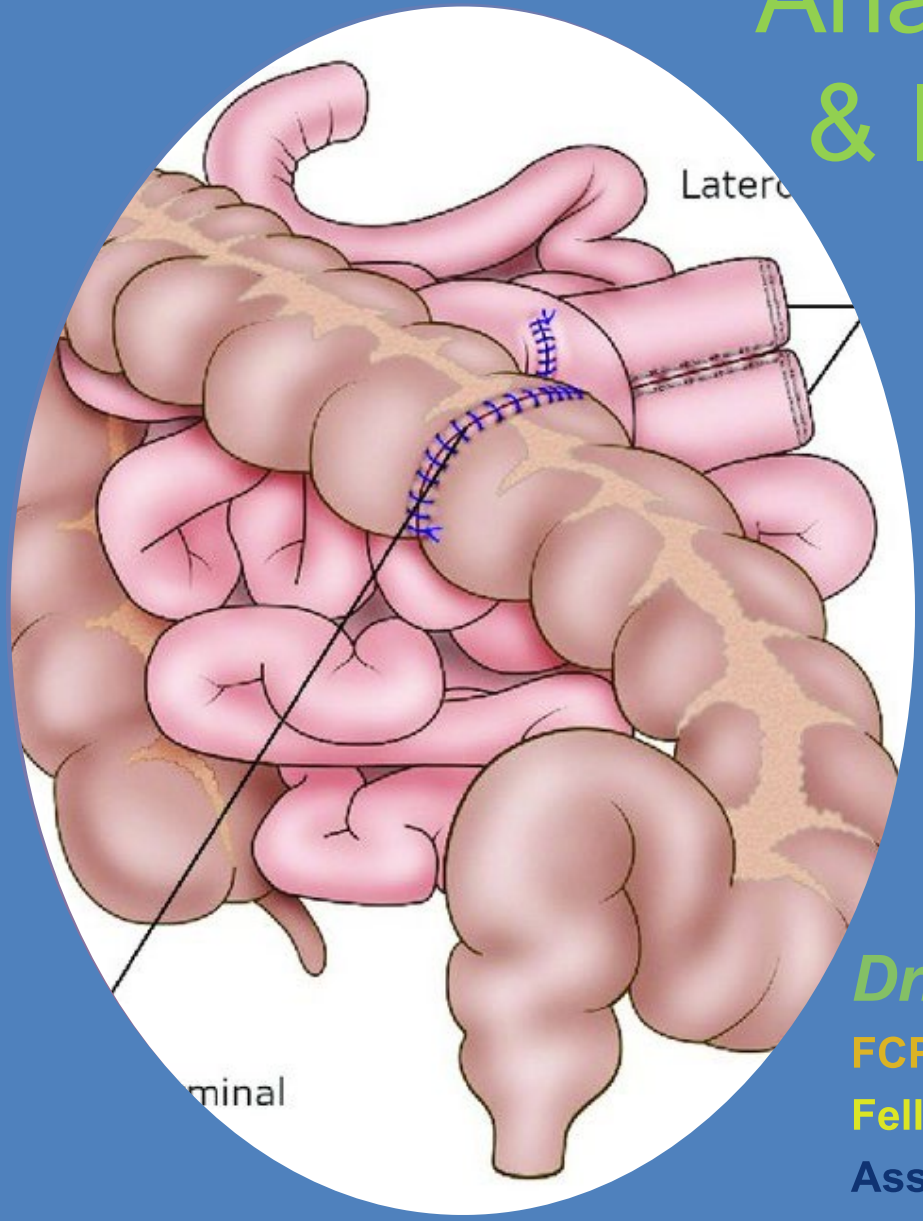
Anastomosis, Leakage & It's Consequences



Dr. Md. Ashek Mahmud Ferdaus

FCPS (SURGERY), MS (Colorectal Surgery).

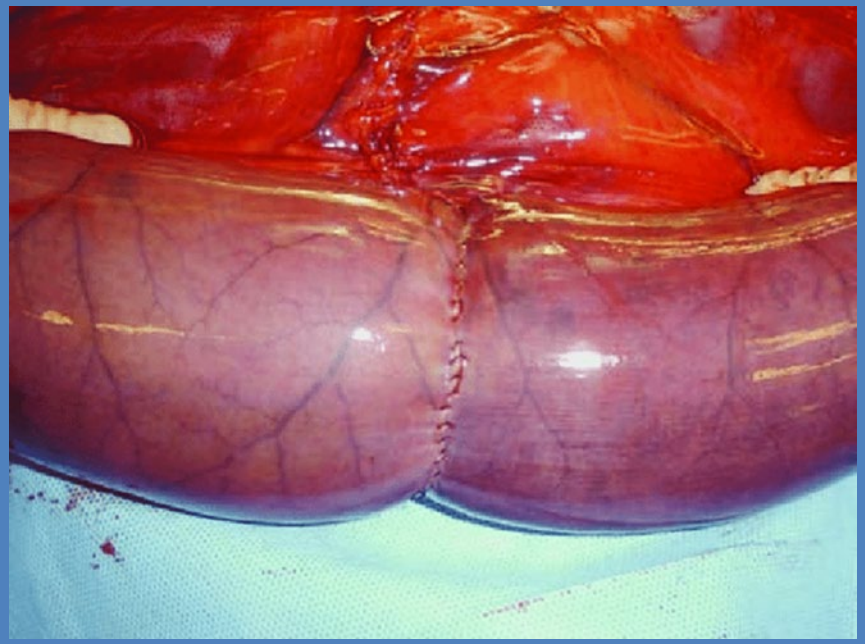
Fellow International Society of Coloproctology.

Assistant Professor (Colorectal Surgery).

Mymensingh Medical College.

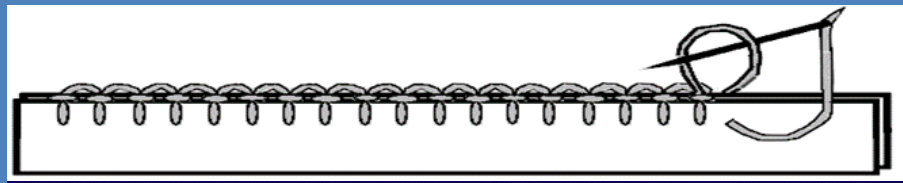
Anastomosis

- Greek “ana”-without.
- Stoma- a mouth.
- When a tubular viscus or vessel is joined after resection or bypass without exteriorization with a stoma.



Intestinal Anastomosis: Historical Perspective

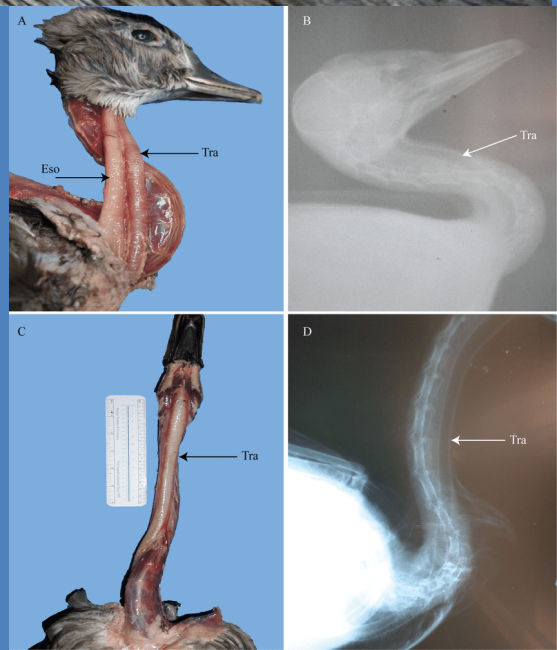
- Hippocrates--intestinal suturing as early as 460 bc.
- Celsus--the glover's stitch to suture colonic perforations & intestinal fistulae--stricture, obstruction.
- Toward the end of the first millennium, Abulkasim of the Muslim school--ant closure. This closure is the forerunner of the Michel clip, which was developed later in France.



Dorylus, army ants

Recovered wound

- In the 11th century, the School of Salerno was founded by the so-called Four Masters.
    - Use of a variety of stents to prevent the stricture.
    - Eg-
        - » elder wood.
        - » goose trachea.

