macroscopic bleeding.
  - Haematochezia.
  - Melena.

Haematochezia

- Bright red in colour.
- May be dark red or maroon colour.
- Usually colonic origin.
- But may be upper GI origin if-
  - Brisk pace or
  - Large volume.

Melena

- Black tarry stool.
- Sticky with Characteristic odour.
- Floats on water.
- > 50 ml bleeding/day.
- Usually upper GI bleeding.

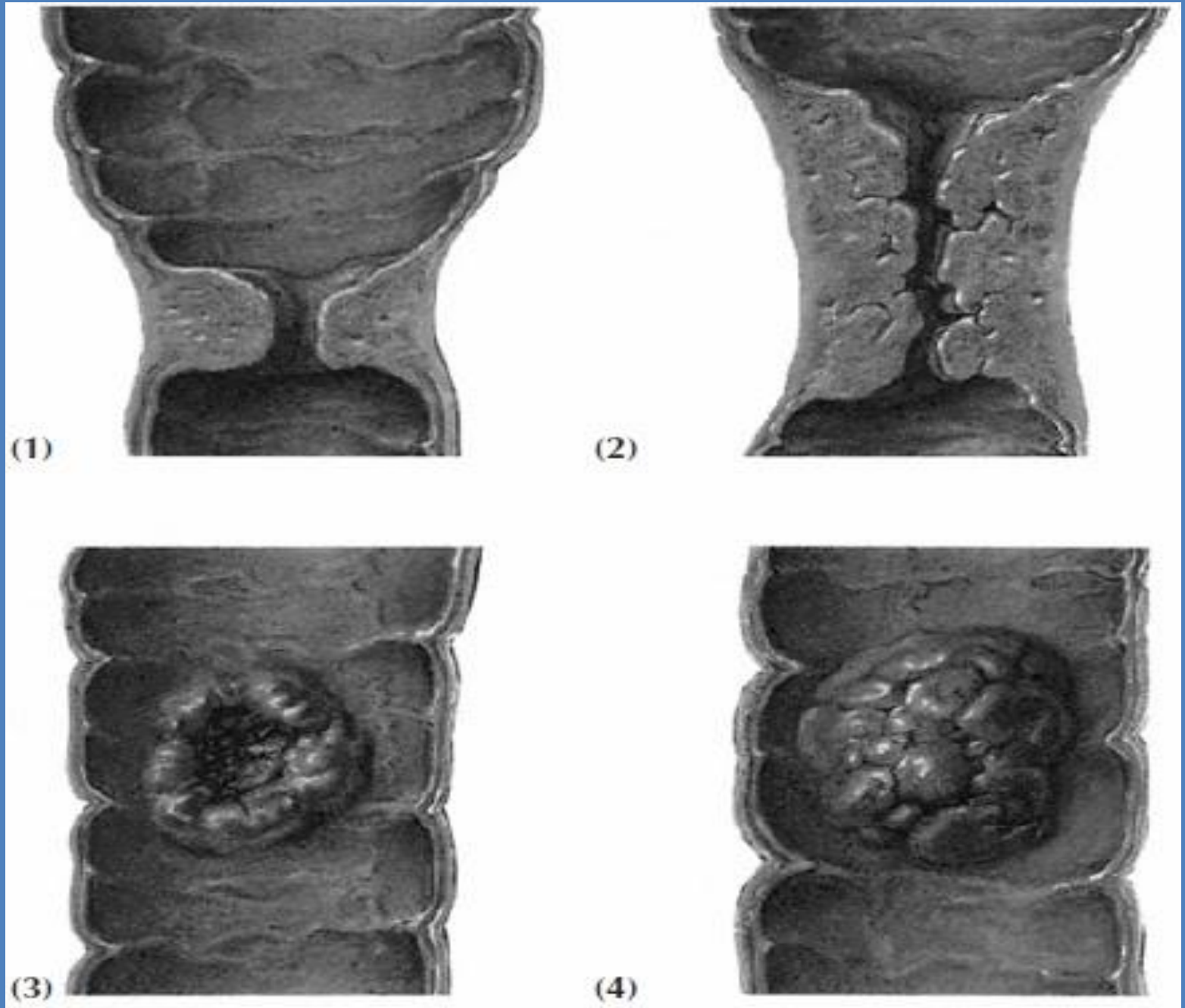


Figure 65.38 The four common macroscopic varieties of carcinoma of the colon. (1) Annular; (2) tubular; (3) ulcer; (4) cauliflower.

Duke’s staging

- A- Within the wall.
  - 15%.
  - Prognosis excellent.
- B- Pararectal tissue.
  - 35%.
  - Prognosis reasonable.
- C- LN involvement.
  - Regional lymph nodes.
  - 50%.
    - ✓ **C1**-Para rectal LN.
    - ✓ **C2**-Nodes accompanying the supplying blood vessels up to the point of division.
      - ✓ Prognosis bad.

Modified Duke’s staging-

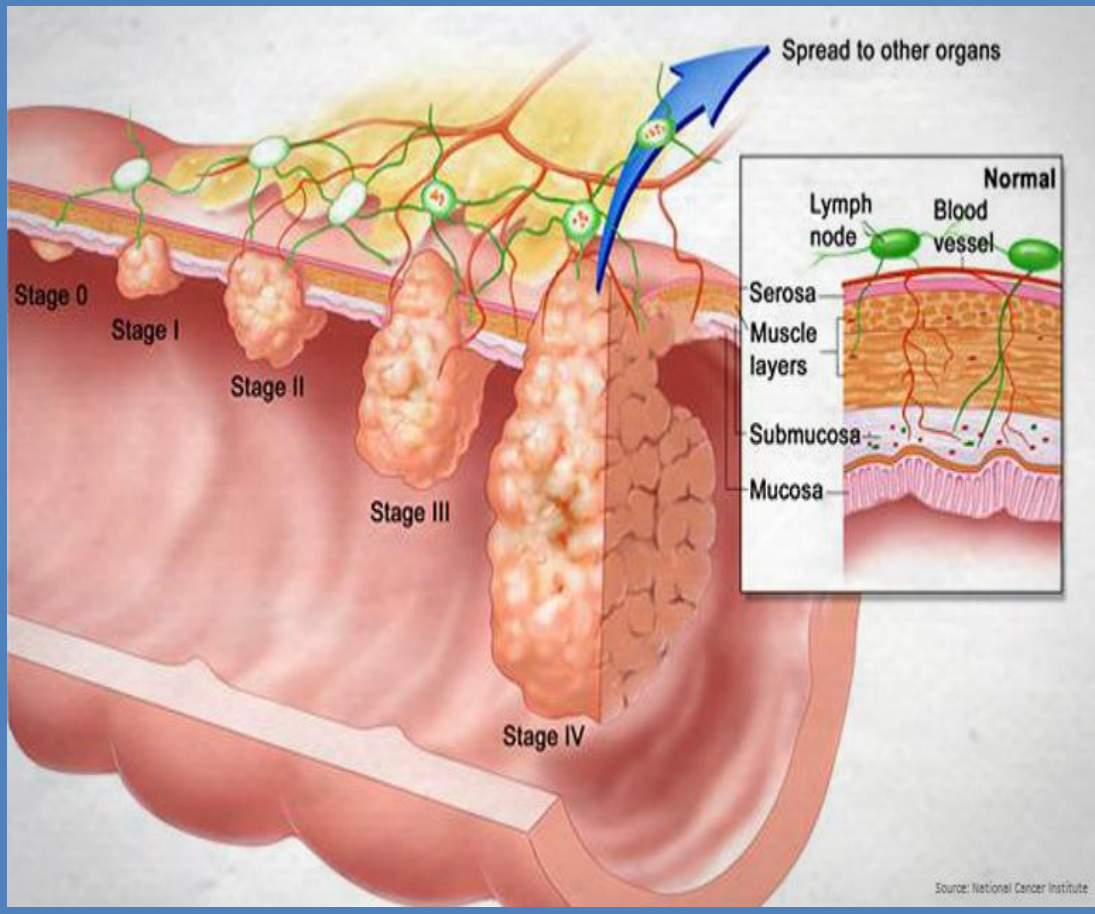
- D- distant spread.

TNM staging

- T_1- Mucosa & submucosa.
- T_2- Muscle layer.
- T_3- Pararectal tissue.
- T_4- Surrounding tissue.

- N_1- Upto 3 LN.
- N_2- > 4 LN.

- M_0- No metastasis.
- M_1- Metastasis present.



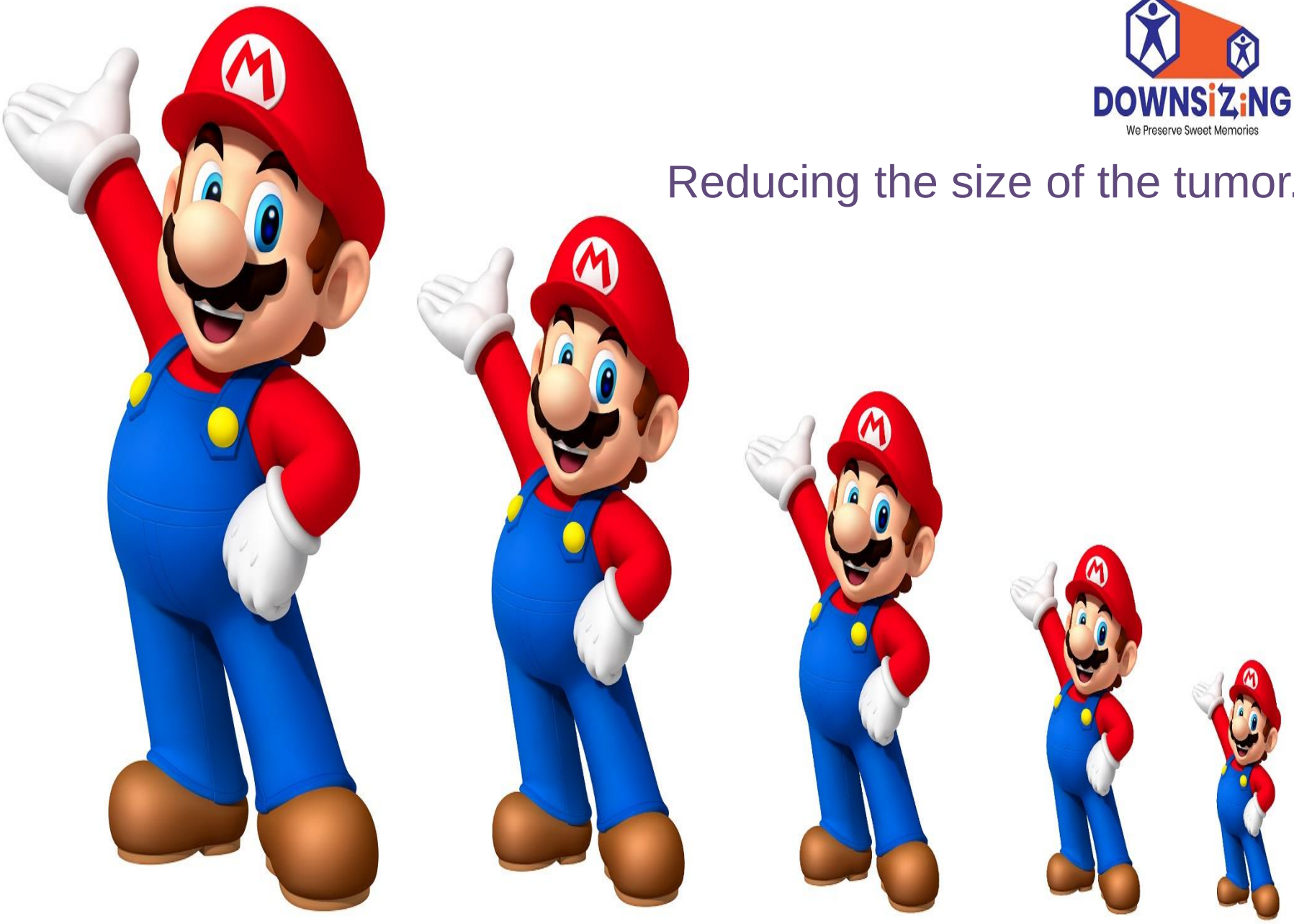
Down staging – Reduction of the stage of the tumor.

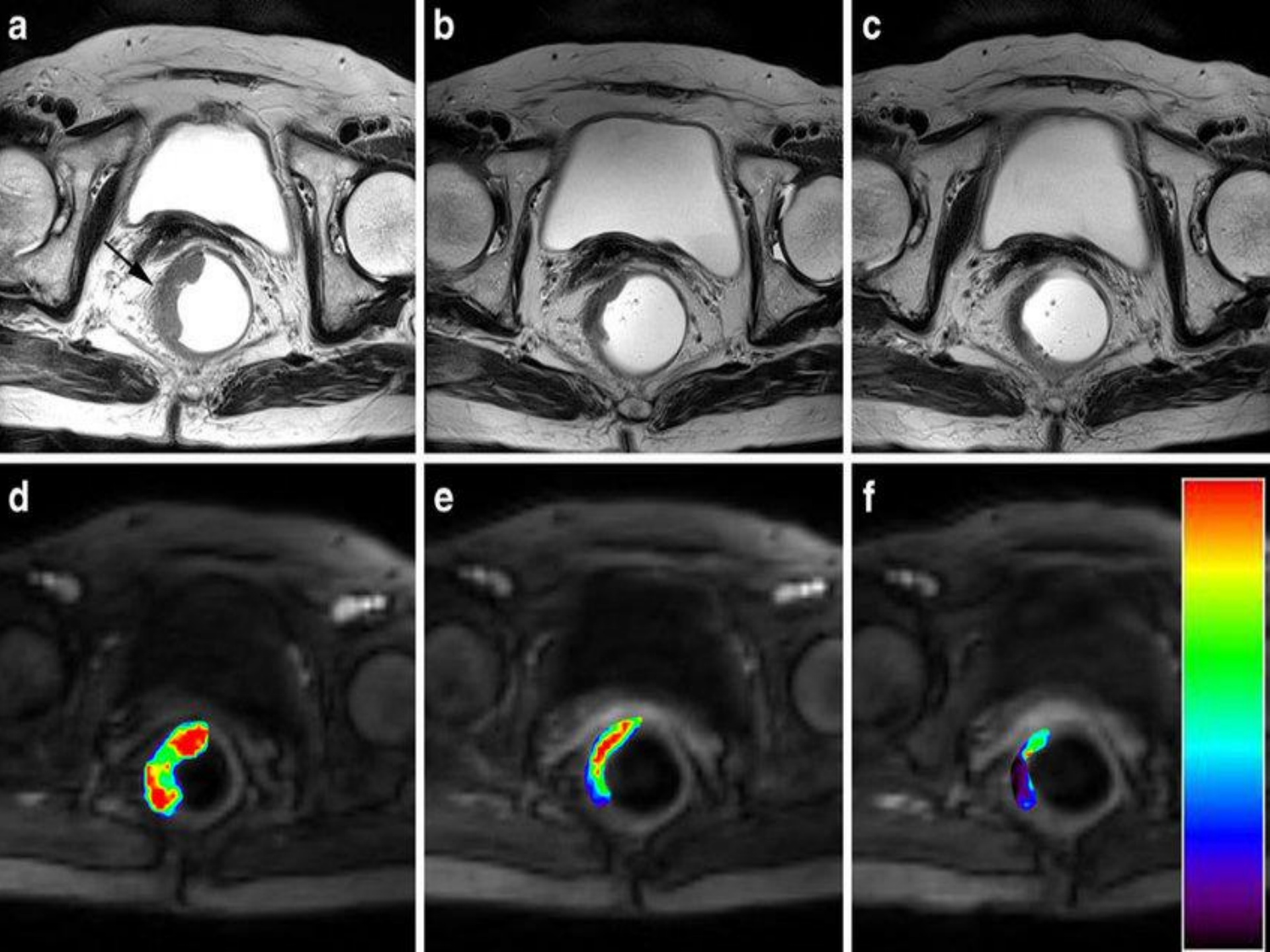
- T
- N
- M.

DOWNSiZiNG

We Preserve Sweet Memories

Reducing the size of the tumor.




a
b
c
d
e
f

DRE-

- Depends upon length of the finger.
- Upto 7 cm.
- With straining 12 cm.

I

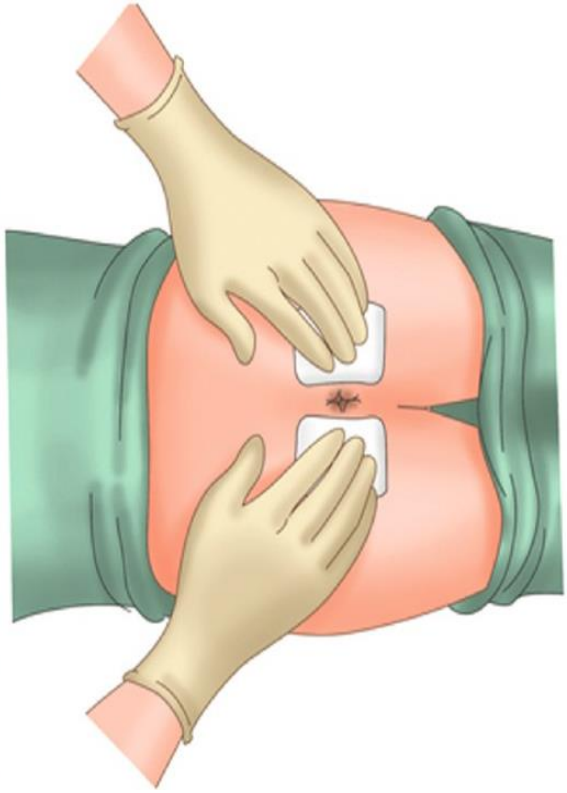
II

III

IV

Positions-

- Left lateral.
- Right lateral.
- Dorsal position.
- Knee-elbow.
- Lithotomy.
- Standing.



