COLONOSCOPY AND POLYPECTOMY

DIPENDRA PARAJULI

Indications for Colonoscopy

Screening and Surveillance

Average / High risk
Polyp and cancer followup

Diagnostic

Unexplained GI symptoms and signs
Unexplained rectal bleeding
IBD
Stricture or colonic narrowing
Infectious/radiation/ischemic colitis
Endometriosis
Diarrhea
etc…

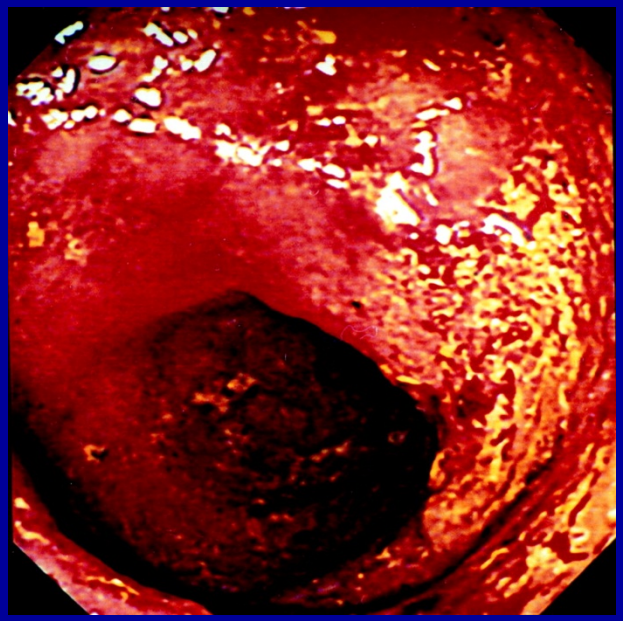
Therapeutic

Therapeutic polypectomy
Foreign body removal
Beeding site localization
Hemostasis
Tumor resection
Colonic decompression
etc…

Contraindications to Colonoscopy

"know when not to do equally as well as when to do"

- toxic, fulminant colitis
  (any bad looking colitis - flex sig is OK)
- acute diverticulitis



Contraindications to Colonoscopy

- perforation of abdominal viscus

  (insufflation of the colon with air may worsen fecal contamination in the peritoneal cavity)
- severe coagulopathy
- acute or recent myocardial infarction (relative)
- patient refusal / uncooperation

High risk situations

(not necessarily contraindications)

- uncontrolled lower GI bleeding
- recent colon surgery
- multiple abdominal and pelvic surgeries in the past, with adhesions
- severe COPD or CAD
- pregnancy in second or third trimester

Complications

Perforation:

estimated - 0.1% to 0.3%

may be recognized immediately or delayed for days.

Instrument tip or shaft perforations

- mechanical trauma from the instrument tip/shaft
- weakened colons (ischemia, diverticula, colitis),
- when the colon is "tacked down" (previous pelvic surgery, tumor, adhesions)
- obstructive lesion

(Gastrointestinal Endoscopy 2011;74: 745-752)

Noninstrumental

- aggressive insufflation with air (serosal tears). (Barotrauma)

Polypectomy

- direct luminal laceration
- delayed sloughing of necrotic bowel following thermal coagulation.

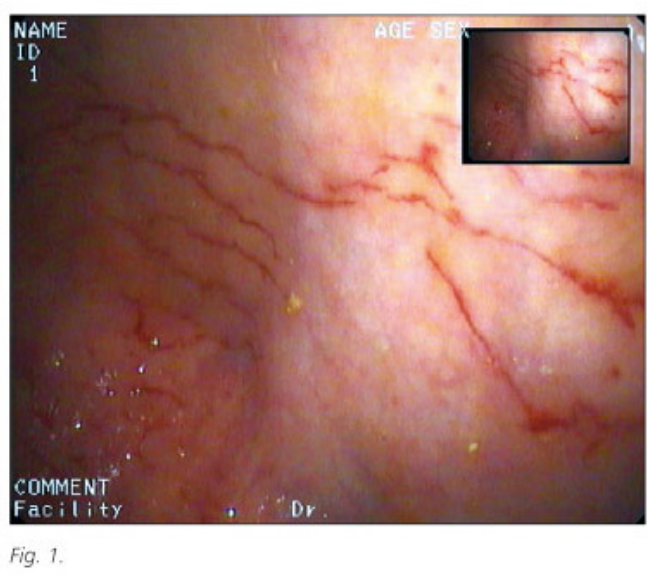
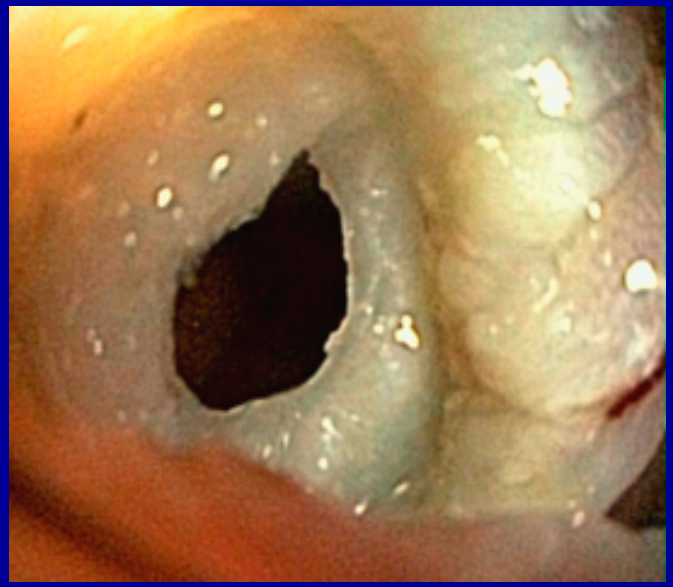


Fig. 1.



“Postpolypectomy (coagulation) syndrome"

- Fever
- Evidence of peritoneal irritation (rebound tenderness) and,
- Leukocytosis

NO Radiographic evidence of perforation or free air

Patients recover without surgery.

Management

- NPO/Clears
- ABX

Hemorrhage:

diagnostic colonoscopy – 0.2% to 0.37%

polypectomy - 0.87%

(immediate or delayed – upto 2 wks)

Cardiopulmonary:

Hypoxia, vasovagal reactions

(Gastrointestinal Endoscopy 2011;74: 745-752)

- **Miscellaneous complications:**
- **electrolyte abnormalities**
- **explosion of combustible gases in the colon**
- **splenic laceration**
- **transient EKG changes**
- **dehydration**
- **volvulus**

Serious Complications Within 30 Days of Screening and Surveillance Colonoscopy Are Uncommon

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gistic regression analyses. **RESULTS:** We enrolled 21,375 patients. Gastrointestinal bleeding requiring hospitalization occurred in 34 patients (incidence 1.59/1000 exams; 95% confidence interval [CI], 1.10–2.22). Perforations occurred in 4 patients (0.19/1000 exams; 95% CI, 0.05–0.48), diverticulitis requiring hospitalization in 5 patients (0.23/1000 exams; 95% CI, 0.08–0.54), and postpolypectomy syndrome in 2 patients (0.09/1000 exams; 95% CI, 0.02–0.30). The overall incidence of complications directly related to colonoscopy was 2.01 per 1000 exams (95% CI, 1.46–2.71). Two of the 4 perforations occurred

CLINICAL GASTROENTEROLOGY AND HEPATOLOGY 2010;8:166–173

Explosion of hydrogen gas in the colon during proctosigmoidoscopy

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Michael Levy, MD
Michael D. Levitt, MD
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Minneapolis, Minnesota

CASE REPORT A 71 year old man was referred for proctosigmoidoscopy as part of an evaluation of vague abdominal discomfort of several years' duration. The procedure was performed 2 hours after his noon meal, and he was prepared with a single sodium phosphate enema which resulted in thorough cleansing of the rectosigmoid area. With the patient in the flexed prone position, the proctosigmoidoscope was easily passed to 20 cm without use of air insufflation or suction. On withdrawing the instrument, a 4 mm sessile polyp was noted at 18 cm which we elected to fulgurate using a standard blunt cautery electrode. With the cautery tip in contact with the lesion, the cautery machine was activated and there was an immediate, loud explosion. The patient's head and chest were pushed into the cushion of the examining table, and the examiner and assistant were thrown backward by the concussion. The patient felt no pain, and looking backward at the examiner who was standing with his arms raised in the air, he exclaimed, "You know, a doctor could get hurt doing that!"

Quality colonoscopy

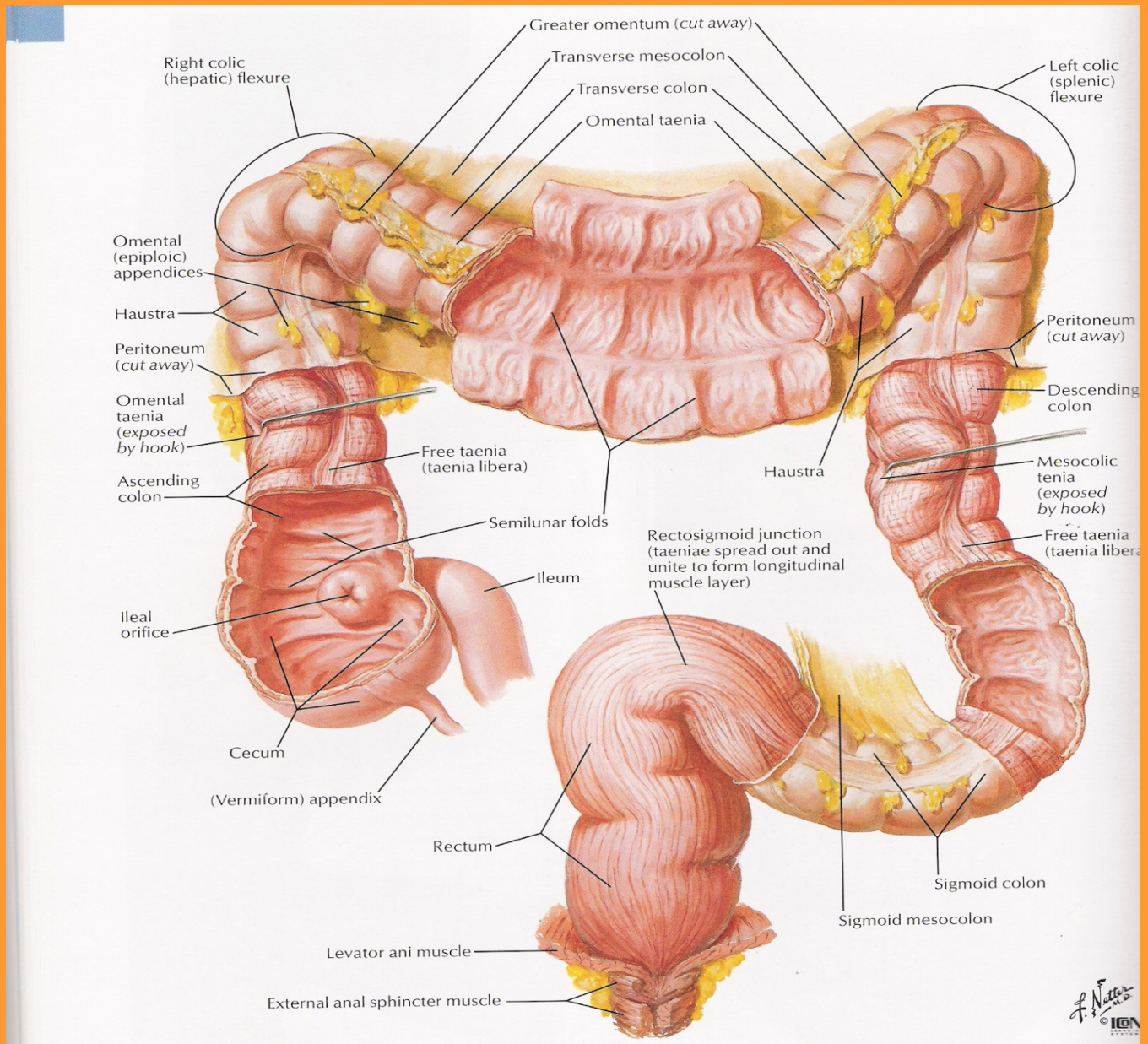
SAFE

- Gentle technique
- Recognize pain as a warning sign
- Recognize that total colonoscopy may not always be possible – STOP!
  Consider alternatives
  – Barium Enema / CT colonography

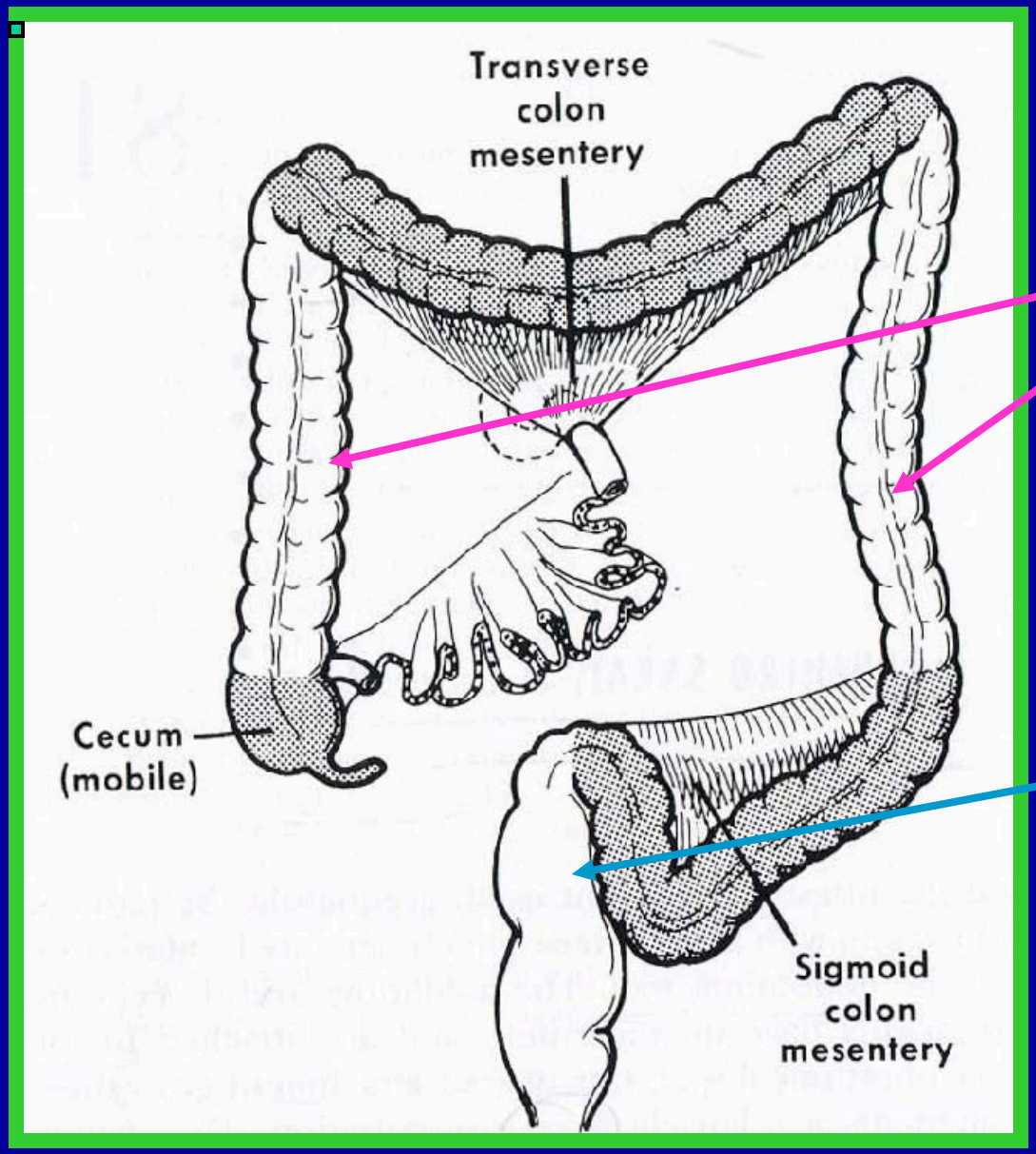
COMPLETE – Appendiceal Orifice, ICV +/- TI

GOOD PREP

ADEQUATE WITHDRAWAL TIME


Greater omentum (cut away)
Transverse mesocolon
Transverse colon
Omental taenia
Right colic (hepatic) flexure
Left colic (splenic) flexure
Omental (epiploic) appendices
Haustra
Peritoneum (cut away)
Omental taenia (exposed by hook)
Free taenia (taenia libera)
Ascending colon
Semilunar folds
Ileum
Ileal orifice
Cecum
(Vermiform) appendix
Haustra
Peritoneum (cut away)
Descending colon
Mesocolic tenia (exposed by hook)
Free taenia (taenia libera)
Rectosigmoid junction (taeniae spread out and unite to form longitudinal muscle layer)
Rectum
Sigmoid colon
Sigmoid mesocolon
Levator ani muscle
External anal sphincter muscle

Predictable Areas of Loop Formation



Areas at risk for Loops

Retroperitoneal

Areas Below Peritoneal Space

Technique of colonoscopy

Positioning

Technique of colonoscopy

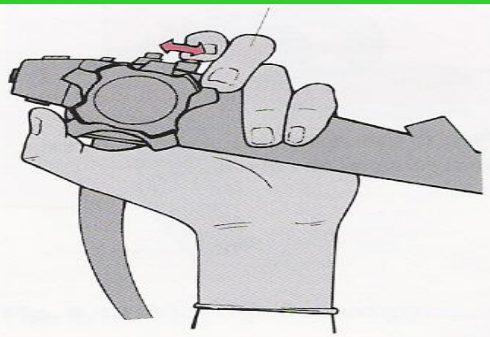


Fig. 6.17 Single-handed control: the forefinger alone activates the air/water and suction valves; the middle finger acts as 'helper' to the thumb for angulation.

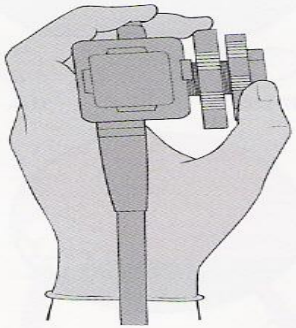


Fig. 6.18 The thumb can reach the lateral angulation control if the hand is positioned appropriately.

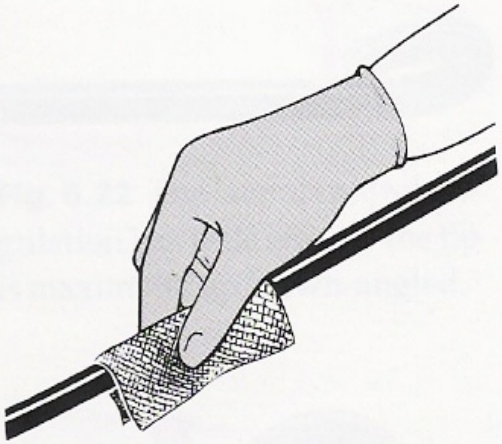
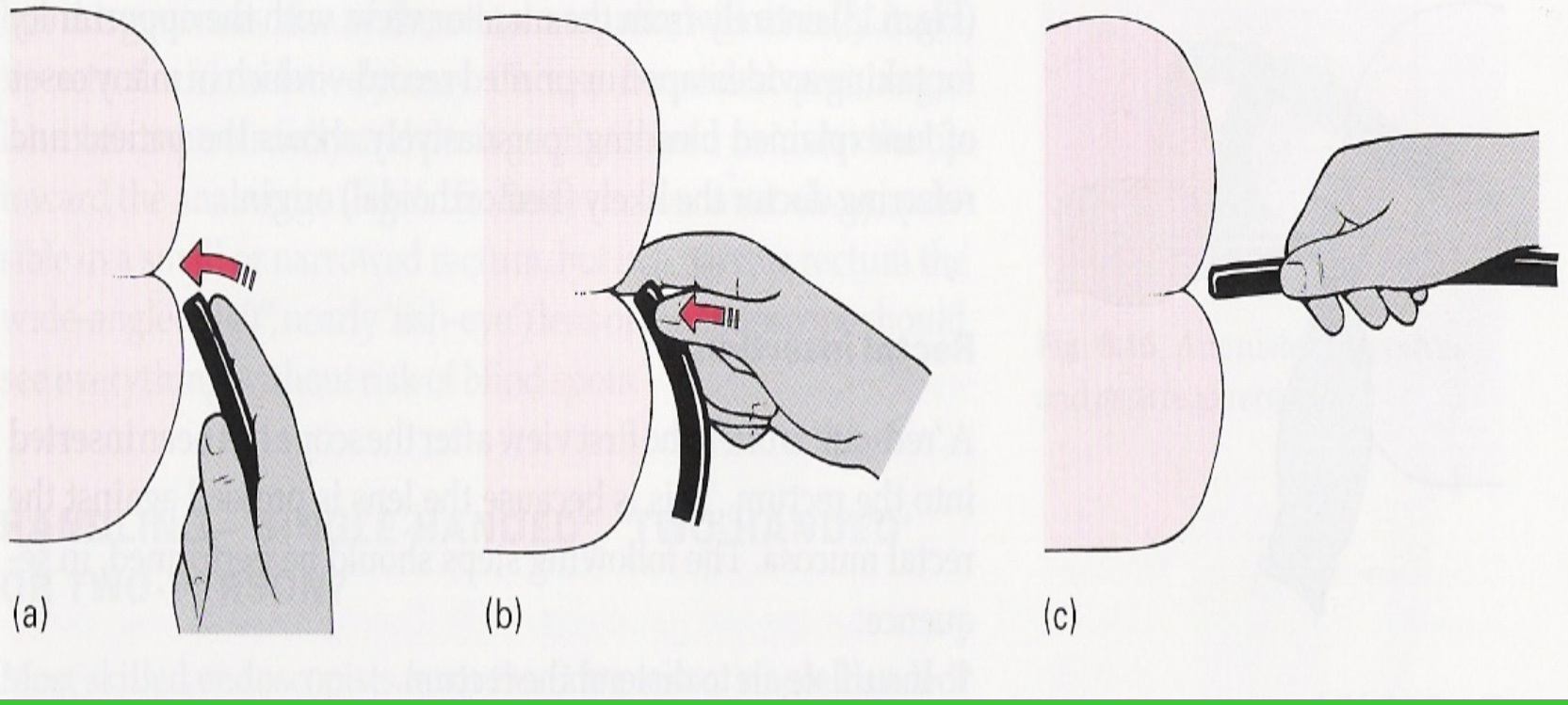
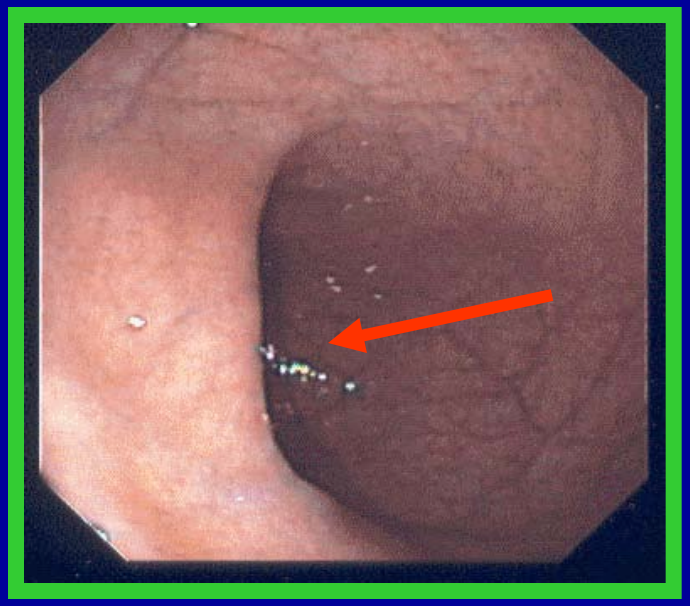


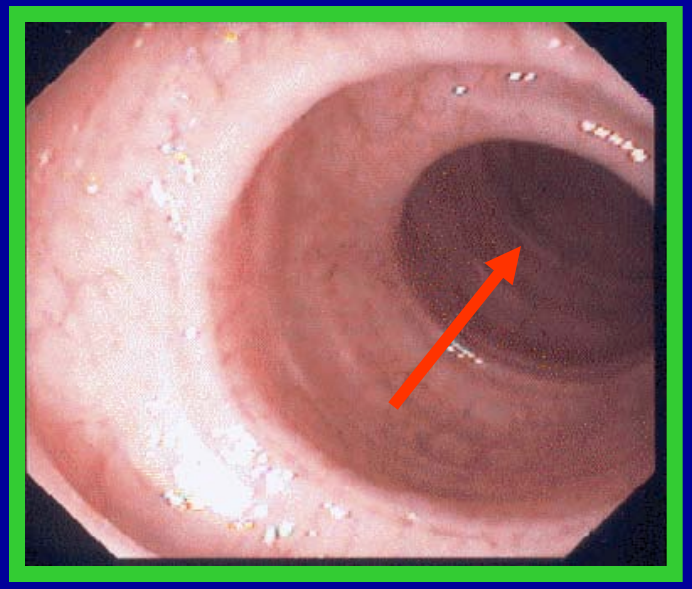
Fig. 6.19 The instrument shaft should be held delicately between the thumb and fingers.

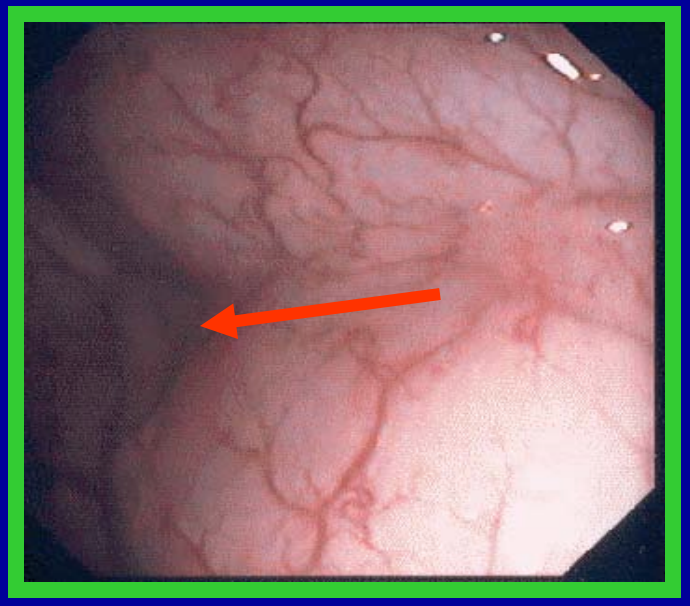
Anal Intubation



Where is the lumen?







Where is the lumen?

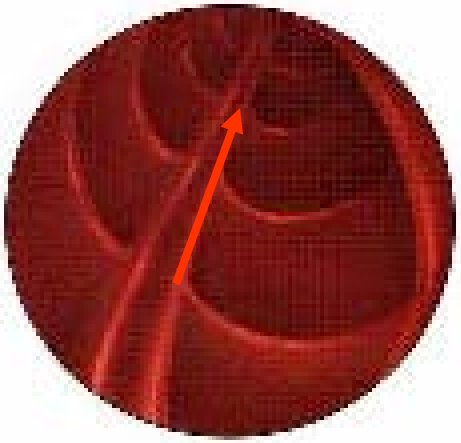
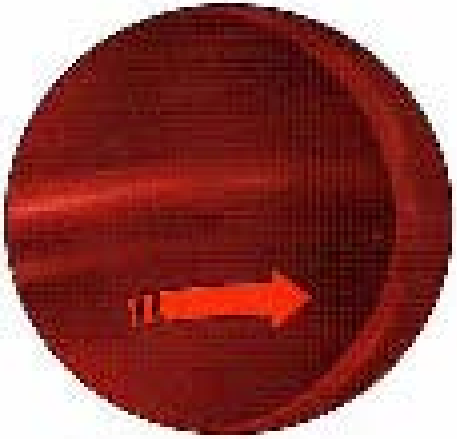
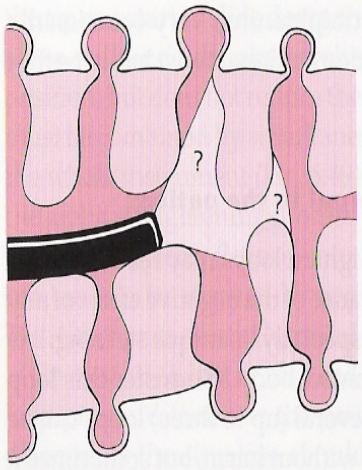
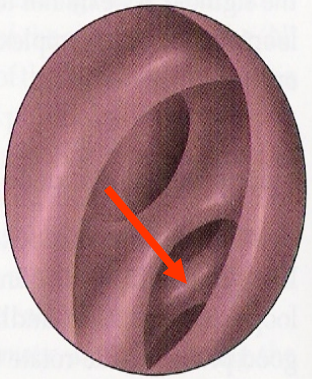


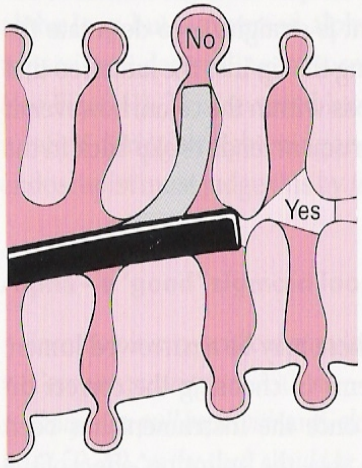
Fig. 9.73 The longitudinal bulge of a taenia coli shows the axis of [illegible].