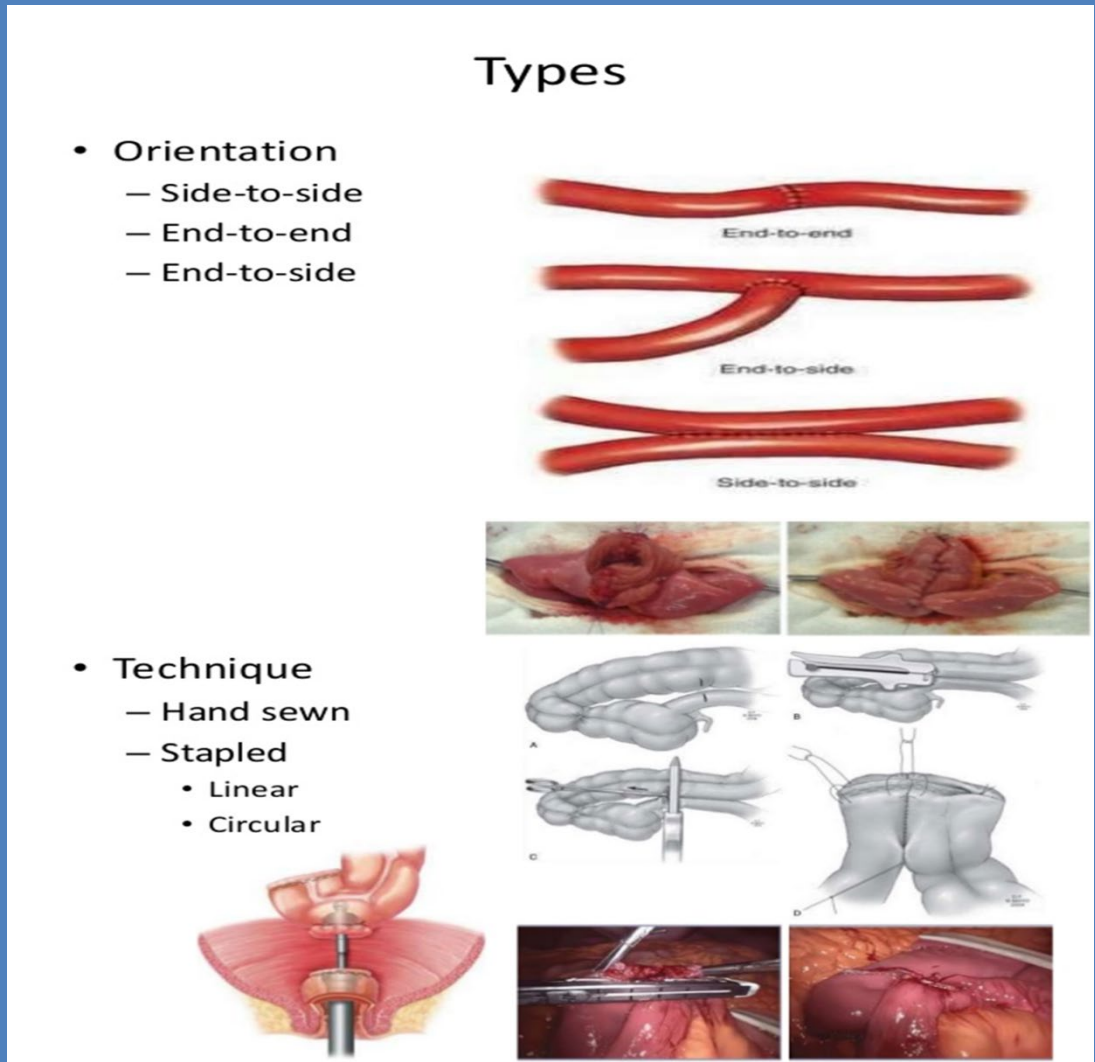


Anastomosis

- Primary resection & anastomosis.
- Resection & anastomosis with a
  - Covering stoma.
  - Diverting stoma.
  - Defunctioning.

Types

- Orientation-
  - Side to side.
  - End to side.
  - End to end.
- Technique-
  - Hand sewen.
  - Stapling.
- Part of the bowel involved-
  - Colocolic, ileocolic.
  - IRA.
  - IPAA.
- Number of layers-
  - Single.
  - Double layers.



- Halsted's principle--- basics of surgical technique regarding tissue handling.

- Introduced in the late 19th century,
- Co-founder of Johns Hopkins Hospital.

  - Gentle handling of tissue.
  - Meticulous haemostasis.
  - Preservation of blood supply.
  - Strict aseptic technique.
  - No tension on tissues.
  - Accurate tissue apposition.
  - Obliteration of dead space.
  - Sharp anatomic dissection.

Preoperative preparation

- Assessment followed by resuscitation.
- Optimization of the condition.
- Bowel preparation?
- Prophylactic antibiotics.
- Counselling.

Assessment of gut viability-

- Clinically-
  - Pink serosa.
  - Peristalsis.
  - Positive pulsation.
  - Bleeding on pin prick.
  - Color change on hot compression.

- Doppler USG- detects antimesenteric blood flow.
- Fluorescein dye test- IV 1 gm Na fluroscein.

Per operative findings-

- Gut is hugely distended & twisted.
- Blackish discoloration.
- No peristalsis.
- No bleeding on pin prick.
- No colour change on hot mop compression.

Suspected viability

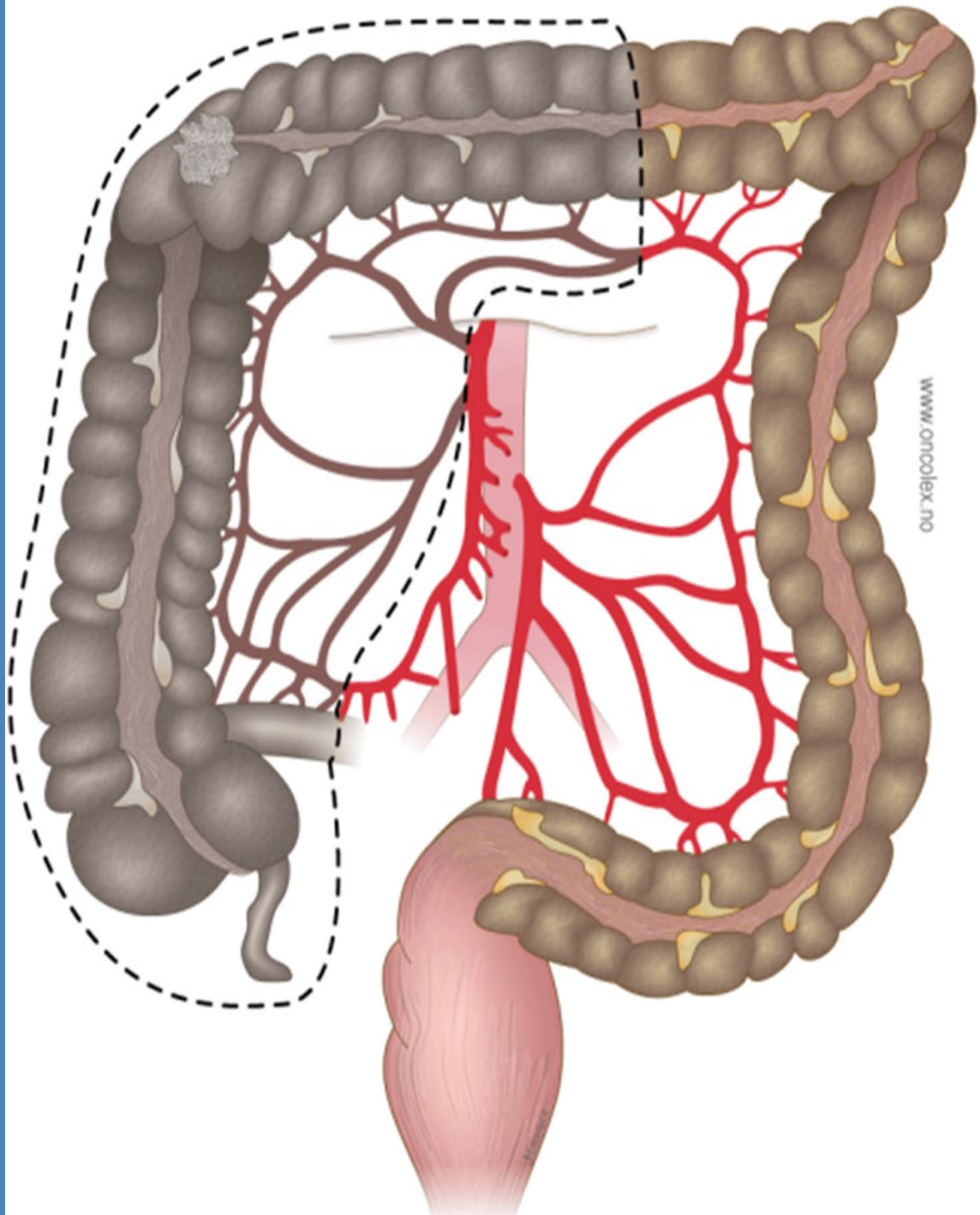
- Return to abdomen.
- Warm compression.
- Increased oxygen flow.
- May improve over hours.
- Consider 2nd look laparotomy.