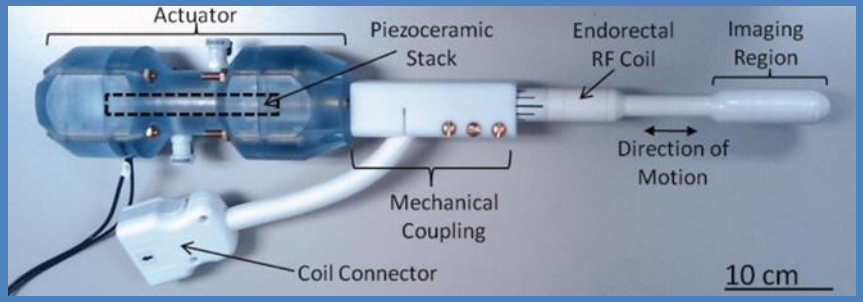
Left lateral position-

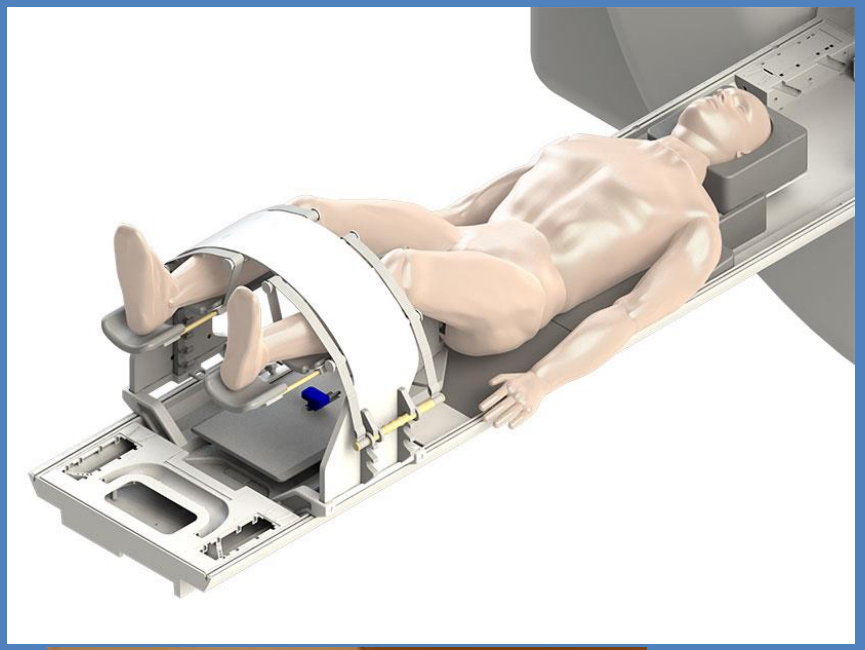
- Sim’s position.
- Knee flexed, hip flexed.
- Buttock at the corner of the bed.
- Right index finger.
- Push over postanal region.
- Relaxes puborectalis, straightens rectum & anal canal.

Investigations

- Colonoscopy & biopsy.
- Barium enema X-ray of large Gut.
- CT scan of abdomen & chest.
- Serum CEA & CA 19-9.
- Serum albumin.
- LFT.
- MRI of Pelvis.
- Endoanal USG.
- Fittness investigations.

Endo Coil MRI

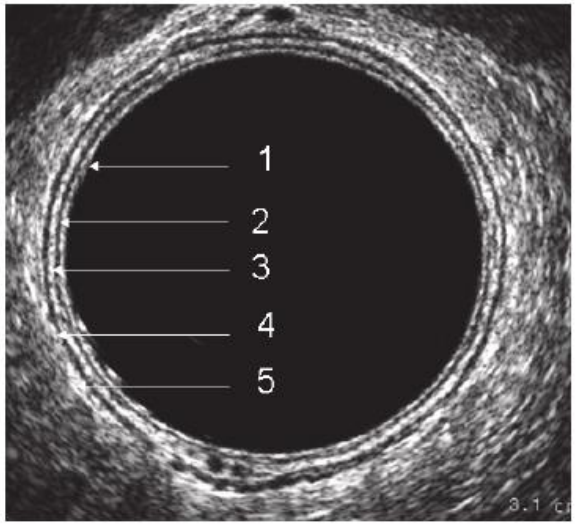




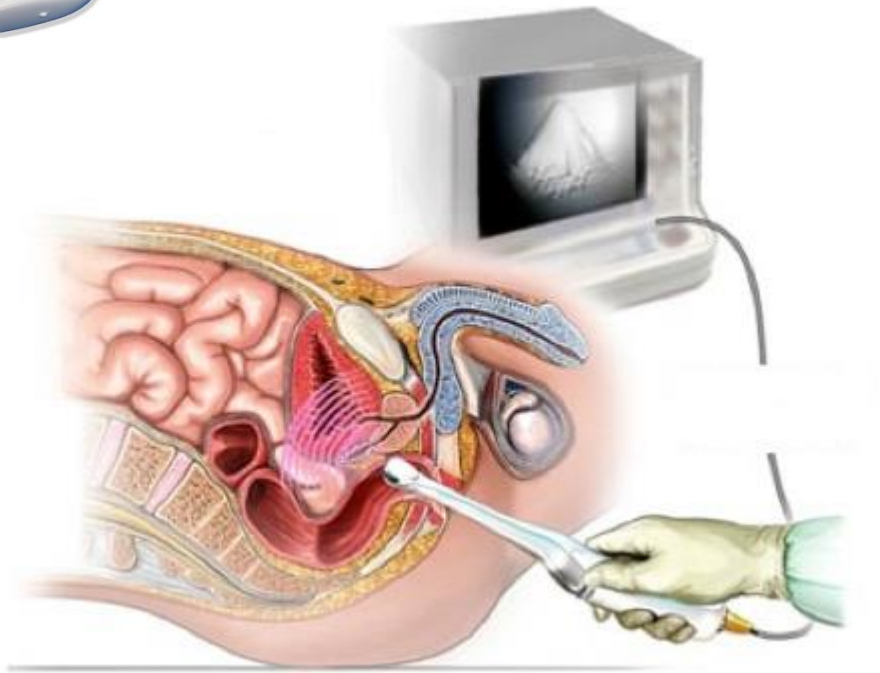
Local staging-

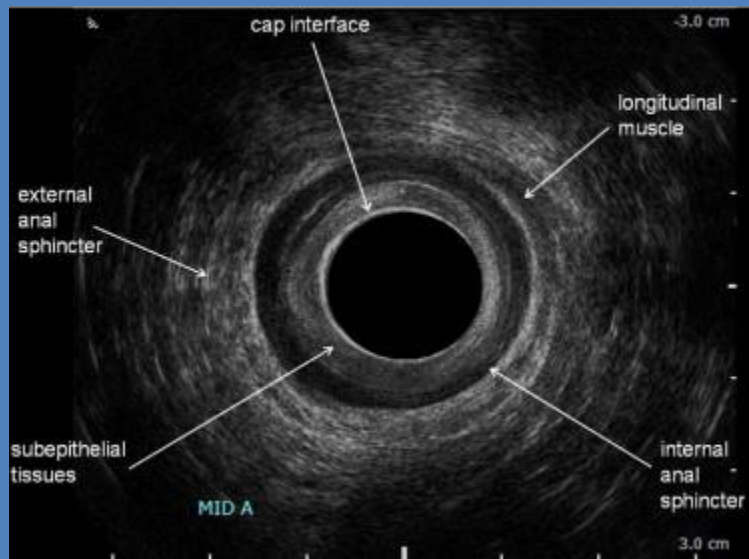
Early cancer

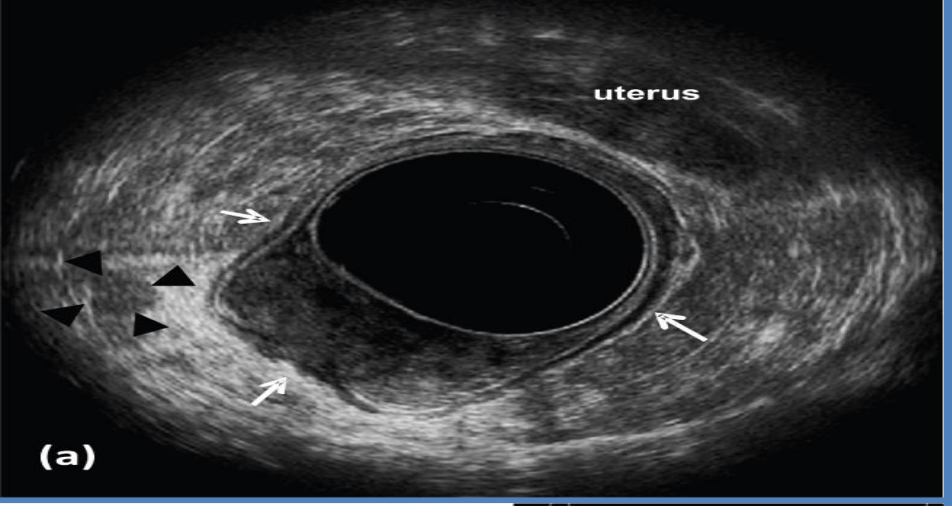
ERUS / EAUS

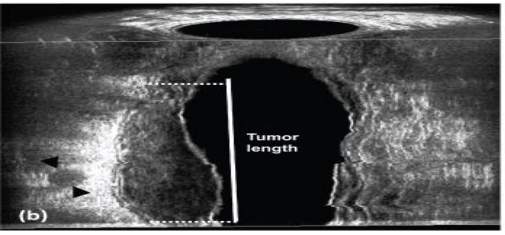


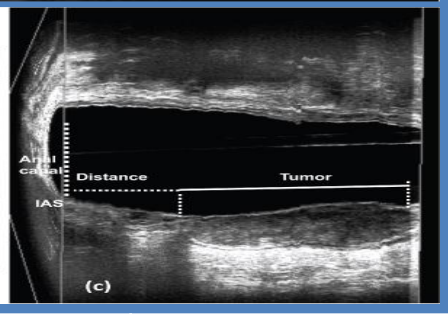
1: Interface, hyperechoic; 2: Mucosa/Muscularis M., hypoechoic
3: Submucosa, hyperechoic; 4: Muscolaris propria, hypoechoic
5: Perirectal Fat/ Serosa, hyperechoic

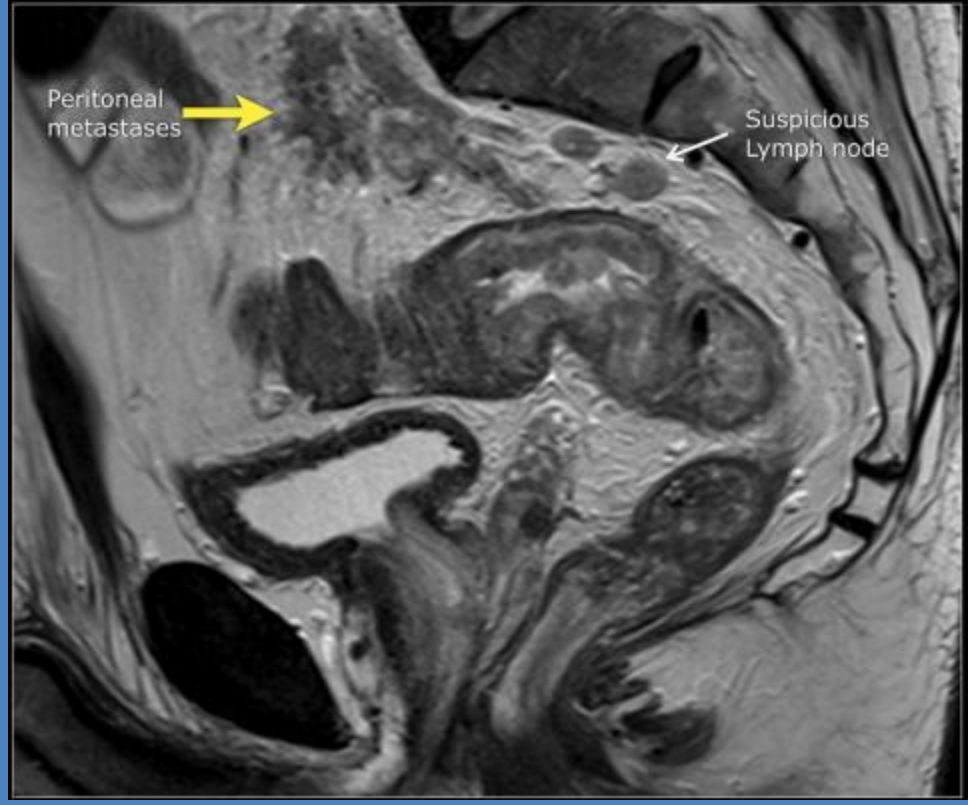












	ERUS	MRI
T stage	71-90%	54-81%
N stage(perirectal LN)	61-80%	41-55%
MRI is as accurate as ERUS in diff. T1 & T2 lesion.		
ERUS- unable to ascertain pelvic or groin LN.		

Metastatic LN-

- T1- 5-10%
- T2- 10-20%
- T3--30-50%.

Stage shift phenomena.

Aim-

- Cleaned out.
- To see any problems.

Steps-

- Fasting one night.
- Cleaning.

Gut preparation

Mechanical cleansing.
Chemical cleansing.

Mechanical bowel preparation

Mechanical ways to reduce the bulk of stool.

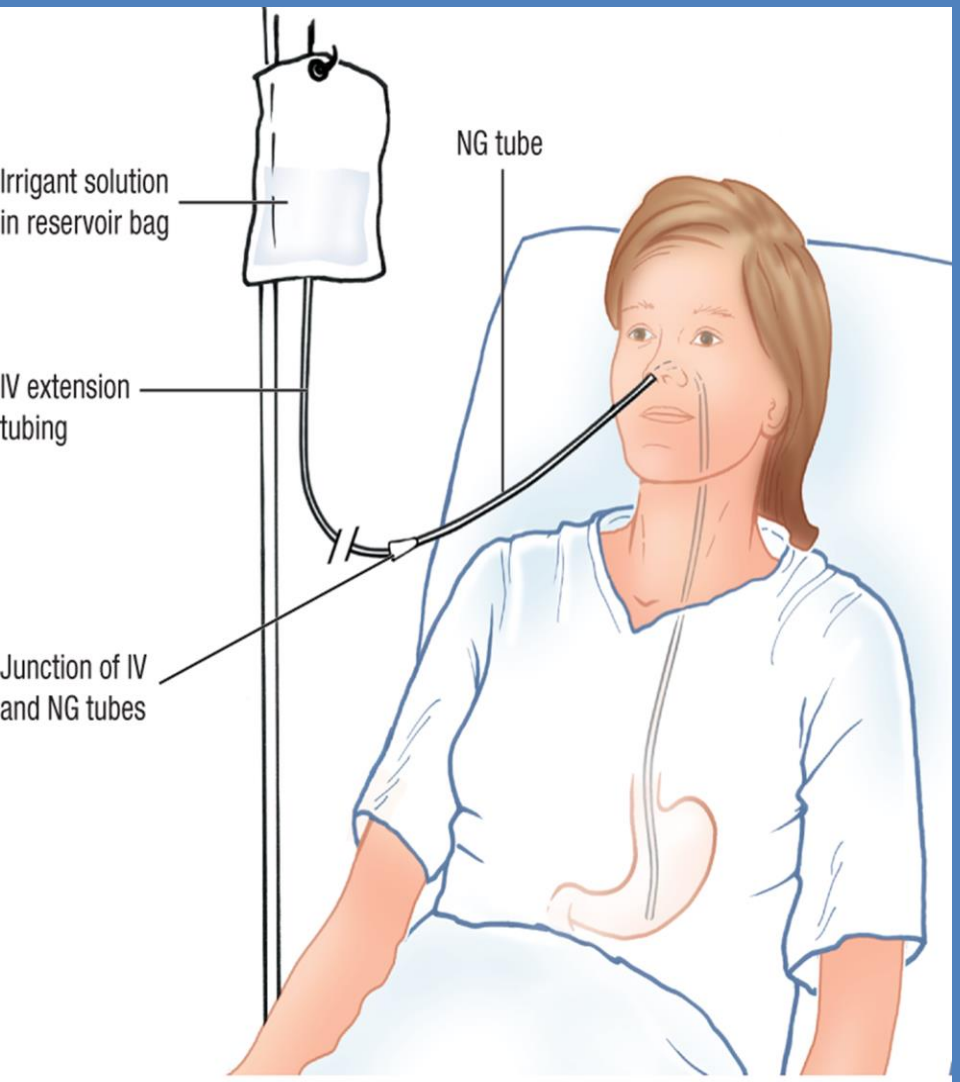
- PEG.
- Sodium picosulfate (Picolax).
- Hercules preparation.
- Enemas.
  - Enema simplex.
  - Compound enema (water, soap, paraffine, glycerine, caster oil, MgSo4).
  - Fleet enema (NaPo4).

Chemical cleansing -reduces bacterial count.

- 3 days preparation.
- 2 days preparation.
- 1 day preparation.
- No bowel preparation.

- 4 bottle PEG solution in 4 litre of fluid.
- 250 ml 15 min interval.
- Starting from 10 am.
- Ends at 2 pm.
- Liquid diet upto 8 pm.
- Then start saline.
- Enema if required.

Whole gut irrigation



What we do?

- No bowel preparation for-
  - Anorectal procedures.
  - Right sided colonic resection.
  - APR.
  - Emergency procedures.
- Bowel preparation for-
  - Left sided colonic resections.
  - AR.
  - LAR.
  - ULAR.
  - Colonoscopy.

Principles of anastomosis

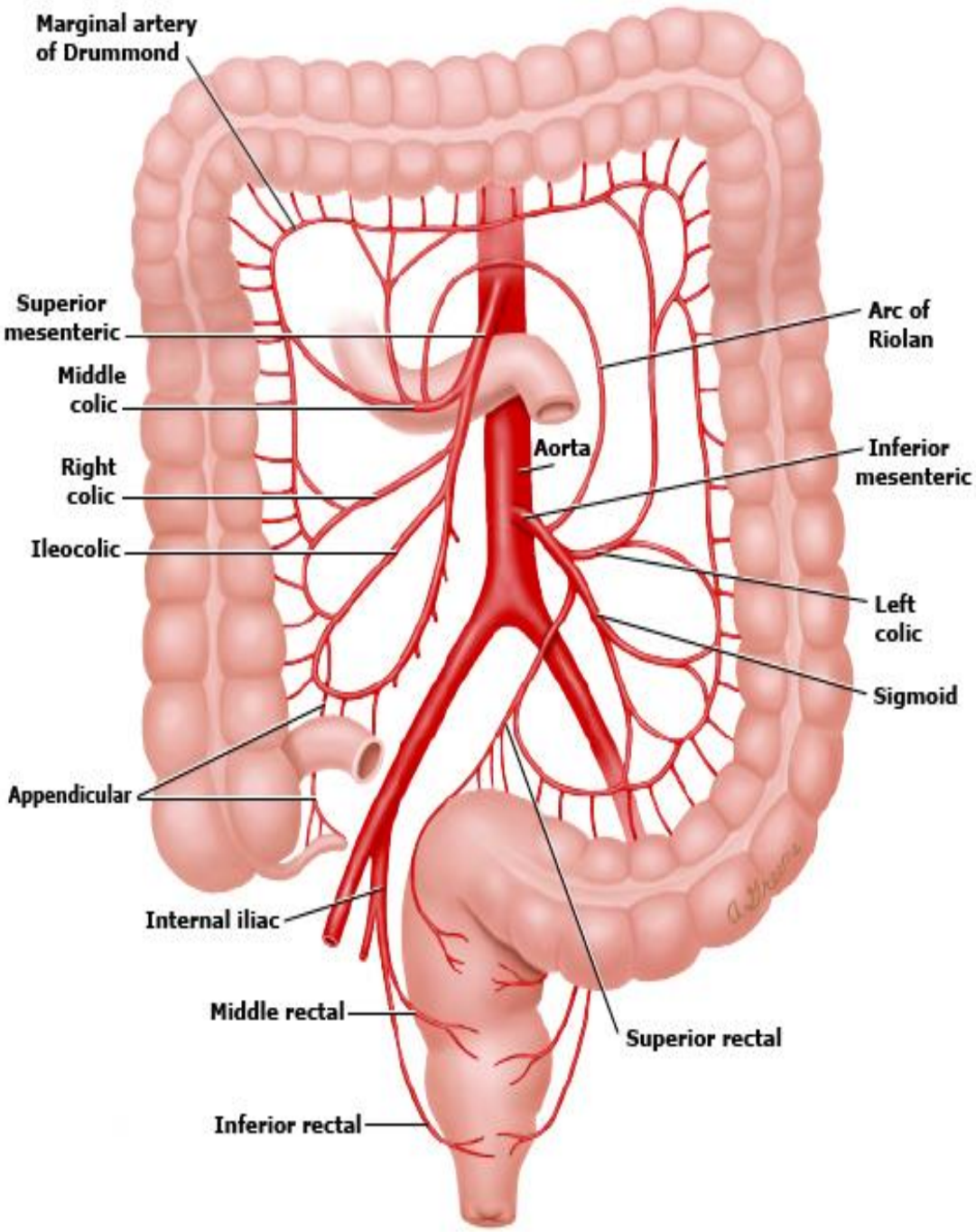
- Good blood supply.
- Tension free anastomosis.
- Air tight & water tight.
- Anastomosis with healthy, non diseased bowel ends.