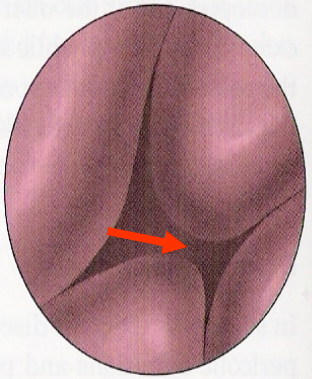


(a)





(b)



Basic movements in scope advancement

- Push / Pull
- Right / Left turn with knobs
- Torque- Right / Left
- Suck air

Additional Help

- Patient positioning
- External pressure

Torque

Works best when shaft is straight

Clockwise torque stiffens shaft

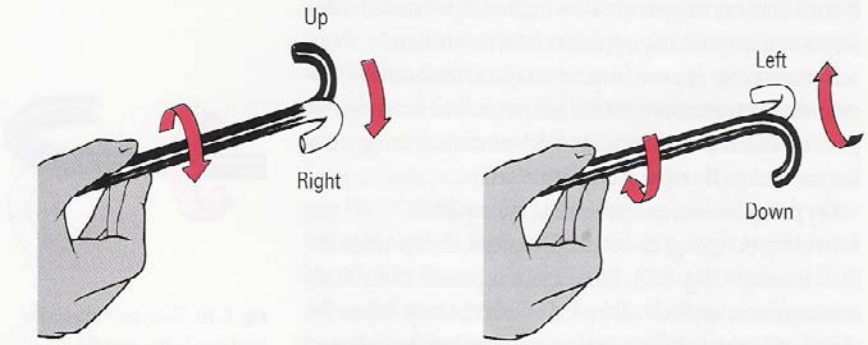


Fig. 6.21 With a clockwise shaft twist: (a) an up-angled tip moves to the right ... (b)... and a down-angled tip moves to the left.

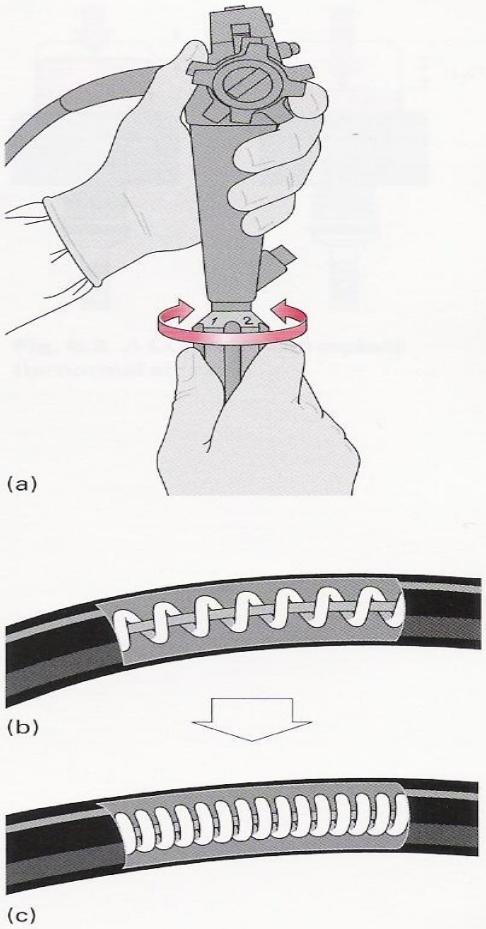


Fig. 6.2 (a) Variable-stiffness colonoscopes have a twist control on the shaft. (b) A pull-wire within an internal steel coil ... (c)... compresses the coil and stiffens it (and the scope).

Some suggestions…

- Stay relaxed
- Don’t just push
- Keep inflation to minimum (you will need some)
- Suck air often / Fluid infrequently
- Use all visual clues
- Steer slowly, carefully and cautiously
- Avoid “Red- Outs”

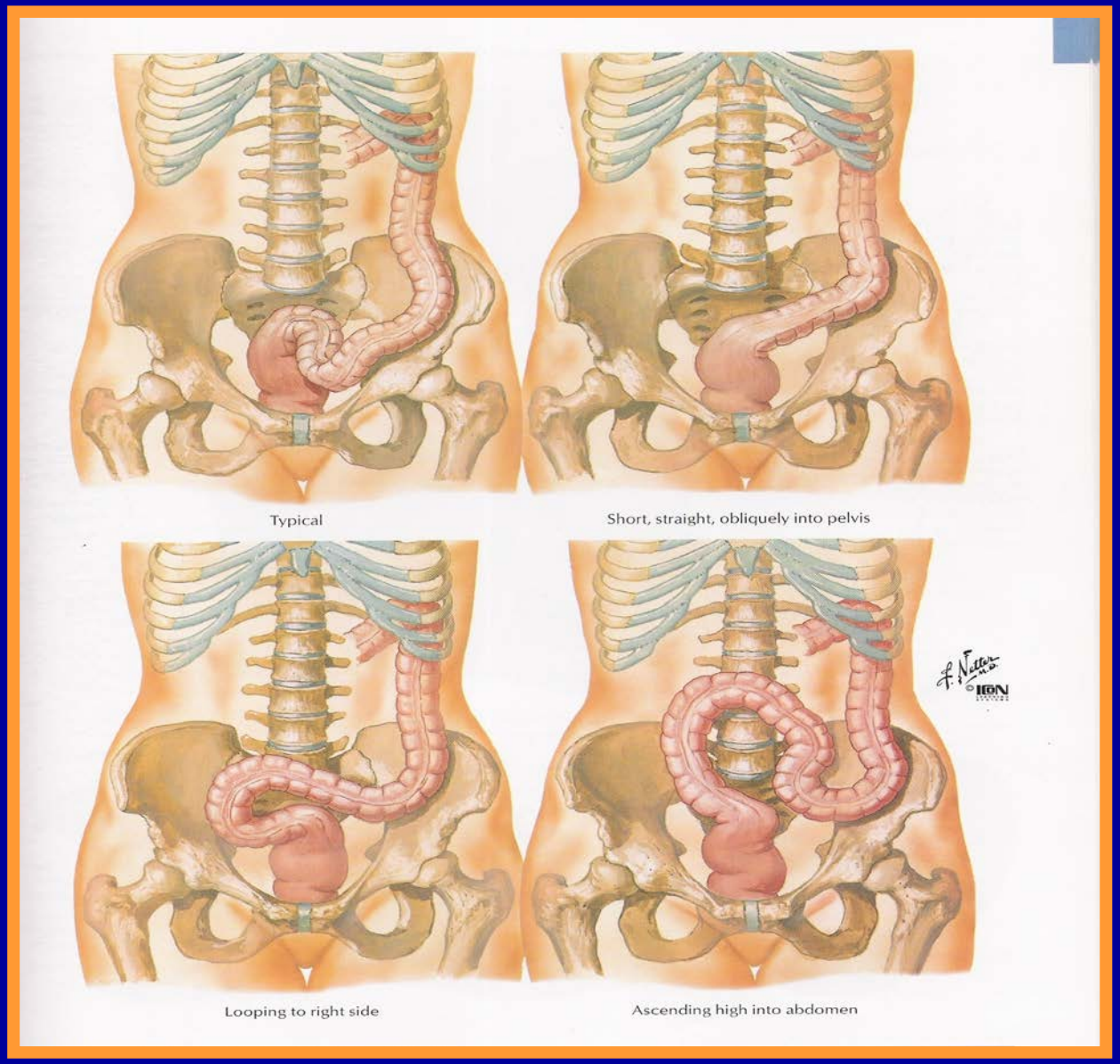
  Don’t hope and push if you have one- PULL OUT
- Try to keep the scope as straight as possible
- Think one step ahead
- Be careful using “slide by”

<u>Personally, Feel of the scope is very important</u>

Negotiating the rectosigmoid

Male

Obese female



Post-Op

Female

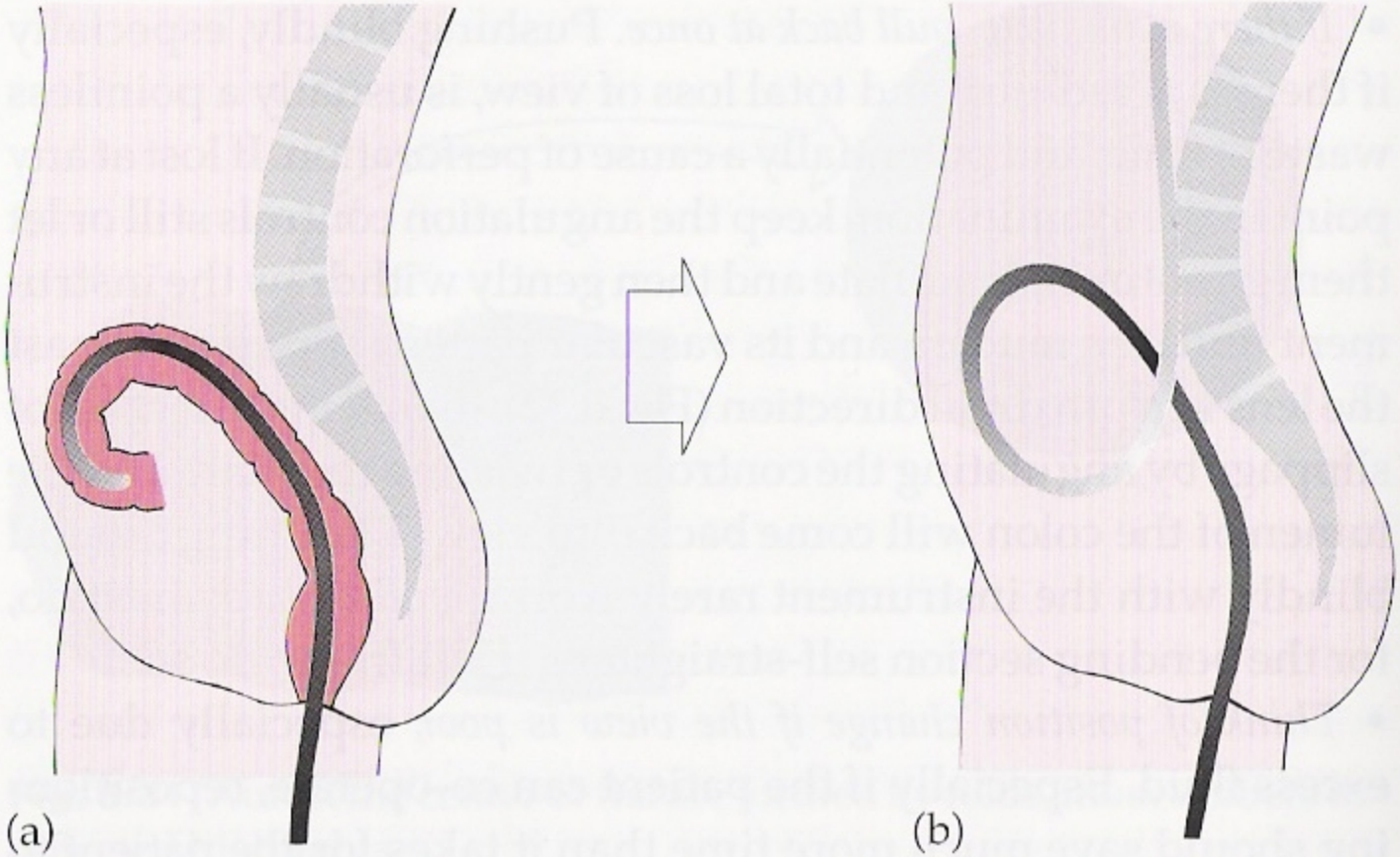


Fig. 6.34 (a) The sigmoid colon loops anteriorly … (b) … then passes up into the left paravertebral gutter.

Hairpin turns

Screaming Colonoscopy

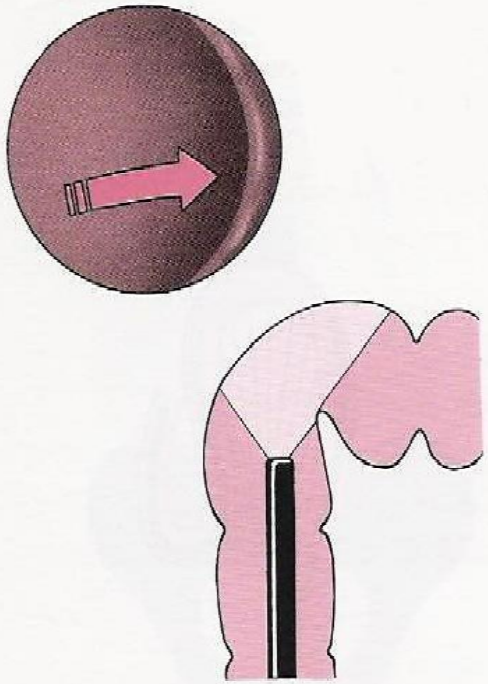


Fig. 6.42 Endoscopic view of an acute bend, with a bright fold on the angle, and the 'aerial' view.

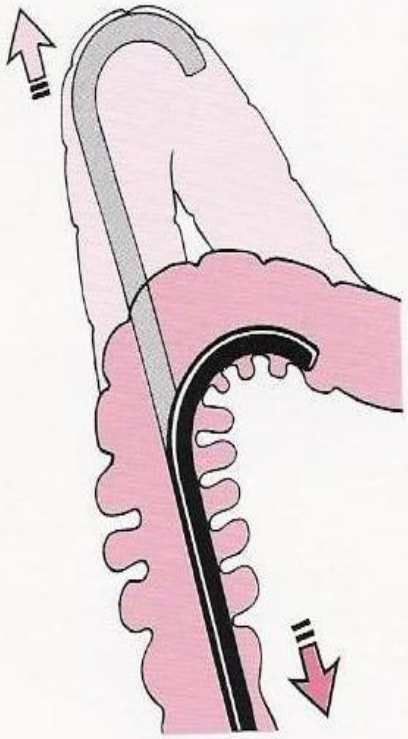


Fig. 6.43 Pulling back flattens out an acute bend and improves the view.

Then advance, using external pressure as needed.

If this does not work…….

Smaller Scope

- **Peds scope/ enteroscope**

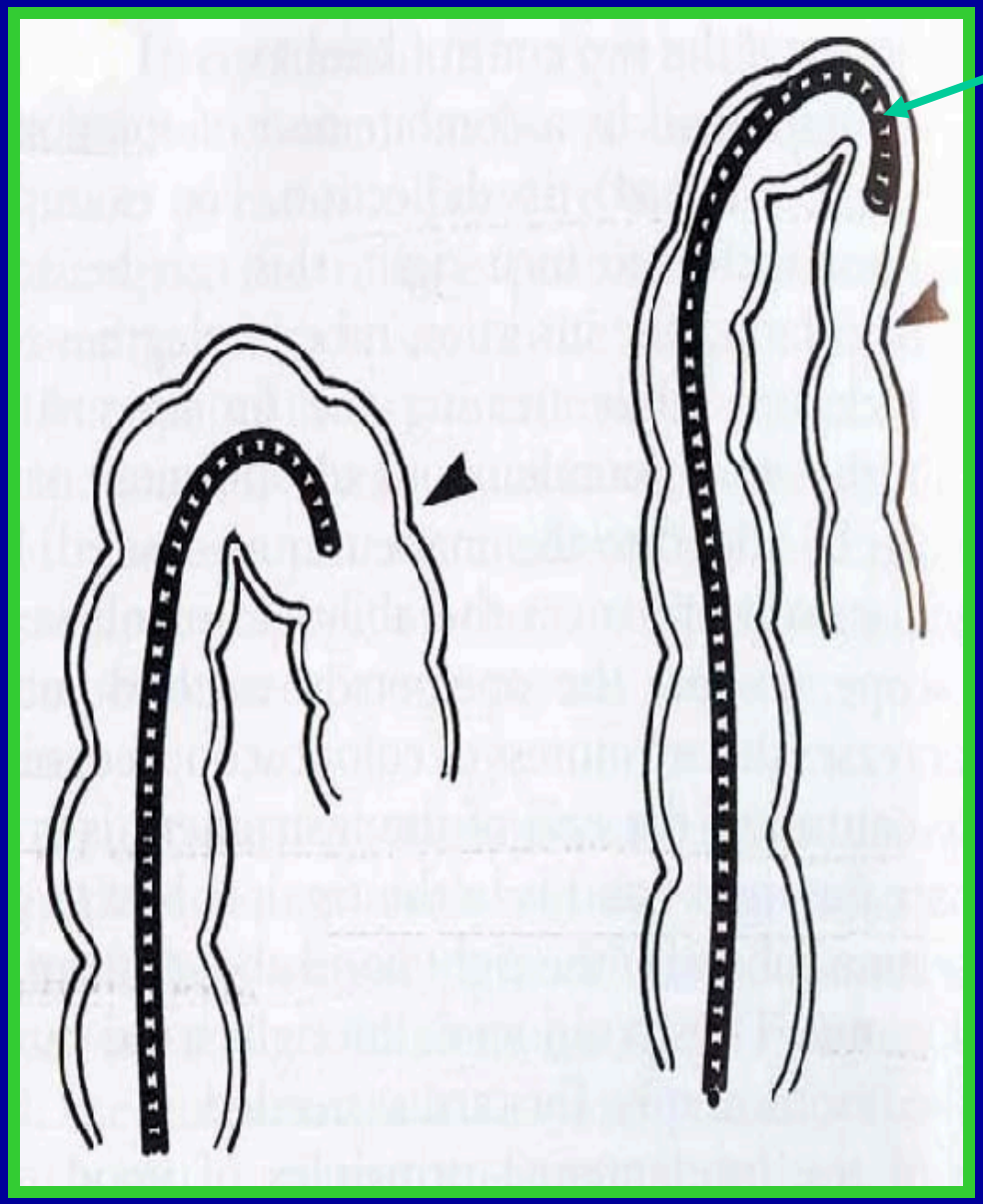
Position change

- **Supine/ Right lateral**

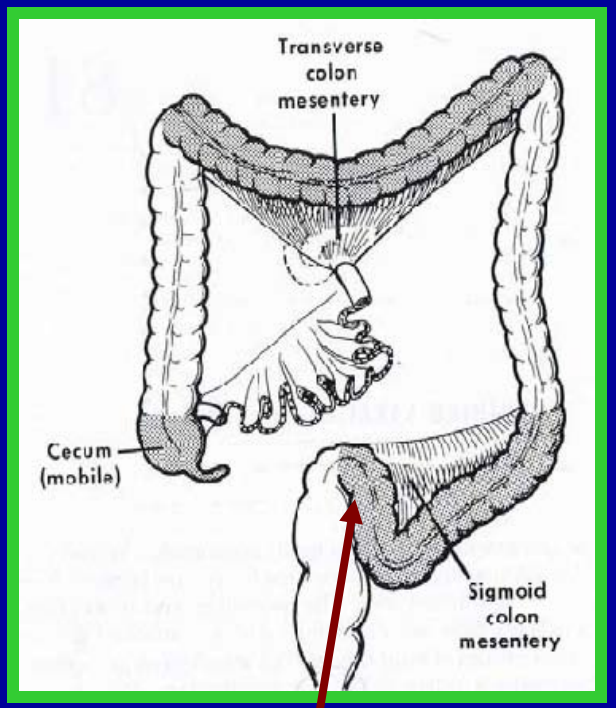
Water immersion

- **“Submarine” technique**

Walking Stick Handle Phenomenon



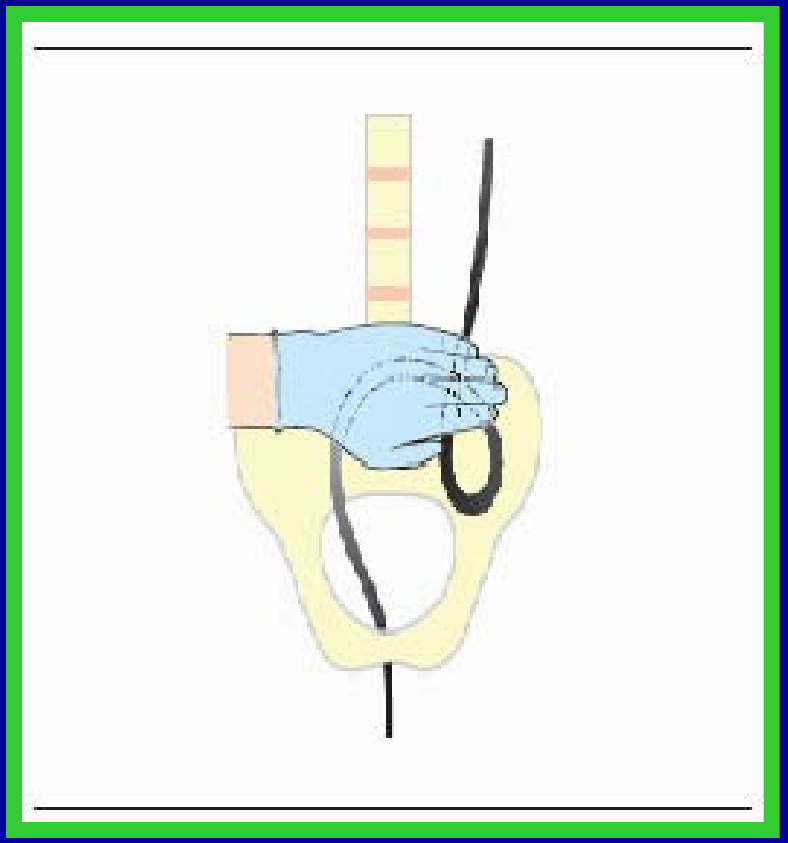
Over-angulation



Tendency to stretch the mesentery

Walking Stick Handle Phenomenon

Abdominal Pressure In Suprapubic Area + **Decrease angulation**



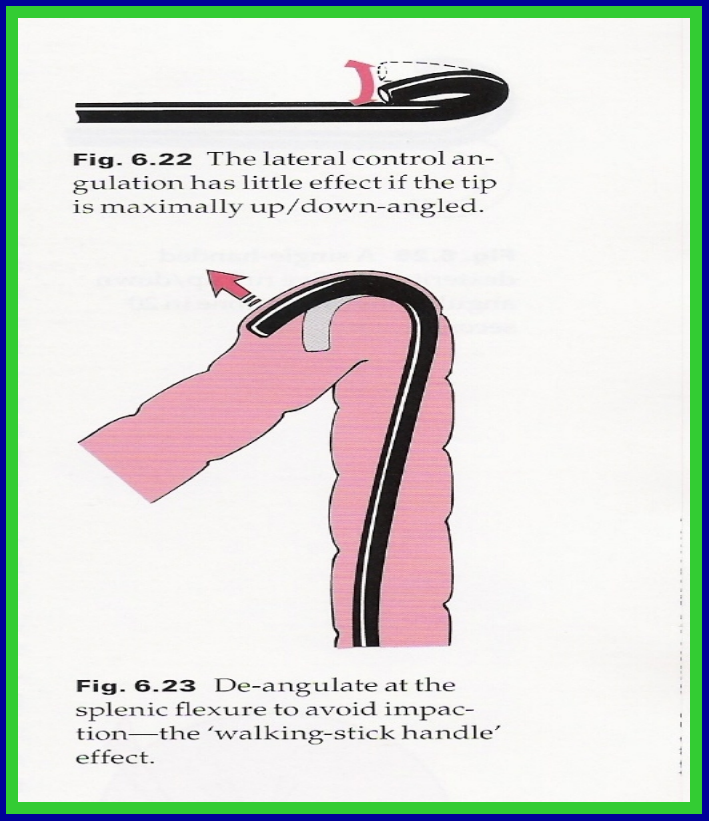
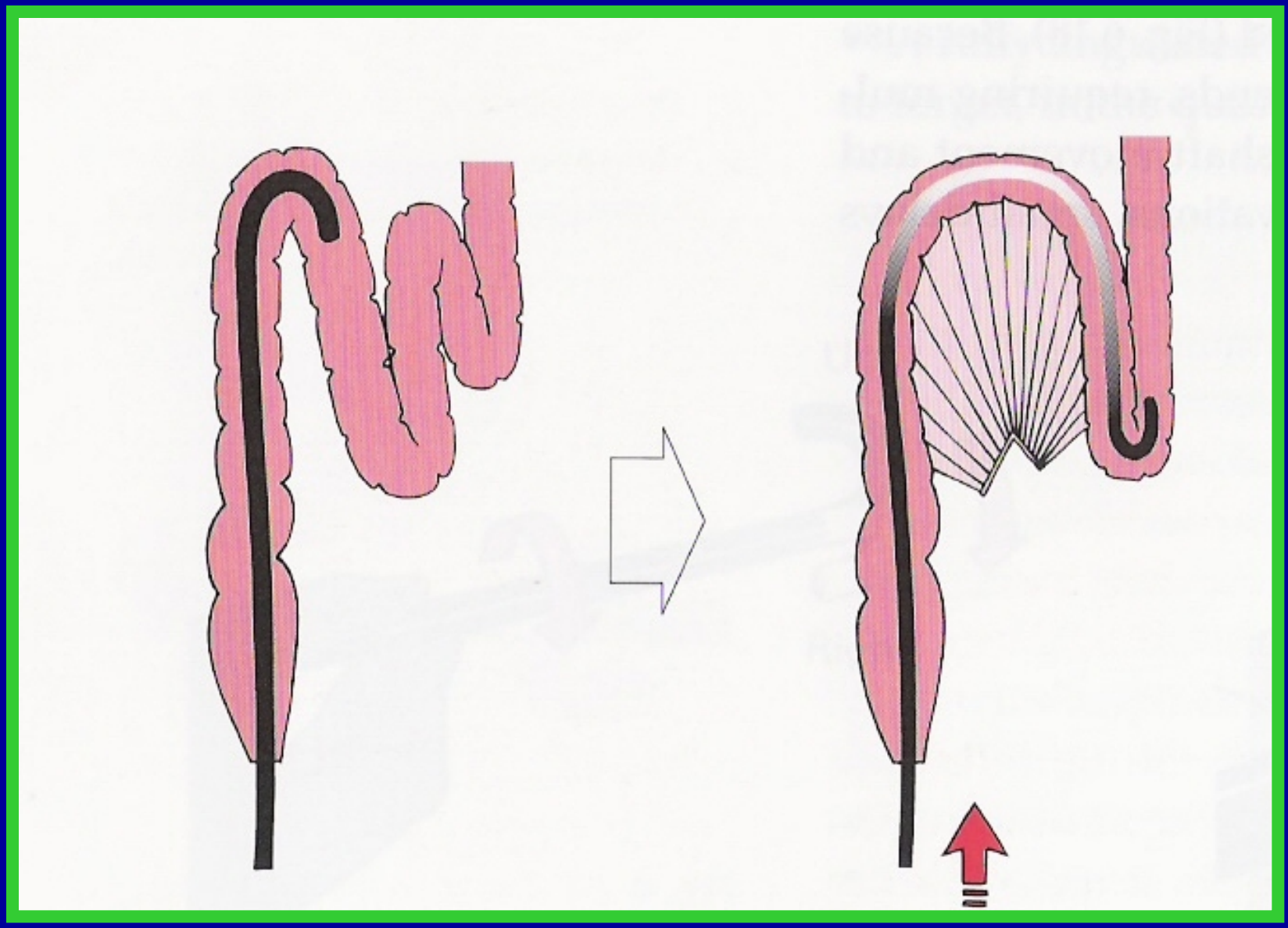


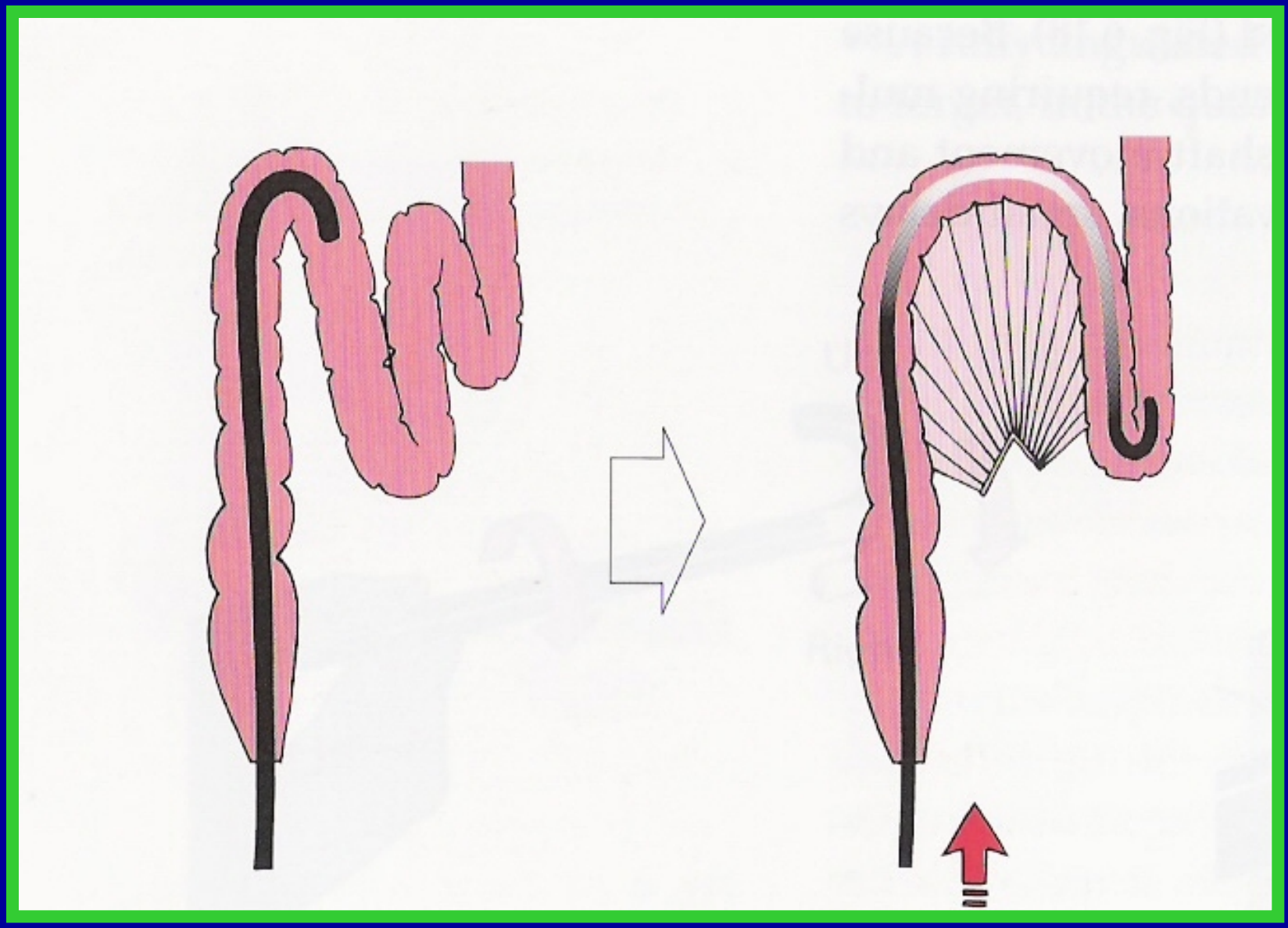
Fig. 6.22 The lateral control angulation has little effect if the tip is maximally up/down-angled.