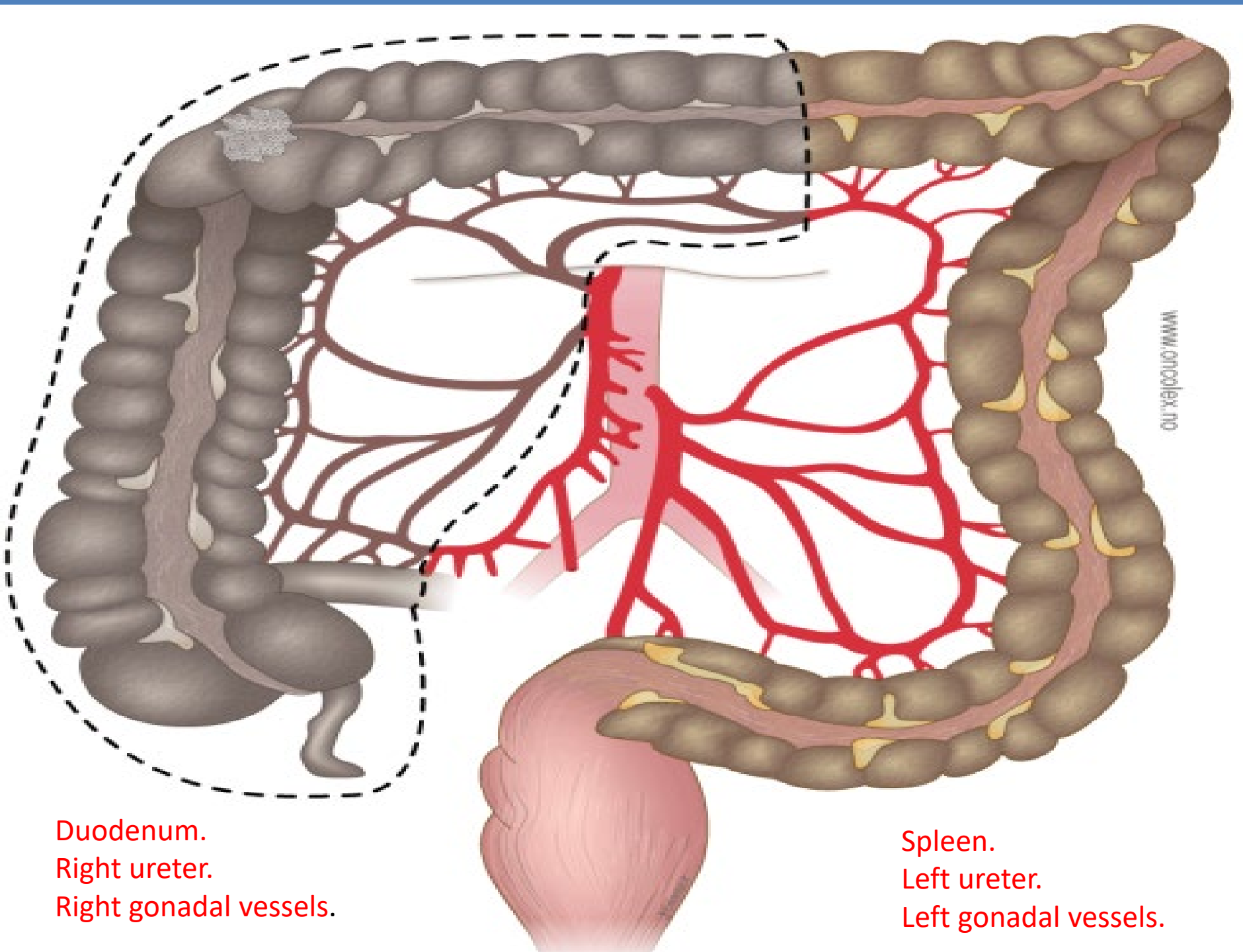
Right hemicolectomy

- Vessels-
  - Ileocolic.
  - Right colic.
  - Right branch of middle colic.
- Structures-
  - Terminal 15-20 cm of ileum.
  - Appendix.
  - Caecum.
  - Ascending colon.
  - Hepatic flexure.
  - Right 2/3rd of transverse colon.

PRM

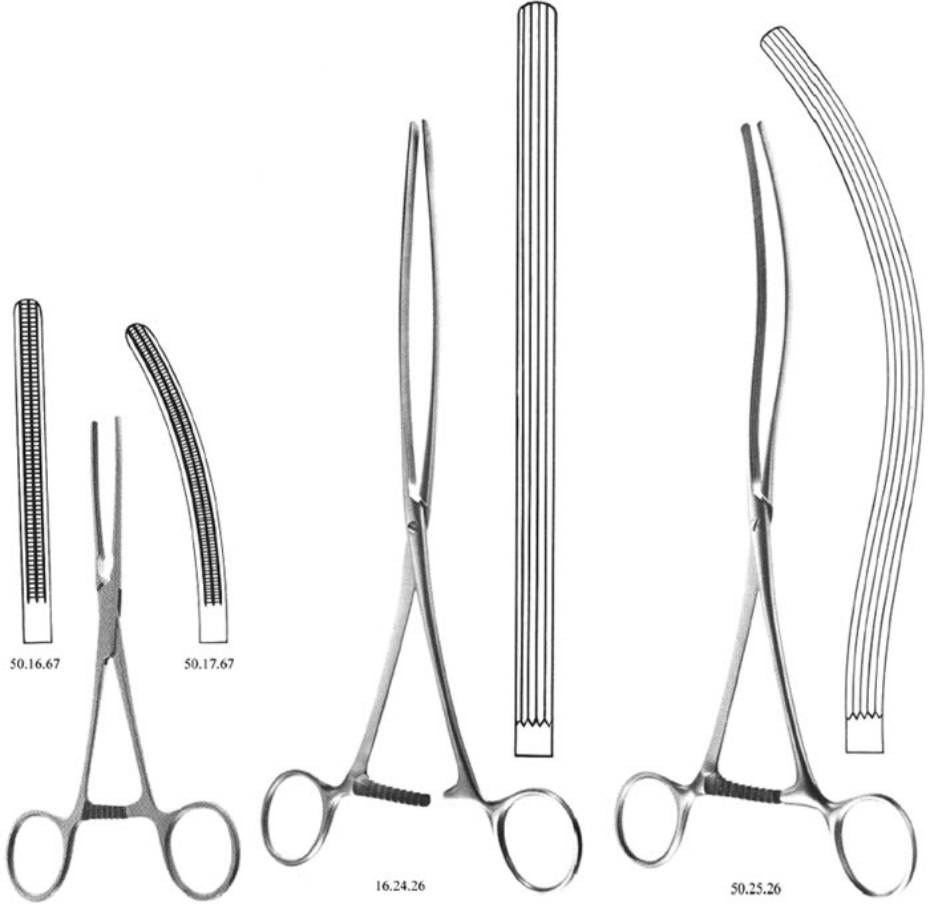
- 10 cm tumor free resection margin is adequate.
- At least 5 cm should be resected.

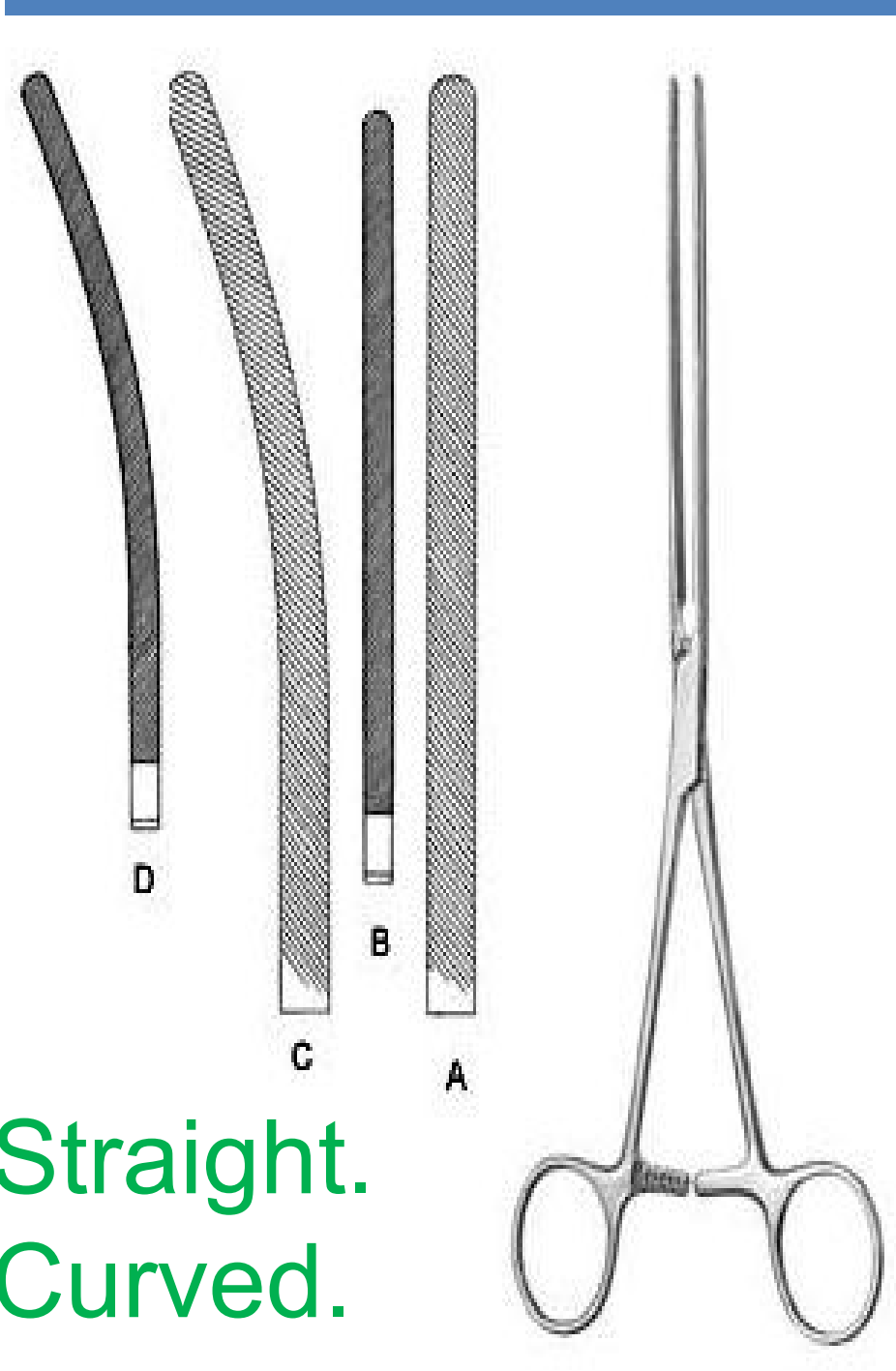




Duodenum.
Right ureter.
Right gonadal vessels.

Spleen.
Left ureter.
Left gonadal vessels.





Occlussive variety.
Crushing variety.

Straight.
Curved.