Constant vascular pedicle-

- ICA.
- Sigmoid artery.
- SHA.

Inconstant-

- RCA absent in 2-18% cases.
- MCA- 4-20% cases.
- LCA-in 6 % cases.
- MCA may be the main supply for splenic flexure in 33% cases.



Collateral circulation

Marginal artery of Drummond-

- anastomoses btw SMA & IMA.
- Central anastomotic artery.

Griffith's critical point-

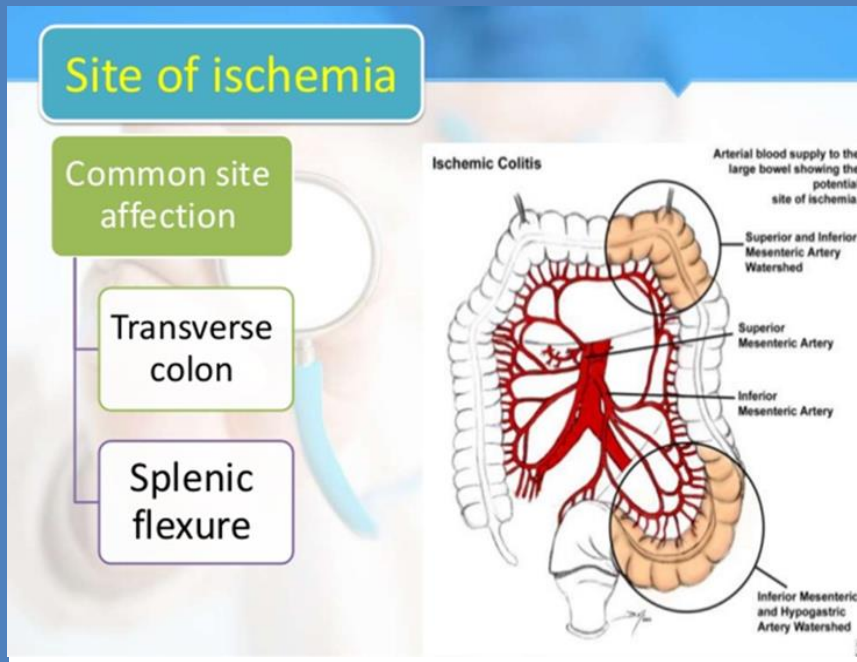
- Splenic flexure, watershed line.
- Discontinuity of marginal artery in 50% cases.
- MCA can be the main supply in 33 % cases.

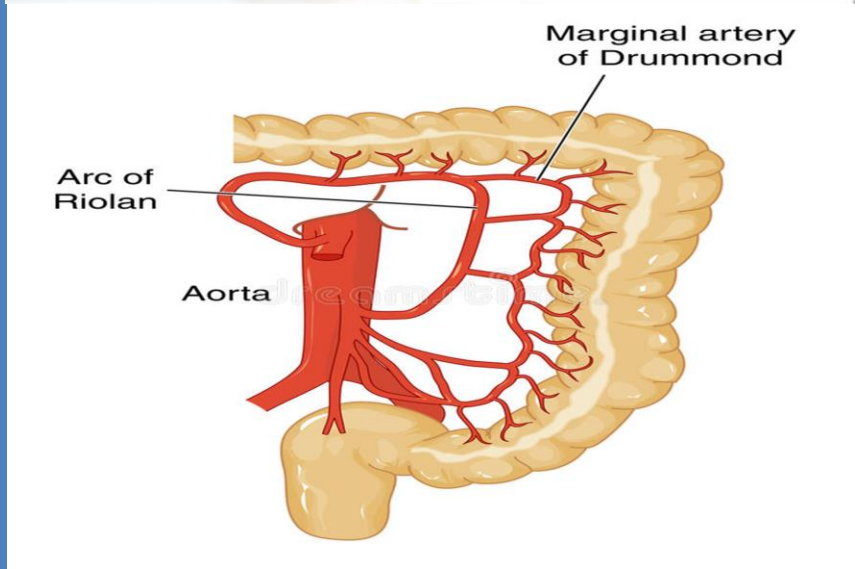
Sudeck's critical point-

- Rectosigmoid area.
- Discontinuity of marginal artery btw lowest sigmoid & SHA.

Arc of Riolan-

- Meanderic mesenteric artery.
- Connects prox. MCA with a branch of LCA.
- Indicates severe stenosis of SMA or IMA.





Meticulous technique

- Tension free.
- Appropriate sutures.
- Inverting edges.
- Adequate resection margins.
- Negotiating calibre.
- Closure of mesenteric defect?
- Patency test.
- Leak test.
- Drain- protection of anastomosis?

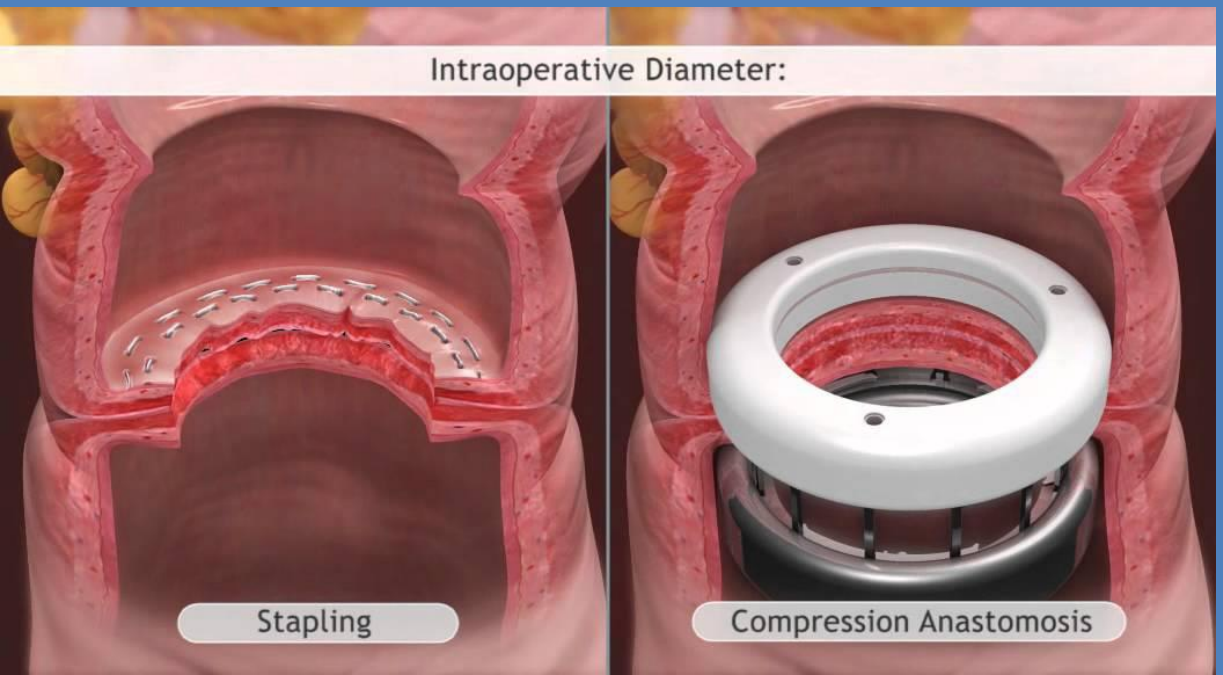
Causes of poor blood supply

- Undue tension.
- Inadequate mobilization.
- Devascularization of mobilized bowel.
- Tightly knotted suture.
- Excessive use of diathermy.
- Tight clamping to mesentery.

Controversies

- Types of Suture?
- Partial or full thickness?
- Inverted or everted?
- Interrupted or continuous?
- Single or double layered?
- Hand sewen or stapled?
- Drain tube?
- NG tube?

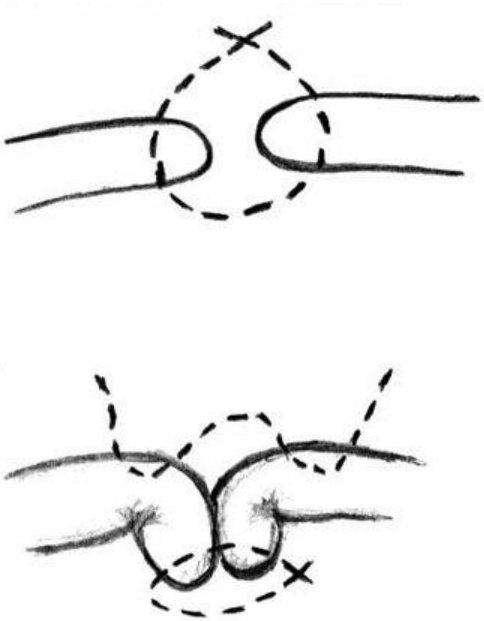
- 3-0 R/B vicryl.
- Single layer seromuscular extramucosal.
- Single layer full thickness.

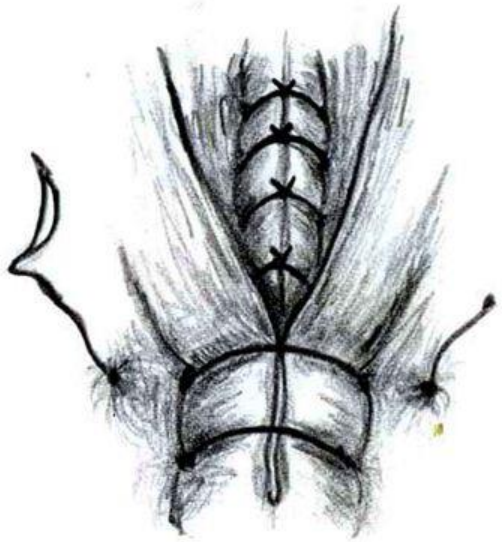


Negotiating calibre

- Oblique division.
- Cheatling.
- Side to side anastomosis.
- End to side anastomosis.
- Closer bites from narrow side & wider bites from wider side.
- Partial closure of wider side.

Lambert's suture





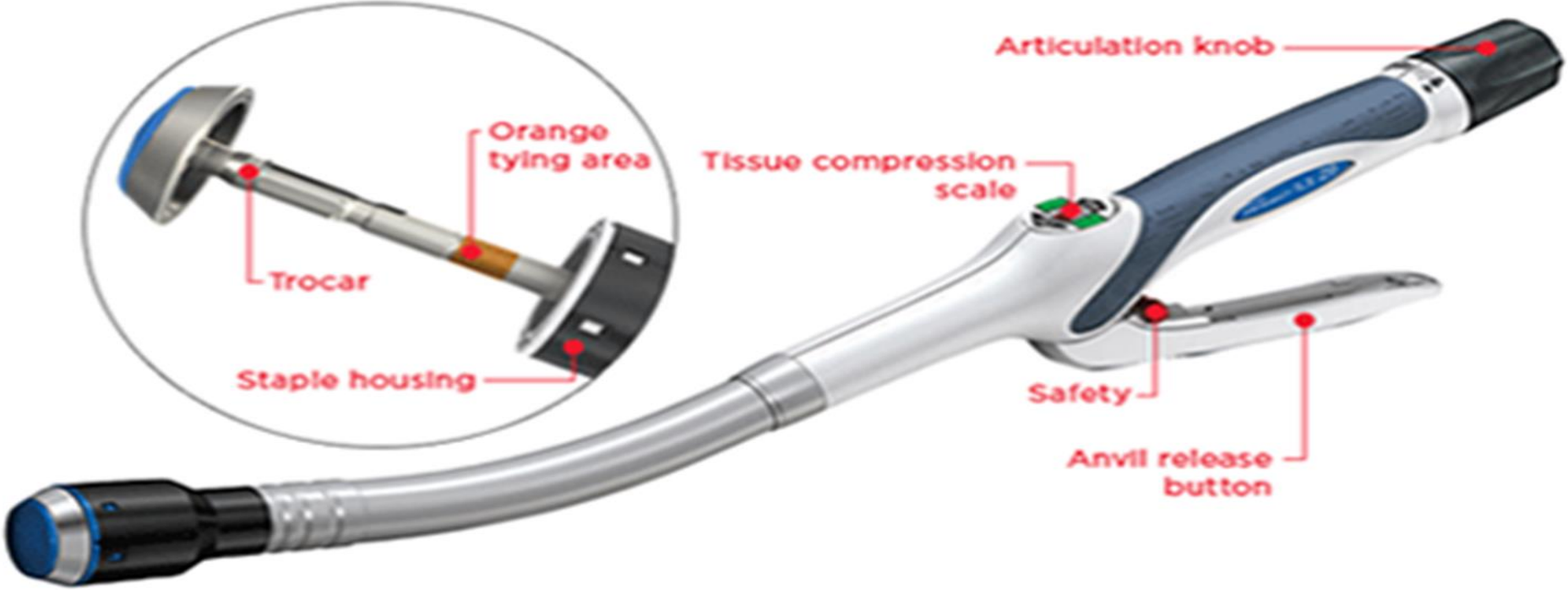
Advantages-

- Inverts lip of the wound.
- Never involves mucosa.
- Possibility of contamination is low.

Disadvantages-

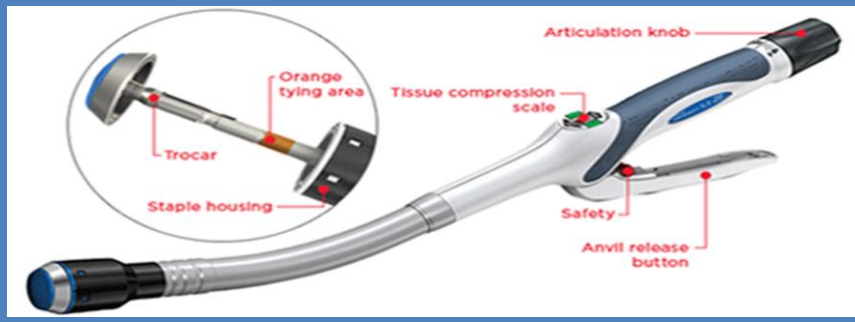
- Chance of stenosis.

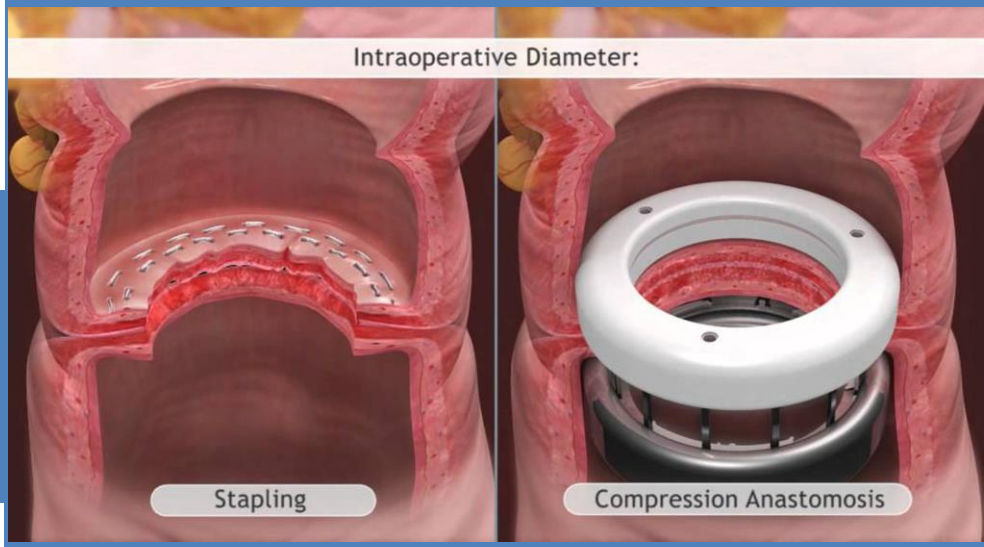

COVIDIEN
TA DST Series
60

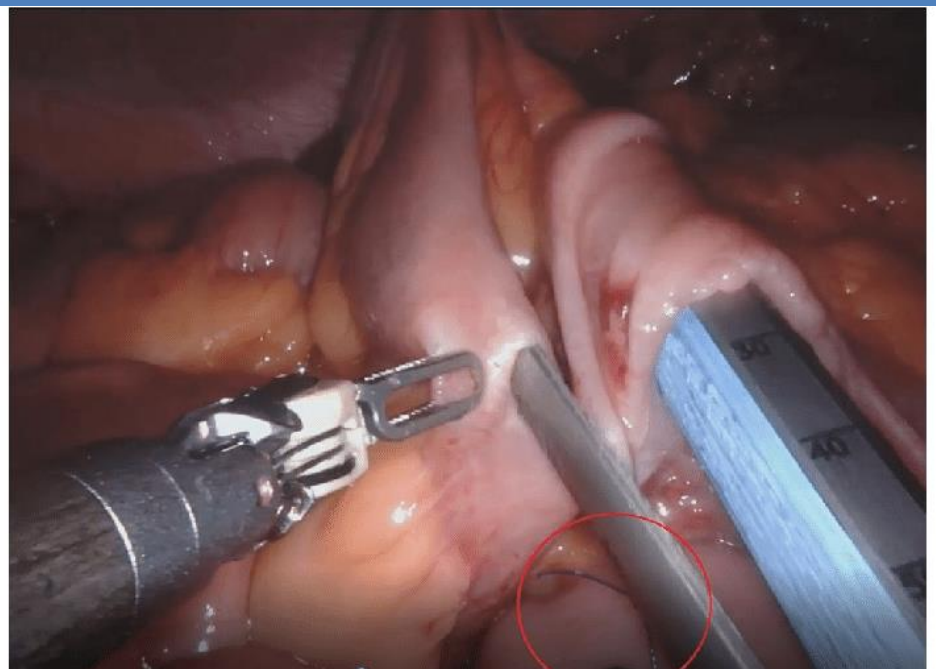

Articulation knob
Orange tying area
Tissue compression scale
Trocar
Staple housing
Safety
Anvil release button