Fig. 6.23 De-angulate at the splenic flexure to avoid impaction—the 'walking-stick handle' effect.

Colonic loops



Colonic loops



Pain/ Resistance on Colonoscopy

Loop in shaft

- **Causes pain**
- **Impedes further intubation**
  Push with a loop = bigger loop
- **Always tends to form**

There is only one way to remove a loop:

Pull back

Loop Reduction

- Pull

- Torque (Clockwise or Counter)

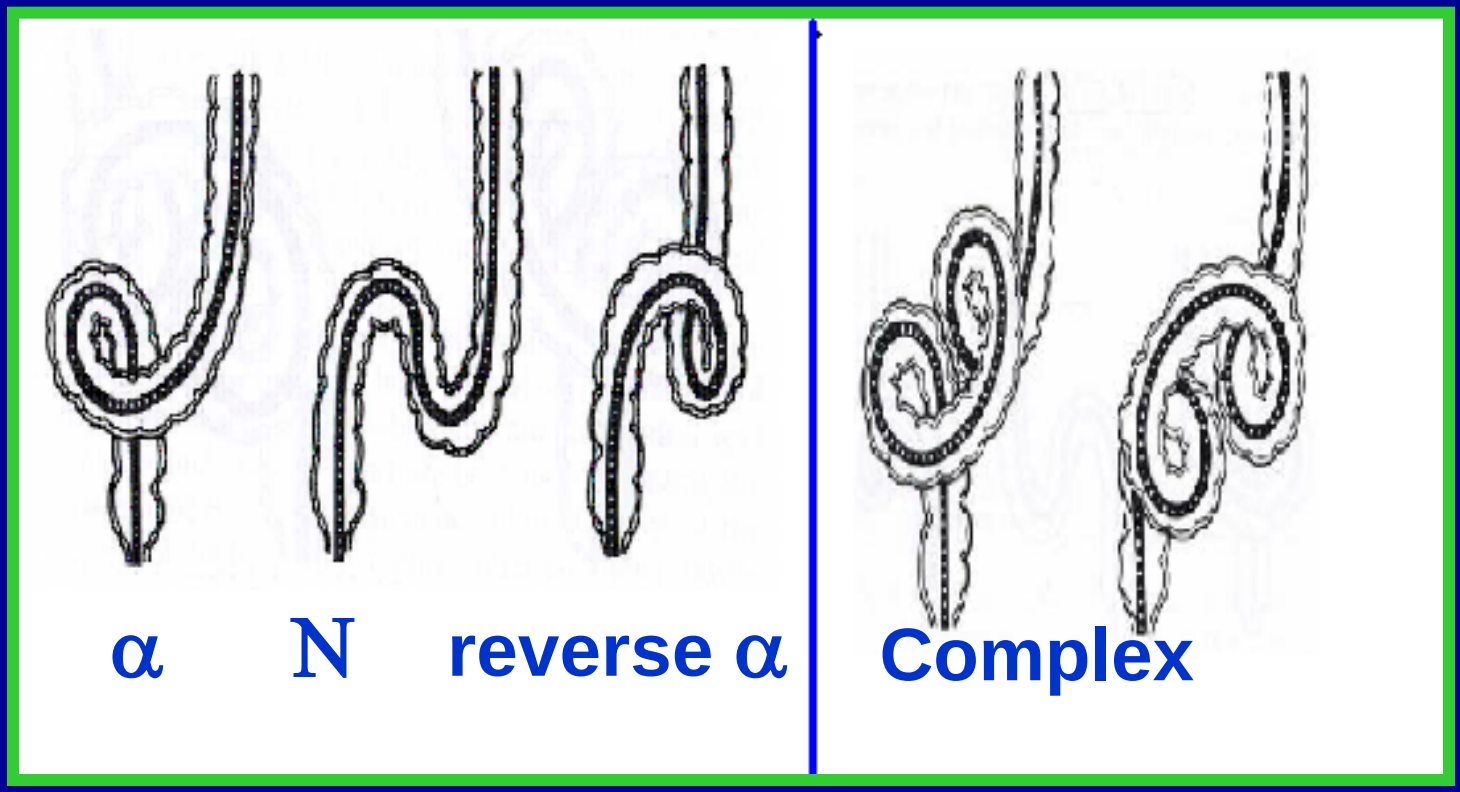
- Suck Air

Pulling Back the Shaft…

- Removes loops
- Changes vector forces from loop to straight
- Decreases patient discomfort
- Permits tip deflection when controls are maximally deflected and further deflection is desired
- Removes tip from contact with mucosa
- Pleats colon on shaft of scope

Dr. Marsano – “Pleat like an accordion”

Colonic Loops



Alpha Loop

A useful loop

No acute bends between the sigmoid and descending

Scope moves easily without any acute bends

Spontaneous in 10%

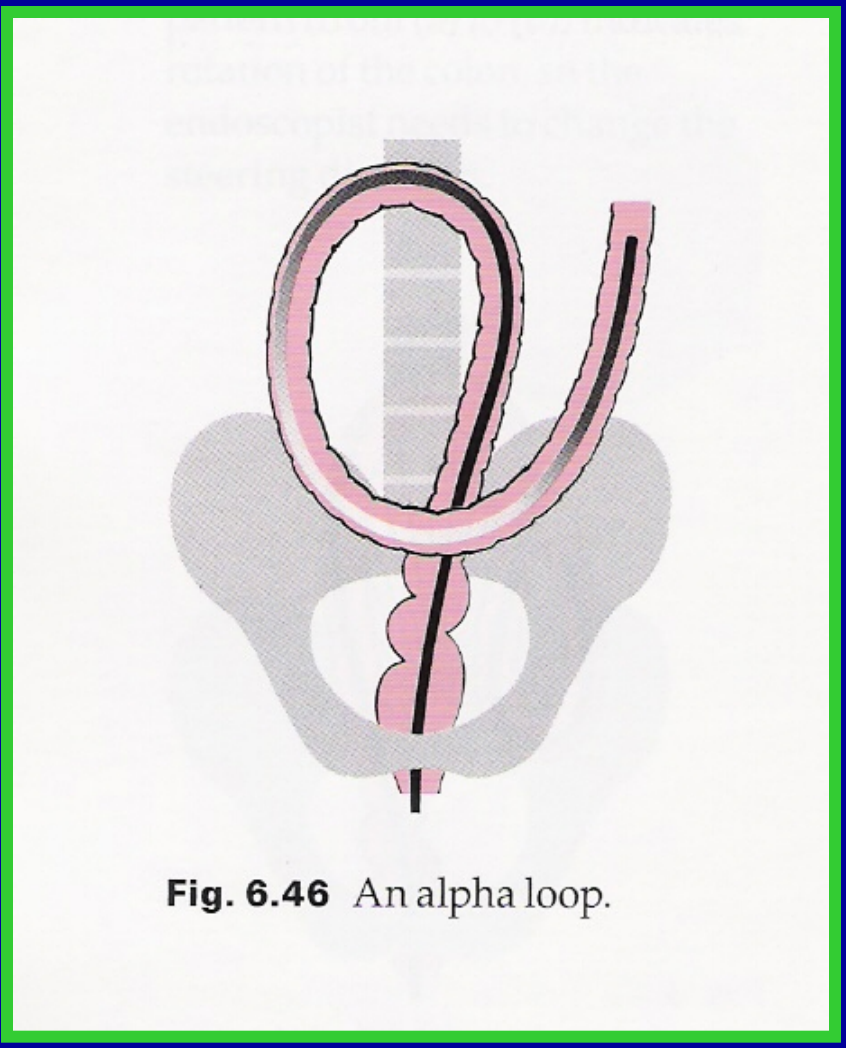


Fig. 6.46 An alpha loop.

Alpha Loop

Alpha Maneuver –Forming an alpha loop intentionally

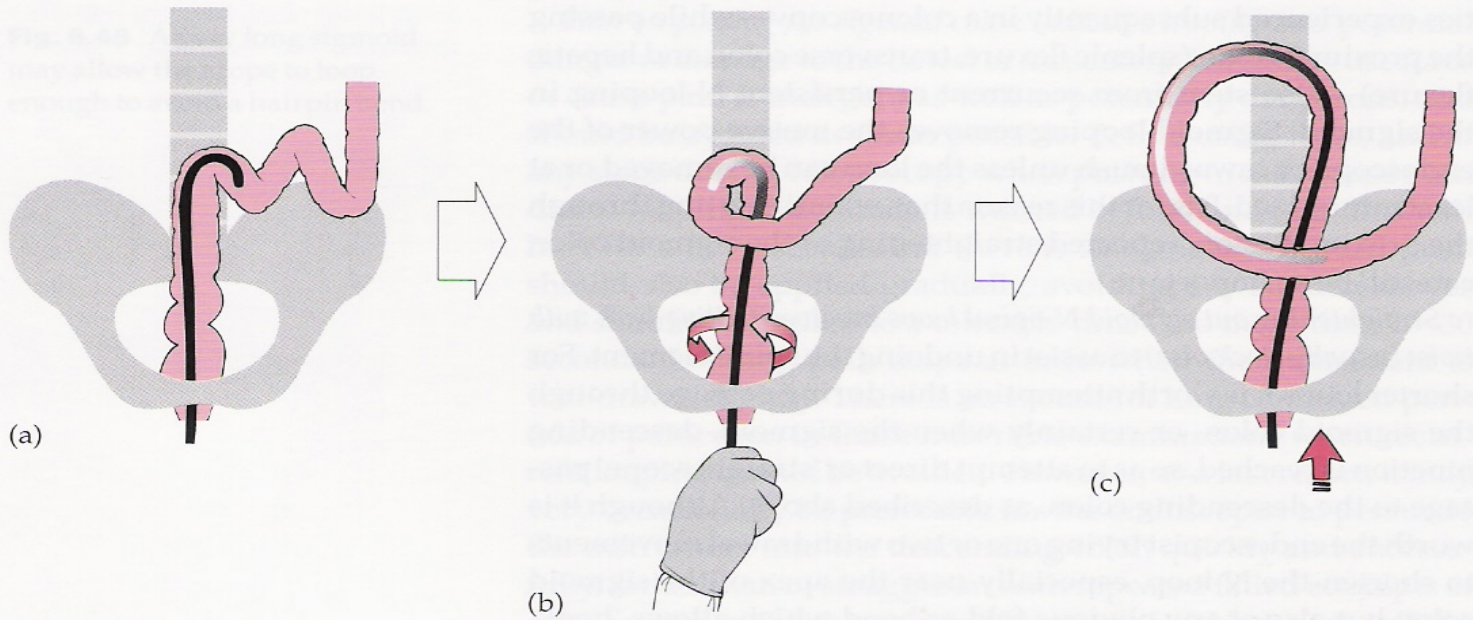


Fig. 6.47 (a) During sigmoid insertion … (b) … if the tip can be made to point to the caecum … (c) … rotate anti-clockwise and push in for the 'alpha' maneuver.

Reducing Alpha Loop

- Combined withdrawal and strong clockwise rotation
- Do not try to reduce too early-may result in N loop formation
- Optimal time- Proximal descending or Splenic flexure. Sometimes even upto distal transverse
- Scope distance ~90 cms

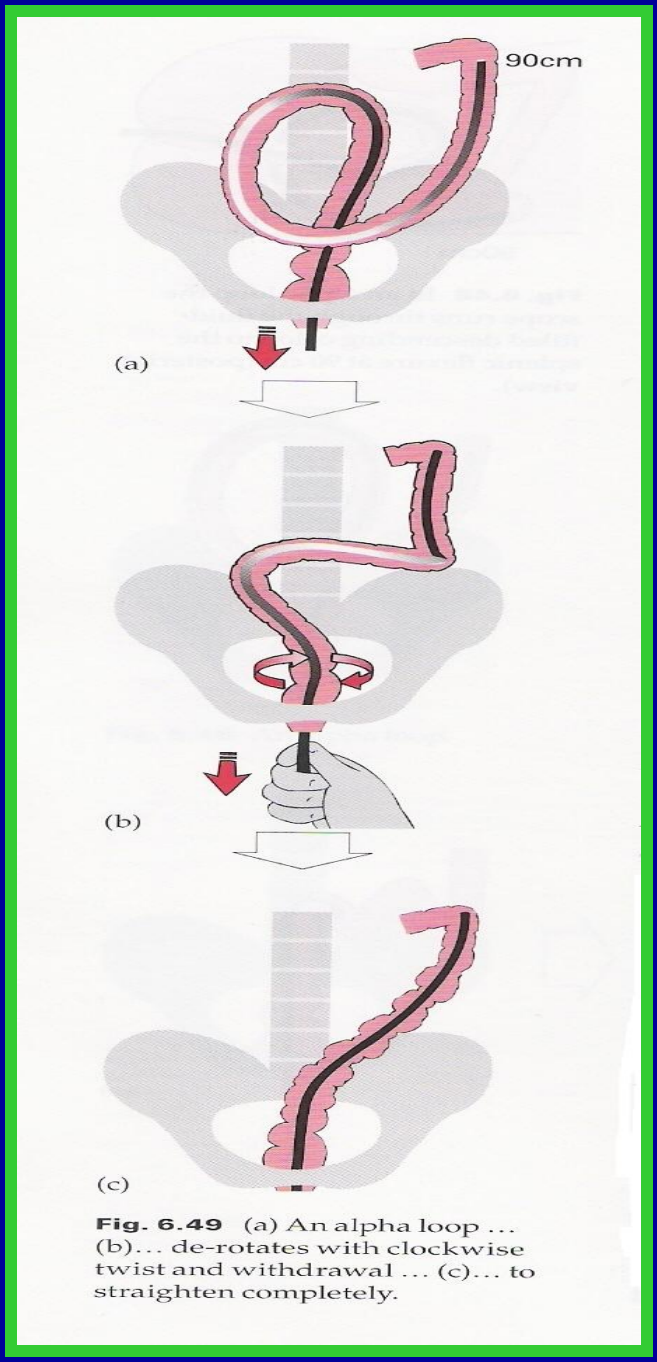
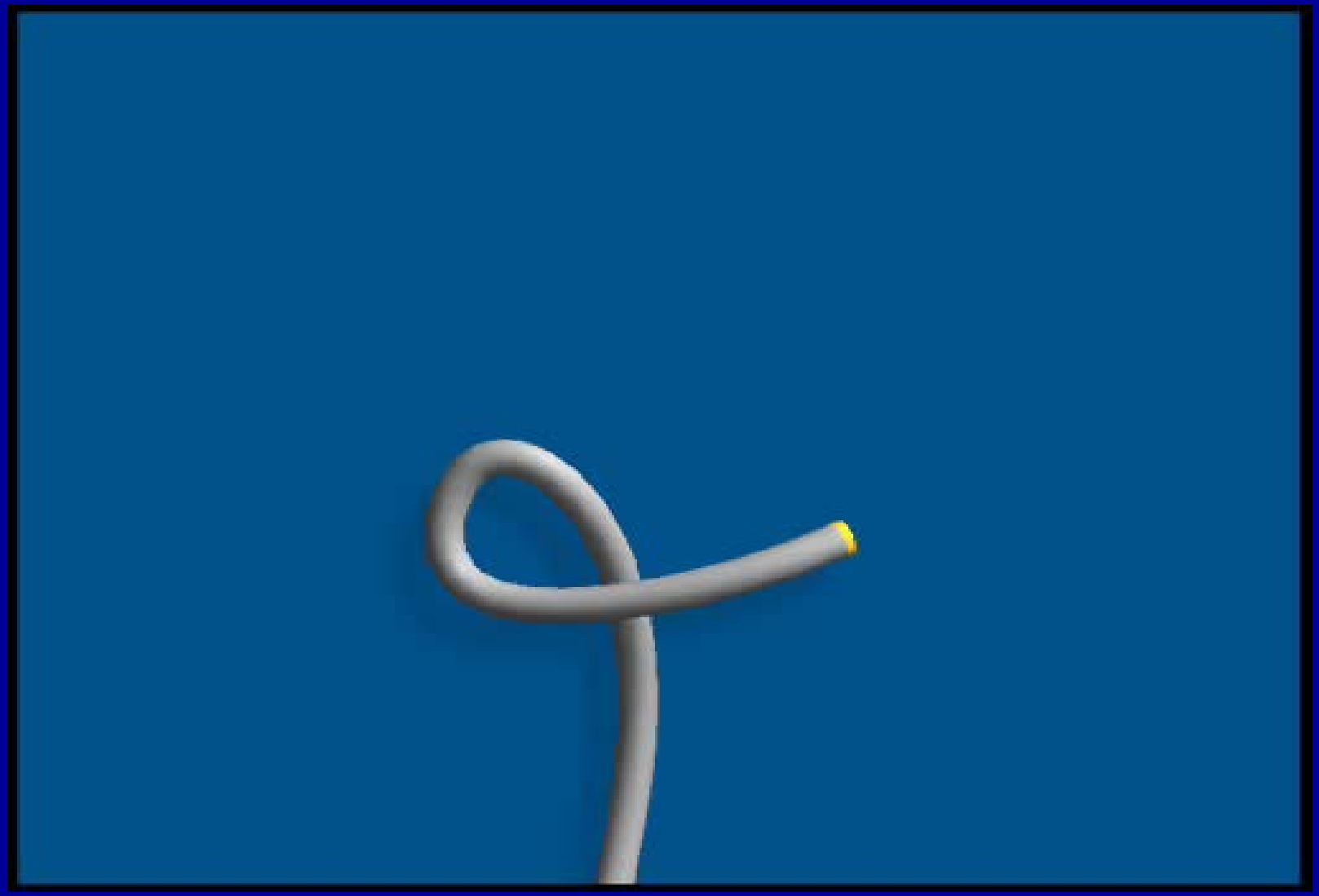


Fig. 6.49 (a) An alpha loop … (b)… de-rotates with clockwise twist and withdrawal … (c)… to straighten completely.



Alpha Loop

Reducing an Alpha Loop

If straightening is difficult or the pt has significant pain –STOP and reassess

- **?Adhesions / ?Fixed areas**
- **? Reverse alpha loop**
  - **– May need counter-clockwise twist**

“N”Loop

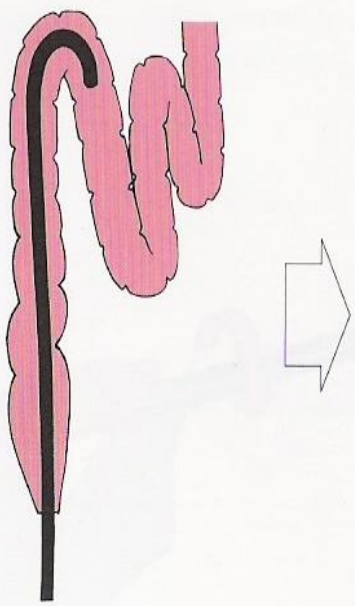


Fig. 6.26 The sigmoid colon is an elastic tube …

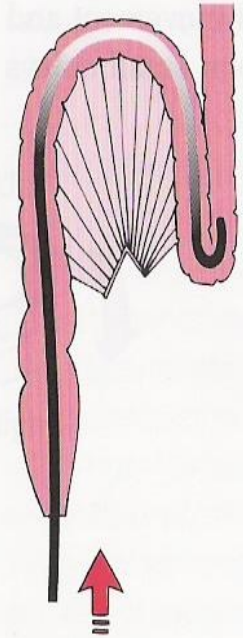


Fig. 6.27 … pushing loops it …

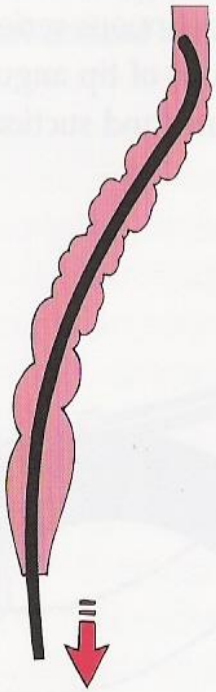


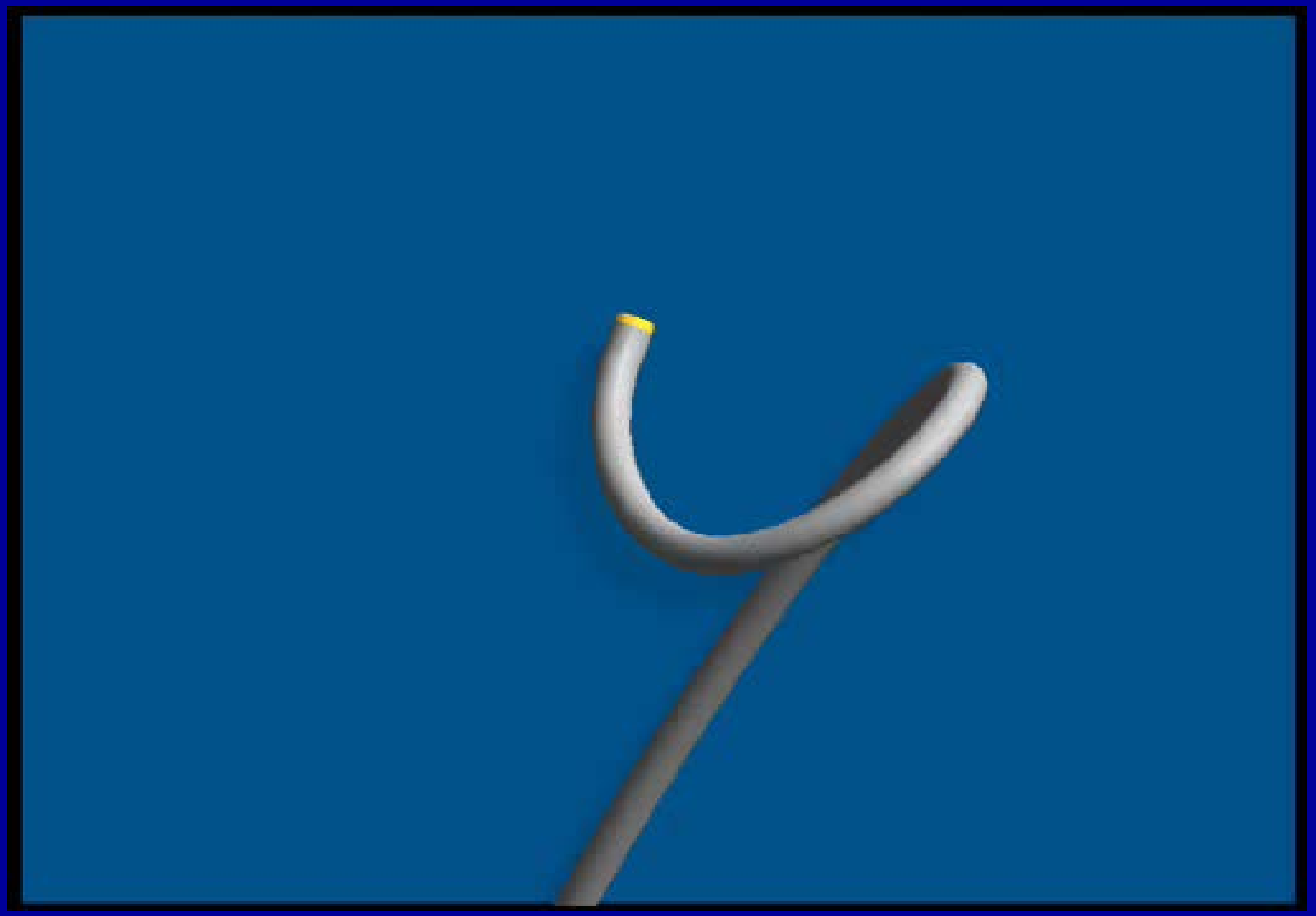
Fig. 6.28 … but pulling back shortens and straightens the colon.