Functions-

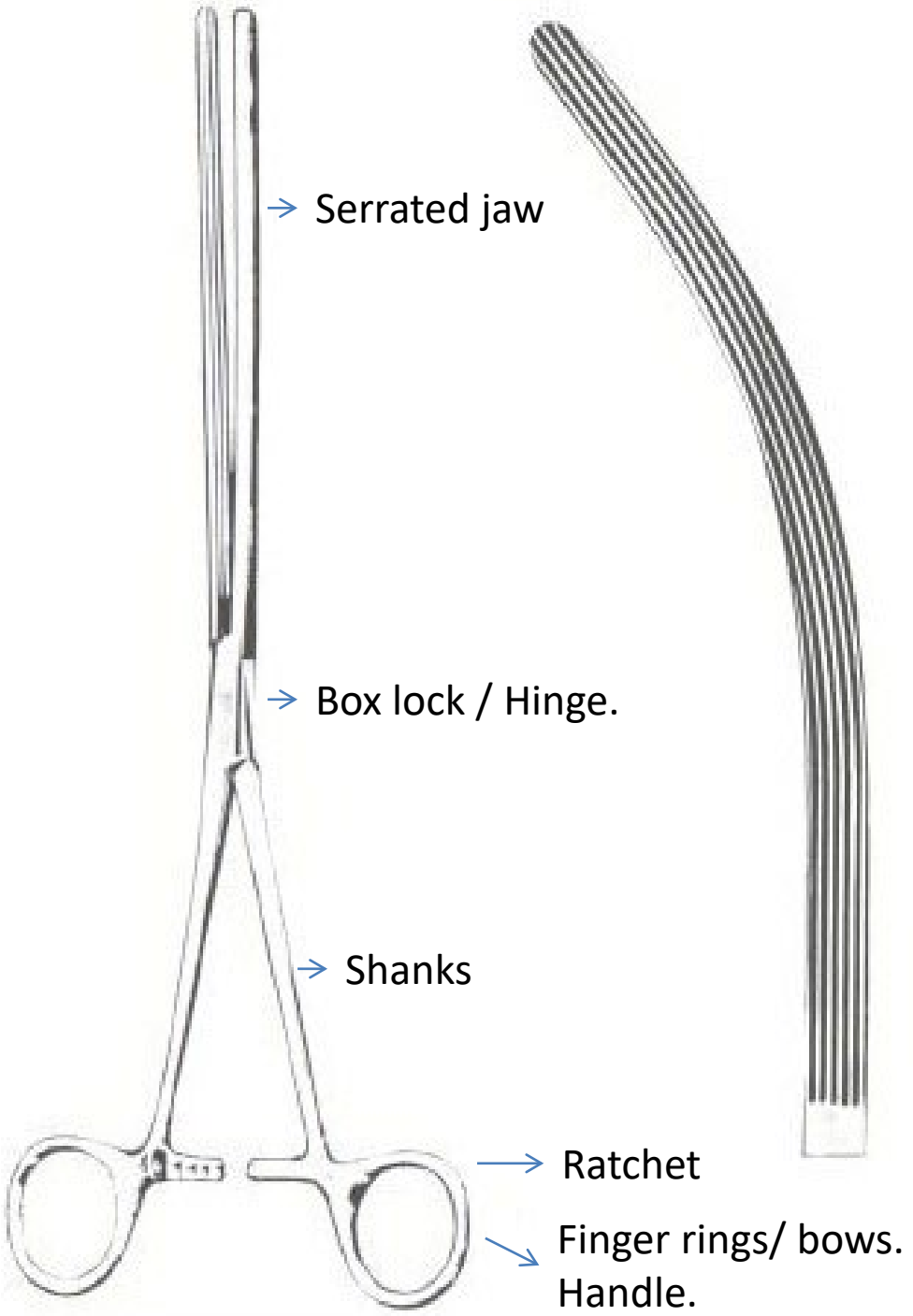
- Occlussion.
- Haemostasis.
- Apposition.

Sterilization-

- Autoclaving.

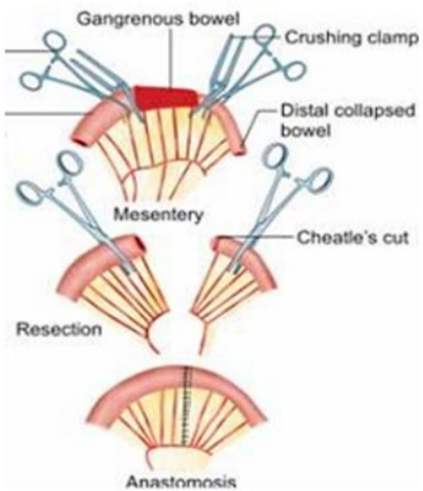
Resected end- Crushing variety.

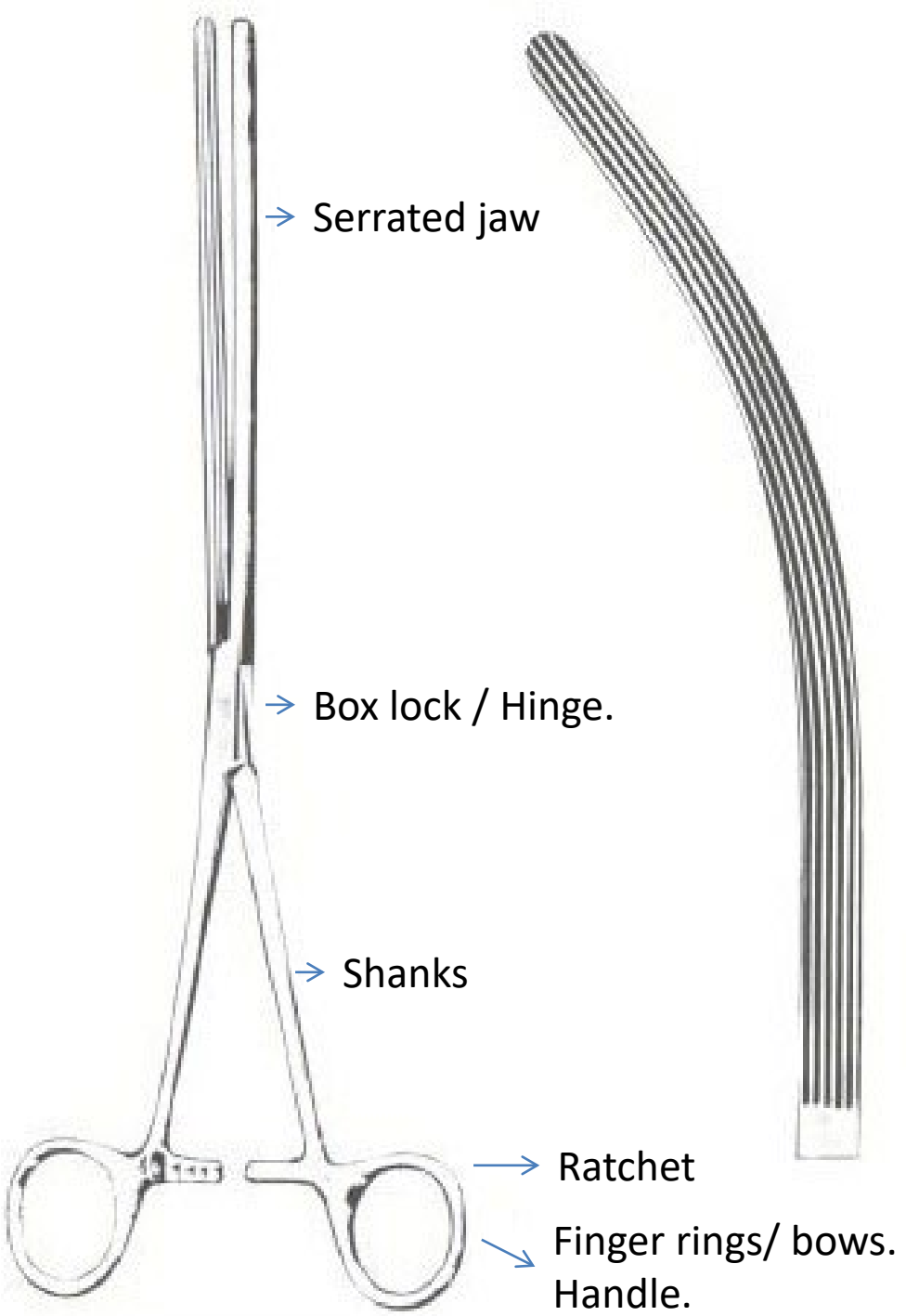
Remaining segment- Occlussive.



Resected end- Crushing variety.

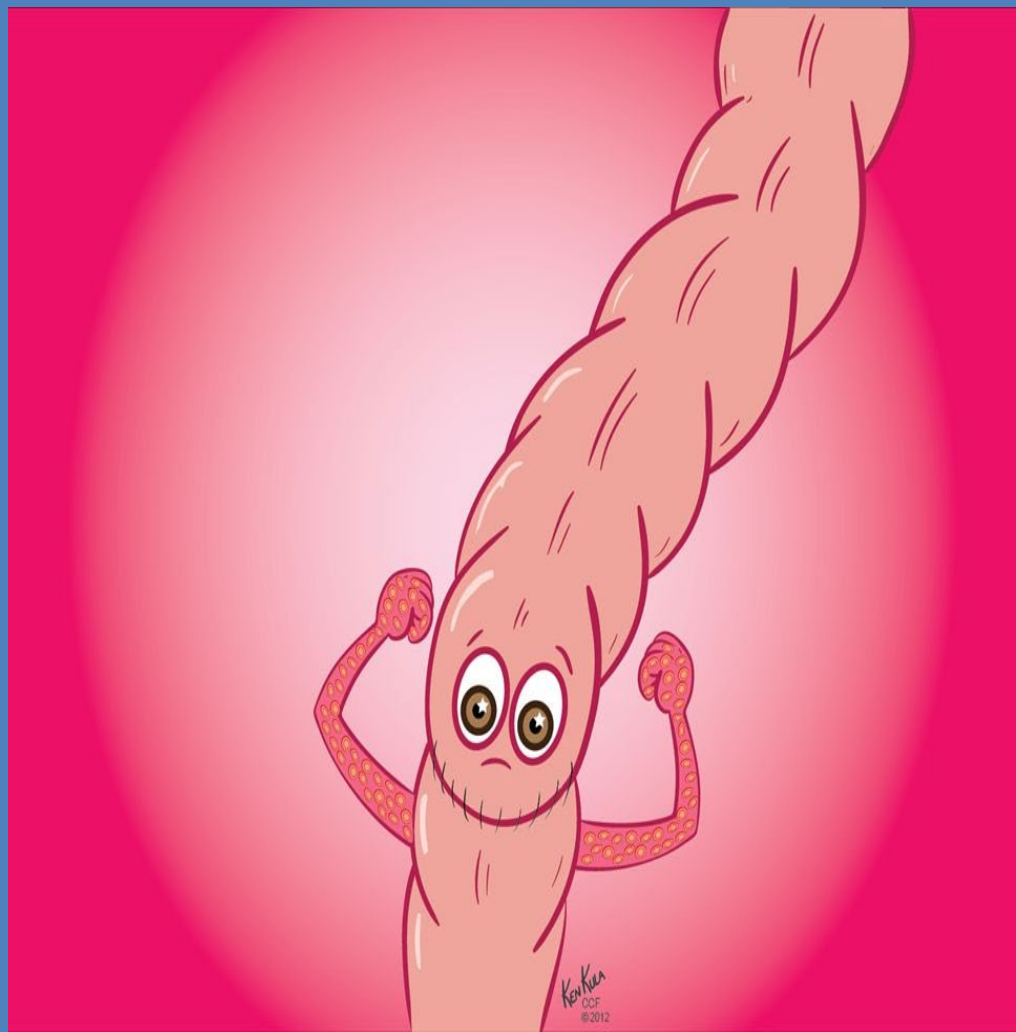
Remaining segment- Occlussive.