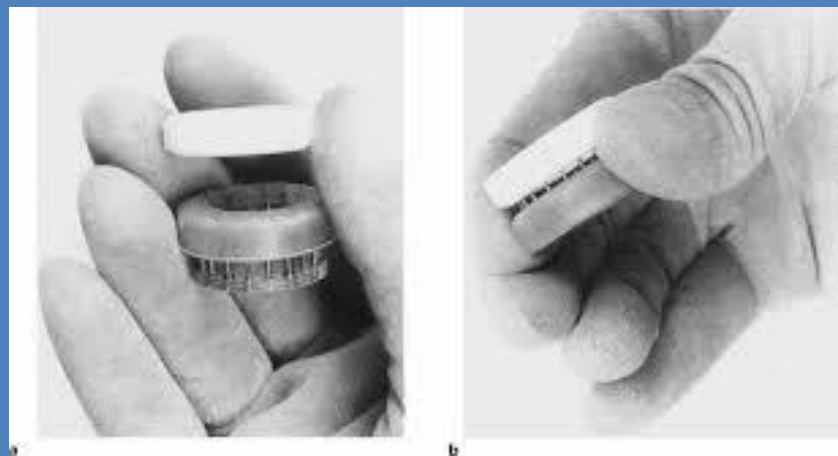
Advantages of stapled anastomosis

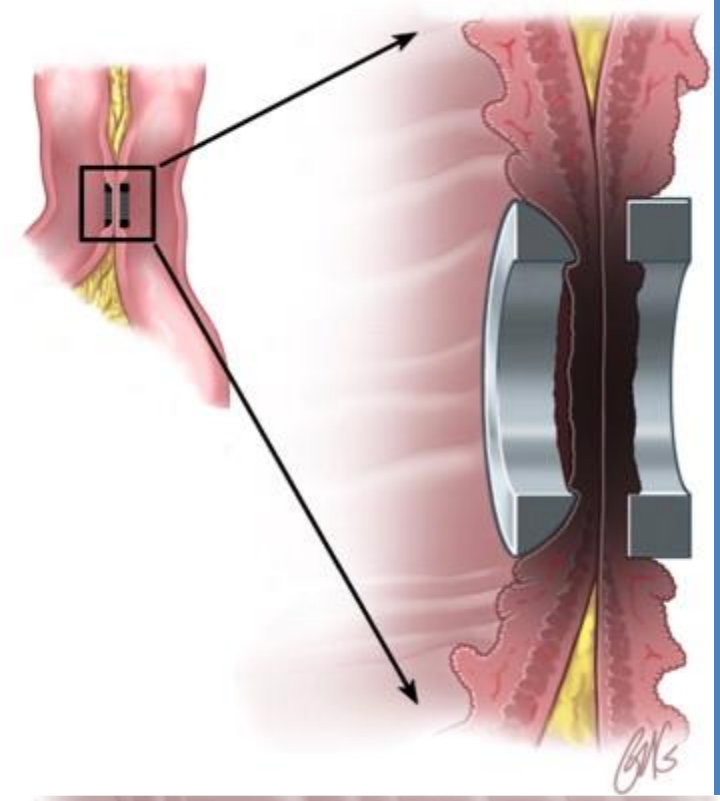
- Minimal inflammation.
- Support in lag phase(weakest phase).
- Shorten operative time.
- Staple line recurrance is less (suture provides < pronounced cellular proliferation).
- Heals by primary intention.



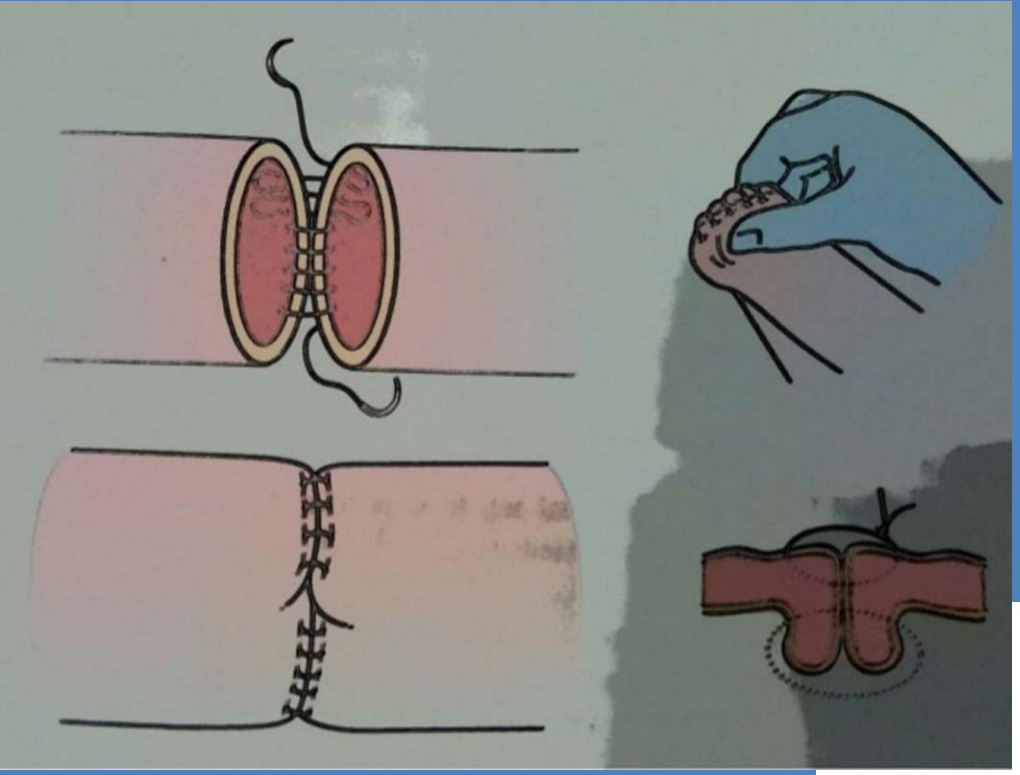

Intraoperative Diameter:
Stapling
Compression Anastomosis

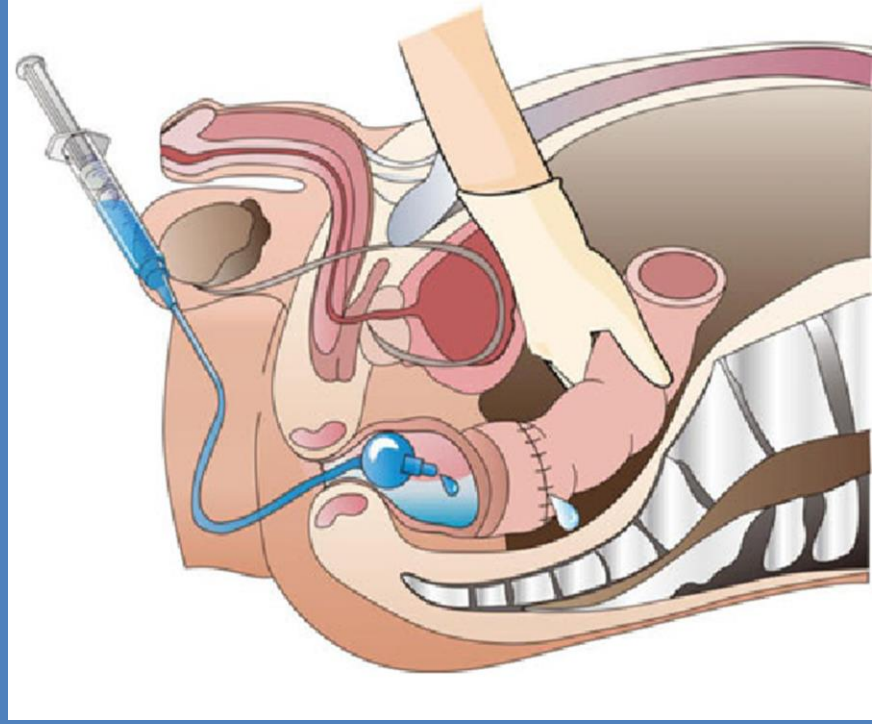


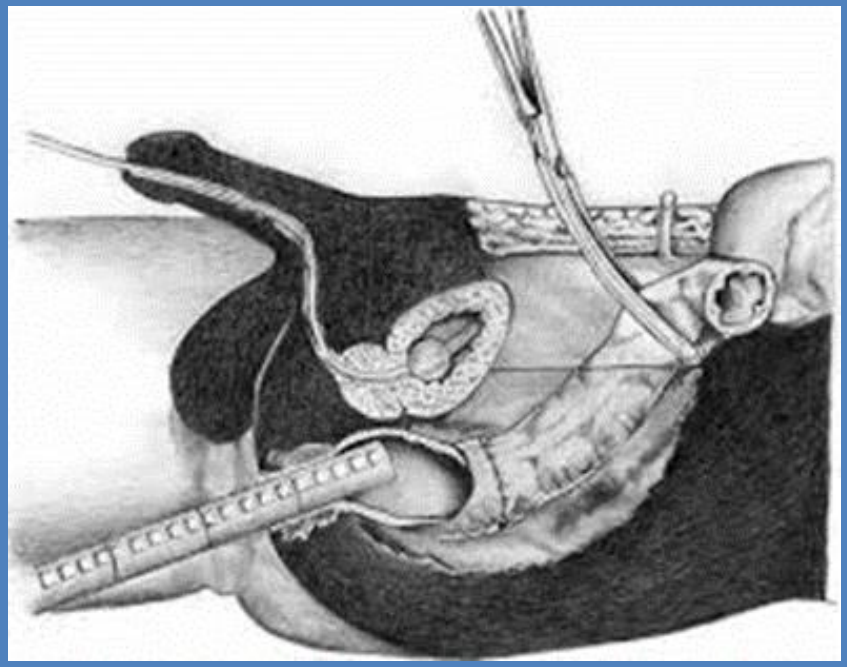




Intestinal anastomosis with the biofragmentable anastomosis ring







Drain tube?

Collection around the anastomosis-

- Impair healing.
- Leads to leakage.

Drain causes inflammation around anastomosis.

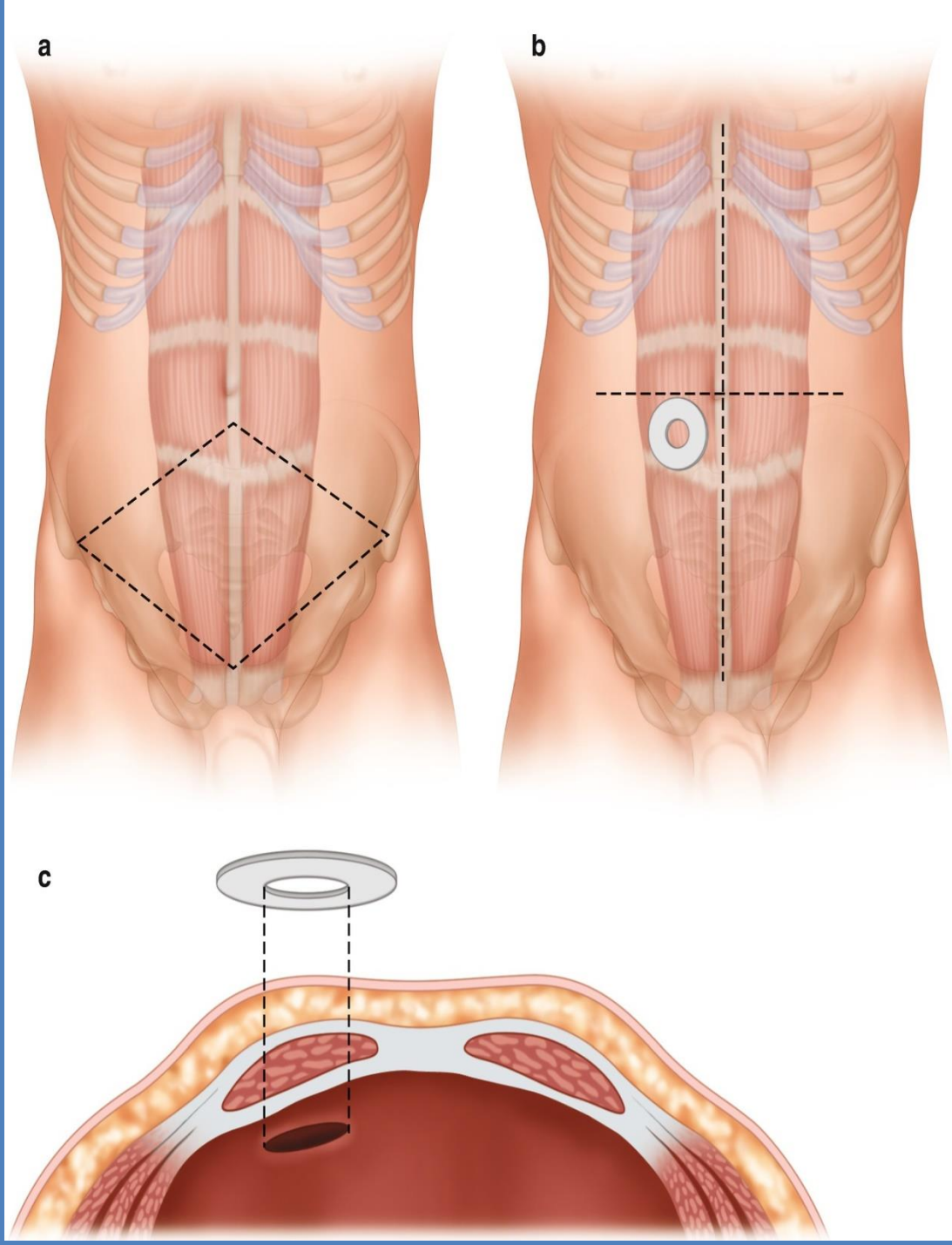
Indications of stoma

- Anastomosis below peritoneal reflection-
  - Low colorectal
  - Coloanal
  - Ileoanal
- Severe malnutrition-
  - Albumin-< 2gm/dl.
  - Wt loss >15%.
- Significant immunosuppression-
  - Prednisolone->40mg/day.
  - CT.
  - RT.
  - Anti TNF.

- Obstruction.
- Perforation.
- Comorbidities.
- Haemodynamic instability.
- Peroperative severe blood loss.
- Purulent peritonitis.
- Neoadjuvant therapy- 1 end should be free from irradiated bowel.

Stoma triangle-

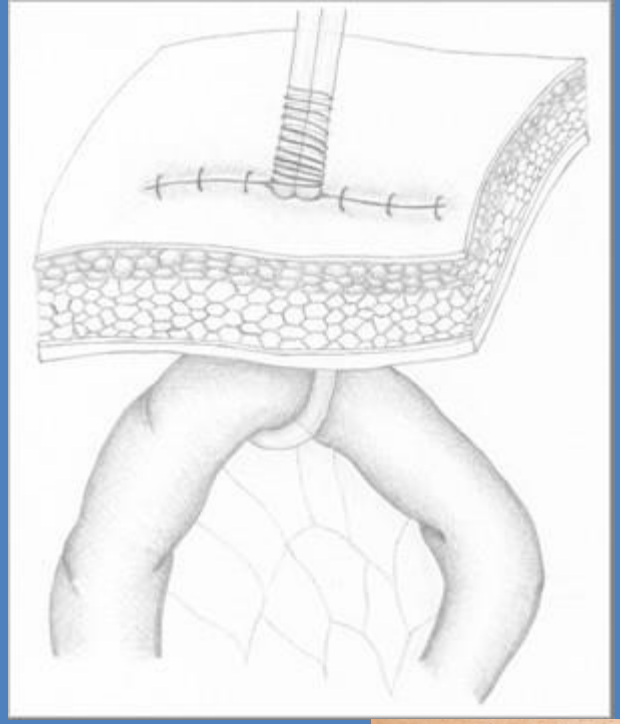
- Anterior superior iliac spine.
- Pubic tubercle.
- Umbilicus.



Two-Piece Ostomy Bag

One-Piece Ostomy Bag

Ghost ileostomy



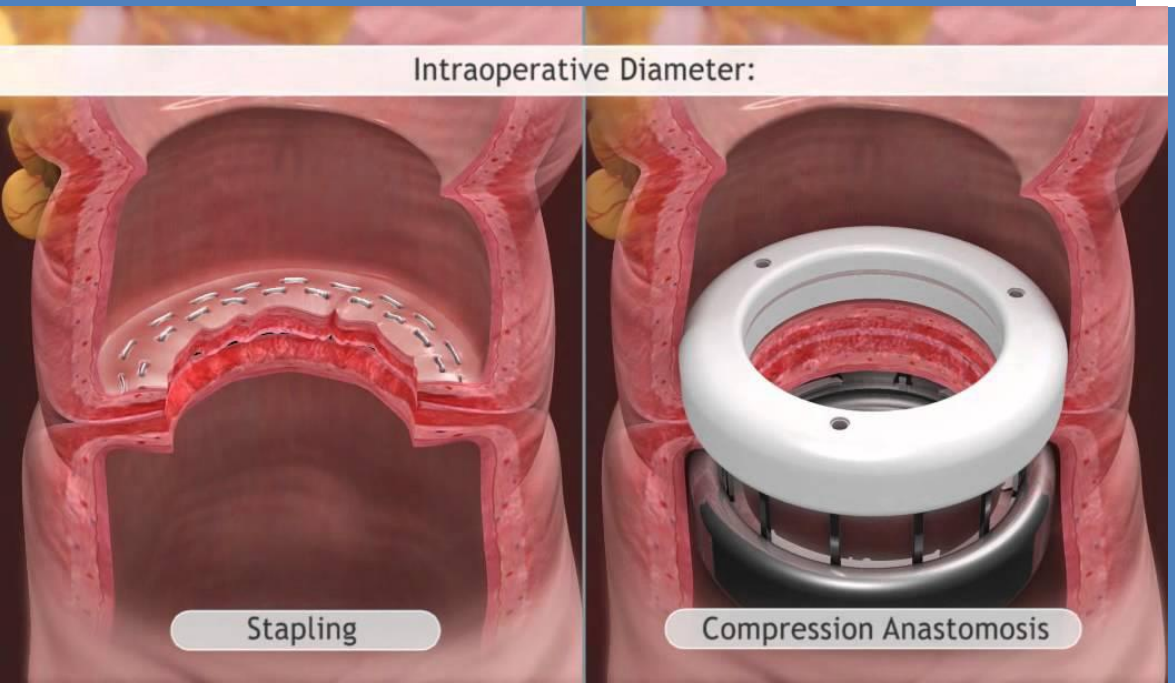
- The so-called virtual ileostomy.
- Pre-stage ostomy that can be easily exteriorised, if anastomotic leakage is suspected, in order to avoid the severe consequences of anastomotic leakage.