Reducing Loops

- Difficult to predict which kind of loop has been formed - …At least for me :-)

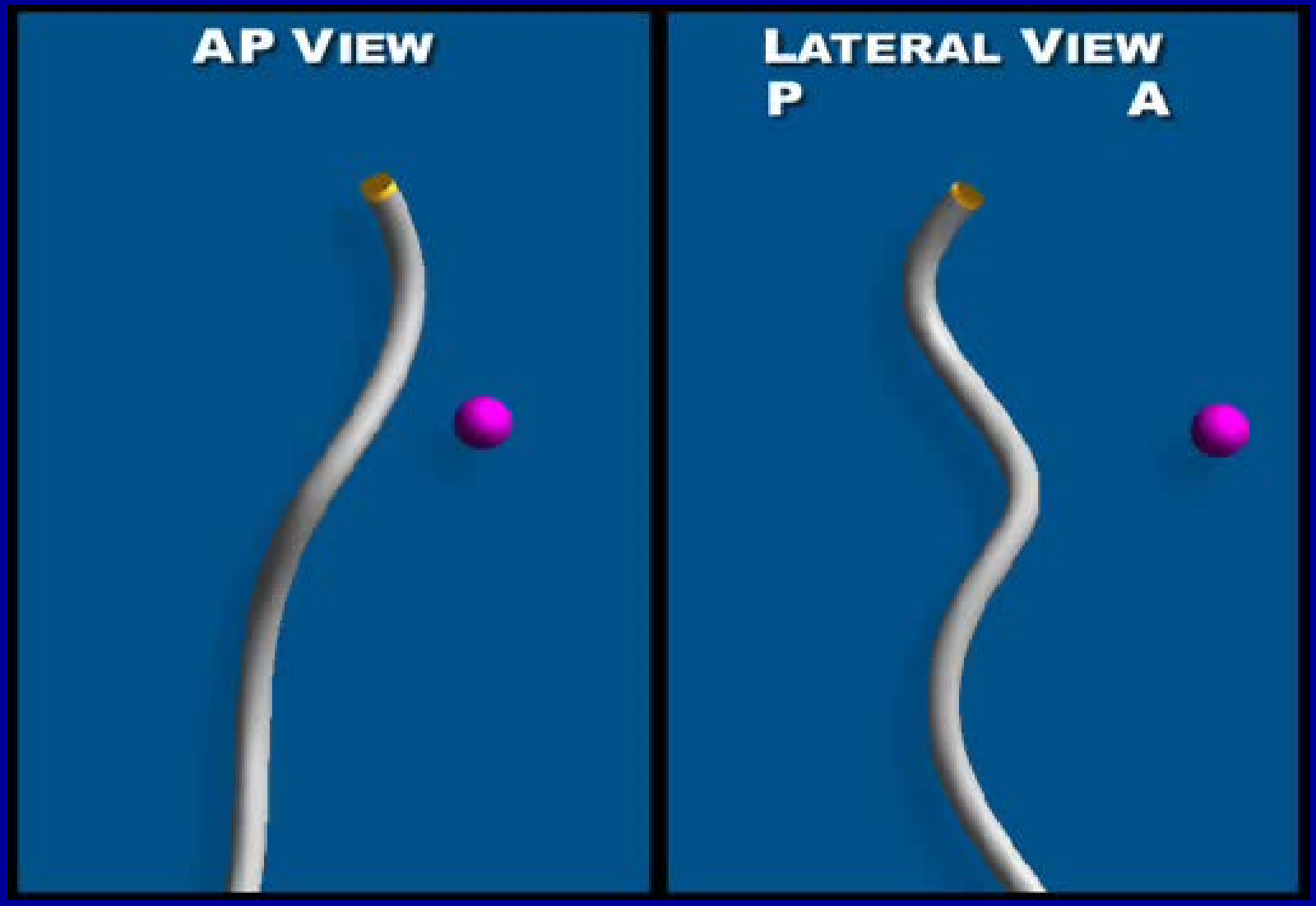
- Usual course of action is….
  Withdraw while torquing to right (clockwise)

- If this does not work……
  Withdraw while torquing to left (counter-clockwise)

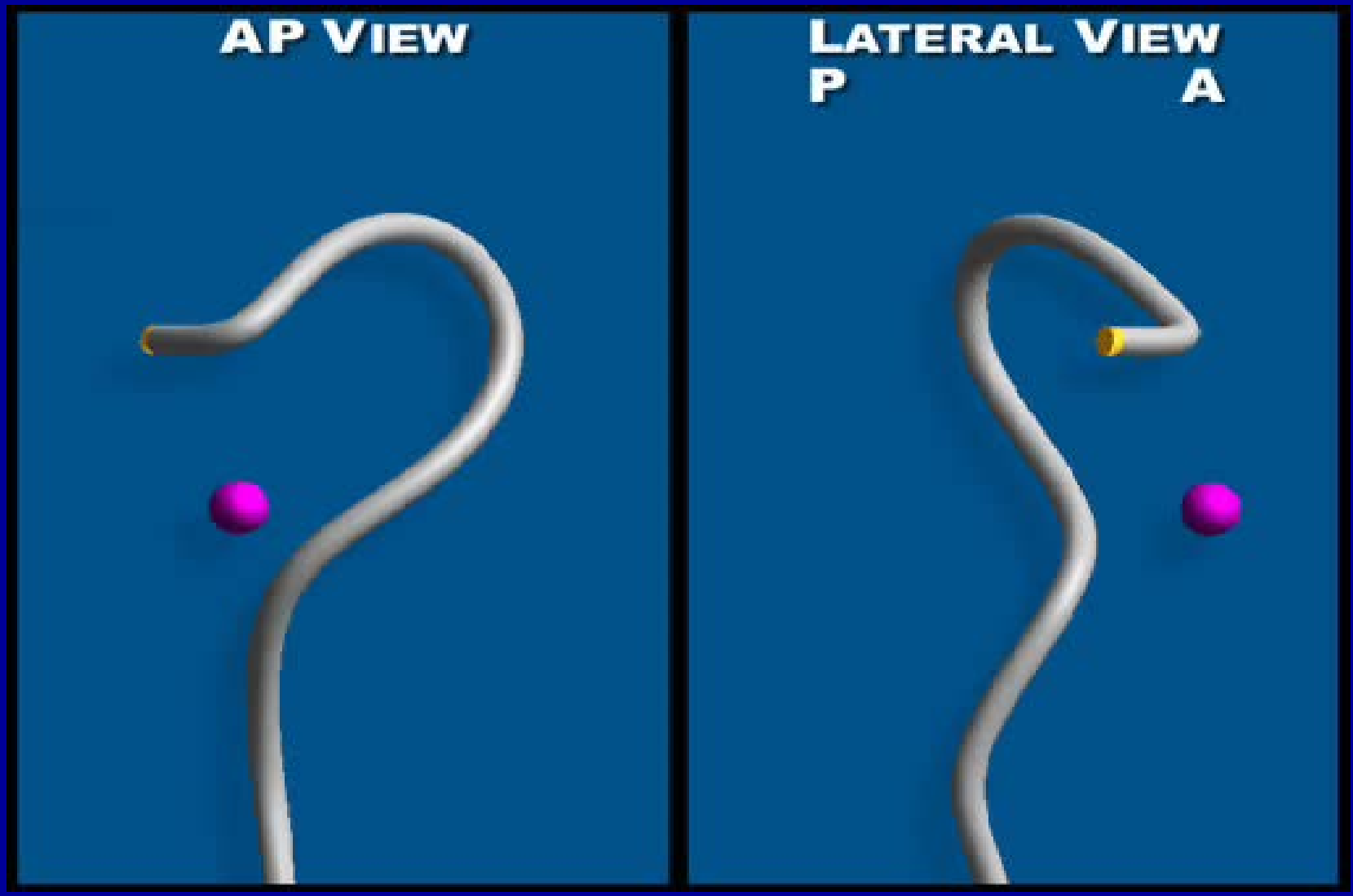


Complex loop

Abdominal Pressure



Abd pressure



Abd pressure

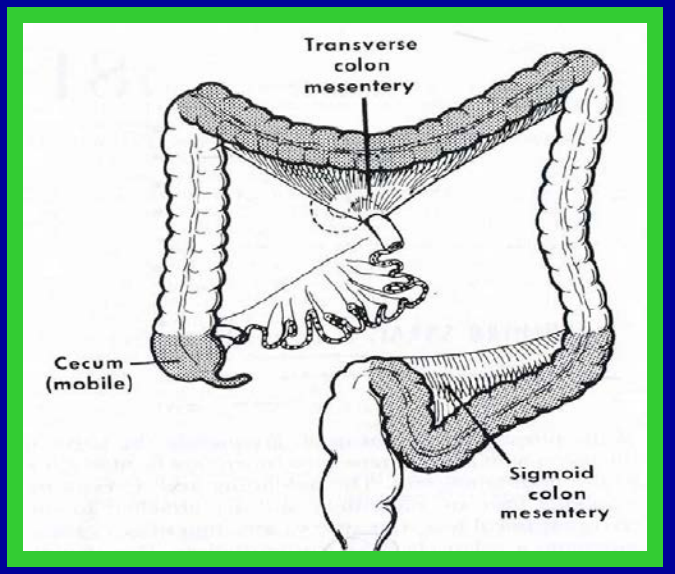
Abdominal Pressure

TIP LOCATION	PRESSURE AREA
20 - 25 cms	suprapubic
25 - 35 cms	left lower quadrant
35-50 cms	left mid-abdomen
hepatic flexure	splenic flexure/ trs colon (pull up)

These are rough guides - try different areas

Descending colon

- Retroperitoneal
- Horizontal Fluid level
- Turn pt on Right side to drain fluid if needed
- Minimize sigmoid relooping - clockwise turn/pressure



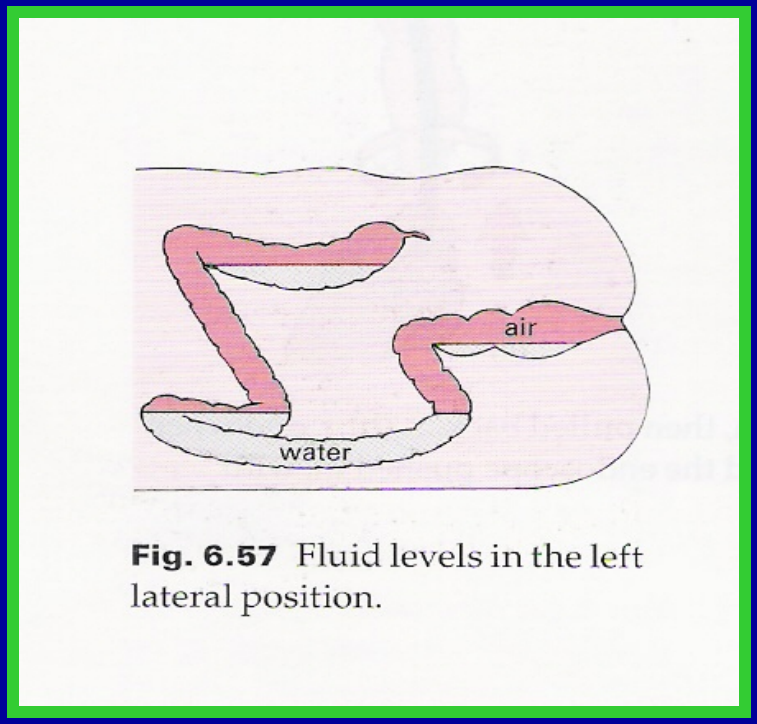
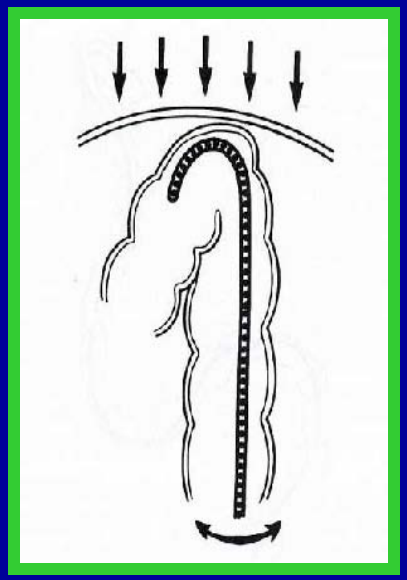


Fig. 6.57 Fluid levels in the left lateral position.

Splenic Flexure

- Fluid filled area
- Half Time point in colonoscopy
- Scope should be 50-60 cms from anus if straight
- If straight scope only few minutes to cecum
- Phrenico-colic ligament
  - (May be fixed or lax)



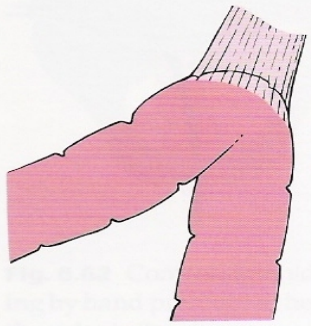


Fig. 6.58 The phrenico-colic ligament.

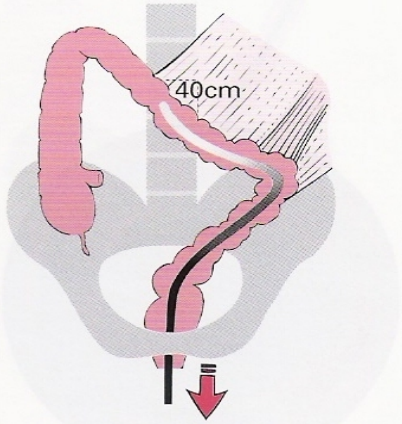
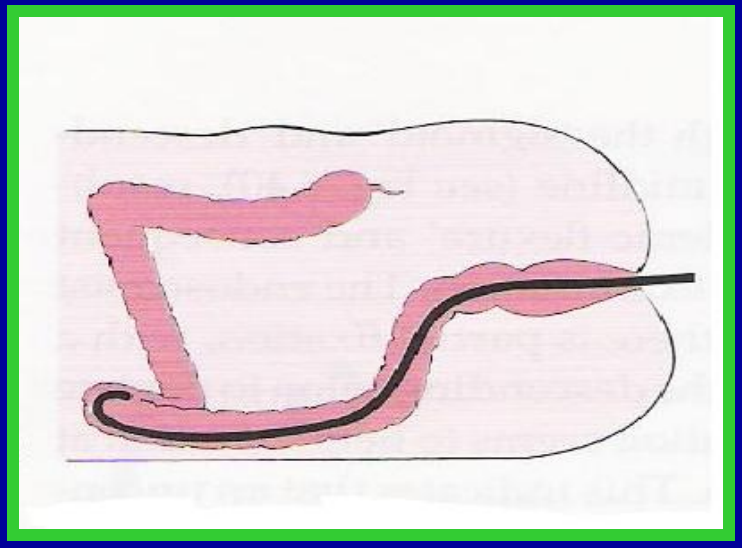
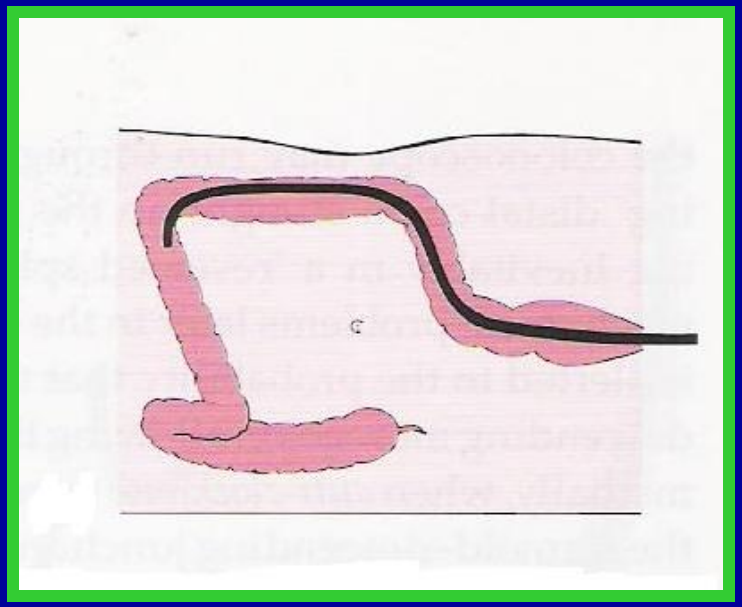


Fig. 6.59 The splenic flexure can pull back to 40 cm if there is a free phrenico-colic ligament.

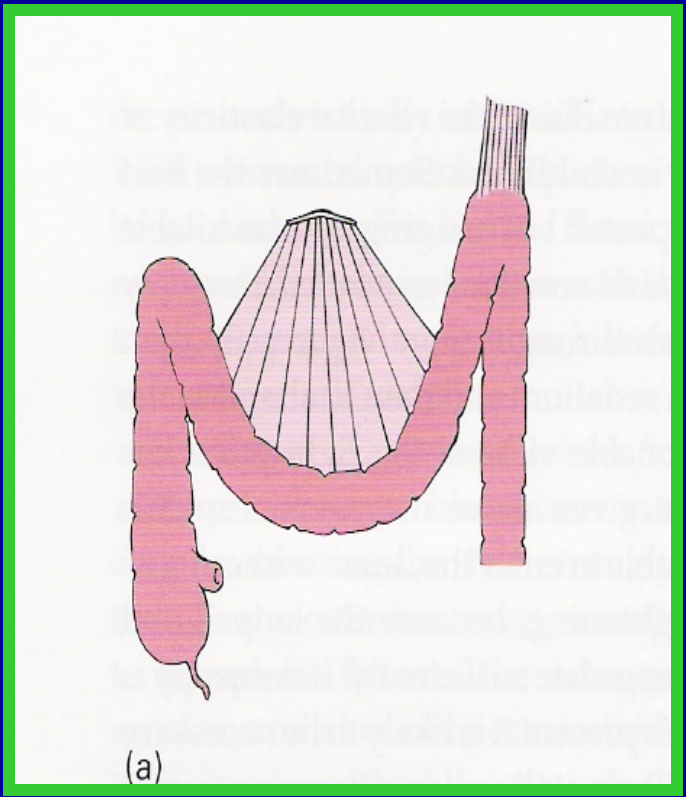
Negotiating the splenic flexure

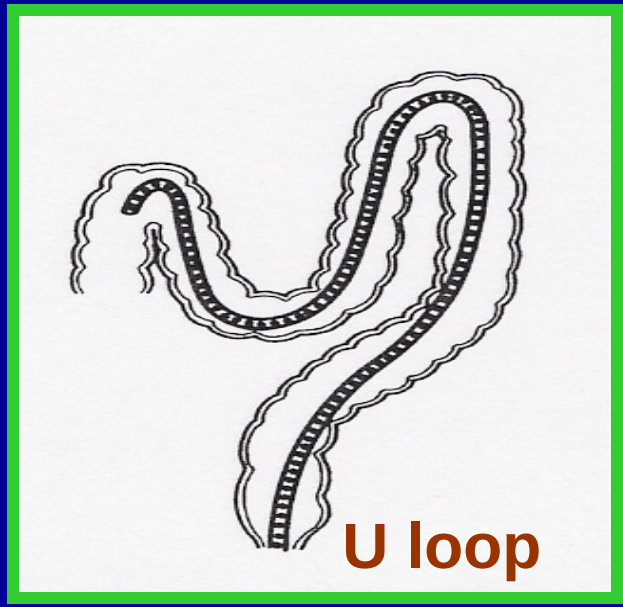
- Pull back-straighten the scope
- Avoid tip overangulation
- Deflate the colon
- Abdominal Pressure
- Clockwise torque on shaft
- Push in - Slowly
- Stiffen a variable Scope
- Change position to Supine or Rt side – And Try Again

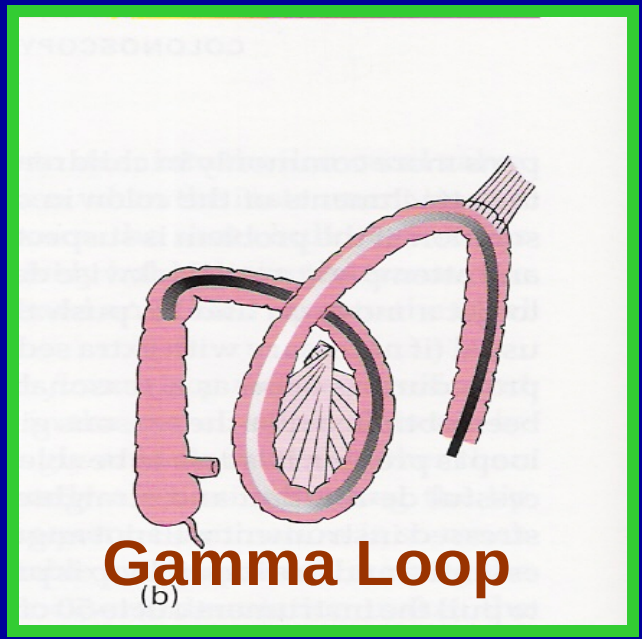




Transverse colon







Transverse colon

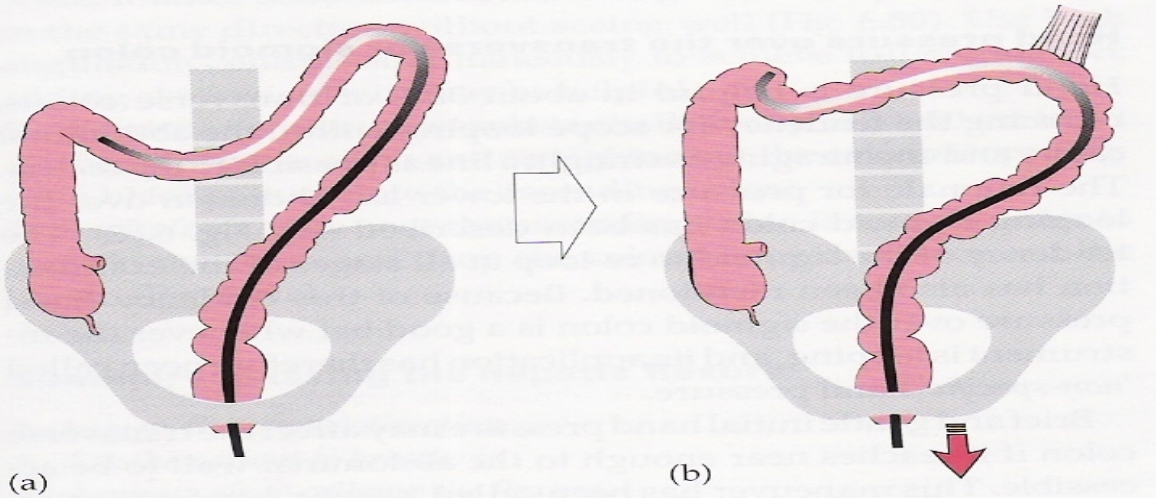
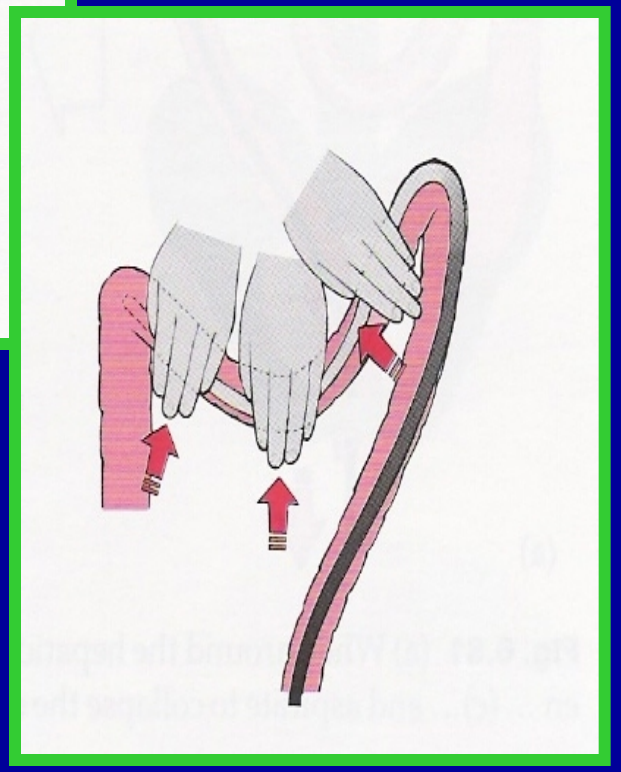
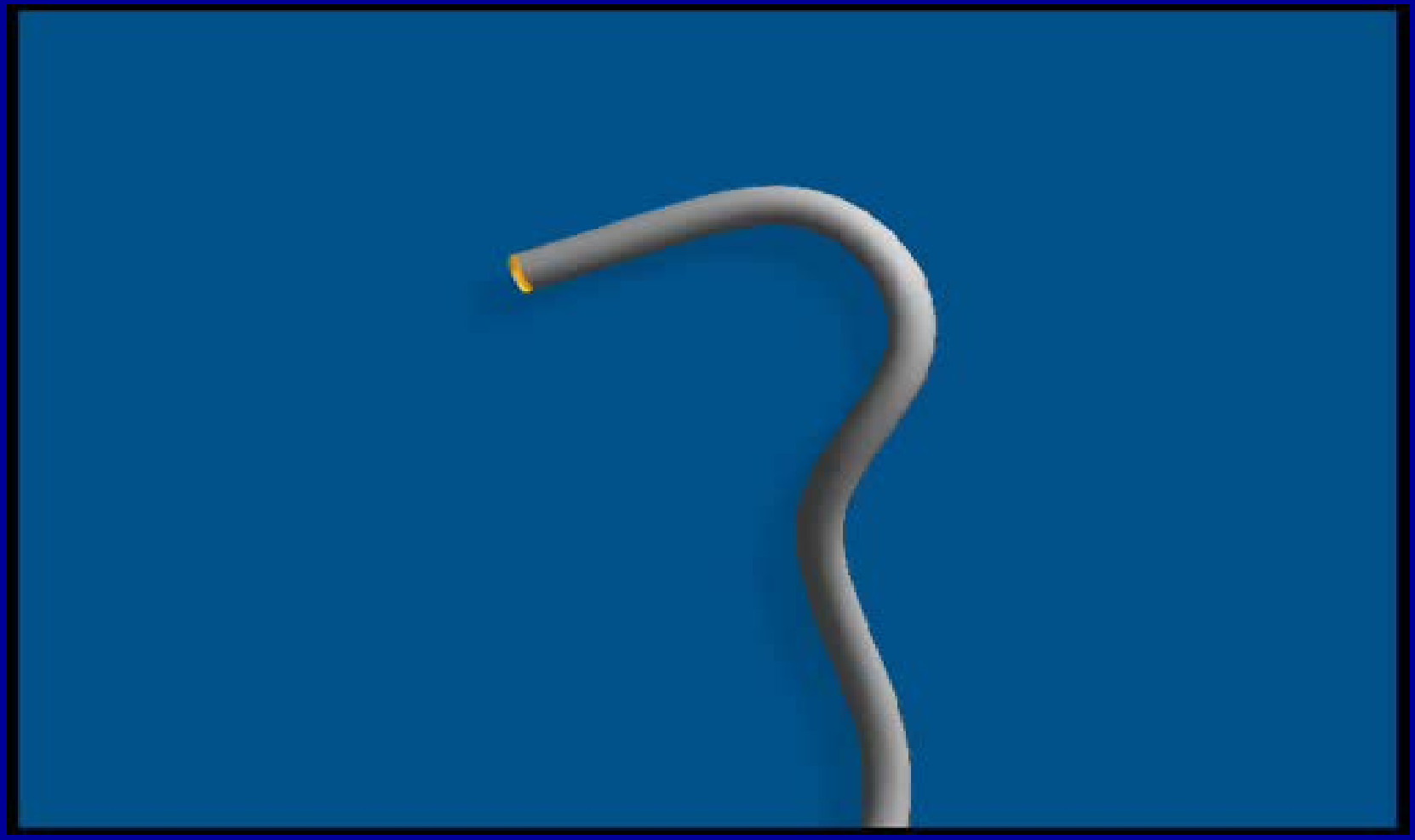


Fig. 6.75 (a) If passage up the proximal transverse is difficult ... (b)... pull back to lift and shorten.





Transverse video

Ascending and Cecum

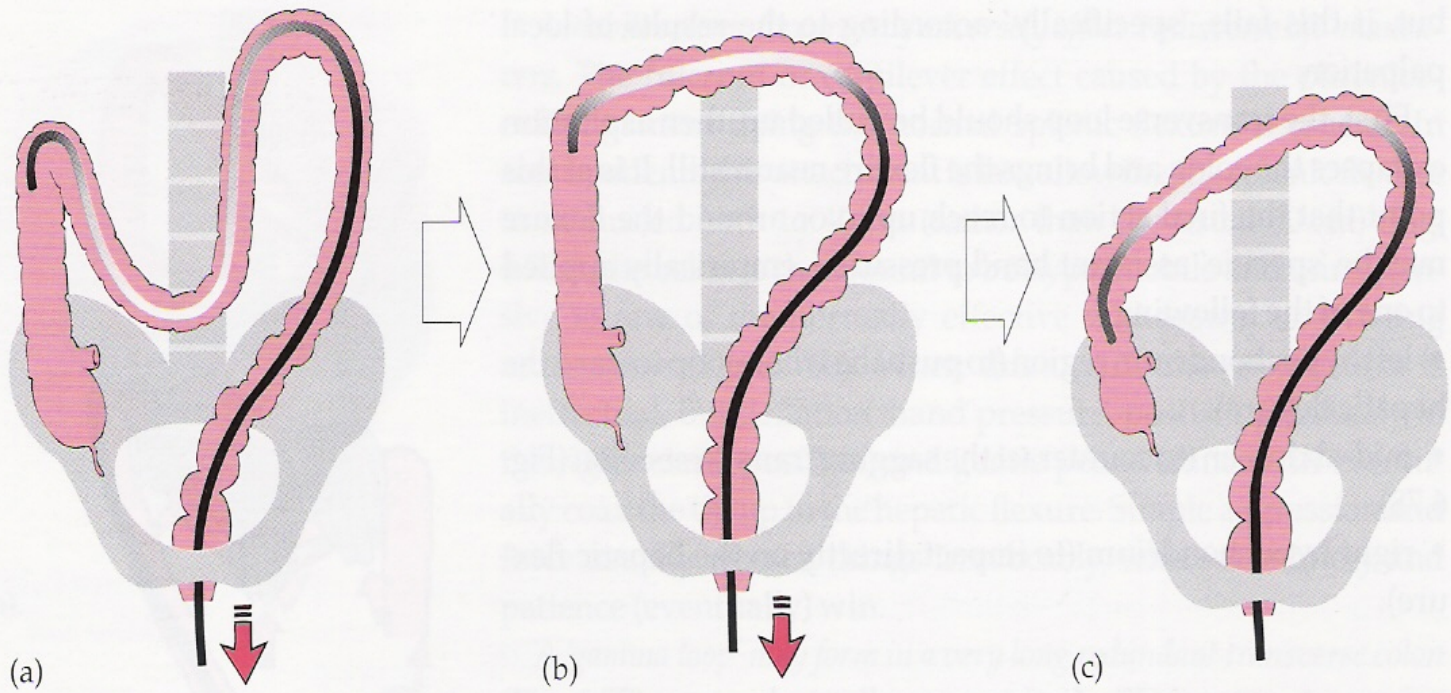


Fig. 6.81 (a) When around the hepatic flexure and viewing the ascending colon … (b)… pull back to straighten … (c)… and aspirate to collapse the colon and pass toward the cecum.