Principles of anastomosis

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

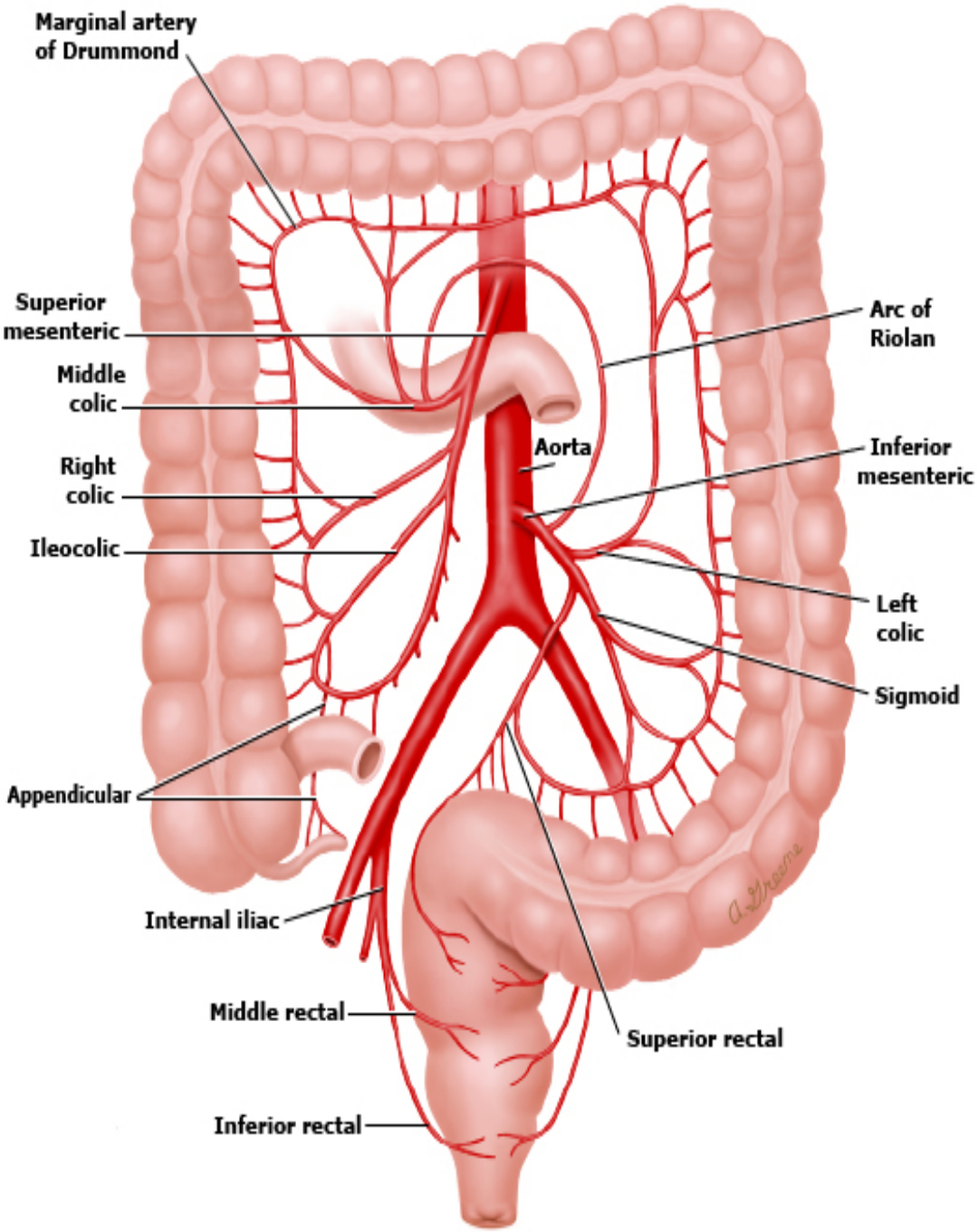


Constant vascular pedicle-

- 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-

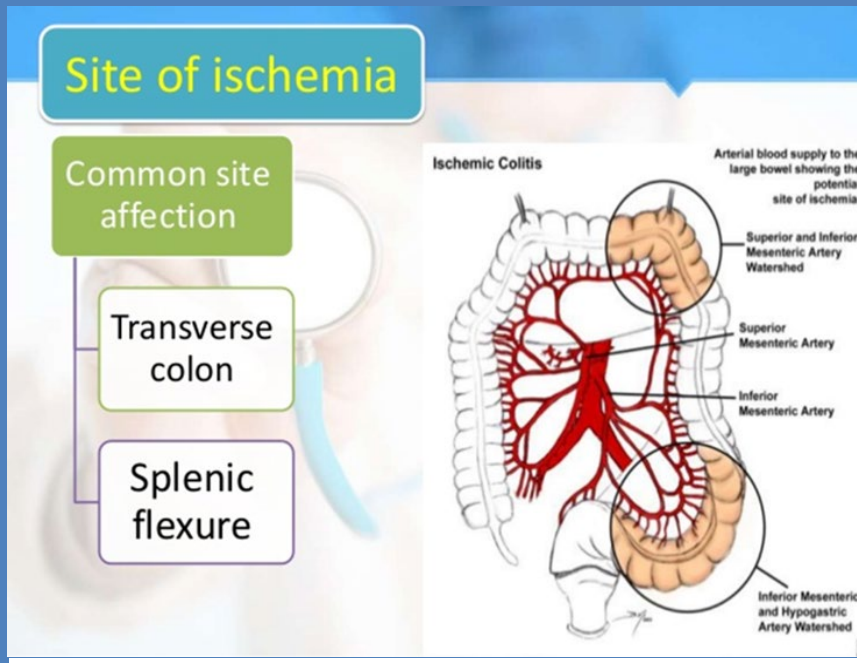
- Splenic flexure, watershed line.
- Discontinuity of marginal artery in 50% cases.
- MCA can be the main supply in 33 % cases.

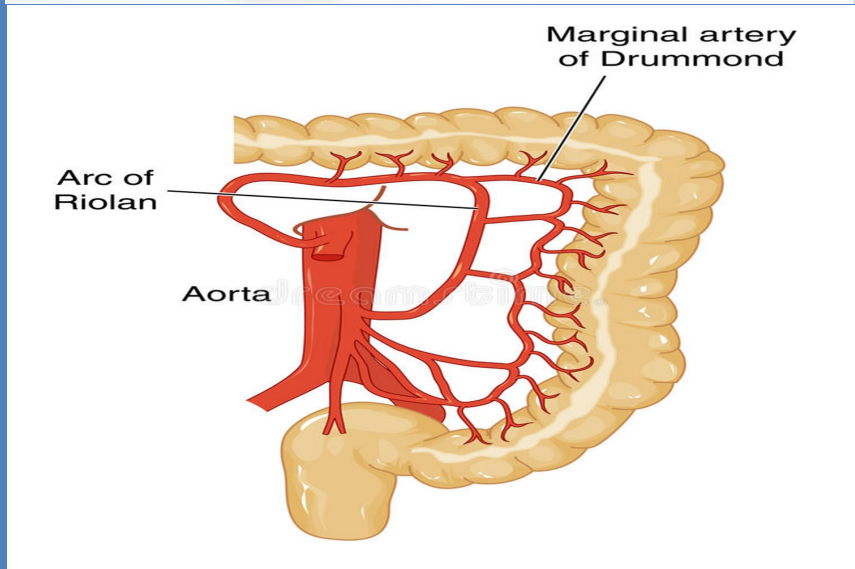
Sudeck's critical point-

- 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?