Postoperative care

- NPO- how many days?
- NG tube?
- IV fluids.
- Antibiotics?
- Drain tube ?
- Dressing change?
- General care.
- Routine investigations?

Anastomotic leakage

- Small intestine,
- Ileocolic &
- Ileorectal anastomosis- safe.



- Oesophageal,
- Pancreaticoenteric
- Colorectal anastomosis

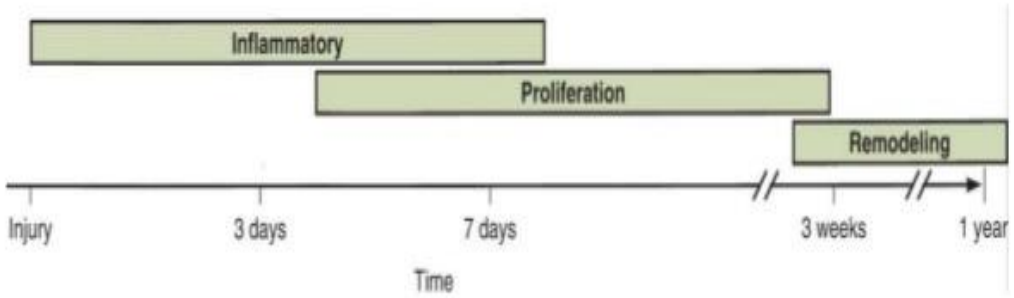
-considered high risk.

Healing of anastomosis

- Inflammatory / Lag phase.
  - 0-4 days.
- Proliferative phase- Fibroplasia.
  - 3-14 days.
- Remodelling / maturation phase.
  - >10 days.

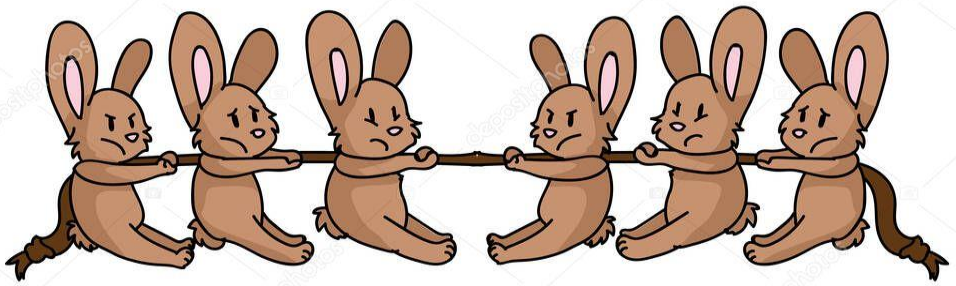
Intestinal healing

- Occurs like other tissues
- Hemostasis & Inflammatory phase
- Proliferative phase
- Remodelling & maturing phase



Anastomotic strength

- From collagen of submucosa.
- Low during the 1st POD.
- Early strength- on suture or stapler.
- Weakest- 3- 4th POD.



Anastomotic leakage
Predisposing factors

General factors-

- Nutritional deficiency (protein, vitamin C and zinc)
- Old age.
- Impaired blood flow.

Local factors-

- Tension.
- Inadequate vascular supply.
- Poor surgical technique-
  - unprepared bowel ends.
  - handling of tissues,
  - excessive use of diathermy,
  - insertion and ligation of sutures,
  - contamination of anastomotic site.

Timings of leak

- 3-45 days postop.
- 2 peaks-
    - Clinically the median is 7 days postop.
    - Radiologically the median is 16 days postop.
- 12% diagnosed >30 days after operation.

Presentation-

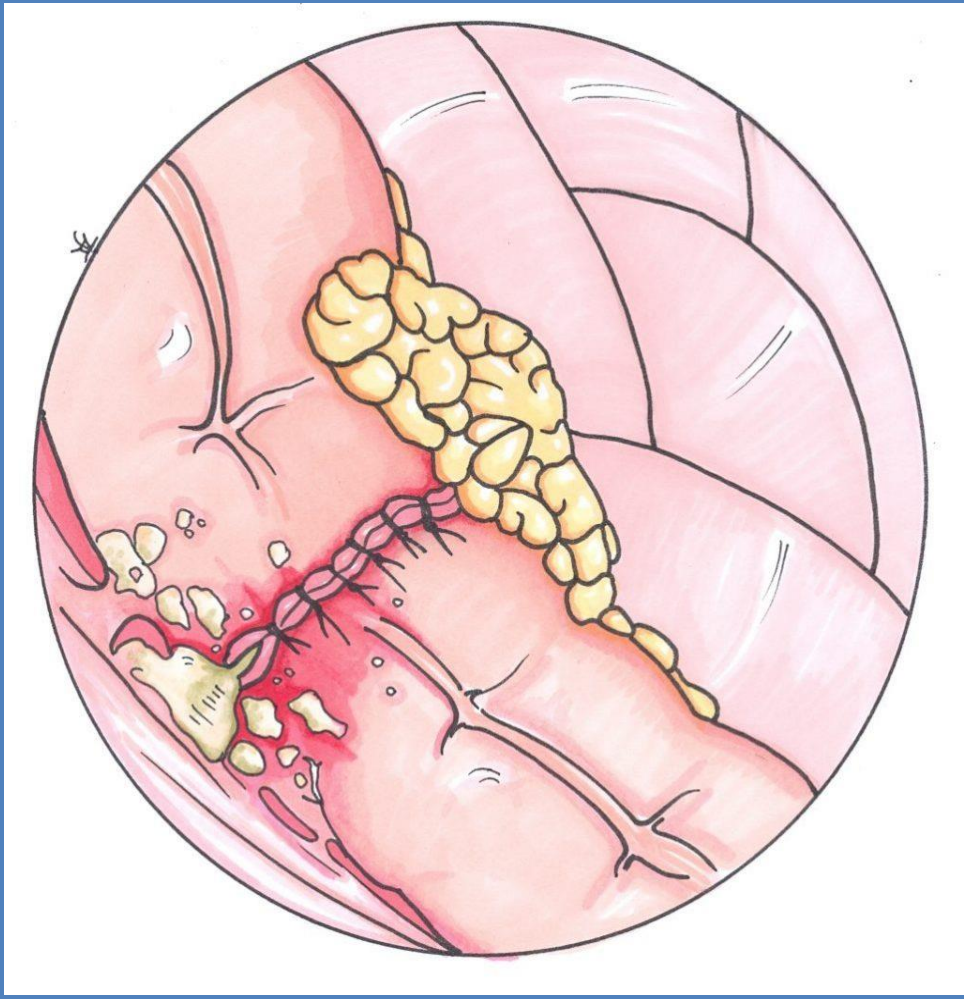
- GI contents may be identified in the wound or at a drain site.
- An intraabdominal abscess or more serious septic complication may develop.
- Prolonged ileus, unexplained fever or tachycardia, sudden collapse postoperatively or development of an internal fistula.

Confirmation-

- can be done by performing X-ray using contrast medium- Gastrograffin .

Grading of anastomotic leakage

- A- leakage with-
  - Minimal or
  - No clinical impairment.
  - Require no active intervention.
- Leakage require-
  - Active intervention.
  - But manageable without surgical intervention.
- Leakage require-
  - Repeat surgical intervention.
  - Often require diversion.



Surgery

- Thorough peritonial lavage with cefuroxime and warmed saline.
- Identification of leak.
- Resection of the area.
- Exteriorization.
- Rarely anastomosis.
- Re anastomosis is done after 3 months.

Fistulas

Management-

In the presence of a fistula management depends on the state of the patient and the fistula output.

When volume is small (<500ml/24hr) and the patient well, initial treatment is conservative(NPO,NG suction, I/V fluid, Antibiotic, Octreotide.)

If such treatment fails or the output is high (>500ml/24hr) or there is associated sepsis, intervention is necessary- surgery.

Reduction of colorectal anastomotic leak

- Ensure good blood supply
- Tension free anastomosis
- Avoid lower sigmoid
- Inspection of anastomotic doughnut for completeness after anastomosis
- Air/ fluid insufflation test.

Treatment

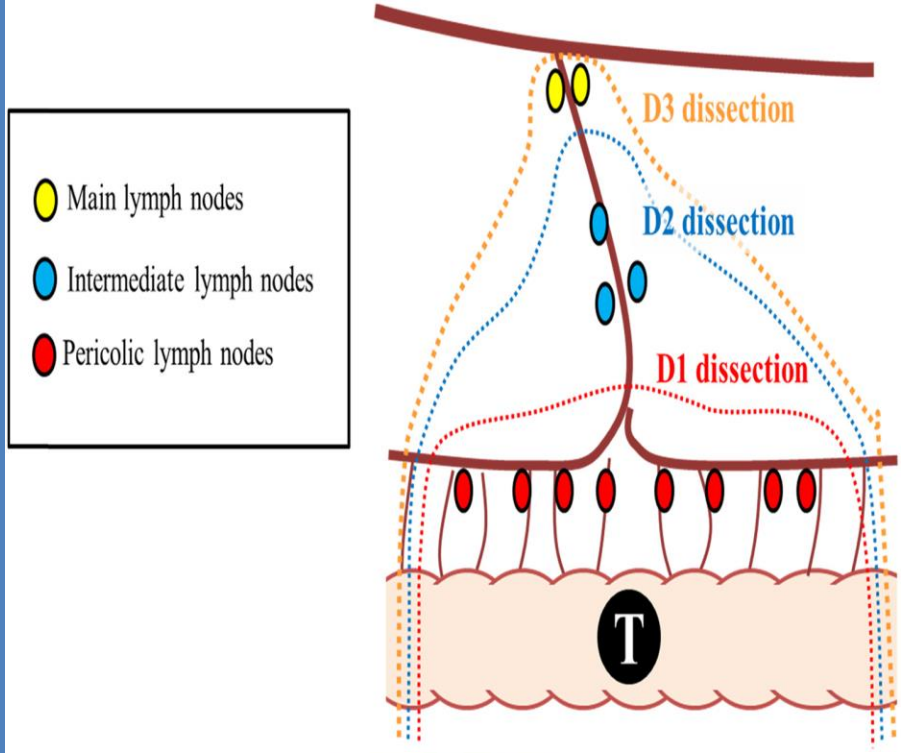
- Surgery is the only hope for cure.
- Resection is the best palliation.
- Proper oncological clearance

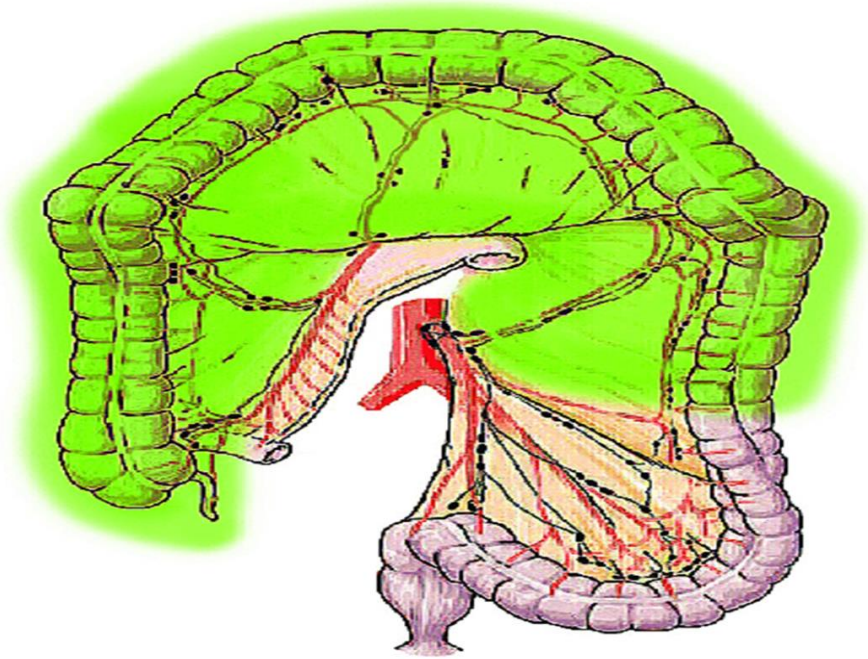
Principle –

- Early ligation of the vascular pedicle.
- No touch technique.
- Avoidance of contamination.

CME with CVL

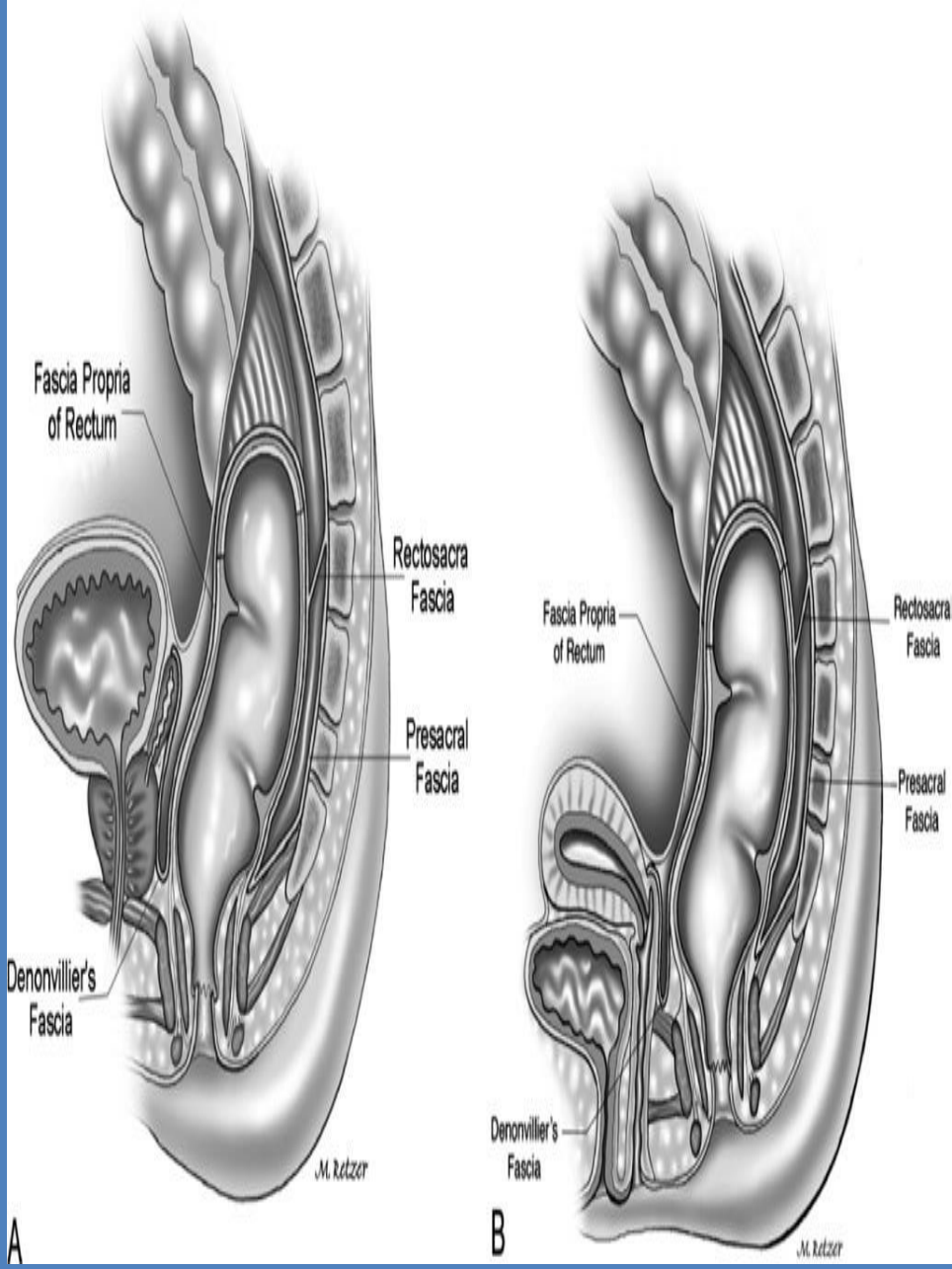
- Adequate length of colonic resection.
- Remove all LN(D1,D2,D3).
- High vascular tie at its origin.





TME principle

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



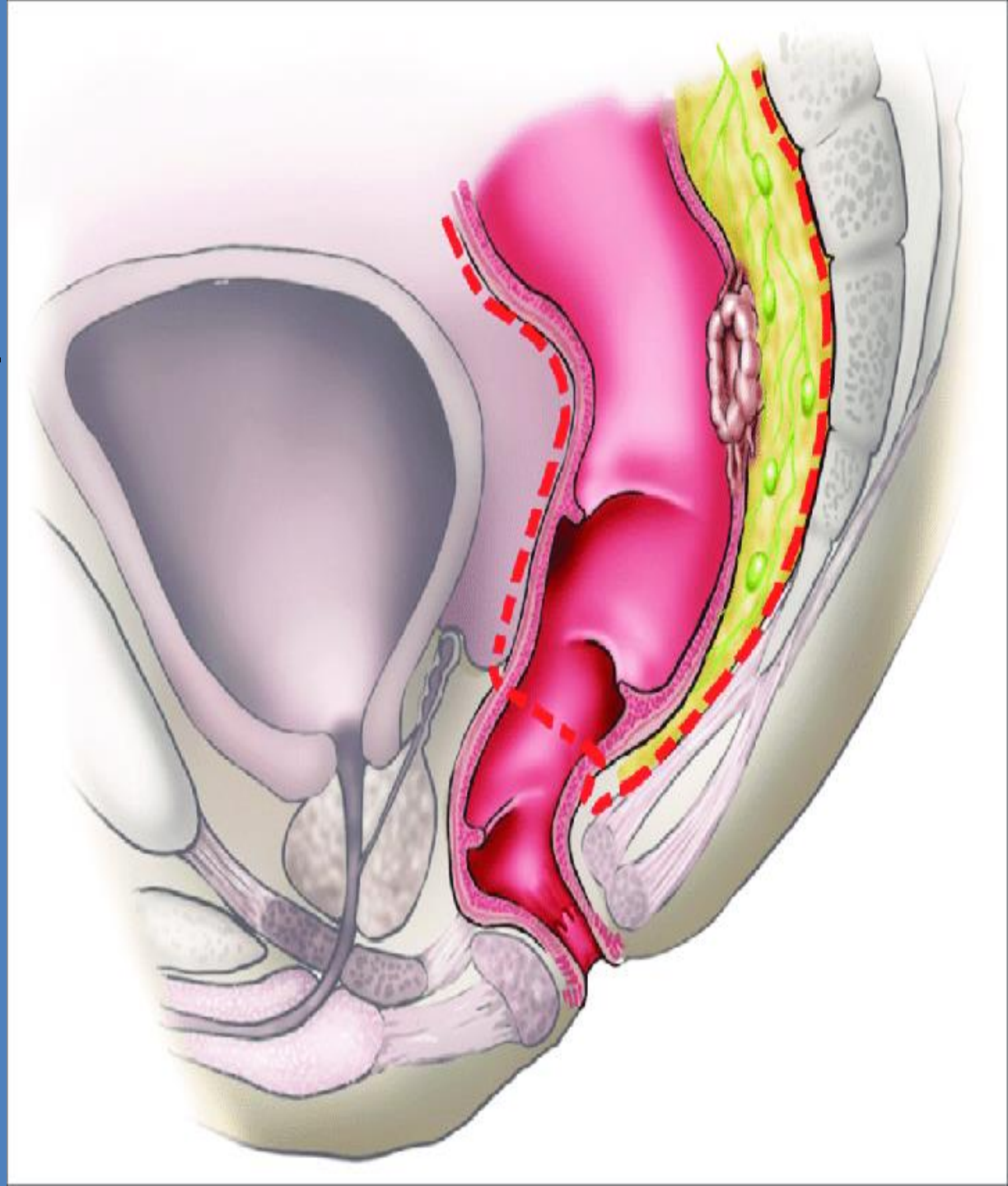
Fascial relationships of the rectum:

Indication-

- Mid rectal cancer.
- Low rectal cancer.