Cecum
May be very difficult in some

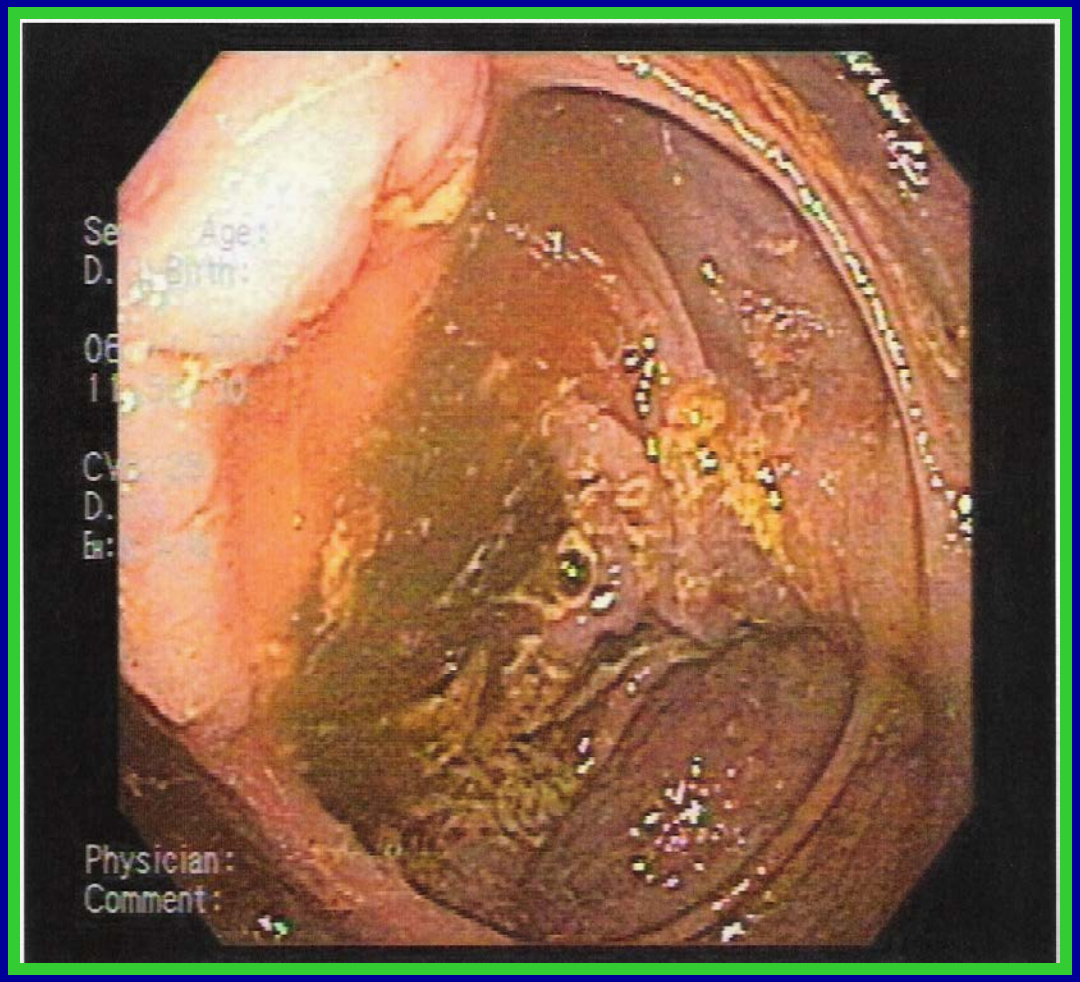
- **Transverse pressure**
- **Try Rt lateral**
- **Prone**

(Courtesy Dr. McClave)

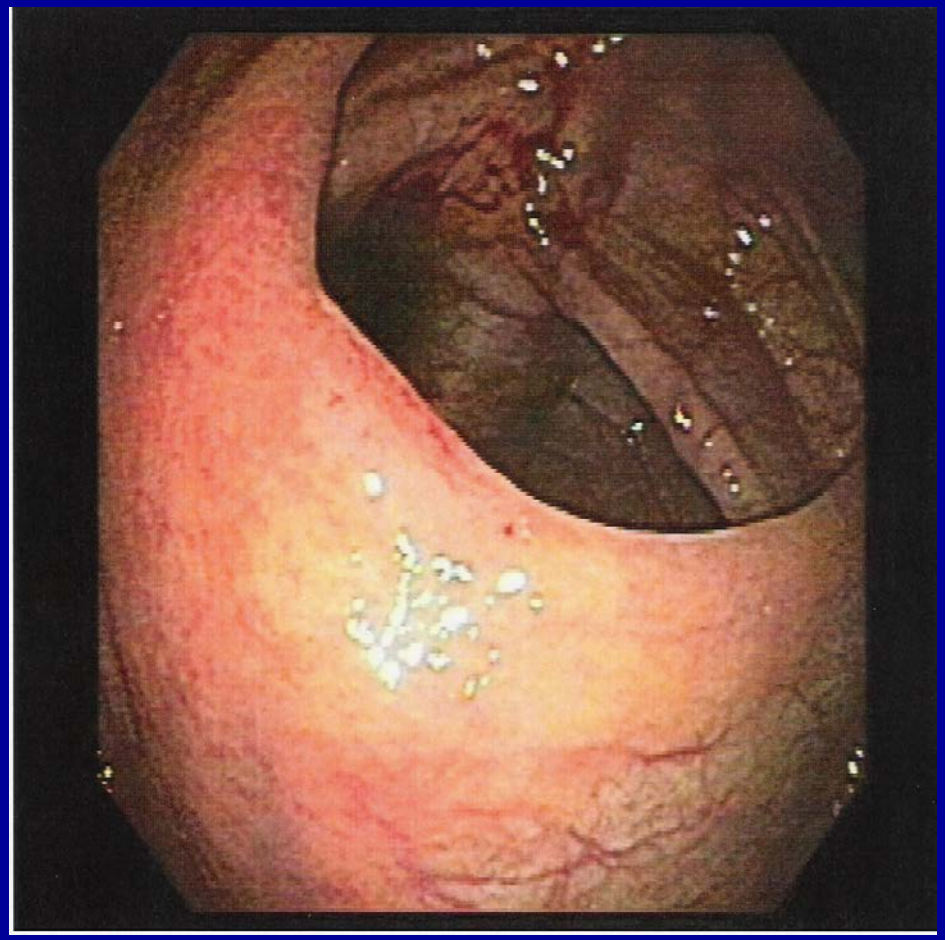
- **“Frog Leg”/ Lithotomy**

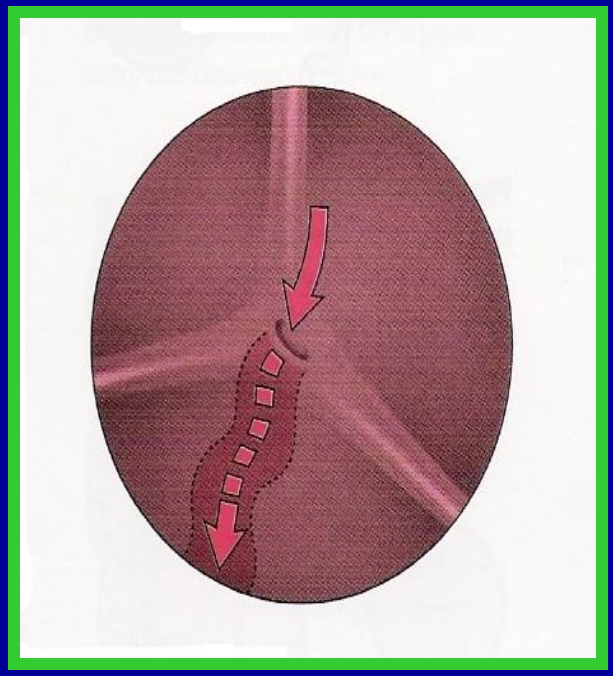
(Courtesy Dr. Hill)

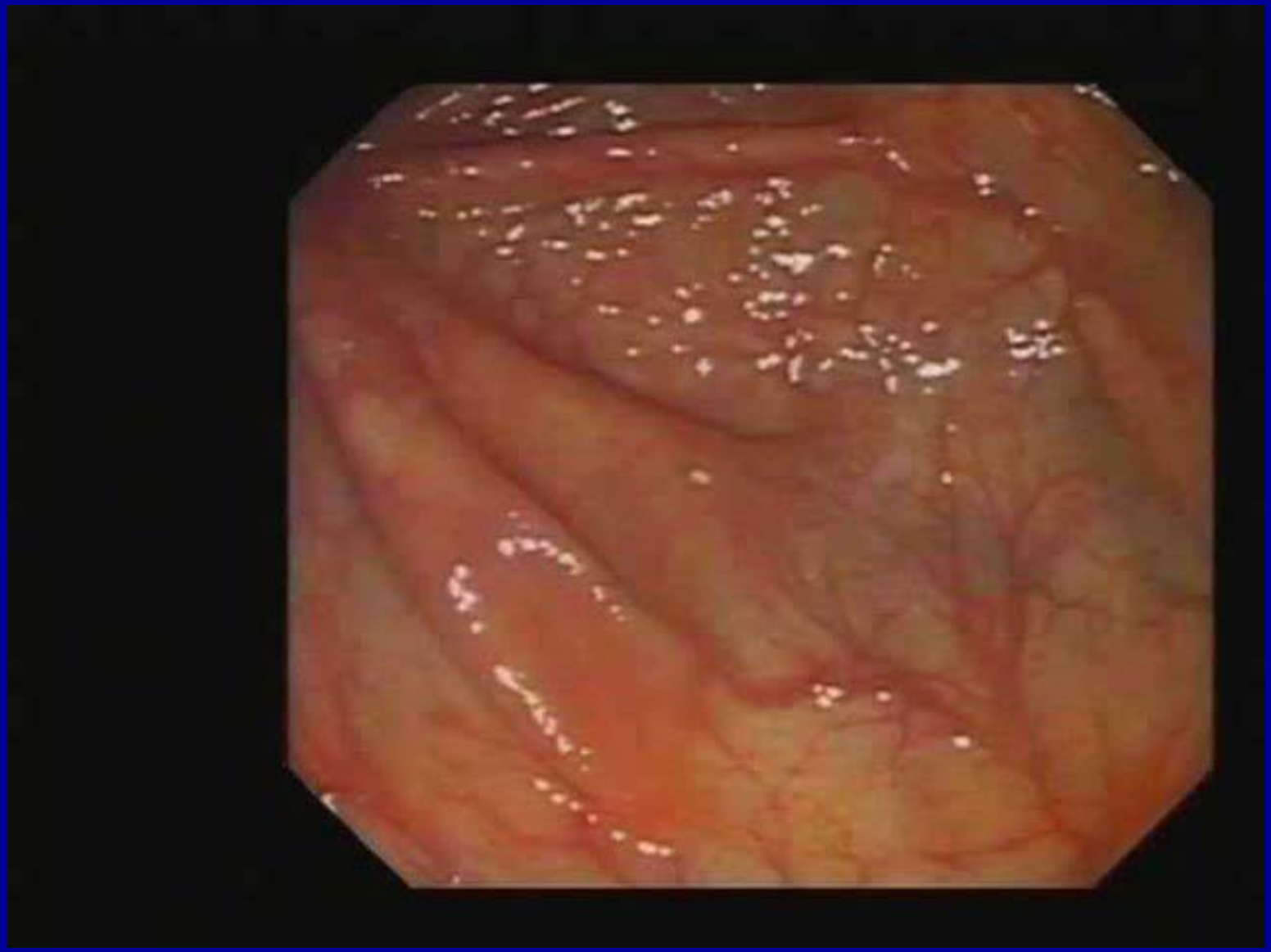
Intubating Terminal Ileum



Intubating Terminal Ileum







TI Video

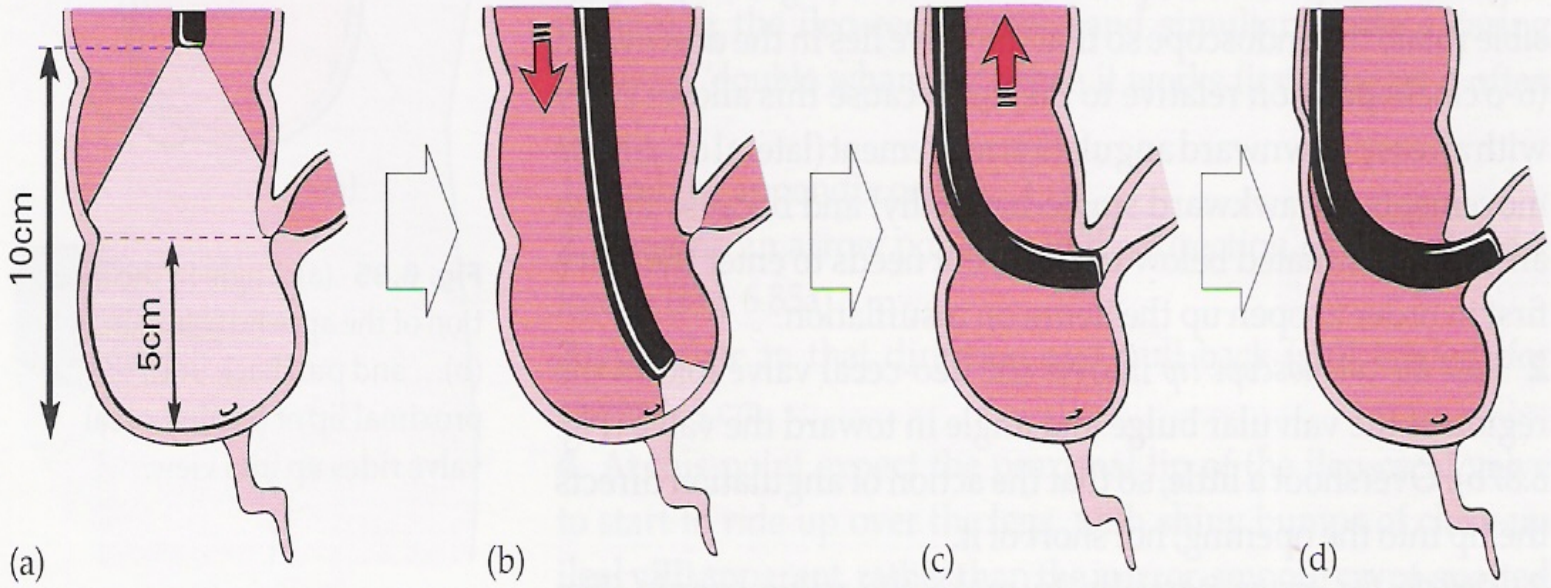
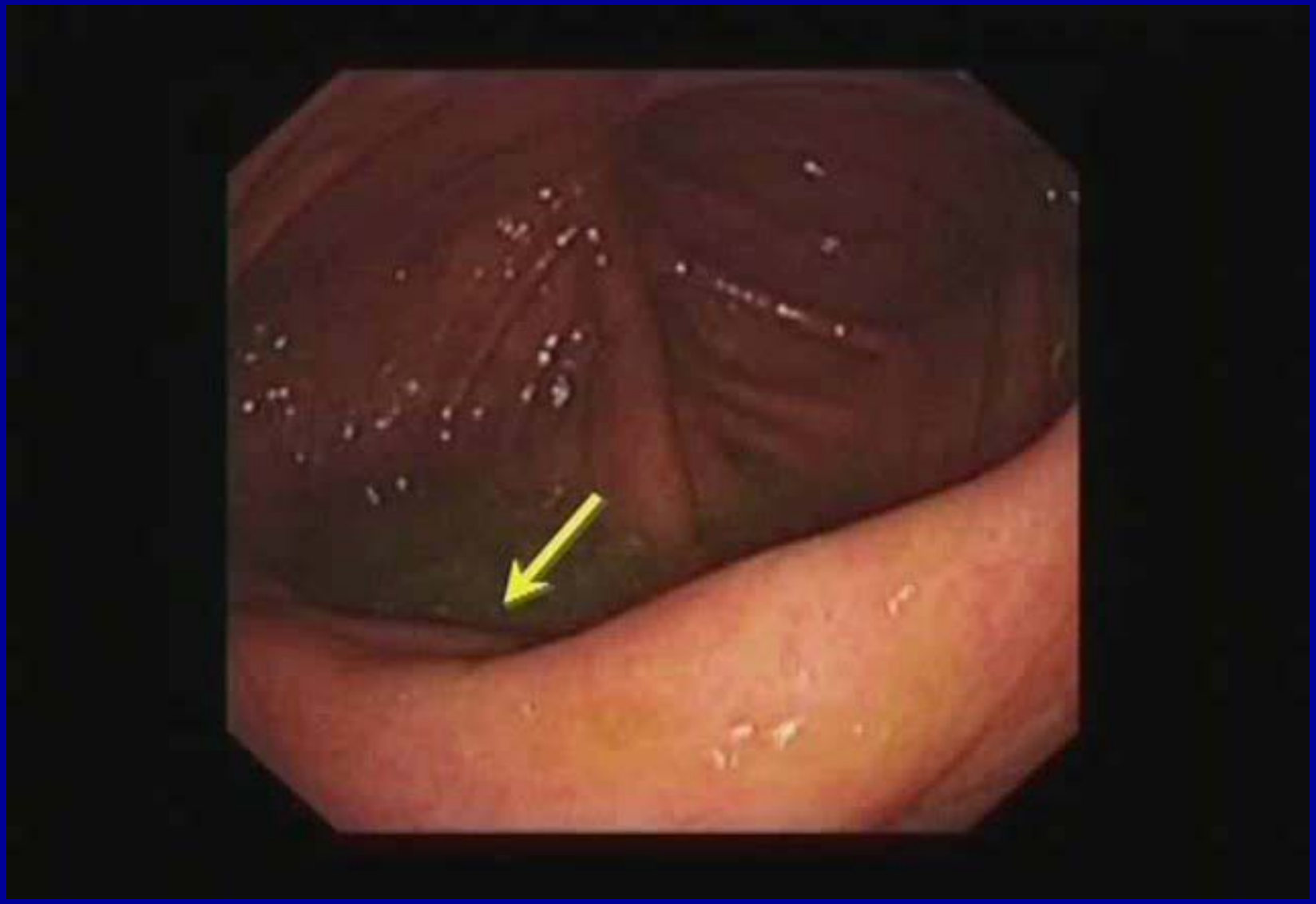


Fig. 6.87 (a) Locate the ileo-cecal valve (preferably at 6 o'clock) … (b)… pass in and angulate and deflate slightly … (c)… pull back until the 'red-out' is seen … (d)… and insufflate to open the valve.



TI video

Withdrawal of Scope

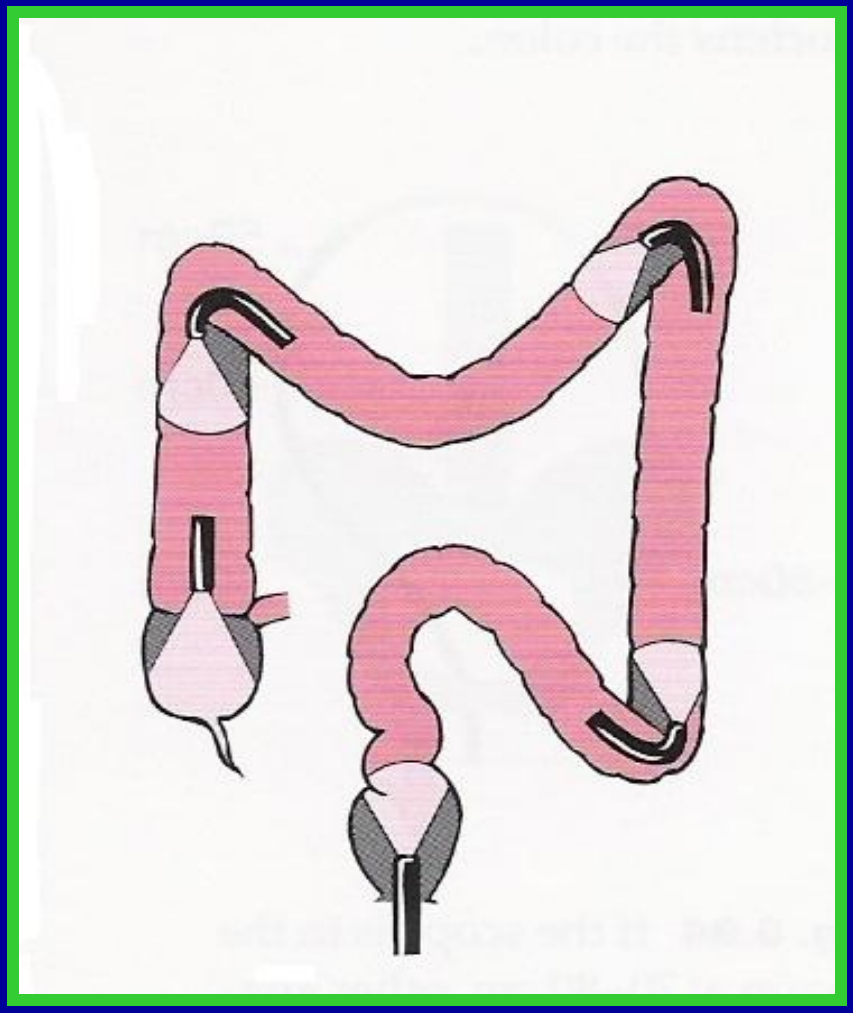
Most important part of exam!!!

Slow - at least 6 mins

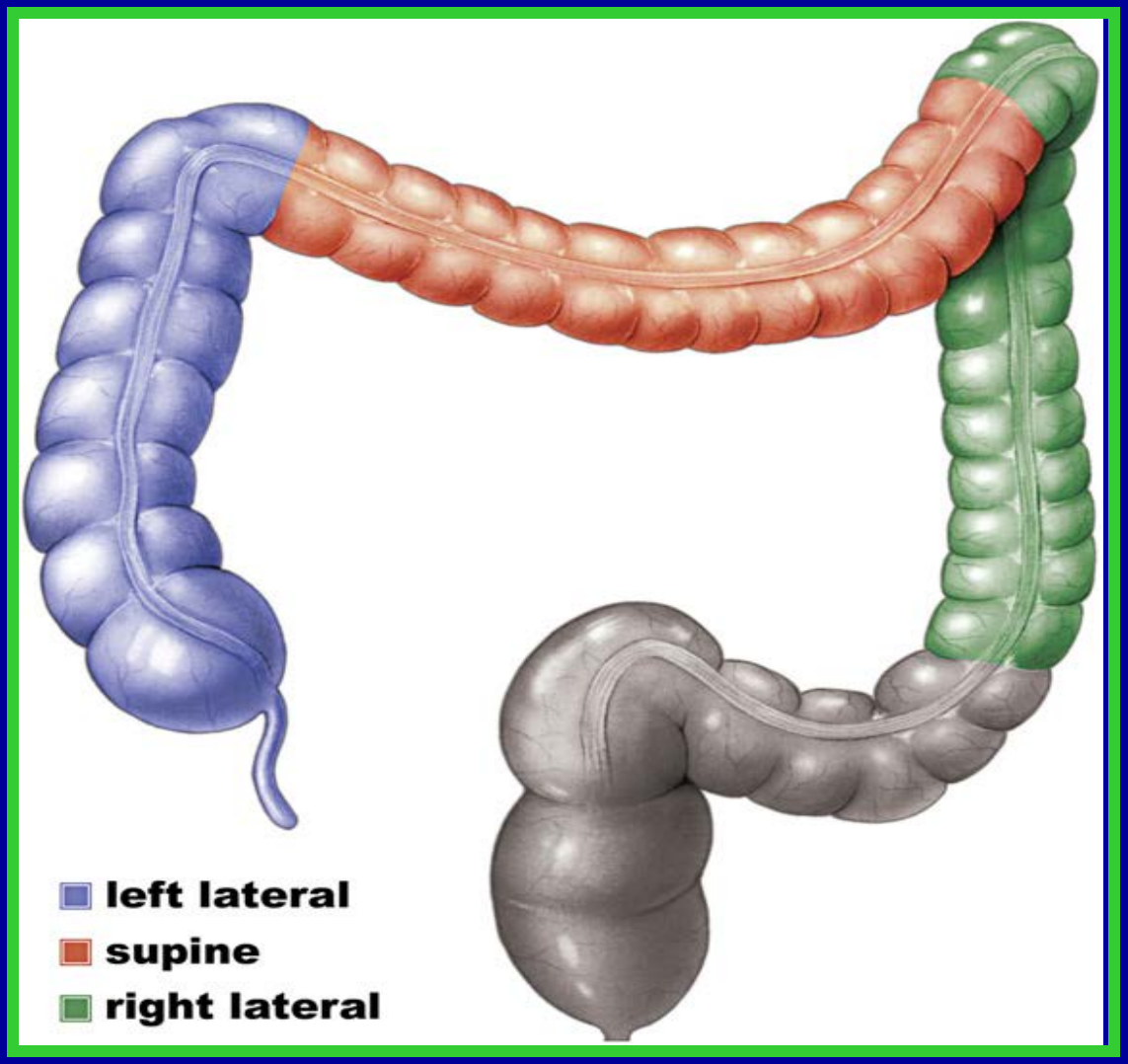
Look behind folds

Beware of blind spots

Areas around turns / Pleated folds of colon may fly away



Withdrawal of Scope



Other Tricks/Tools

- Submersion (Submarine) technique
- Enteroscope (if available)
- Cap assisted
- Fluoroscopy
- Exchange over guide-wire

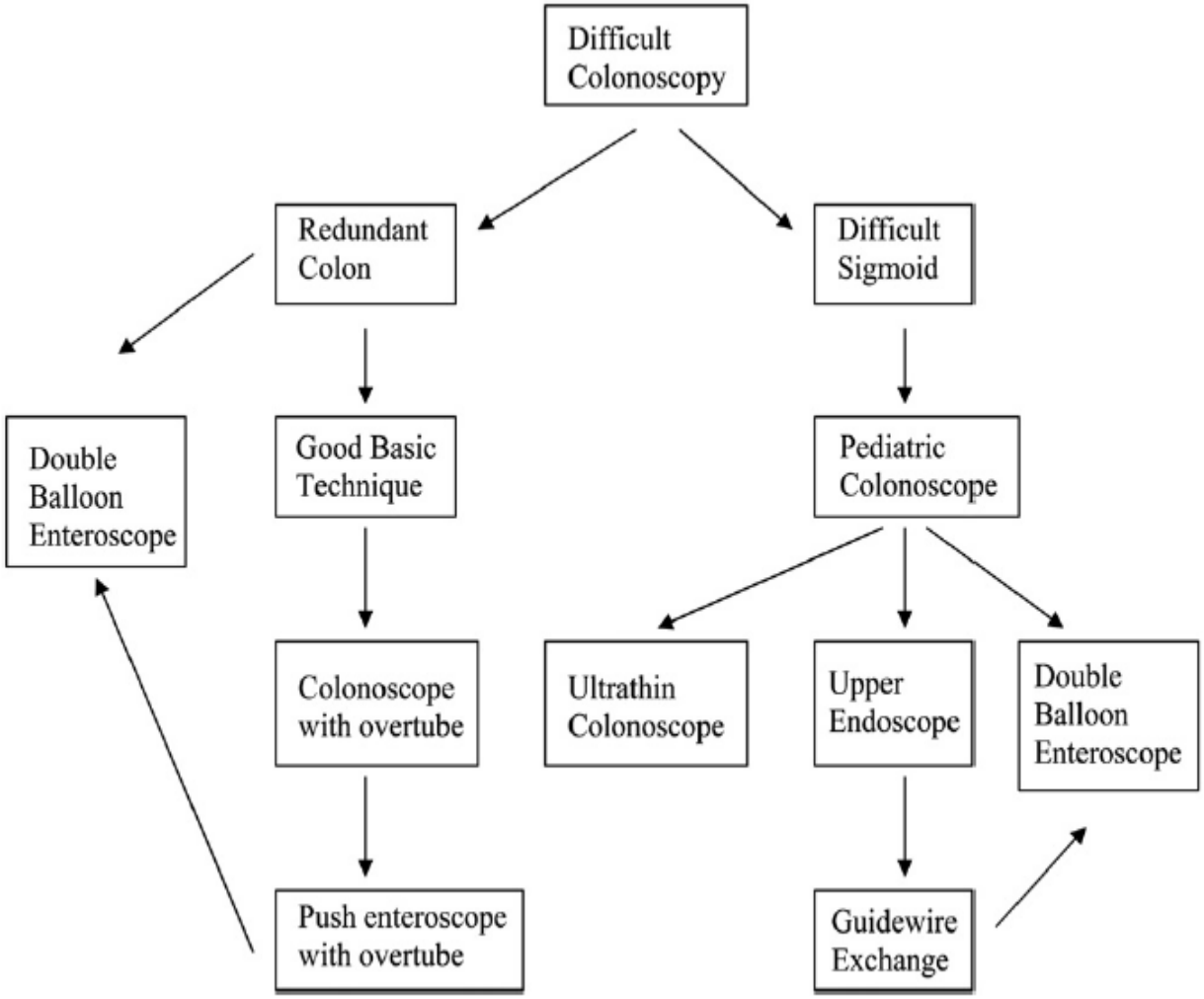


Figure 1. Algorithm for achieving cecal intubation in the very difficult colon.

Principles of Electrocautery

(From Dr. Marsano's lecture)

Radiofrequency Generator:

- Generates high-frequency currents (100 K-Hz to 4 M-Hz) which induces ionic vibration but no movement.
- Ionic vibration generates intracellular heat but no muscle/nerve depolarization.
- Power settings are in Watts (amps x volts).

•Intracellular heat can cause:

CUT

Boiling + explosion

COAGULATION

Dehydration (desiccation), and/or fire (fulguration).

Types of Electrocautery

- **Monopolar**
  - **Coagulation**
    - Contact
    - Non Contact (Argon Plasma)
  - **Cut**
    - Pure
    - Blended
- **Bipolar**

Monopolar Electrocautery

- Has a large “Indifferent Plate”for electricity return and a small “active electrode”; causes high current density and very high heat at active electrode.

- Causes deeper injury, hence is bad choice for hemostasis (high perforation risk except with non-contact technique – APC).

- There must be absence of flammable gases (bowel lavage) to avoid explosion.

Monopolar Electrocautery

- Indifferent plate should:
  - A) be near to site of active electrode, to decrease resistance from other tissues,
  - B) have conductive gel to decrease skin resistance,
  - C) remain in complete contact all the time (dual plate w monitoring circuit confirms contact) to maximize energy in active electrode.

- Examples: hot snare, hot biopsy, Argon Plasma Coagulator, sphincterotome, needle knife.

Bipolar Electrocautery

- Usually gives low-energy or “micro-bipolar”. Has two or more small active electrodes very close to each other (active and return electrode)
- Does not use “indifferent plate”.
- Risk of explosion with flammable gases (needs colon prep)
- Less depth of injury. Saline pillow further decreases depth of injury (very important in colon & small bowel).
- Excellent dessication and coagulation at low settings (15-20 W). Excellent for hemostasis.
- Example: BICAP, Gold-Probe.

ULH, VA & Norton endoscopy - only monopolar cautery is used.