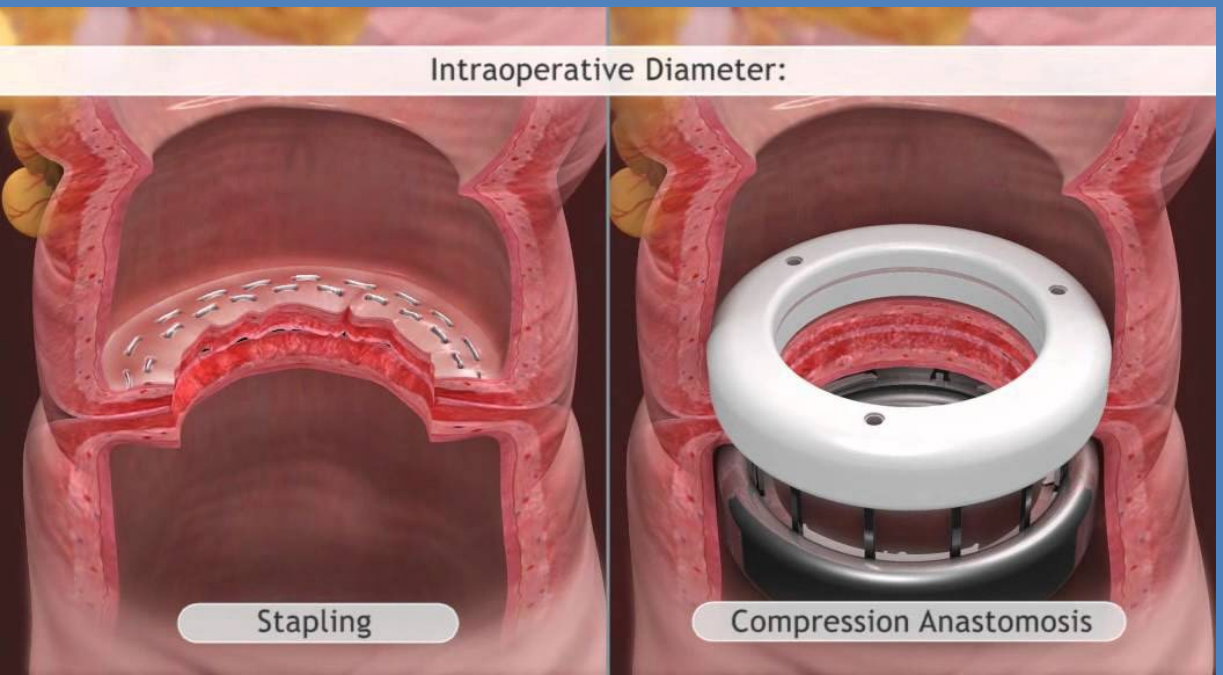
Causes of poor blood supply

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

Controversies

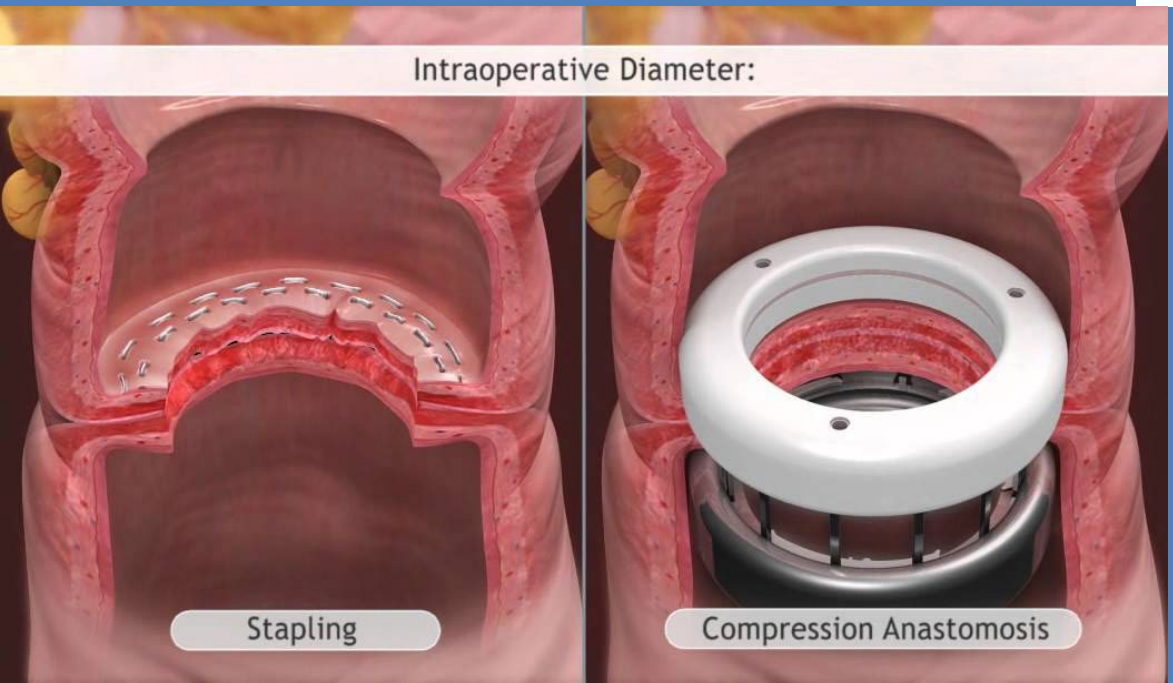
- Types of Suture?
- Partial or full thickness?
- Inverted or everted?
- Interrupted or continuous?
- Single or double layered?
- Hand sewen or stapled?
- Drain tube?
- NG tube?

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



Anastomotic leakage

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



- Oesophageal,
- Pancreaticoenteric
- Colorectal anastomosis

-considered high risk.

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 suture

Advantages-

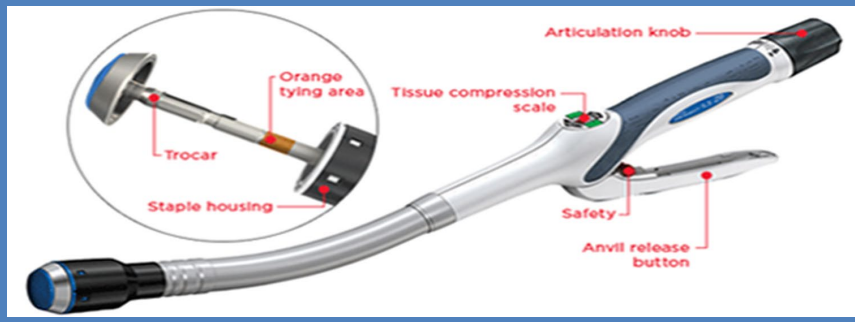
- Inverts lip of the wound.
- Never involves mucosa.
- Possibility of contamination is low.

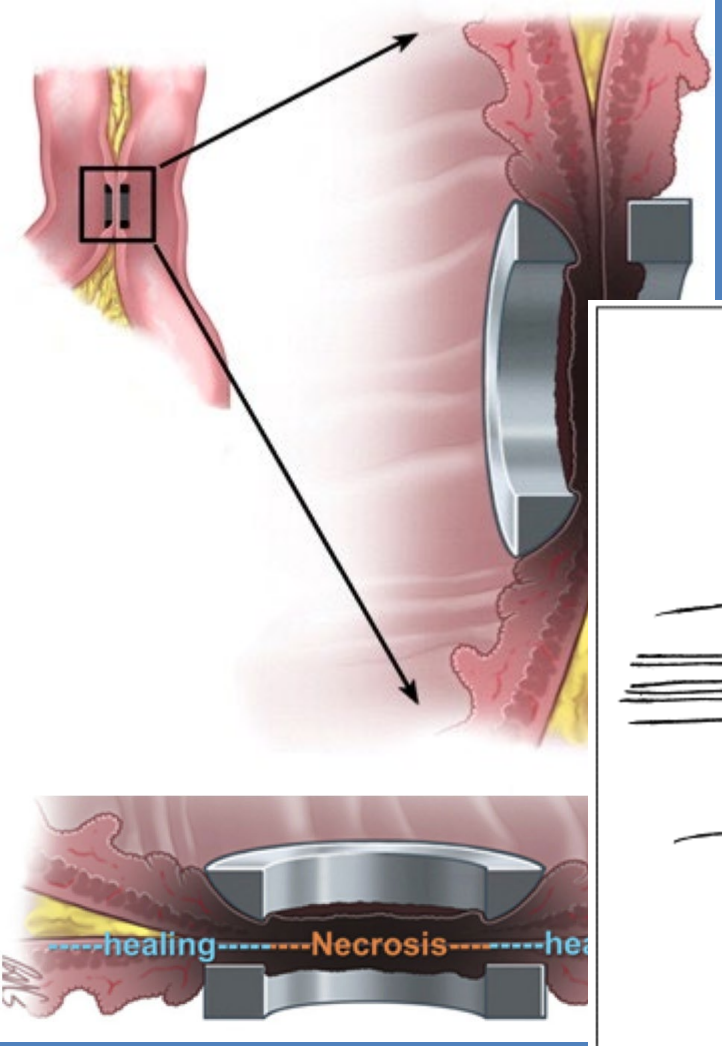
Disadvantages-

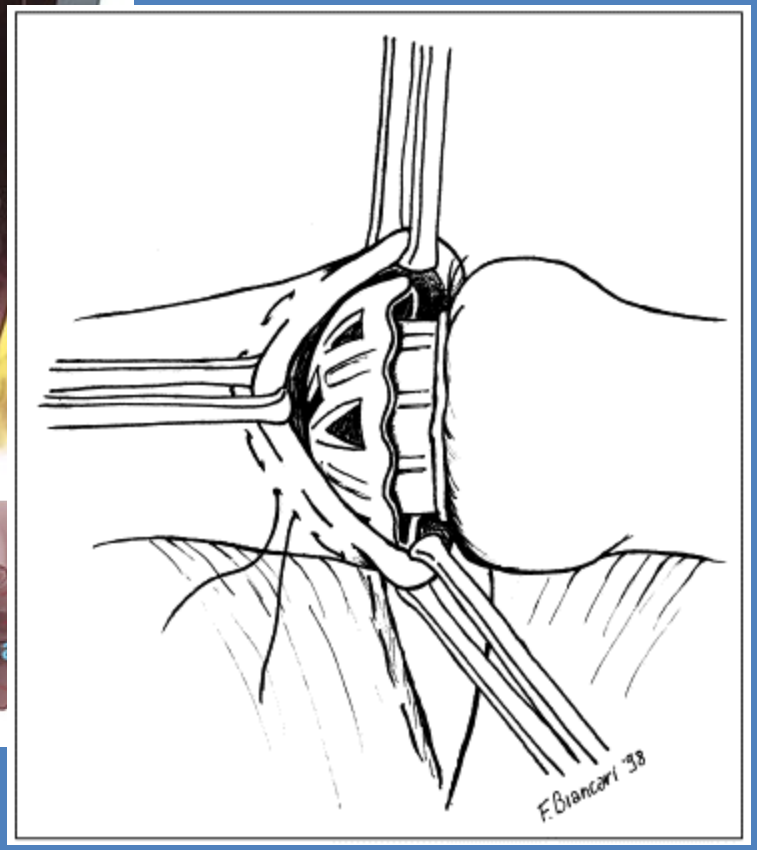
- Chance of stenosis.