Good TME specimen-

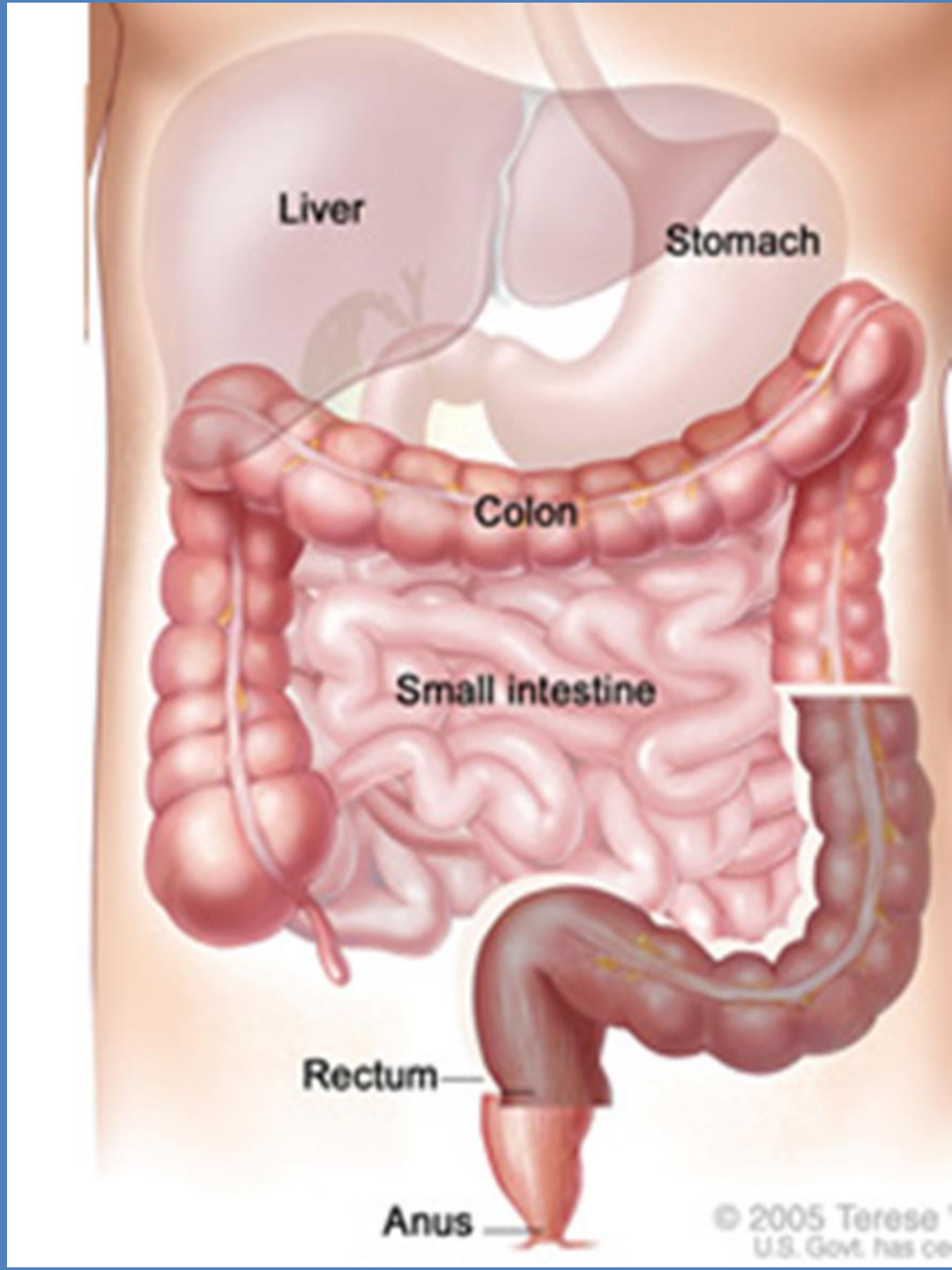
- Intact mesorectal fascia.
- Avoid coning.
- Adequate DRM, PRM,CRM.
- No perforation.



PME / SSME / Tailored TME

Indication-

- Upper rectal cancer.
- Rectosigmoid cancer.



DRM

Maximum distal mesorectal spread upto 2-3 cm.

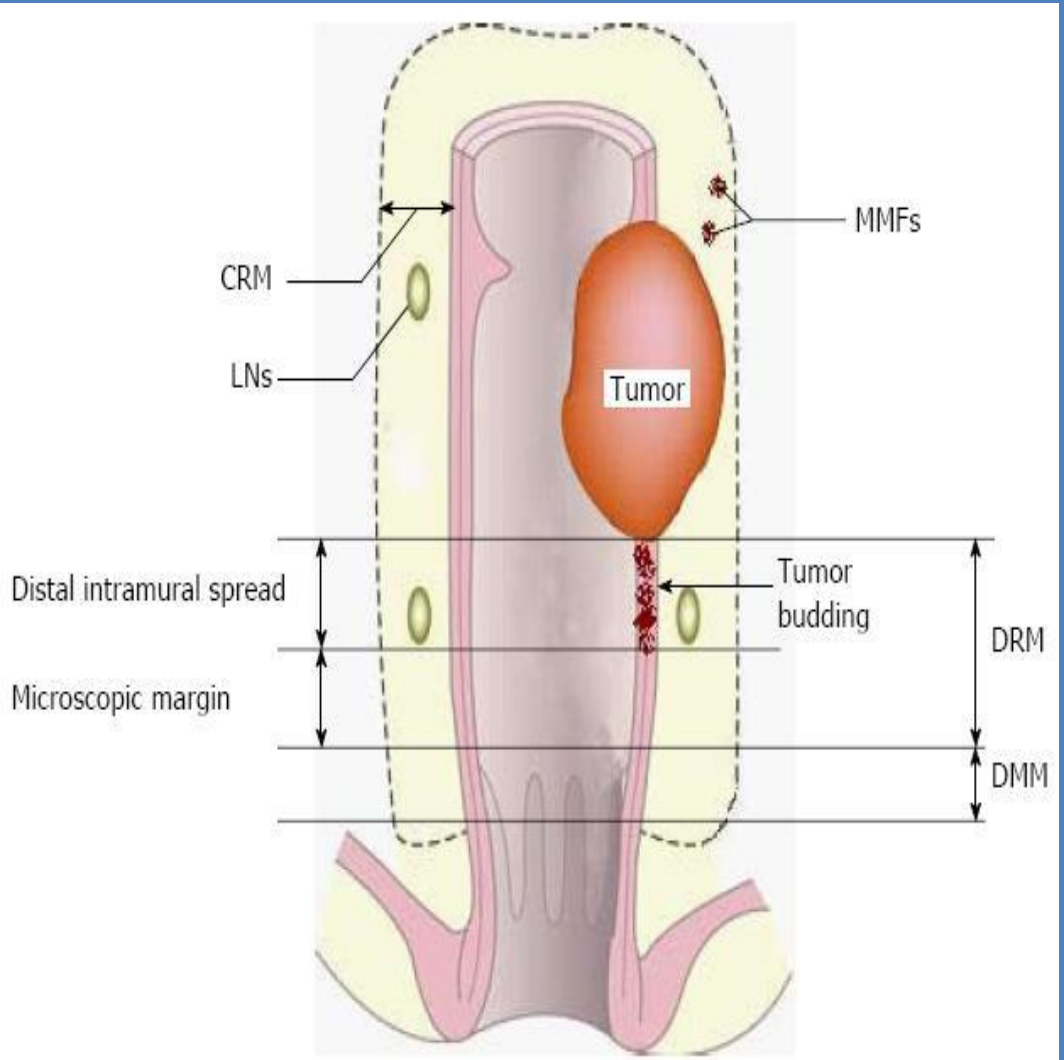
- DRM should be 5 cm where possible.

Standard for low rectal cancer

- At least 2 cm.

SSS-

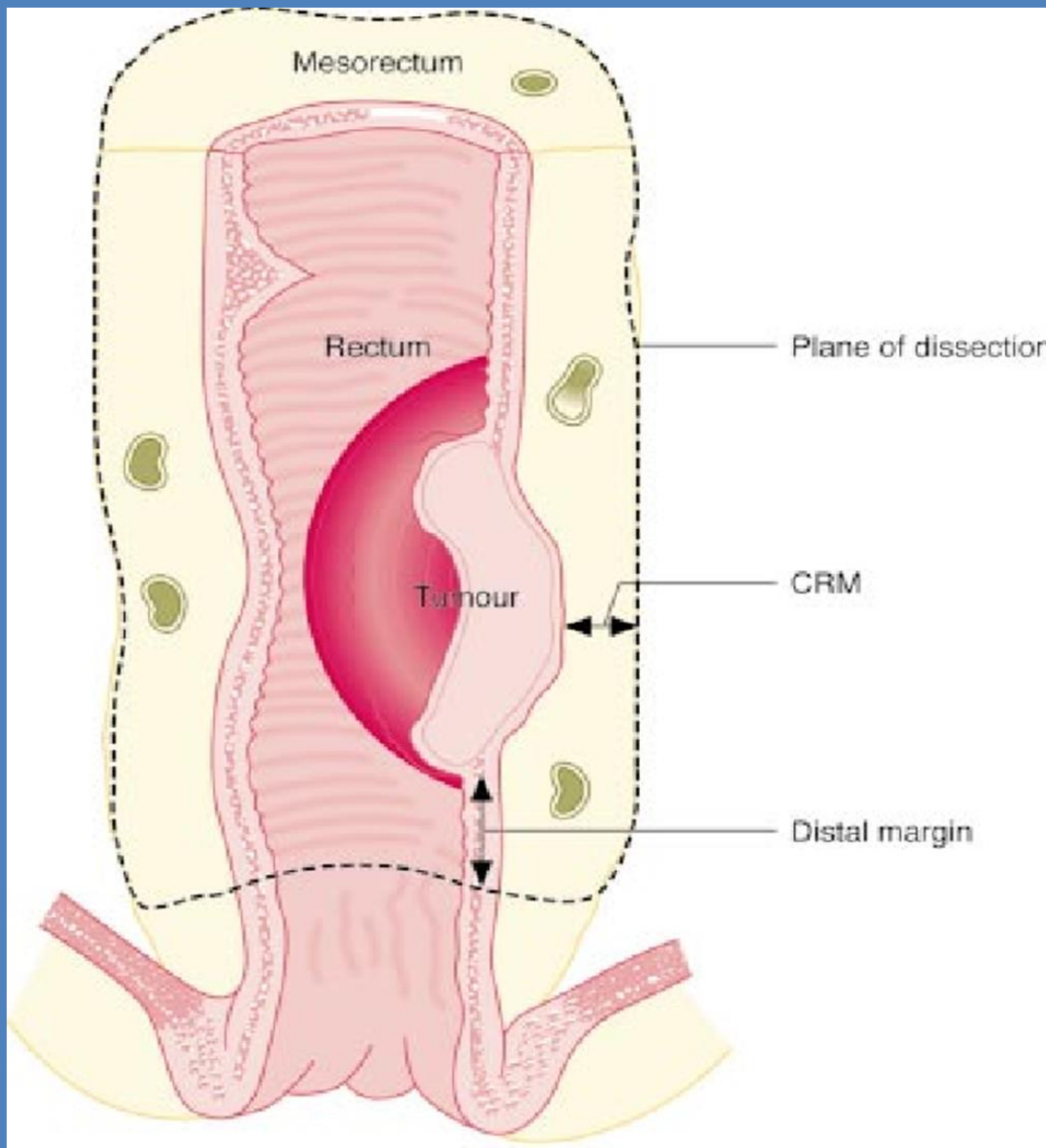
- Well diff-0.5 cm
- Mod diff-1 cm
- Poorly diff- 2 cm



CRM

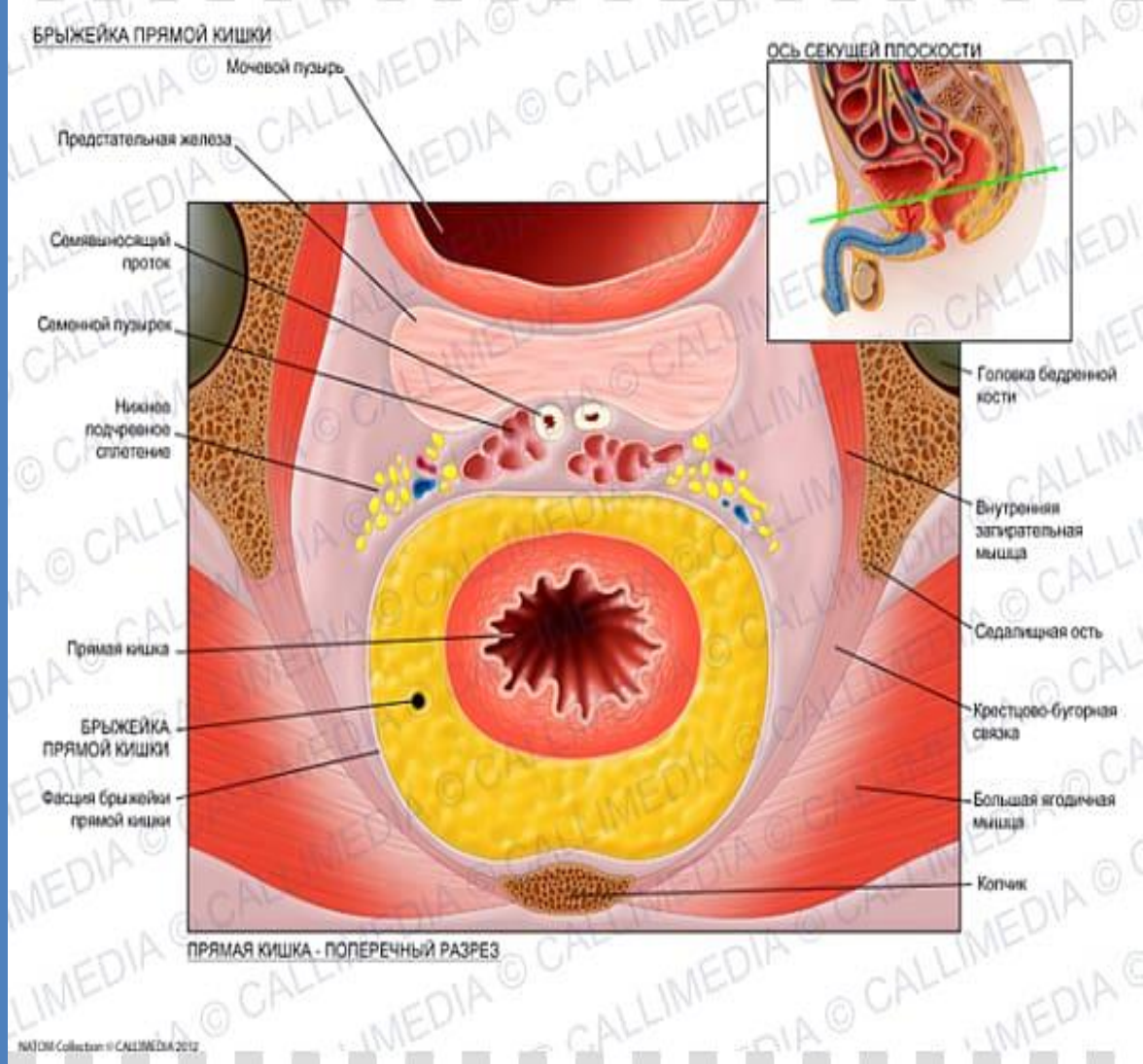
CRM positive

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



Dissection-

- Close rectal.
- Mesorectal.
- Extramesorectal.