Jewish Hospital has Bipolar (Gold Probe)

Modalities used in colonoscopy

- Snare- Coag/Cut/Blended
- APC

ERBE Electrocautery

Indifferent electrode

MONOPOLAR CUT or COAG

BIPOLAR COAG

YELLOW SIDE

- **CUT**
- Activation: Yellow Pedal
- Settings: yellow side ONLY
- Modes:
  - Pure-cut
  - Blend-Cut with several "modes" with different coag/cut ratios.
- Outlet usually single.

BLUE SIDE

- **COAGULATION**
- Activation: Blue Pedal
- Settings: blue side ONLY
- Modes:
  - Monopolar
  - APC
  - Bipolar
- Outlets: separate for monopolar & bipolar

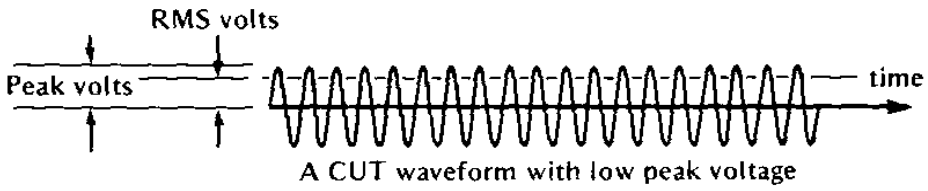
Electrocautery Waveforms

COAGULATION

CUT

Same energy (W): CUT vs COAGULATION
CREST: [peak/root mean square] voltage

CUT



A CUT waveform with low peak voltage

COAG

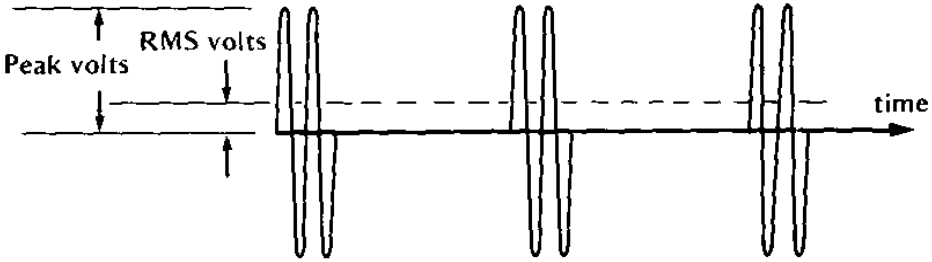


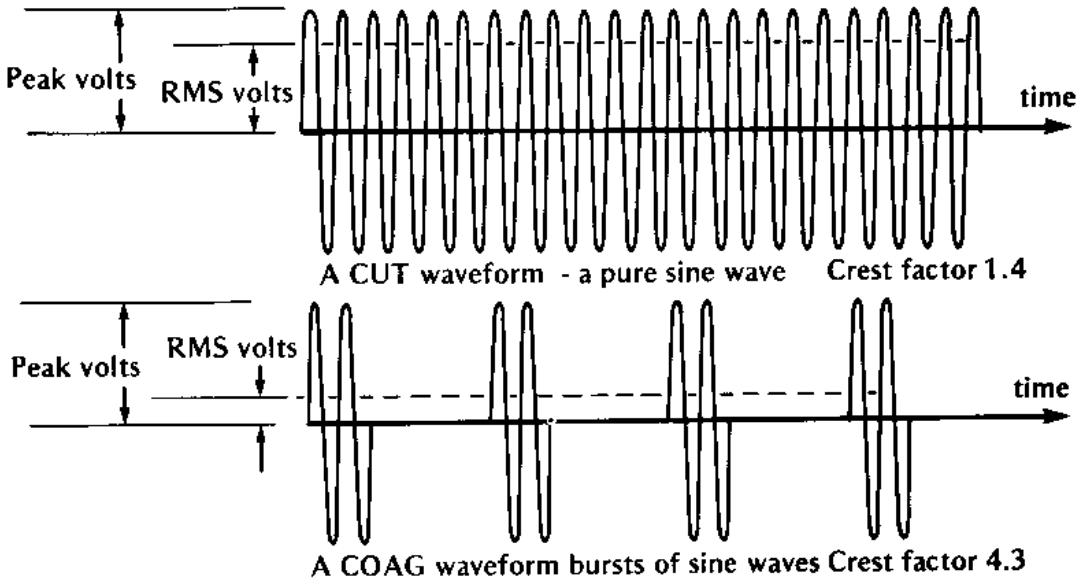
FIGURE 7–7. The COAG waveform (*bottom*) with equal power (energy per second) to that of the CUT waveform (*top*). COAG peak voltage is about three times higher in this example than in in Figure 7–6. Note that RMS (average) voltages are equal in both waveforms.

Usual CREST: Coag = 7-8, Pure-Cut < 2, Blend-Cut = 2.2-5

High CREST = longer cooling time/higher peak = more desiccation/fulguration & less cut

Same "peak voltage": CUT vs COAG
Energy (W) CUT >>> COAGULATION

FIGURE 7–6. In this diagram peak voltages of CUT (*top*) and COAG (*bottom*) waveforms are the same, but power is about one third less in the COAG waveform.



Snare Polypectomy

- **VARIABLES**
- Energy
- Wave: coag vs blend-c
- Stalk diameter
- Wire tension (>1.5cm)
- Wire diamet(.3-.4mm)

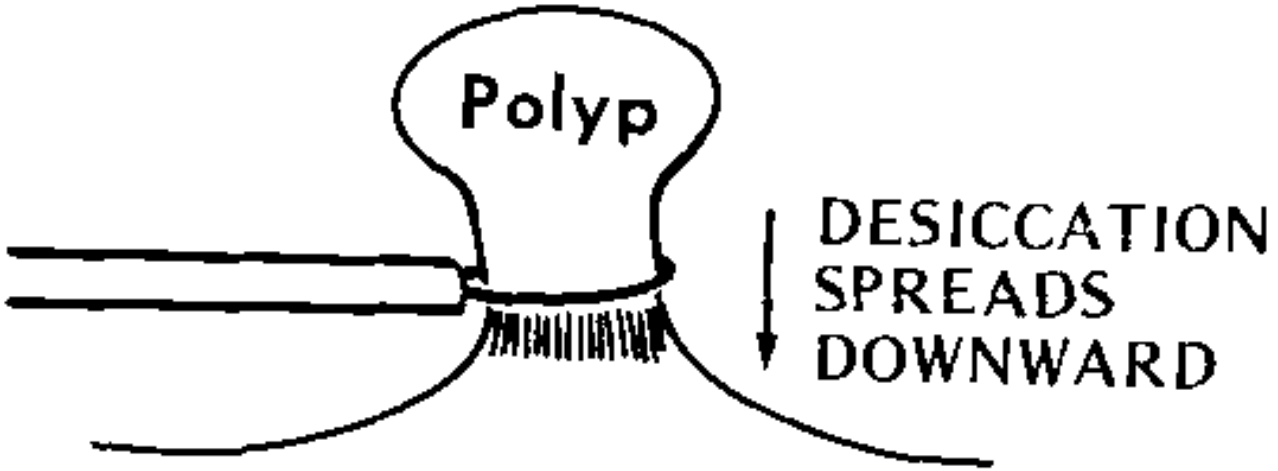
- **PHASES**
- Desiccation
- Cut: mechanical vs electrosurg. vs mixed
  - Sequential
  - Combined

Snare Polypectomy

- **Desiccation**:
  - COAG @ 20-30 **(25)**W, or Blend Cut 2 @ **20**-30 W, or Endo-Cut-3@ 200 W;
  - Lower energy on Rt colon. Higher in thick stalk.
  - Saline “pillow” in sessile lesions.
  - Avoid:
    - Too much desiccation: difficult to cut; transmural necrosis
    - Polyp contact with other wall: burn (shake it)
    - Fluid pool: loss of energy.

Snare Polypectomy

- **Cutting:**
  - A) **Mechanical or Mixed**: close snare with ***constant mild-moderate pressure*** during or after COAGULATION.
  - B) **Electrosurgical**: Close snare with ***very light hold*** during Blend-Cut or Endo-Cut.
- If snare gets stuck after excessive desiccation, change to pure-cut @ 100-150 W.(If tissue is too dry, will not cut)



DESICCATION FIRST FOR HEMOSTASIS

FIGURE 7–8. Diagrammatic representation of initial desiccation of polyp stalk prior to mechanical or electrosurgical cutting of stalk.

Current required is proportional to the square of the polyp diameter since current density should be the same.

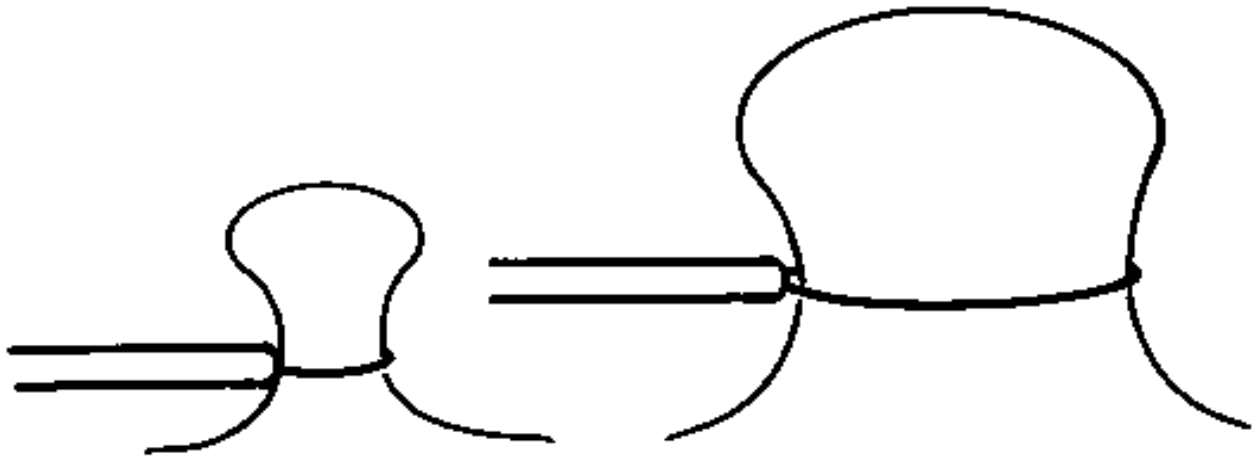


FIGURE 7–9. Current must be increased to achieve the same current density required for desiccation as with a small polyp.

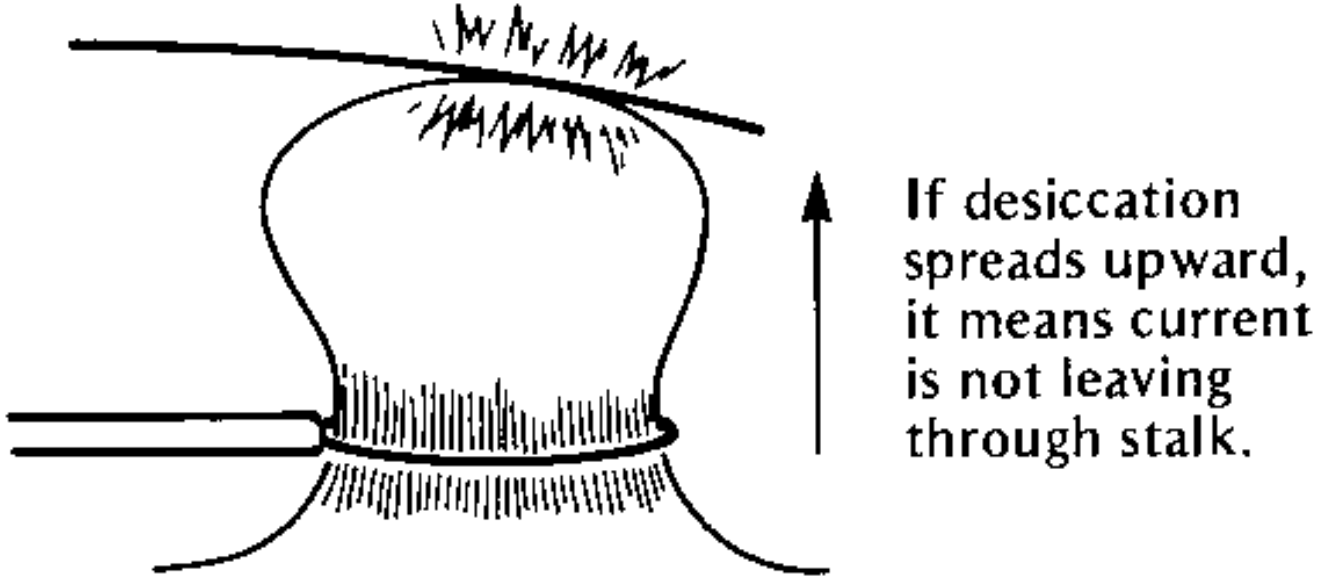
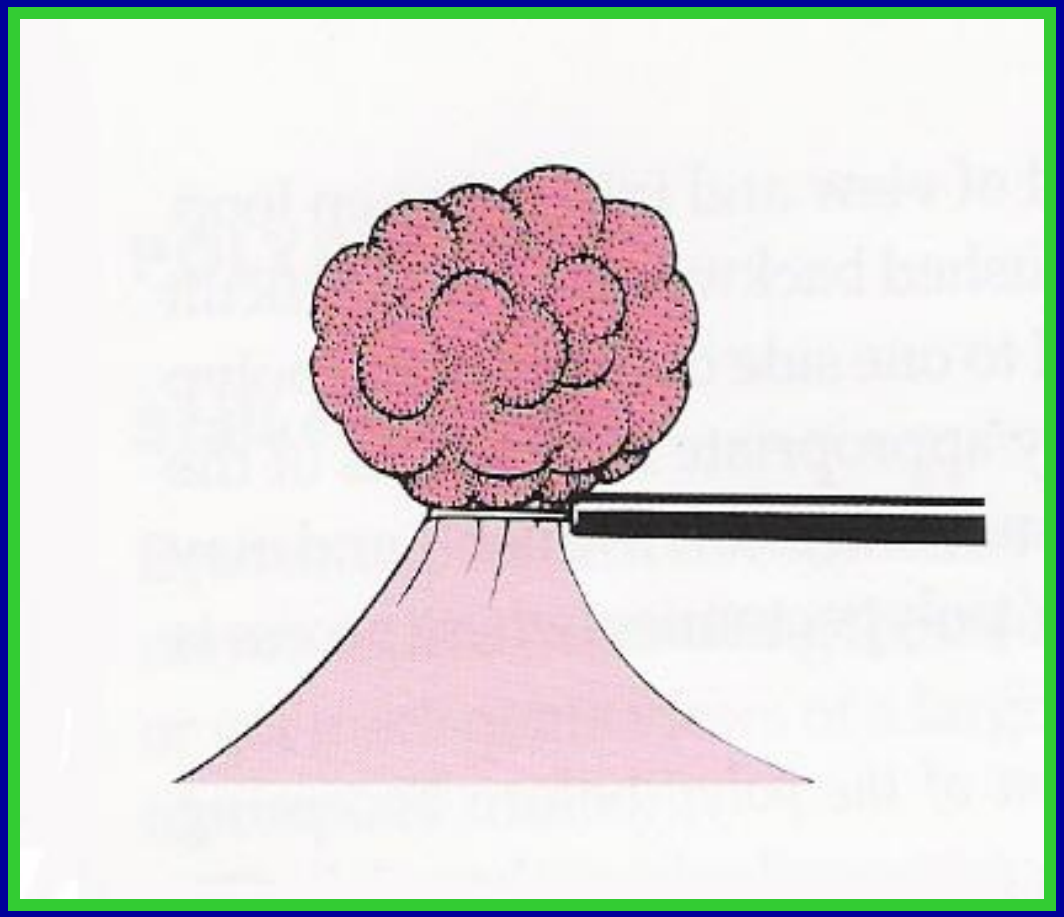


FIGURE 7–10. Clinical effect of electrosurgical current is altered by contact of the polyp with opposite wall of the bowel.

Usual Electrocautery Settings

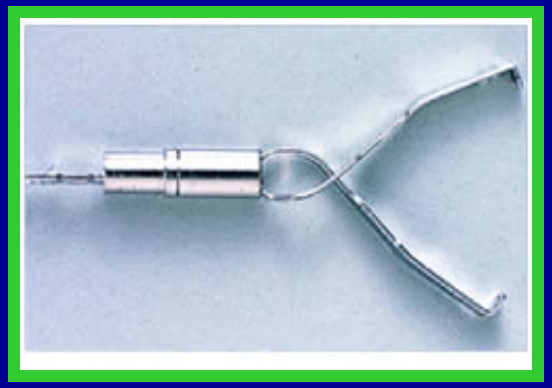
UNIT	Polypectomy/ Sphincteroto my bleed	Alternative Polypectomy	Hot Biopsy	Sphincteroto	Pre-cut Needle Knife
ERBE	COAG-**Forced 25W** COAG (blue) pedal (Tap in Hot Bx)	Endo CUT: **ON** Effect 3 **200 W** CUT (yellow) pedal	COAG – **Soft 60 W** COAG (blue) pedal	Endo CUT: **ON** Effect 3 **200 W** CUT (yellow) pedal	Endo CUT: **OFF** Effect 3 **200 W – Tap** CUT (yellow) pedal
ValleylabForce 2 Olympus (VA)	COAG **15-25 W** COAG (blue) pedal	CUT Blend 2 **20 W** CUT (yellow) pedal	COAG **20 W** COAG (blue) pedal	CUT Blend 2 **40 W** CUT (yellow) pedal	
Valleylab Force 40	COAG- Fulgurate **15-25 W** COAG (blue) pedal	CUT Blend 1 **25 W** CUT (yellow) pedal	COAG- Fulgurate **20 W** COAG (blue) pedal	CUT Blend 1 **50 W** CUT (yellow) pedal	

Polypectomy



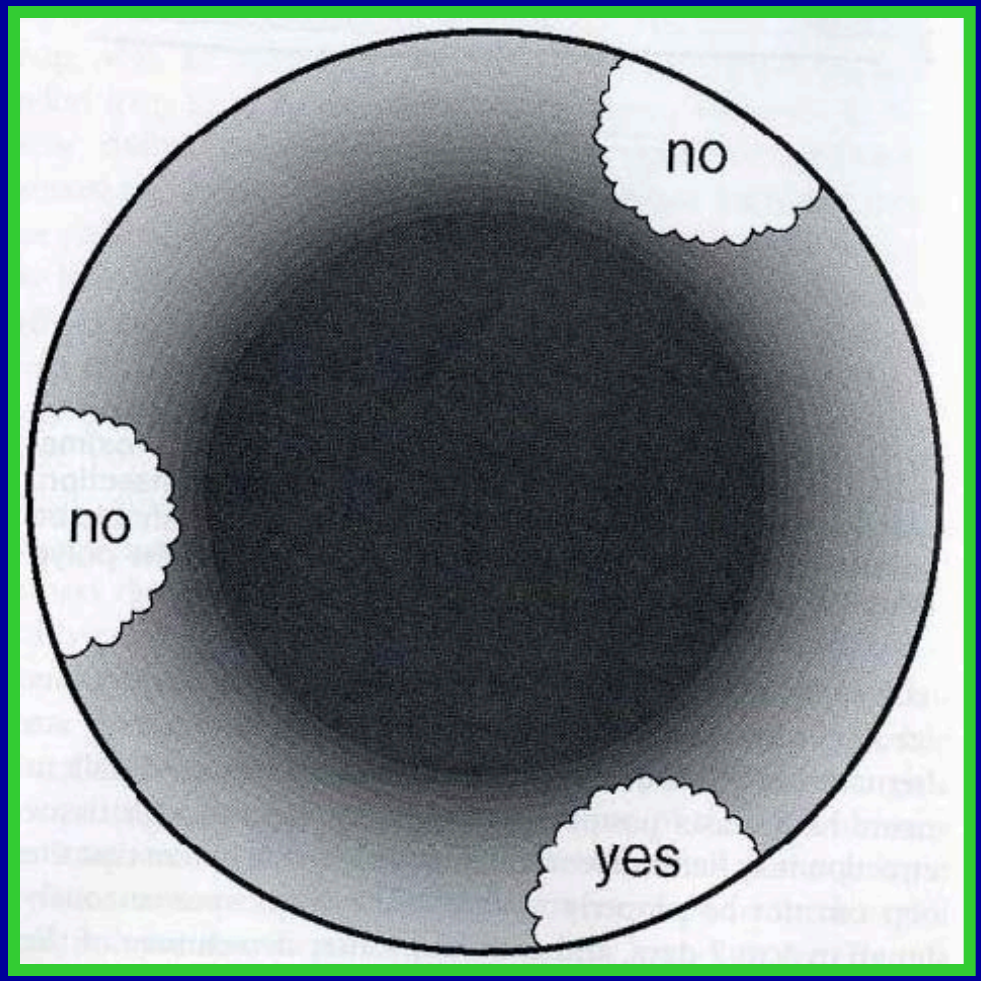
Polypectomy

Some Tools of the trade



Polypectomy

Scope orientation



Polypectomy

Scope orientation

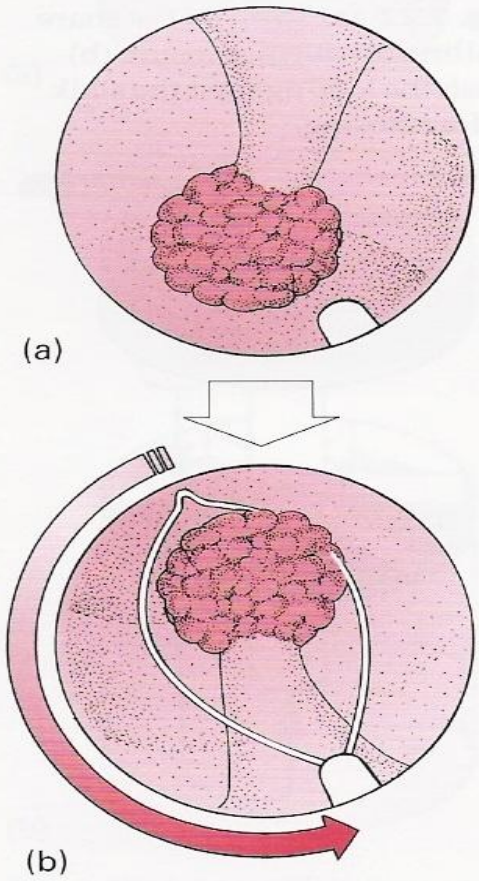
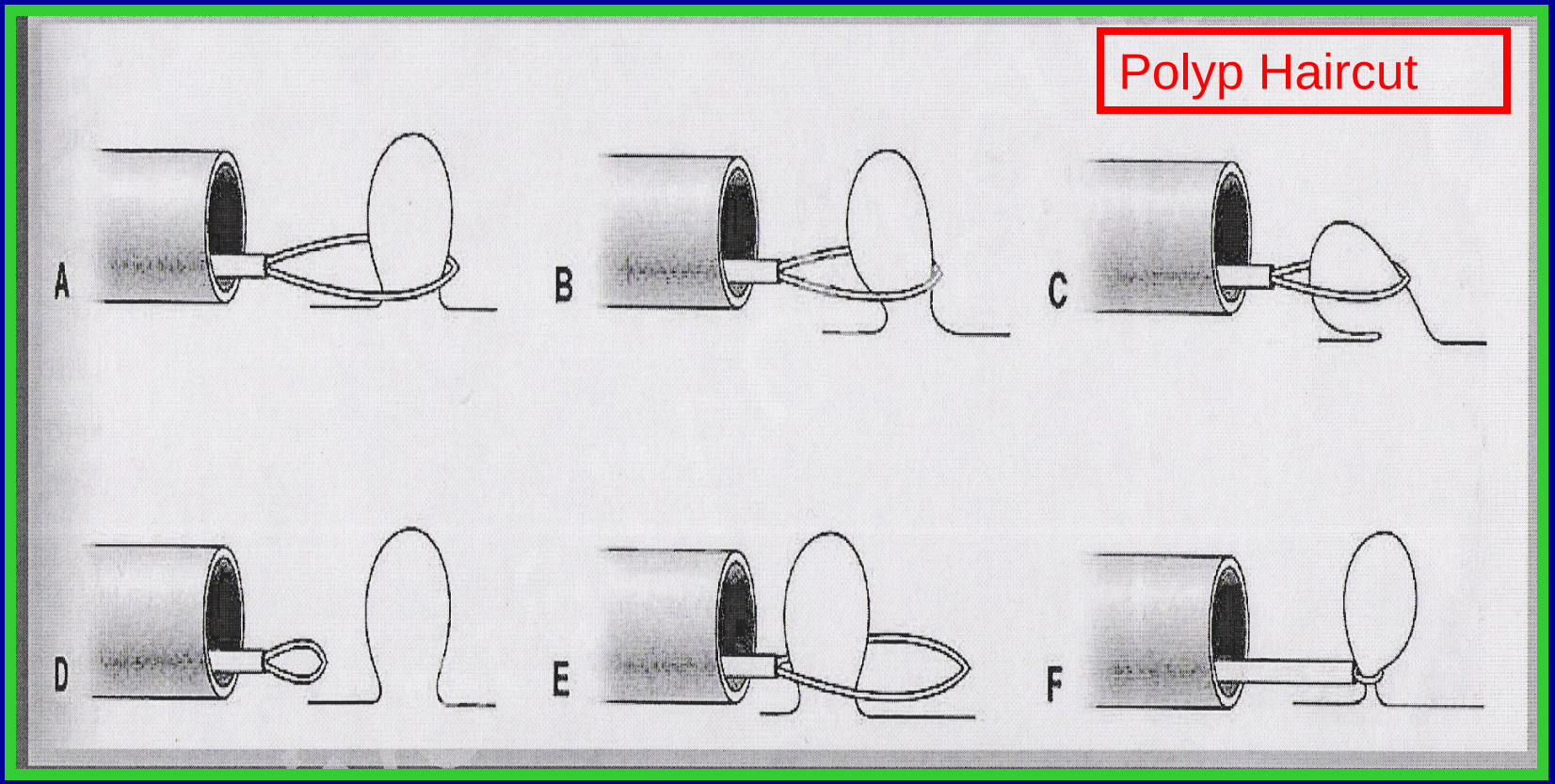


Fig. 7.21 (a) Bad position for snare placement? (b) Rotate the instrument to get a better working position and view.