Advantages of stapled anastomosis

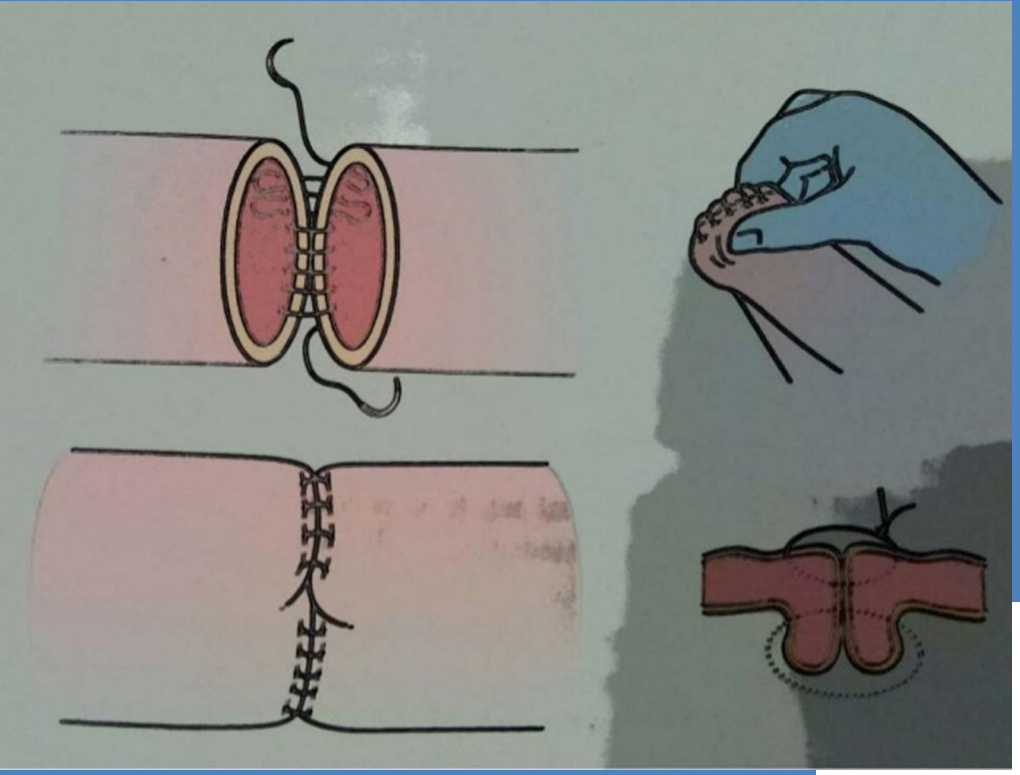
- Minimal inflammation.
- Support in lag phase(weakest phase).
- Shorten operative time.
- Staple line recurrance is less (suture provides < pronounced cellular proliferation).
- Heals by primary intention.





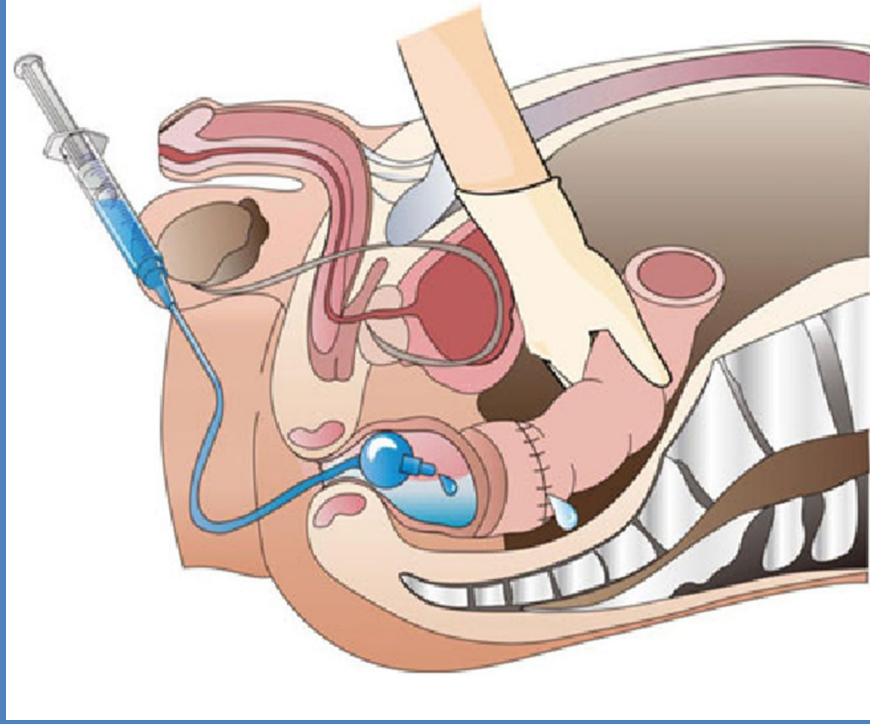


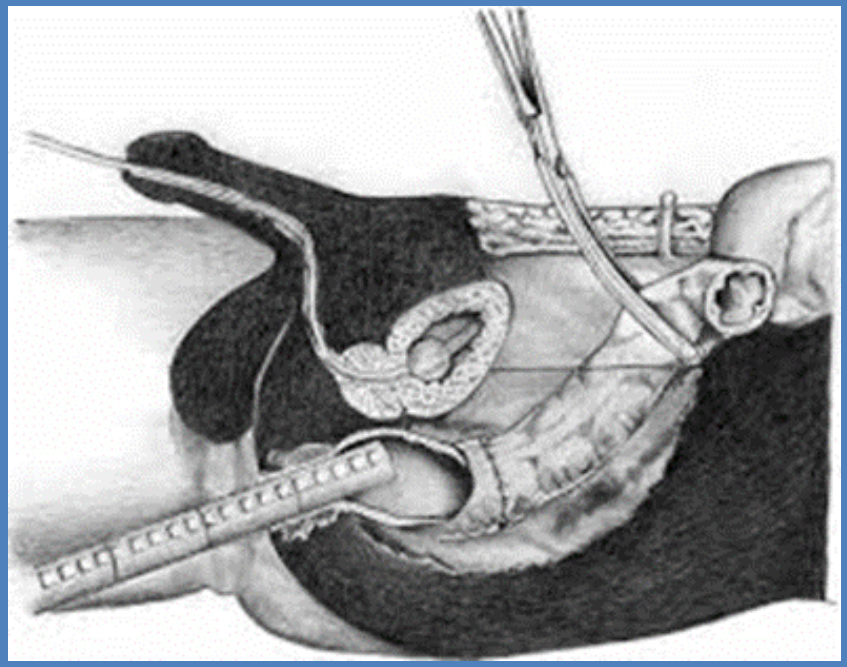
Intestinal anastomosis with the biofragmentable anastomosis ring



Patency test

Leak test





Drain tube?

Collection around the anastomosis-

- Impair healing.
- Leads to leakage.

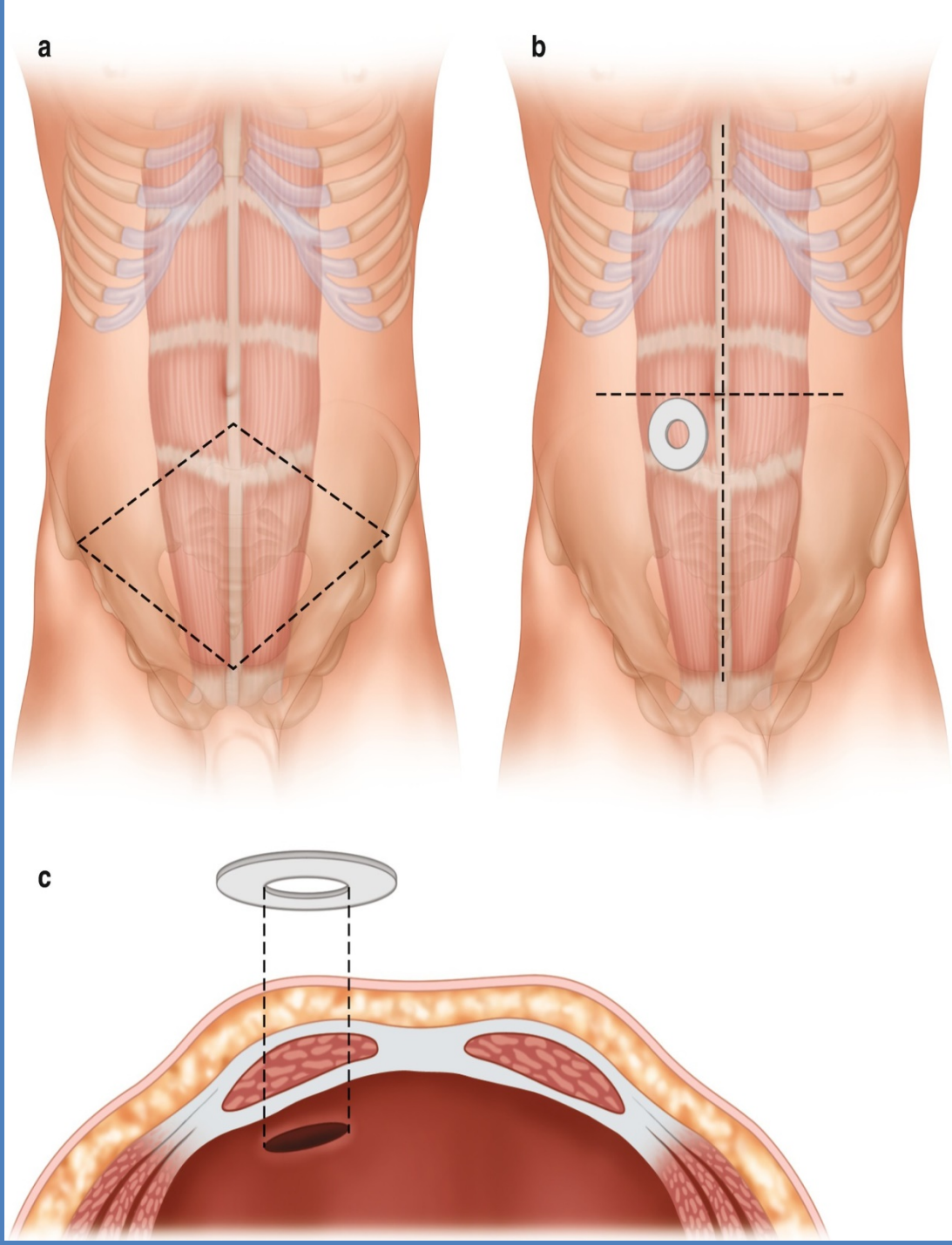
Drain causes inflammation around anastomosis.