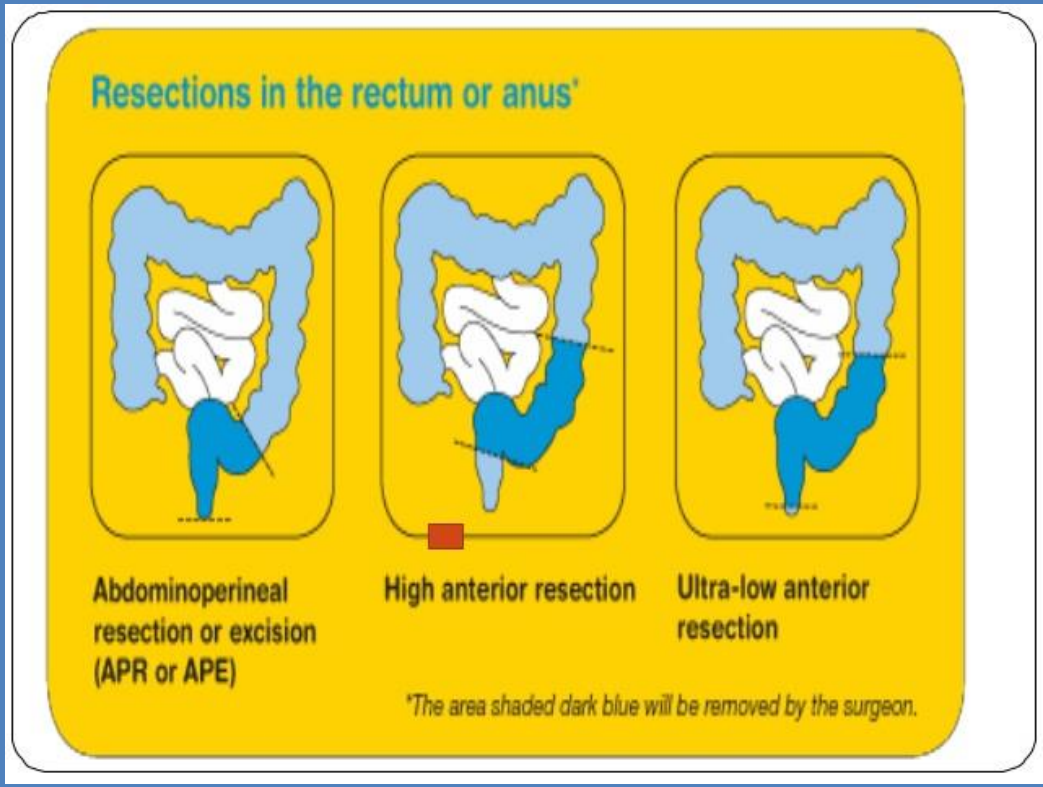
For early lesion

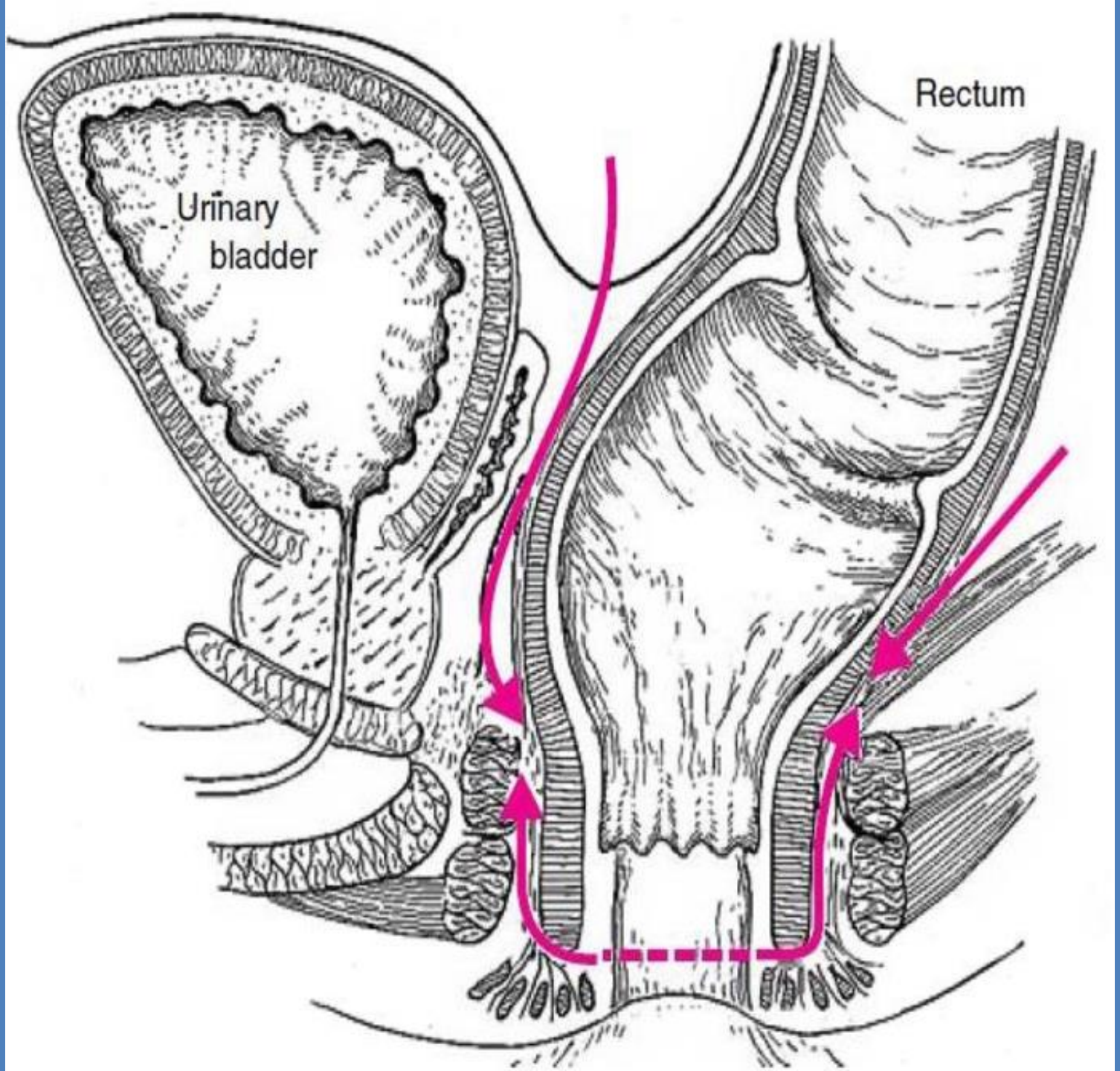
- Polypectomy.
- EMR.
- SMD.
- TAE.
- TEM.
- TAMIS.

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.

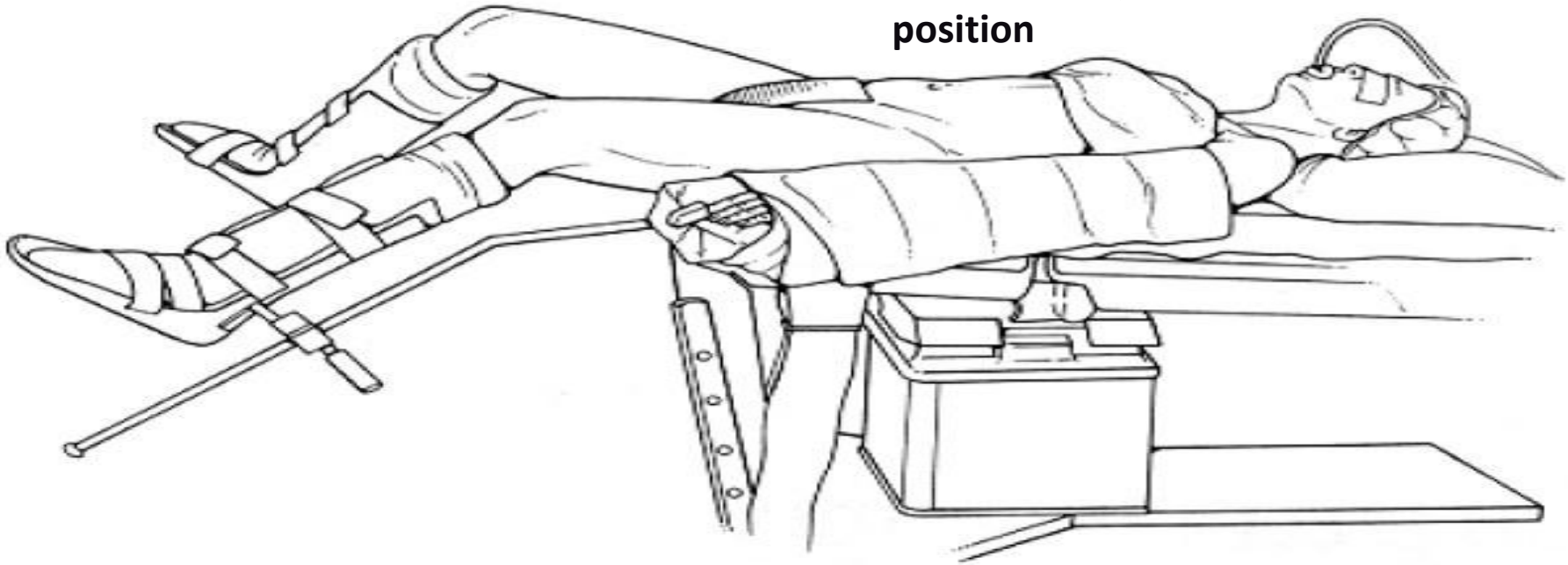
Compulsory for all resecting procedure- TME.




Rectum
Urinary
bladder

Lithotomy position

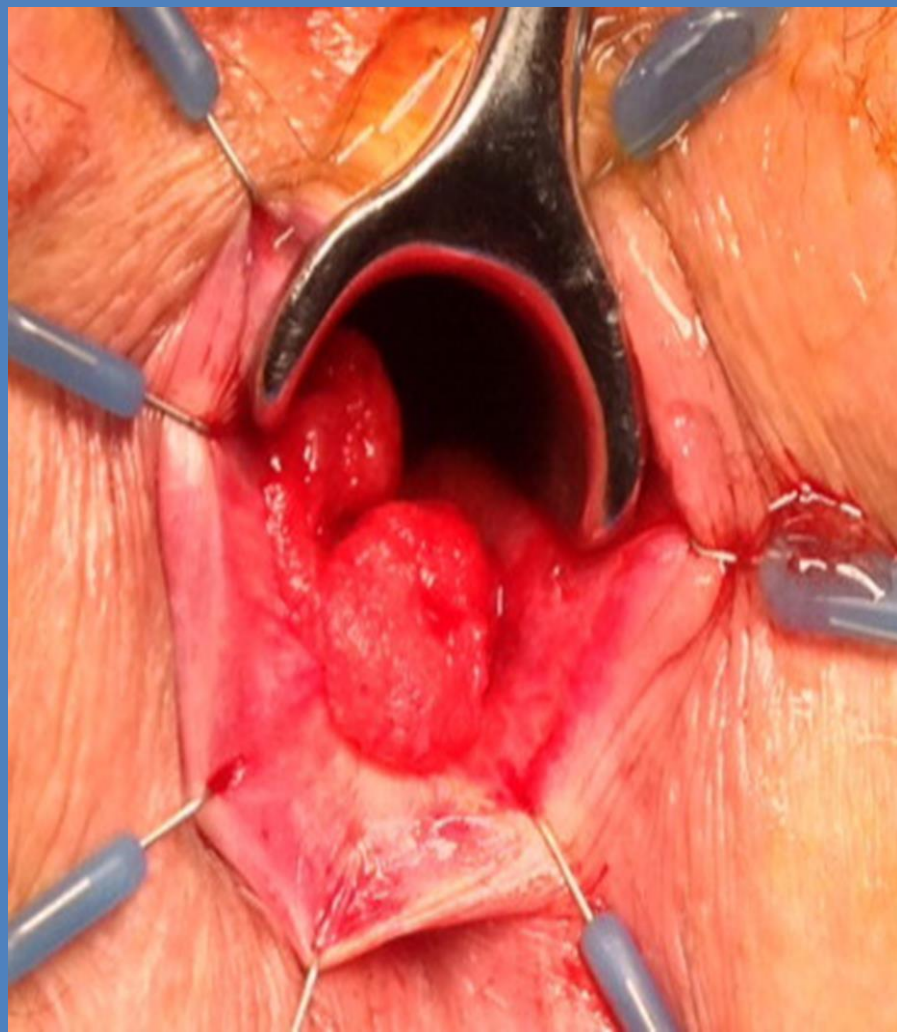
Modified Lithotomy position



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-

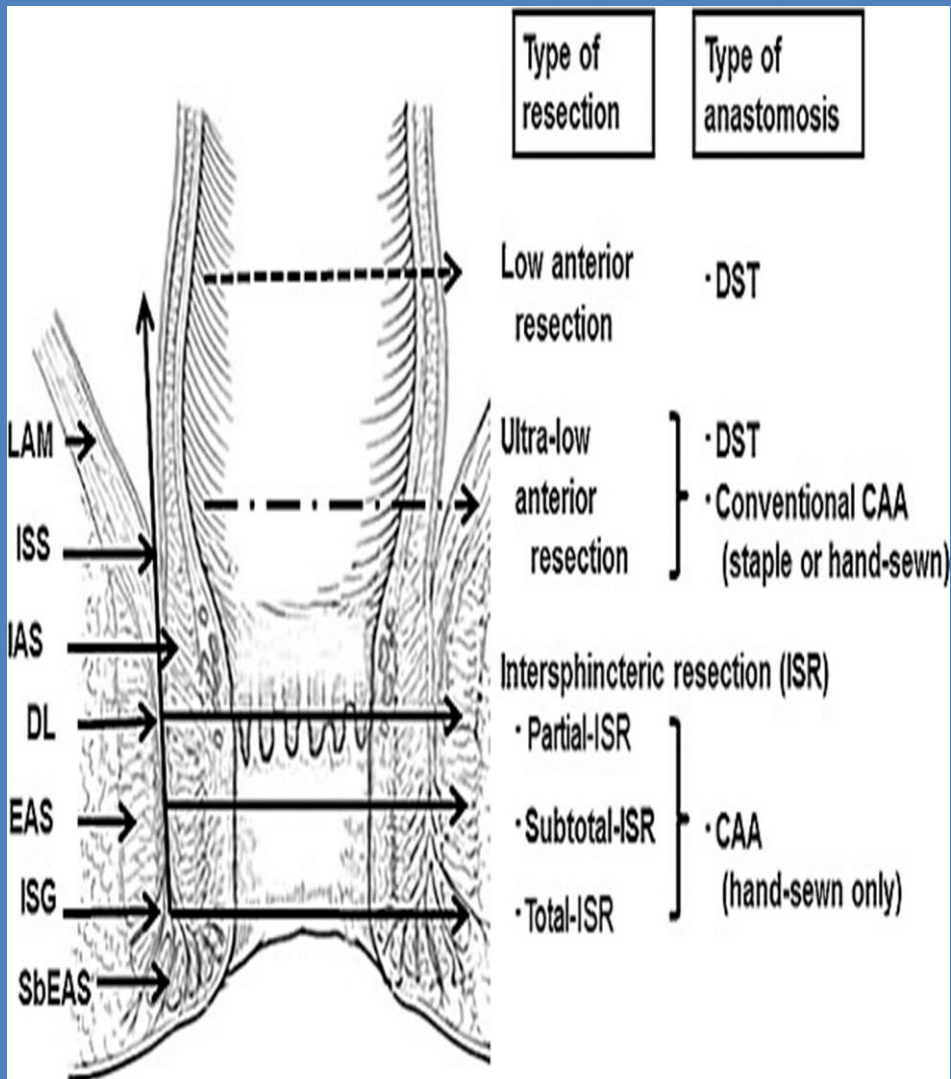
- **T_1- 4-18%.**
- **T_2- 27-67%.**

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.

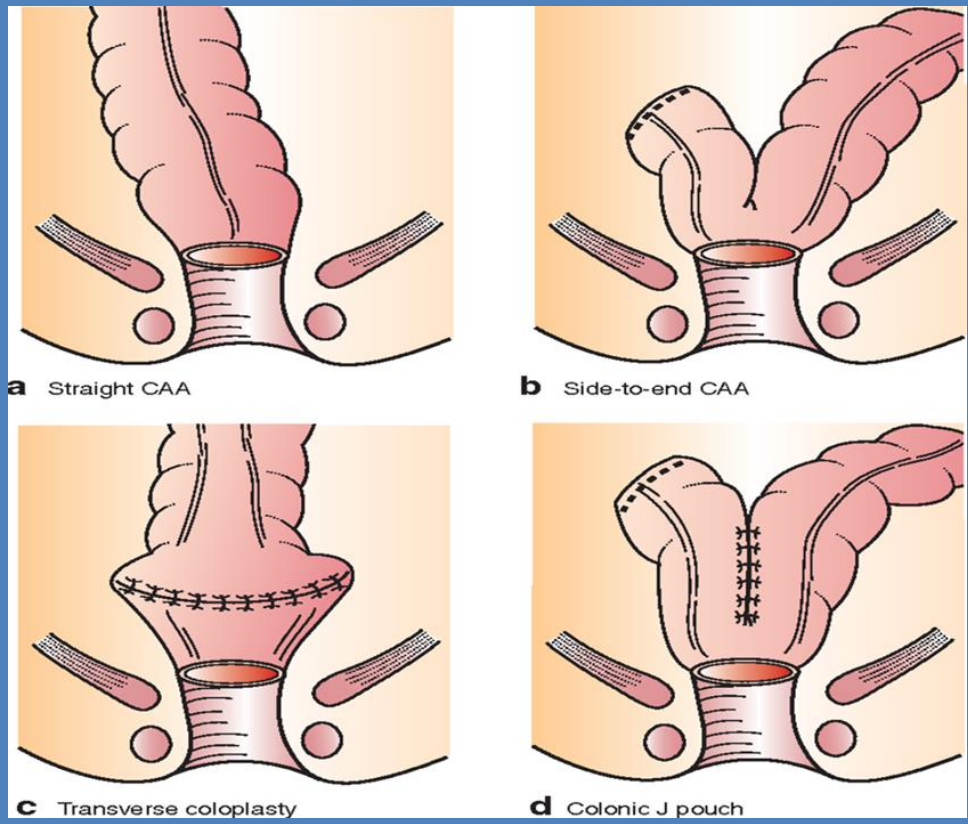
Sphincter sparing surgery

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



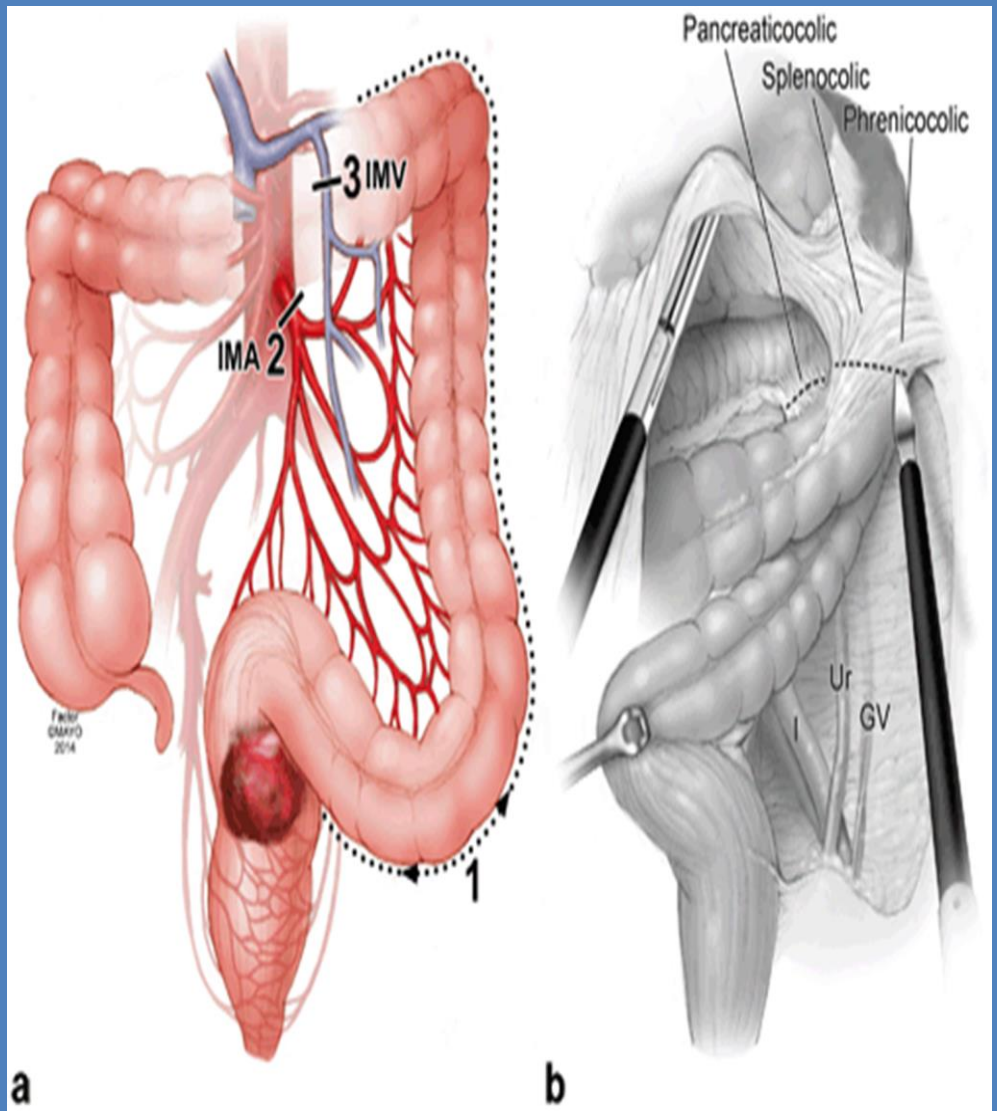
Reconstructive option

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



Optimum mobilization of large gut

- Division of lat. attatchment of dscending colon.
- Complete mobilization of splenic flexure.
- High ligation of IMA.
- Division of IMV at inf. border of pancreas.
- Separation of omentum from distal T. colon & mesocolon.
- Colon may be passed through ileal mesentery behind terminal ileum.