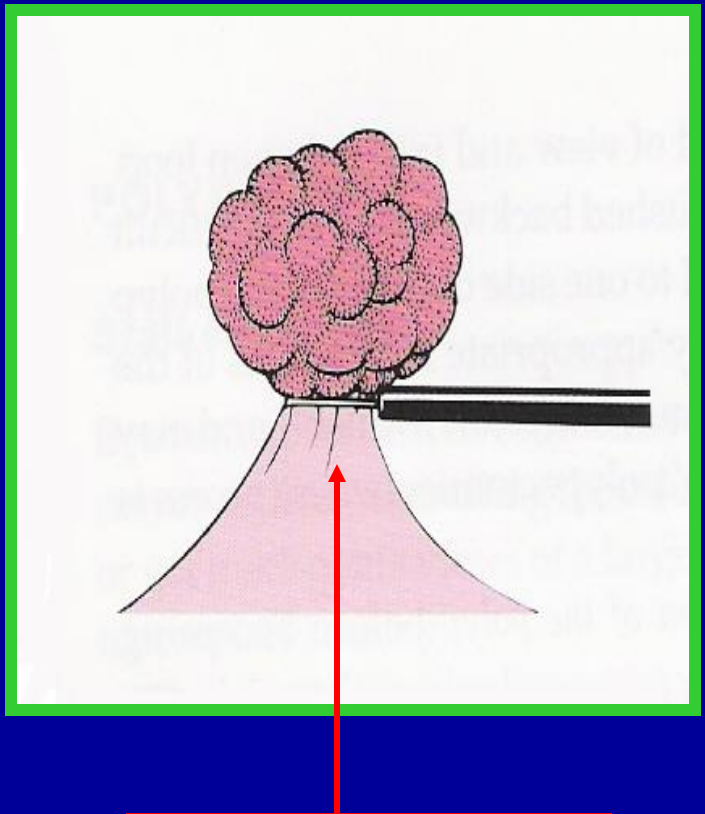
Polypectomy

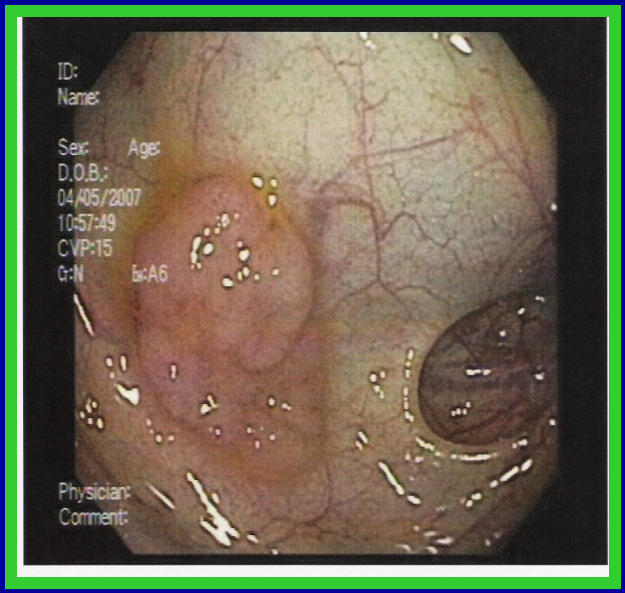
Positioning the snare

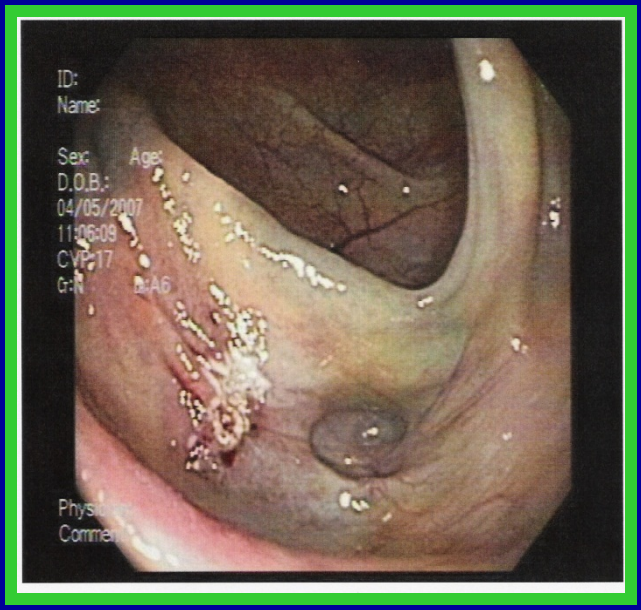


Simple Polypectomy

Small sessile polyps

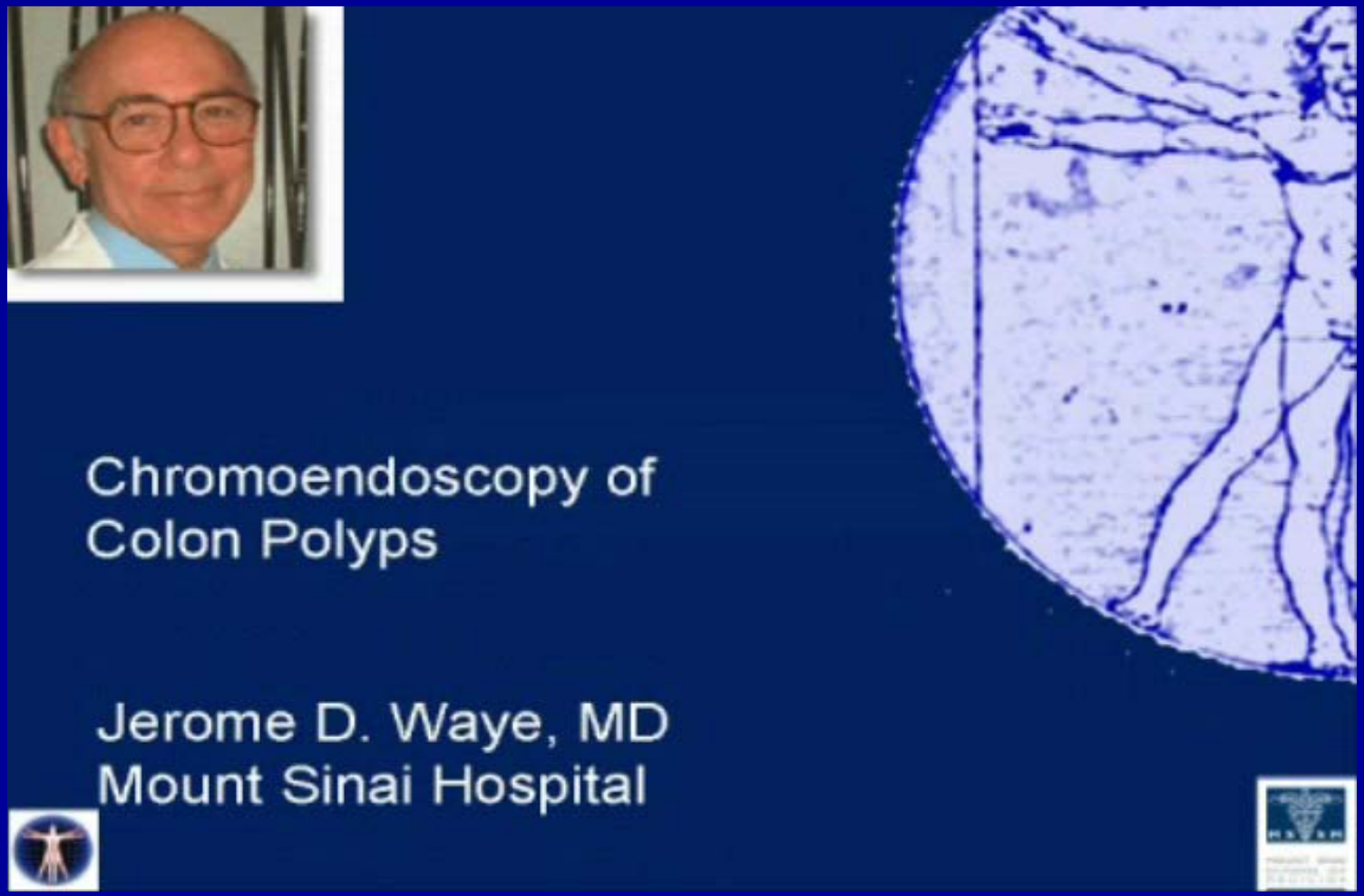






Simple Polypectomy

Small sessile polyps



Pit Pattern Classification in Colonoscopy

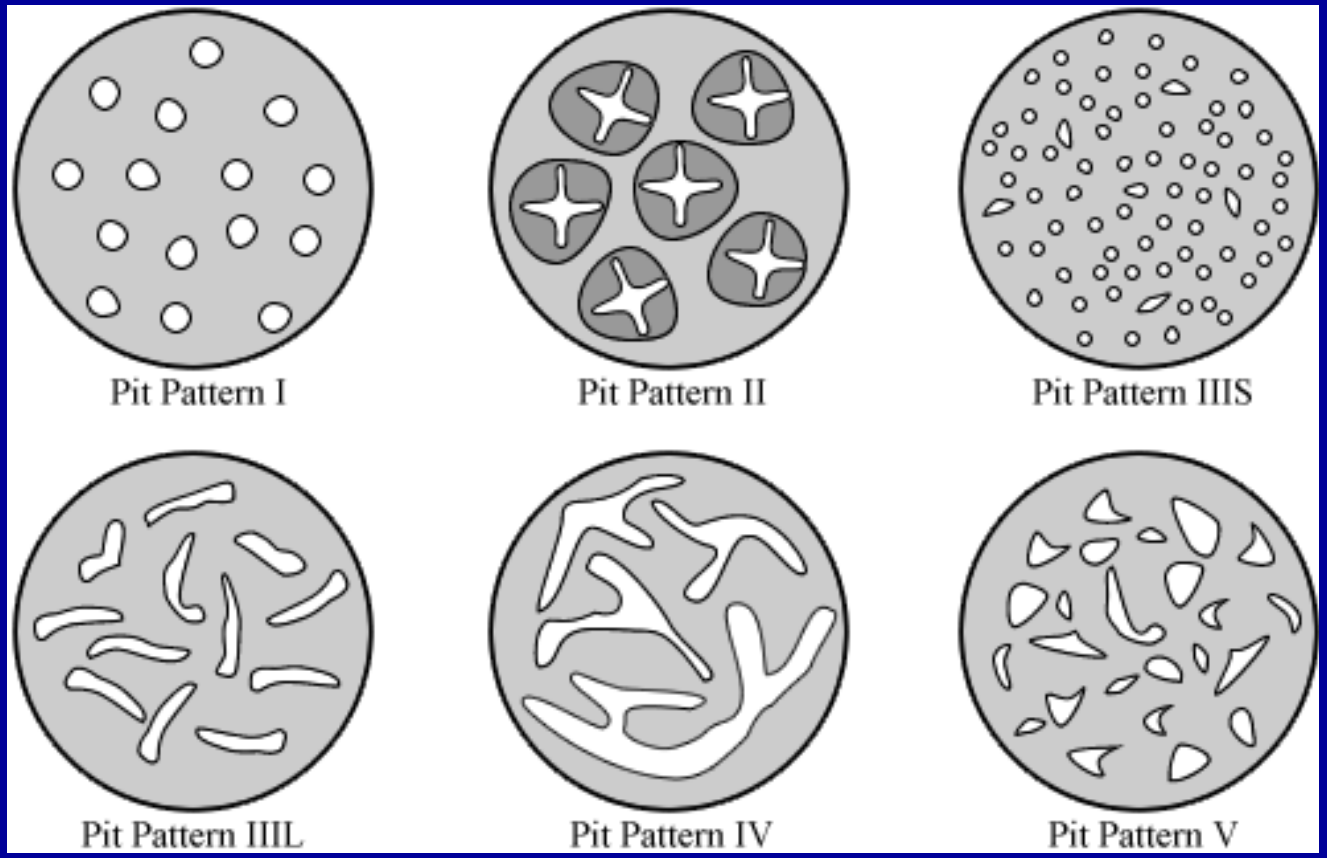
Kudo Pit pattern classification

- based on the pit patterns of the colonic mucosa
- differentiation between 5 types of pit patterns:
  - Type I to type V
  - Type III has sub types III-S and III-L

Type I and II are benign (Hyperplastic)

Type III to V are (pre) malignant

Different pit pattern types



Characteristics of the different pit pattern types

Pit pattern type	Characteristics
I	roundish pits
II	stellar or papillary pits
III S	small roundish or tubular pits (smaller than type I pits)
III L	large roundish or tubular pits (larger than type I pits)
IV	branch-like or gyrus-like pits
V	non-structured pits

In real life classification is not really that easy

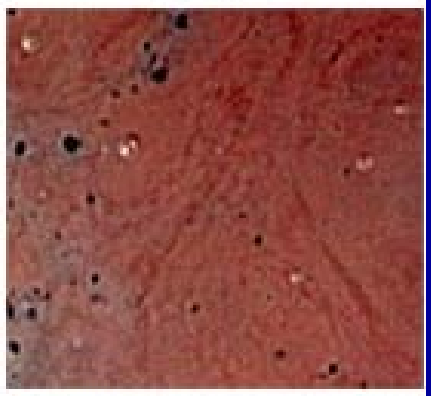
Pit Pattern I

Pit Pattern II

Pit Pattern IIIS

Pit Pattern IIIL

Pit Pattern IV



Pit Pattern V

Hyperplastic polyp

The Paris endoscopic classification of superficial neoplastic lesions: esophagus, stomach, and colon

November 30 to December 1, 2002

Participants in the Paris Workshop

Paris, France

type 0 - superficial polypoid, flat/depressed, or excavated tumors

type 1 - polypoid carcinomas, usually attached on a wide base

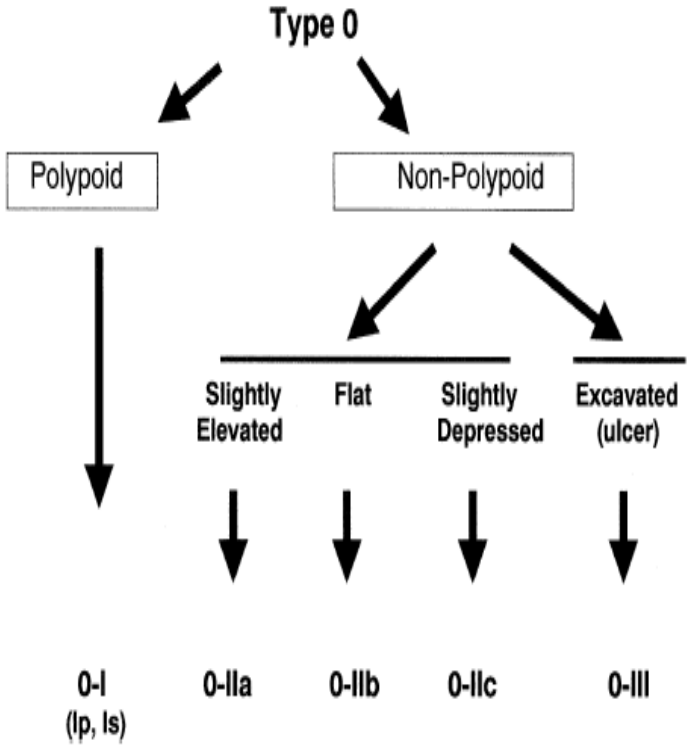
type 2 - ulcerated carcinomas with sharply demarcated and raised margins

type 3 - ulcerated, infiltrating carcinomas without definite limits

type 4 - nonulcerated, diffusely infiltrating carcinomas

type 5 - unclassifiable advanced carcinomas

Table 2. Neoplastic lesions with "superficial" morphology



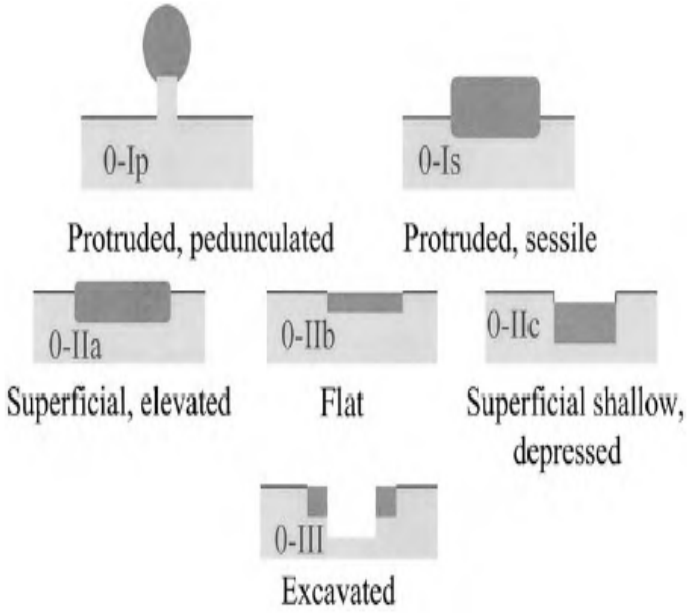
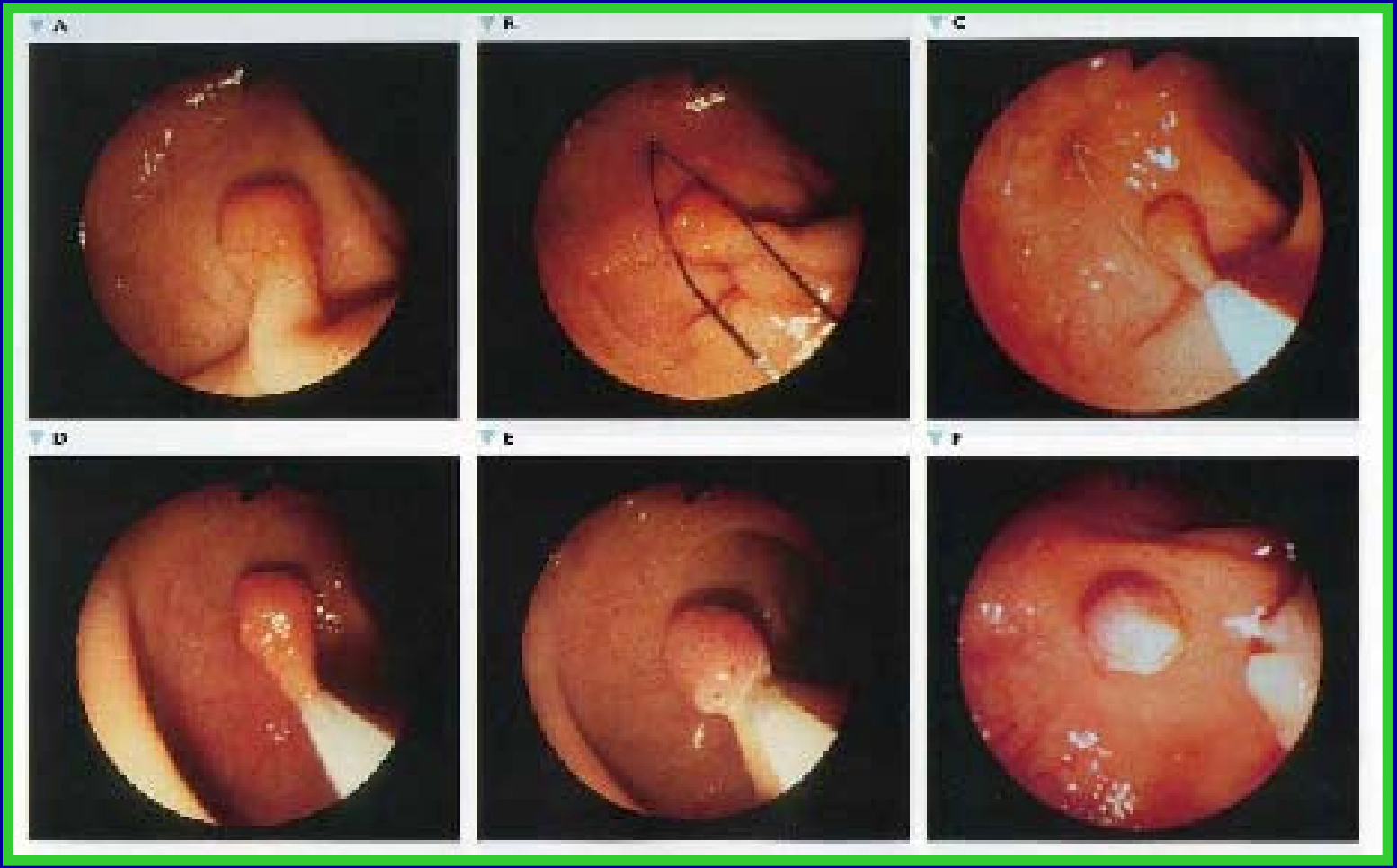


Diagram 1. Schematic representation of the major variants of *type 0* neoplastic lesions of the digestive tract: polypoid *(Ip and Is)*, non-polypoid *(IIa, IIb, and II c)*, non-polypoid and excavated *(III)*. Terminology as proposed in a consensus macroscopic description of superficial neoplastic lesions.[15]

Simple polypectomy

Small pedunculated polyp

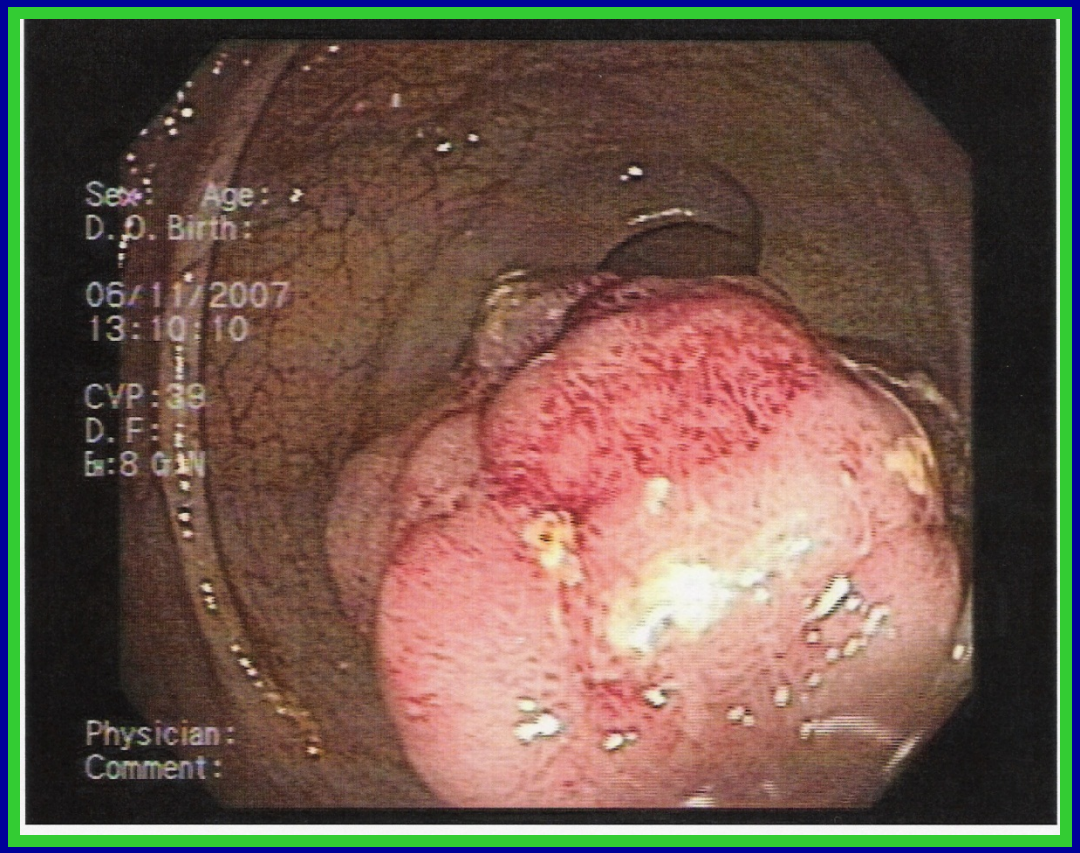


Simple polypectomy

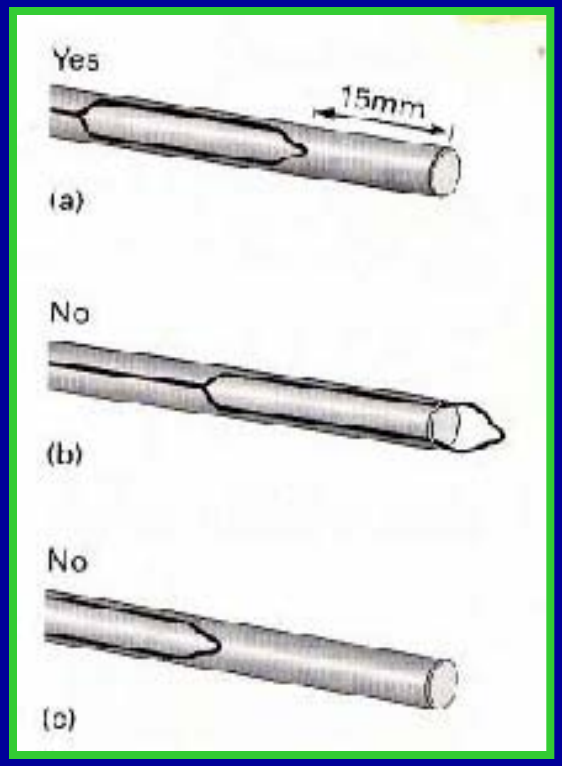
Small pedunculated polyp

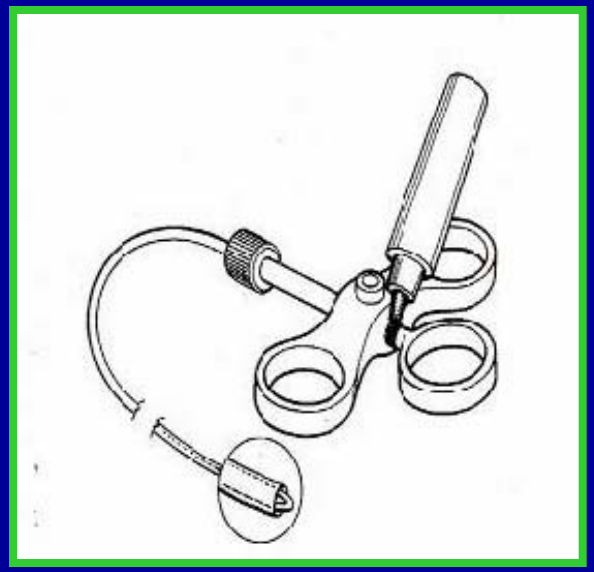
Difficult polyps

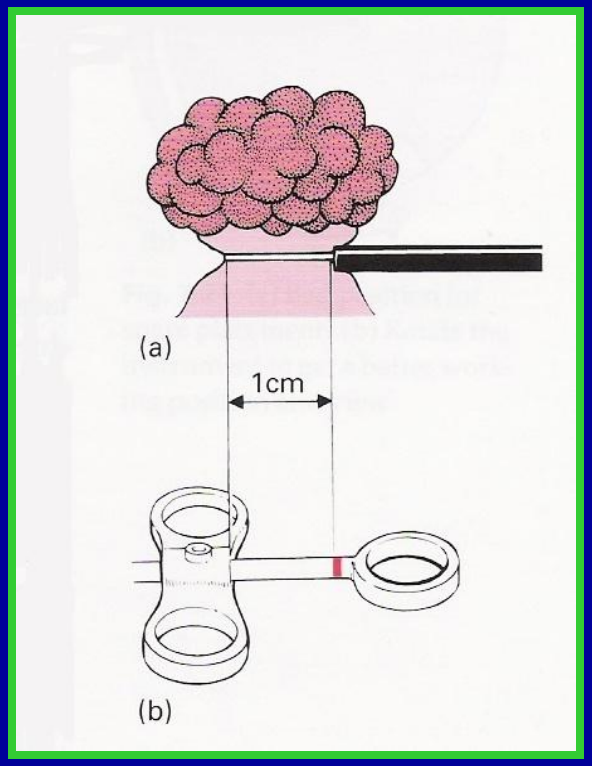
- Large sessile polyps
- Pedunculated polyps with thick stalks



Marking the snare







Saline Lift

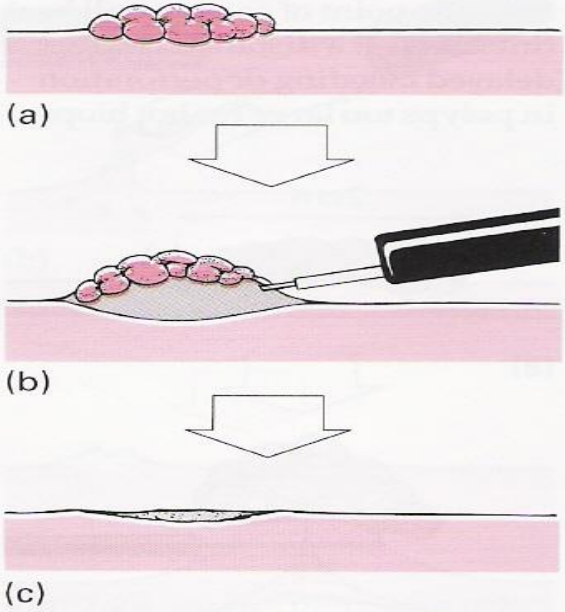


Fig. 7.34 Injection polypectomy. (a) A small sessile polyp ... (b)... is elevated by submucosal saline injection ... (c)... and snared off in one piece.

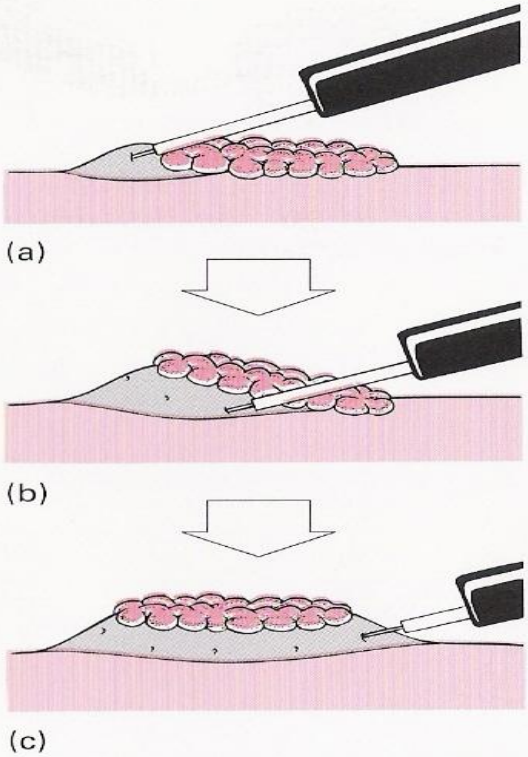


Fig. 7.35 (a) First inject *proximally* to a larger sessile polyp... (b)... then around the periphery ... (c)... to elevate it completely before snaring.