Indications of stoma

- Anastomosis below pertoneal reflection
- Obstruction
- Perforation
- Immunosupression
- Comorbidities
- Haemodynamic instability
- Peroperative severe blood loss
- Hypoalbuminemia-< 2.1 gm/dl
- Sepsis
- Long time steroid
- ……..

Stoma triangle-

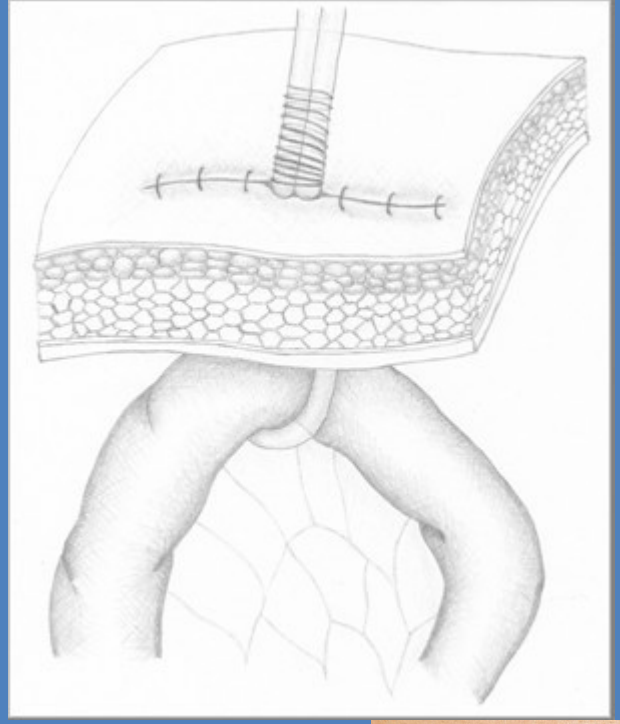
- Anterior superior iliac spine.
- Pubic tubercle.
- Umbilicus.



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?

Post operative complications

Early-

- Bleeding.
- Anastomtic leakage.
- Intraabdominal sepsis.
- Wound infection.
- Prolonged ileus.

Late-

- Stricture.
- Obstruction.

Anastomotic leakage
Predisposing factors

General factors-

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

Local factors-

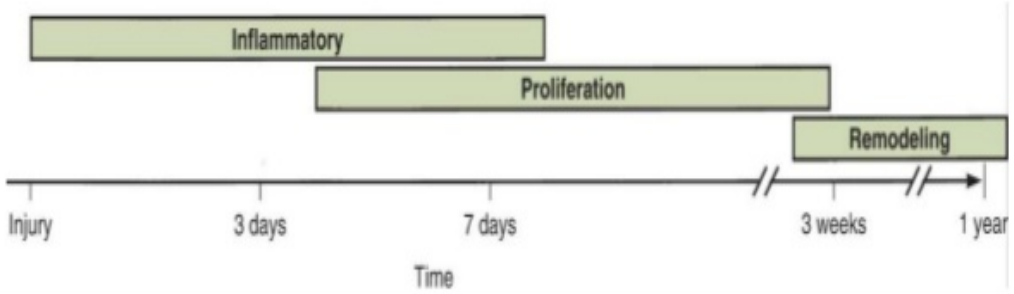
- Tension.
- Inadequate vascular supply.
- Poor surgical technique-
  - unprepared bowel ends.
  - handling of tissues,
  - excessive use of diathermy,
  - insertion and ligation of sutures,
  - contamination of anastomotic site.

Healing of anastomosis

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

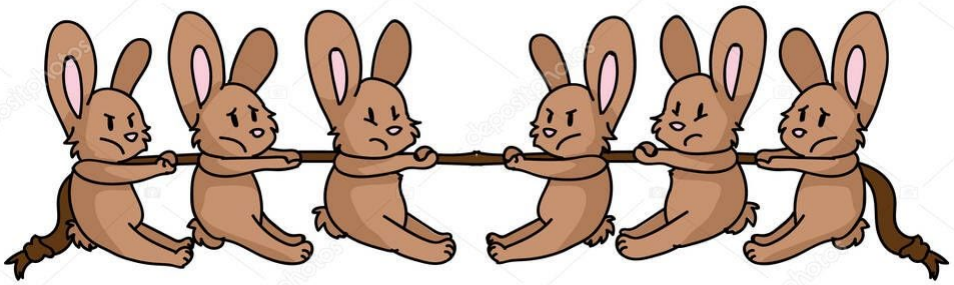
Intestinal healing

- 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.



Timings of leak

- 3-45 days postop.
- 2 peaks-
    - Clinically the median is 7 days postop.
    - Radiologically the median is 16 days postop.
    - Early -1st 2 days following surgery-mechanical/ tissue causes.
    - Ischaemic- 5-7 days.
- 12% diagnosed >30 days after operation.

Anastomotic leakage

If equivocal sign "Leak Until Proven Otherwise" post op day 1-14.

Presentation-

- Unexplained fever.
- Sustained tachycardia.
- Prolonged ileus.
- Sudden collapse postoperatively or
- Development of an internal fistula.

- GI contents may be identified in the wound or at a drain site.

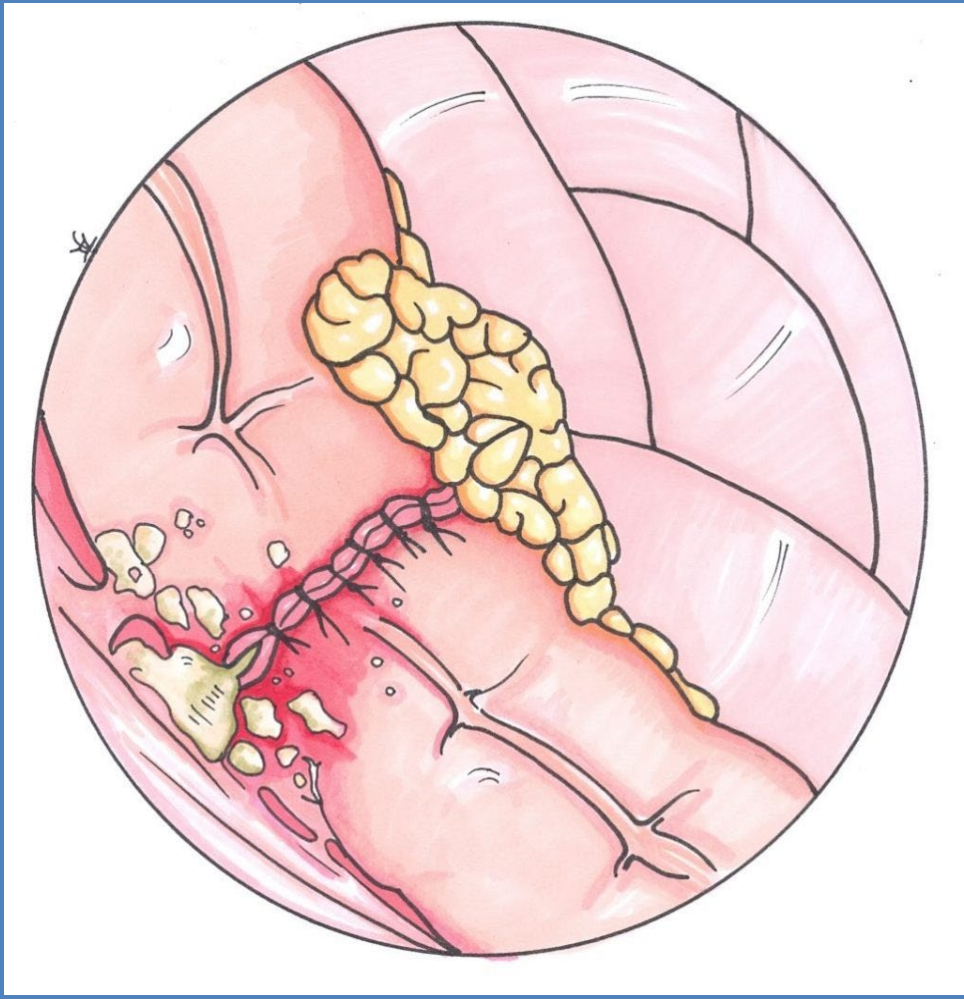
- An intraabdominal abscess or more serious septic complication may develop.

Presentation

- Fever.
- Peritonitis.
- Discharge from wound, drain, vagina, anus.
- Leukocytosis.
- C-RP.
- Procalcitonin.
- Confirmation-
    - can be done by performing X-ray using contrast medium- Gastrograffin.
    - Contrast CT.

Grading of anastomotic leakage

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

www.Ferdauscolorectalcare.info