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.

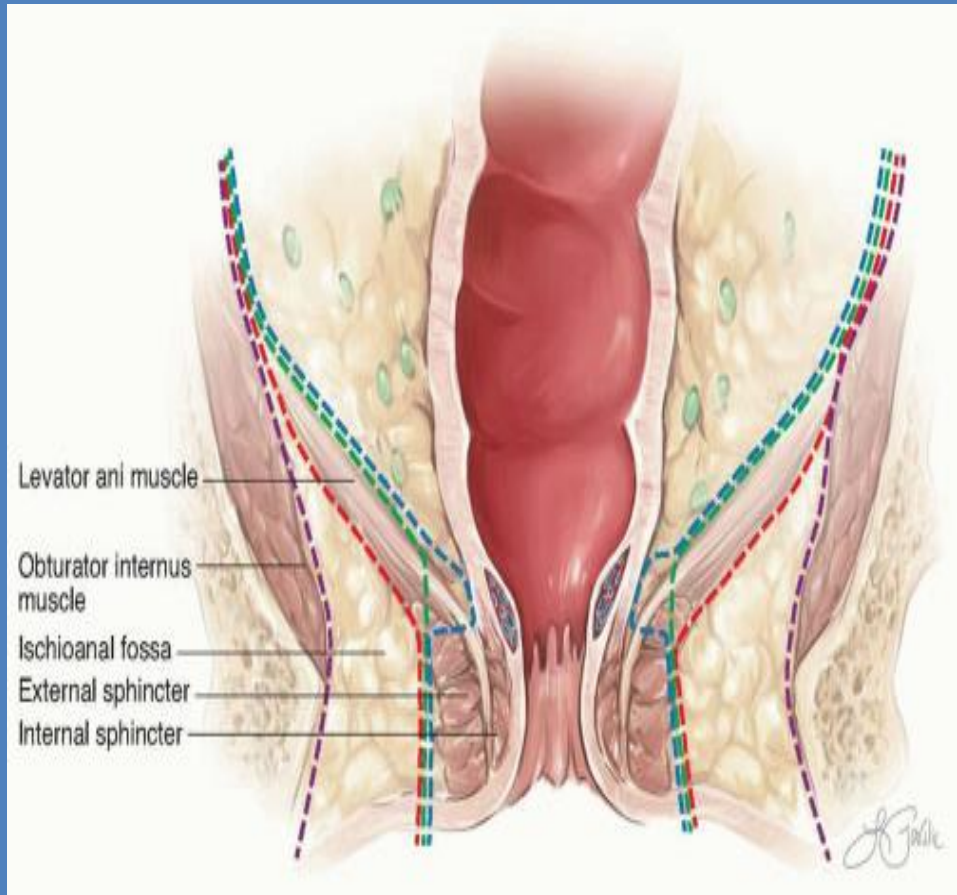
Indicatin of APR

- 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.



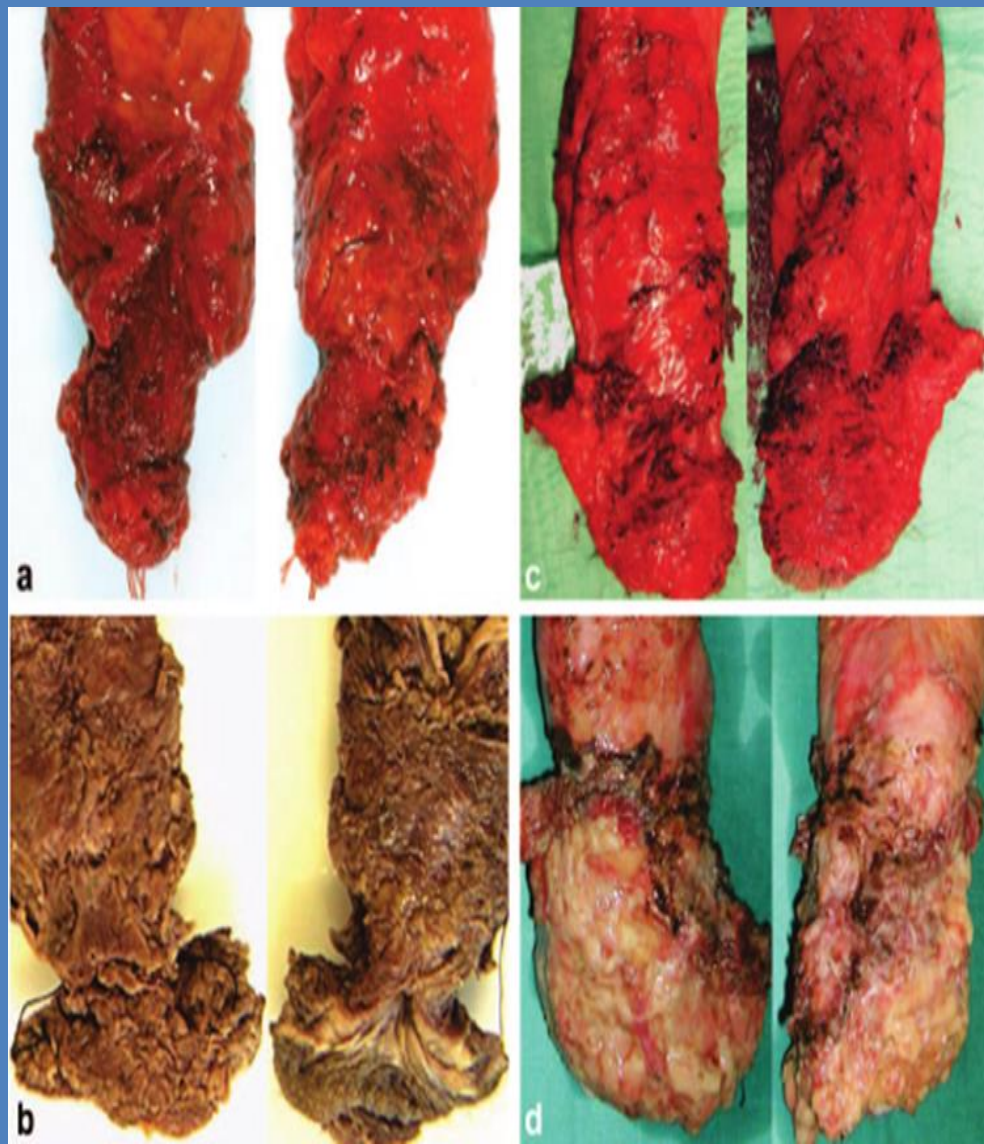
ELAPR

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.

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 -

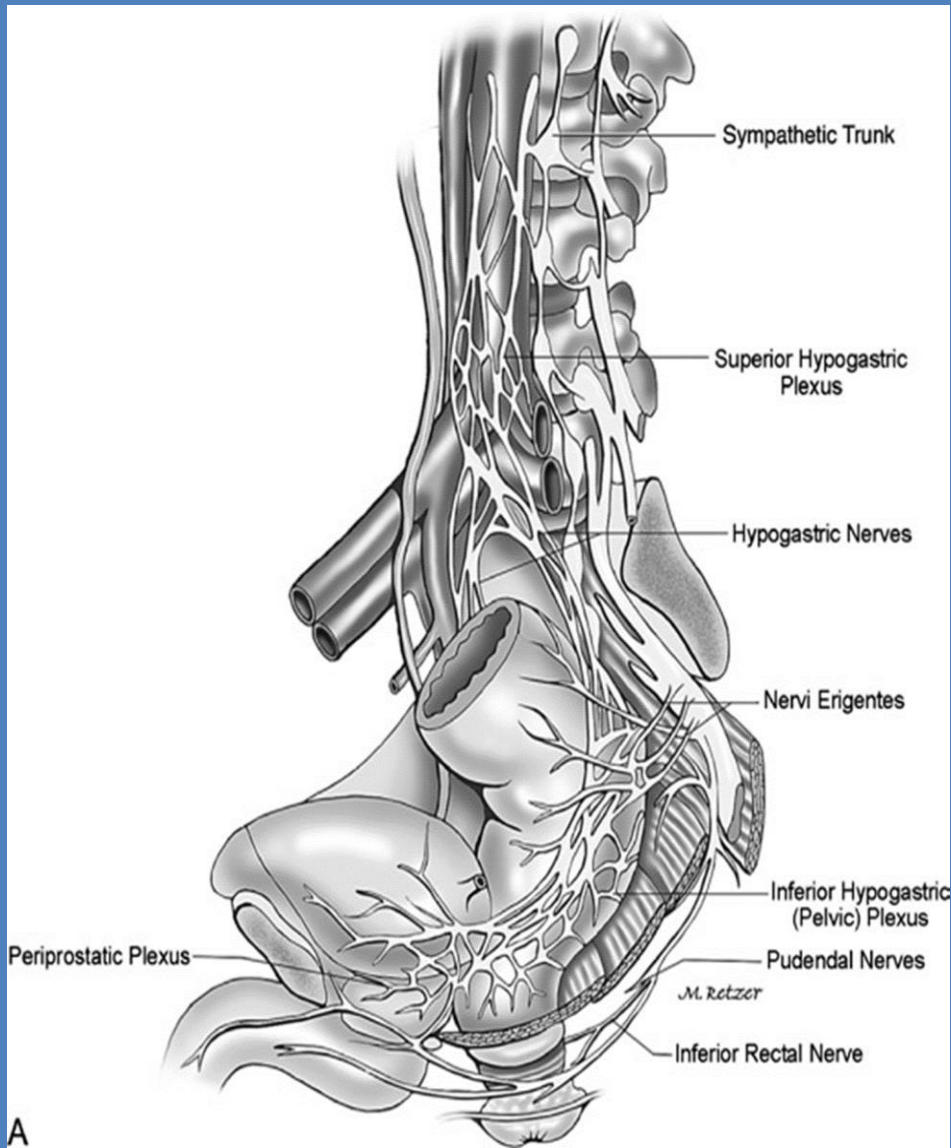
- Division of both superior hypogastric plexus and hypogastric nerves- sympathetic denervation with intact nervi erigentes -retrograde ejaculation and bladder dysfunction.

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.

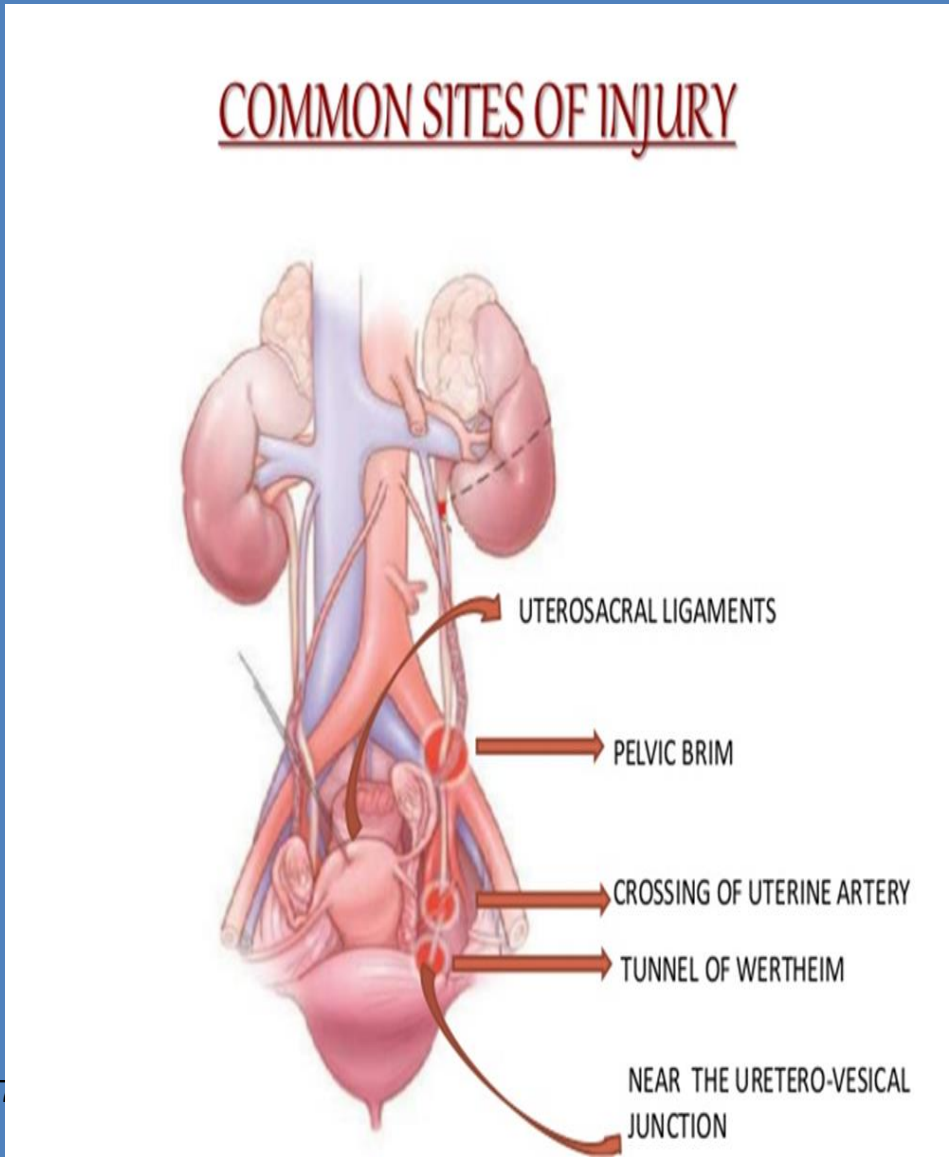
<50% identified during surgery.

Anterolateral dissection of lower rectum.

- At ureterovesical junction.

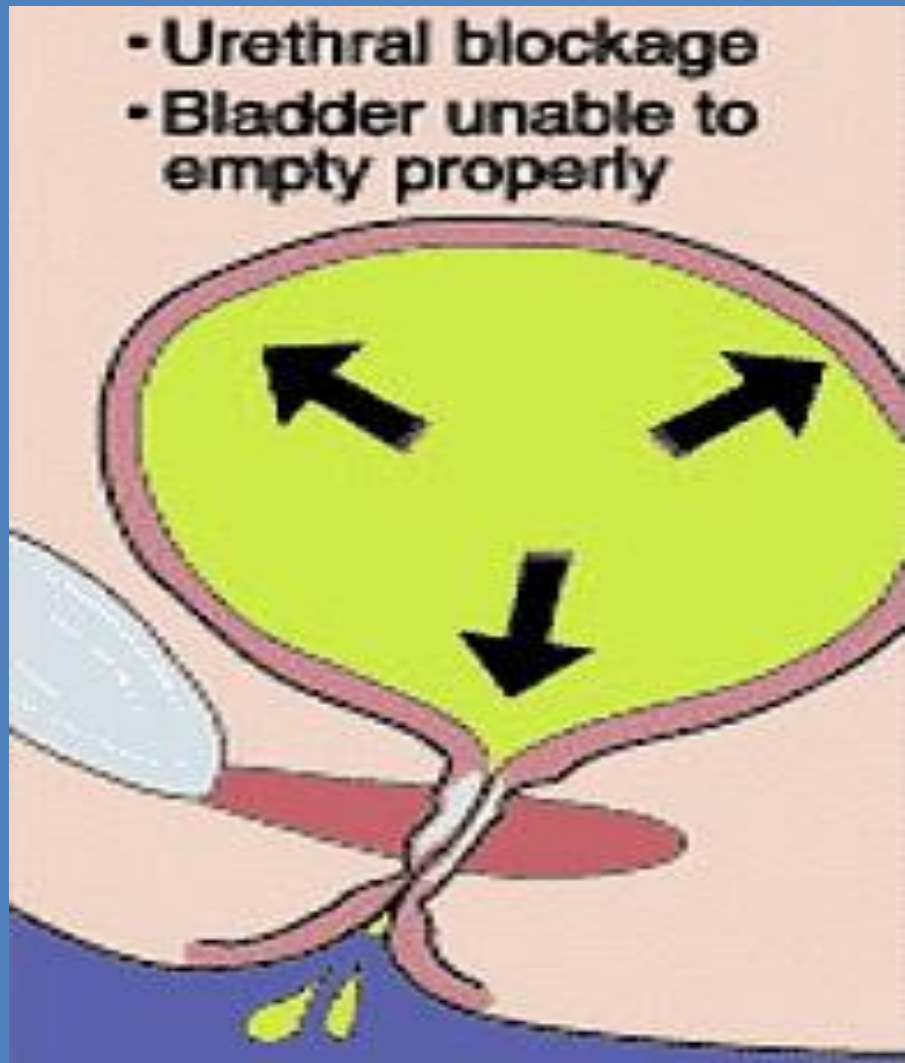
Most cephalad portion of perineal dissection.

- At ureterovesical junction.
- Requires reimplantation by ureteroneocystostomy.



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**.



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