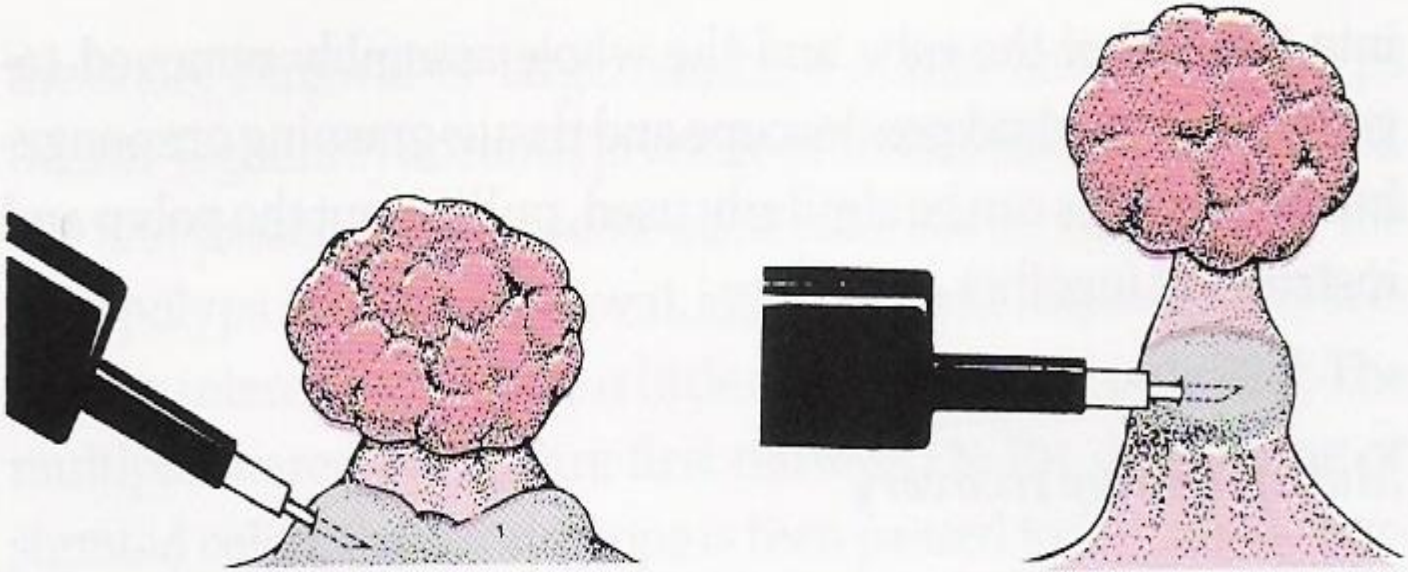
Table 4. Substances Used for IAP (Submucosal Cushion)

Normal saline solution (0.9%)
Normal saline + epinephrine (1:10,000 or 1:100,000)
Hypertonic glucose (dextrose) (20%, 30%, 50%)
Hypertonic saline (3%–4.7%) + epinephrine (0.01%) + glucose (dextrose) (50%)
Normal saline + glucose (dextrose) (50%) (50/50)
Saline + methylene blue (0.5%)
Sodium hyaluronidate (hyaluronic acid) (0.5%)
Fibrinogen
Albumin
Autologous blood
Gylcerol
Hydroxypropyl methyl celullose (methylcellulose)

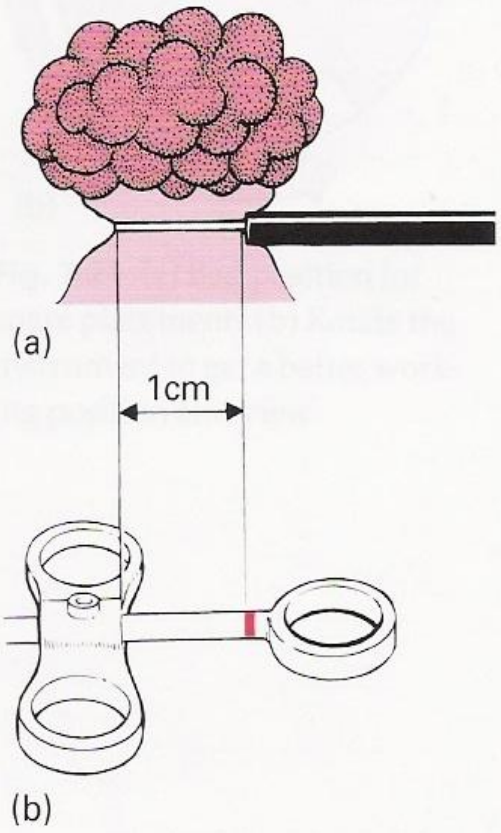
Table 5. Seven Steps to Generate an Appropriate Submucosal Cushion or IAP

1. Place polyp in adequate position (5 o'clock)
2. Inject in oral (proximal) region, ie, behind polyp
3. The needle should only penetrate just barely into the mucosa
4. Needle should enter base of polyp at a less than 30-degree angle, almost tangentially
5. Cecum versus rectum (since saline disappears fast in rectum, use diluted epinephrine or a mixture of dextrose 50% with saline; in cecum use only saline or epinephrine:normal saline, 1:100,000)
6. It is not necessary to inject in all 4 quadrants if an adequate raise observed
7. Coordinate with assistant: do not inject forcefully, inject while retrieving the needle

Big pedunculated polyps



Big pedunculated polyps



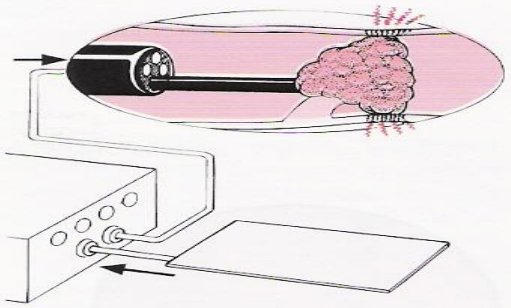


Fig. 7.38 'Leak' current can result in contralateral burns.

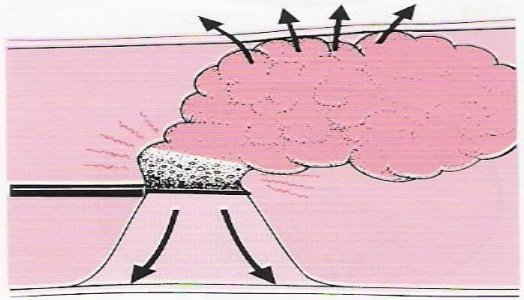


Fig. 7.39 A large area of contact reduces the risk of contralateral burn, but also reduces current flow and heat coagulation in the lower stalk.

Big pedunculated polyps

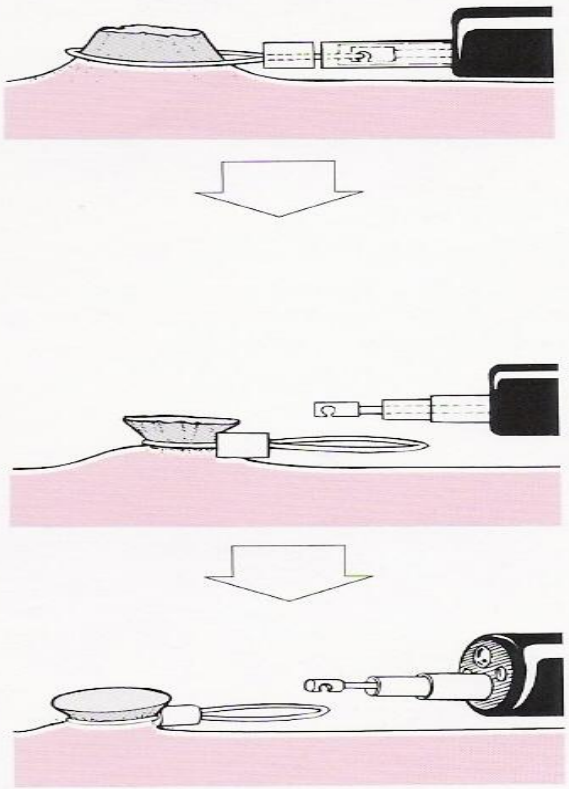
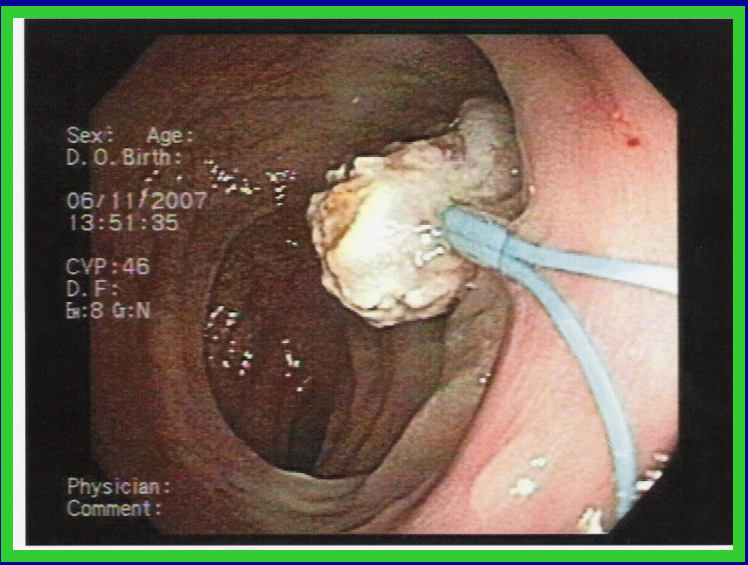


Fig. 7.41 (a) A nylon self-retaining loop can be placed over a large stalk ...(b)... and its self-retaining cuff tightened; (c)... and the loop unhooked leaving the stalk strangulated.



Big polyps

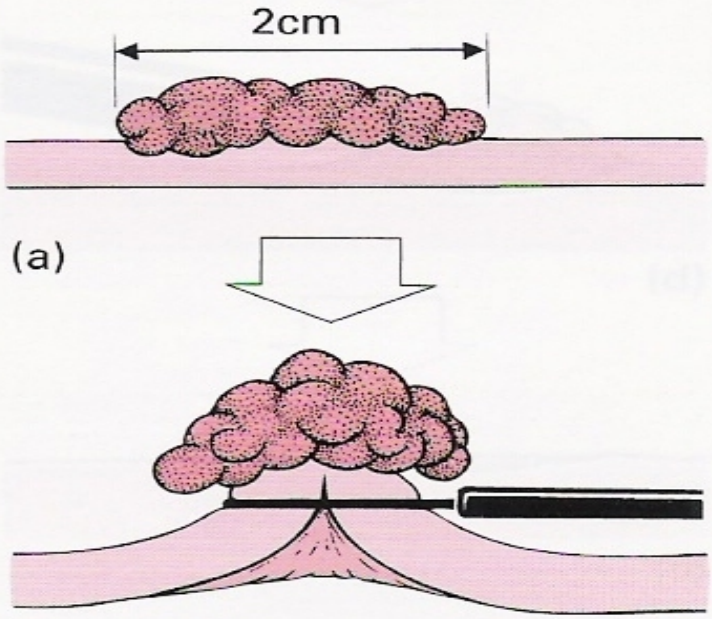


Fig. 7.32 (a) Sessile polyps can be risky to snare in one portion… (b)…because 'tenting' results.

Big polyps
Piecemeal polypectomy

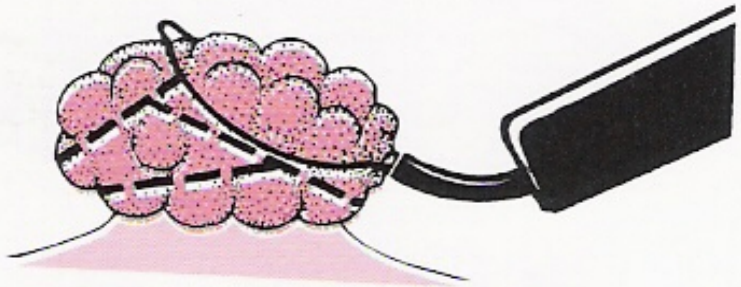
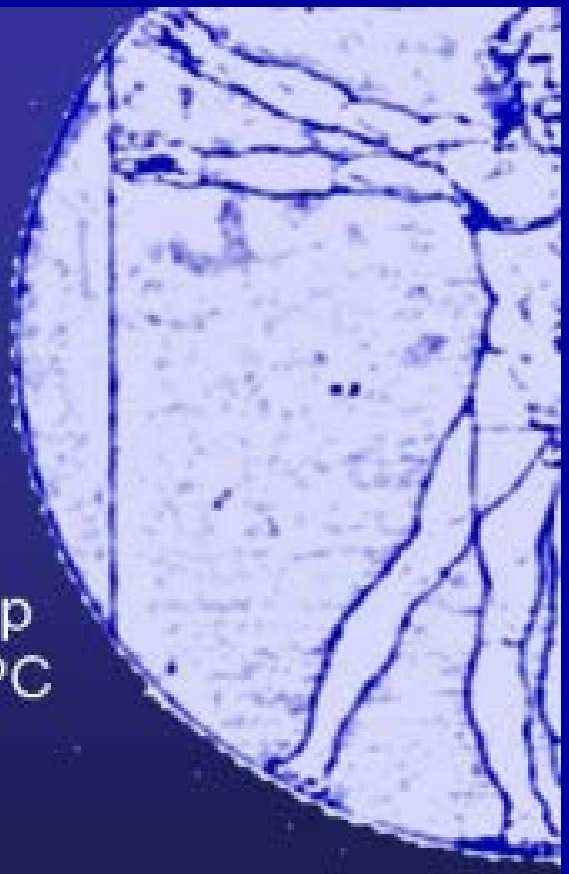
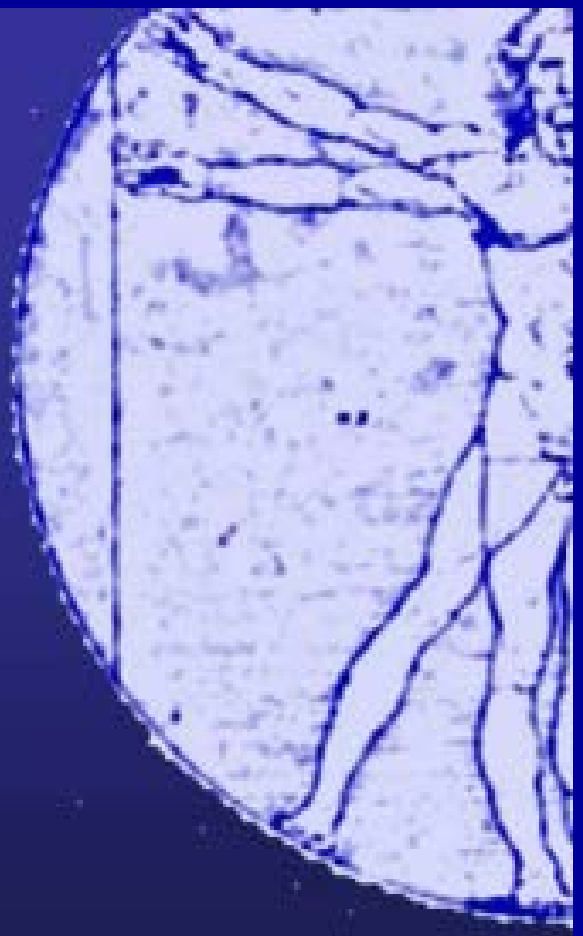


Fig. 7.33 Piecemeal removal is safer (although less satisfactory for the pathologist).



Piecemeal Resection of a Large Polyp Using a Saline Lift Technique and APC

Jerome Waye, MD
Mount Sinai Hospital



Snare Resection Using a Saline Lift Technique and Tattooing with SPOT for Follow-up

Jerome Waye, MD
Mount Sinai Hospital

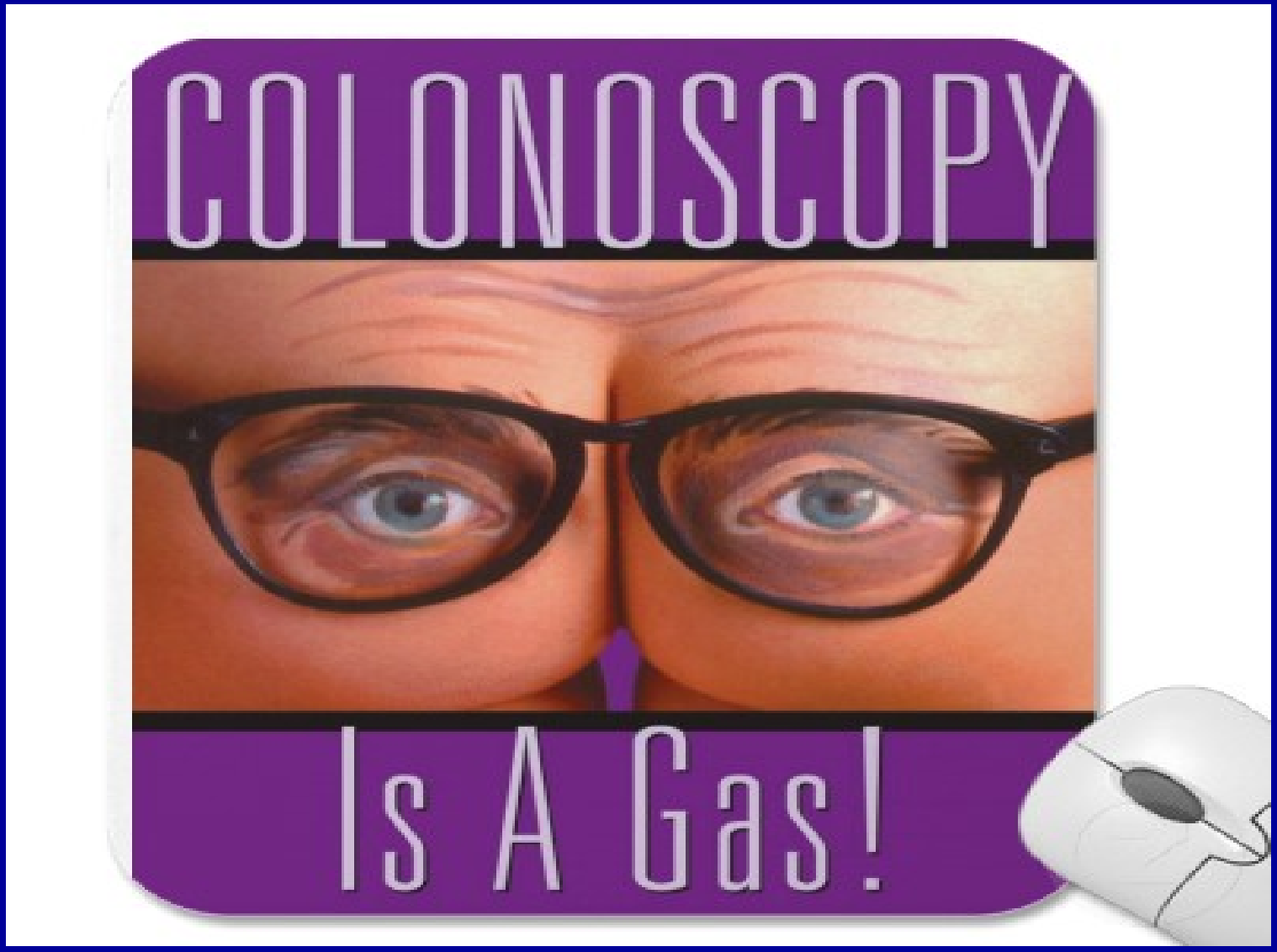
Difficult Polyps

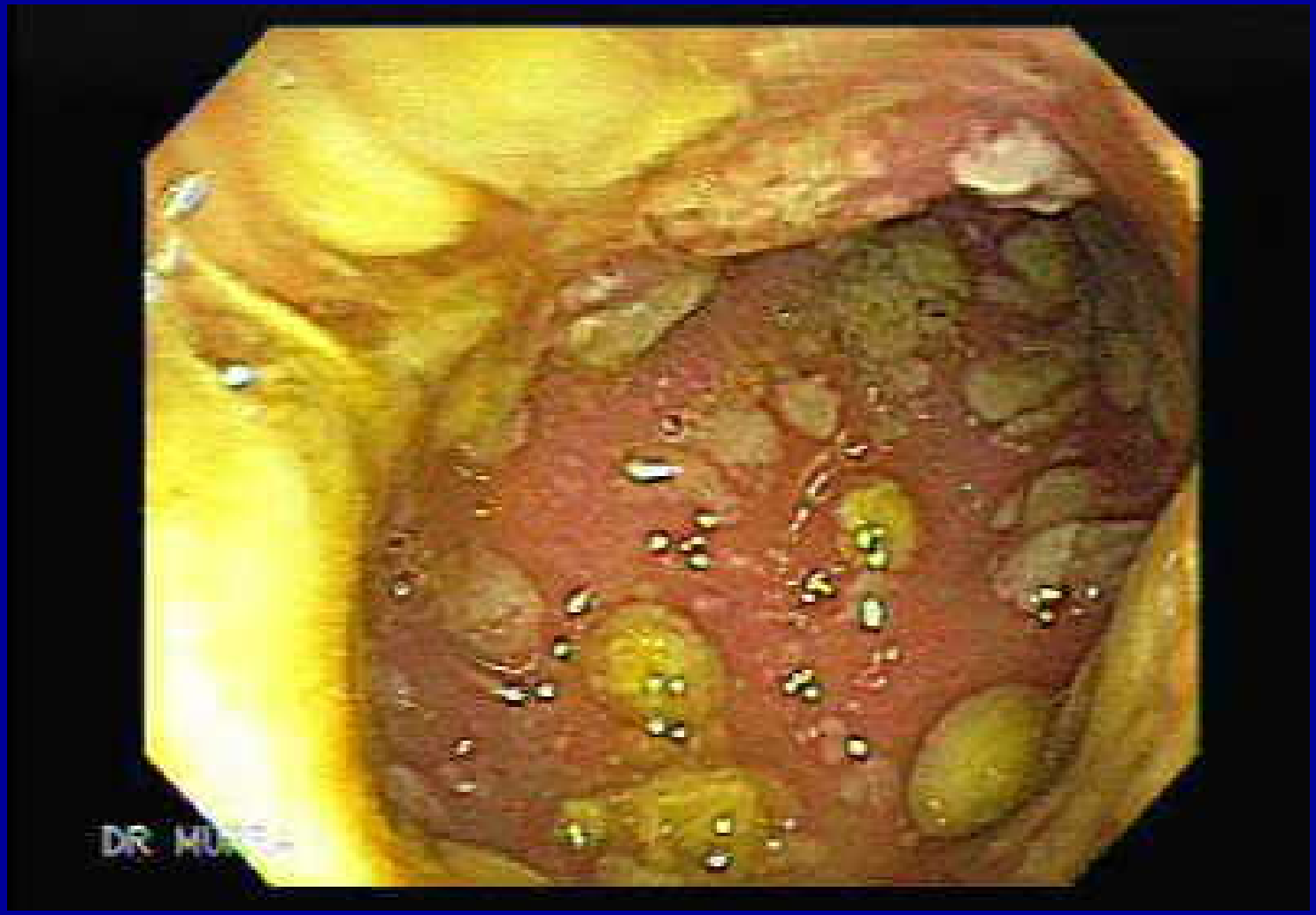
- OK to retroflex-
  Peds / EGD scope preferable

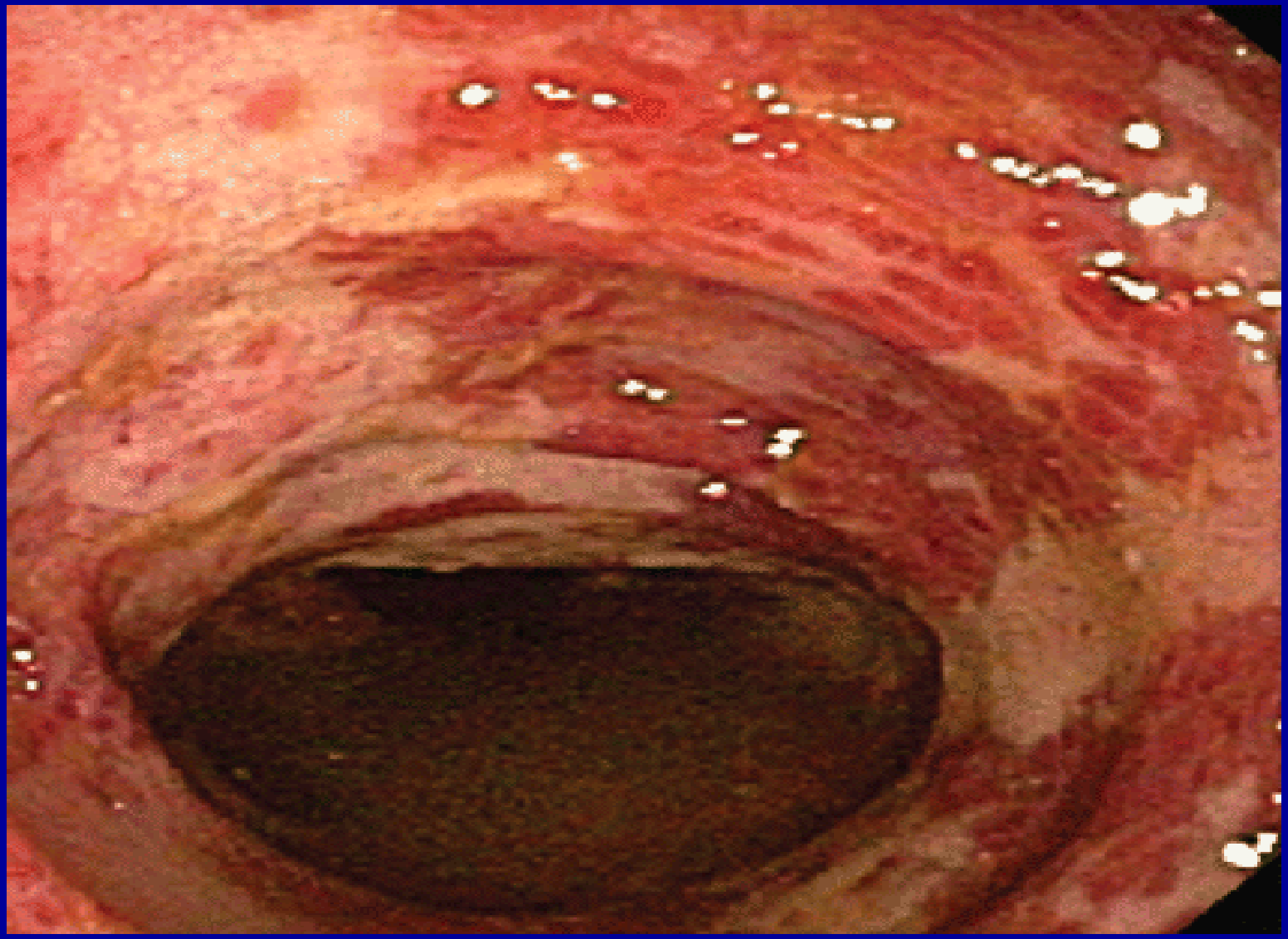
- Duodenoscope

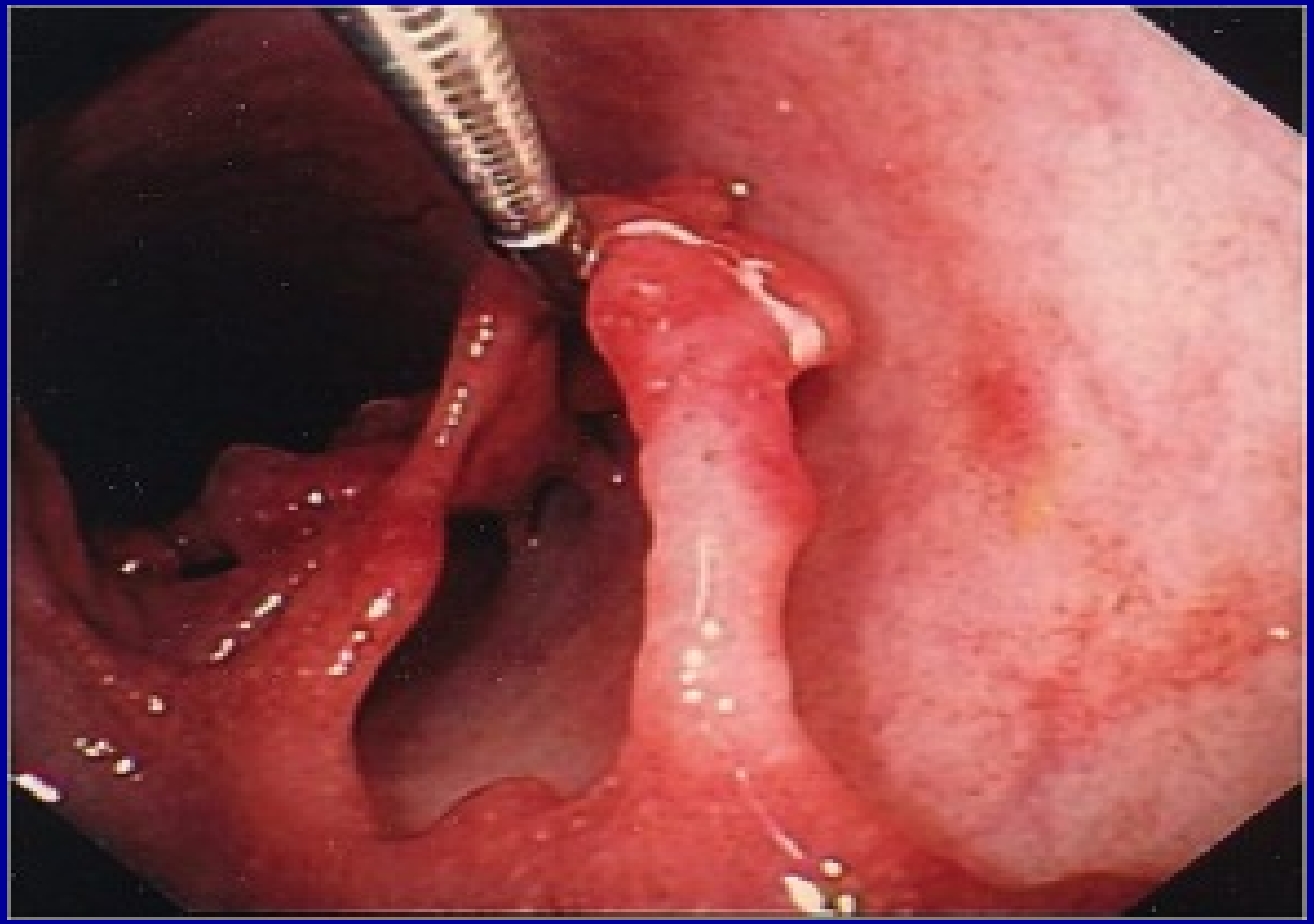
Table 2. Technical Pearls to Deal With Difficult Polyps

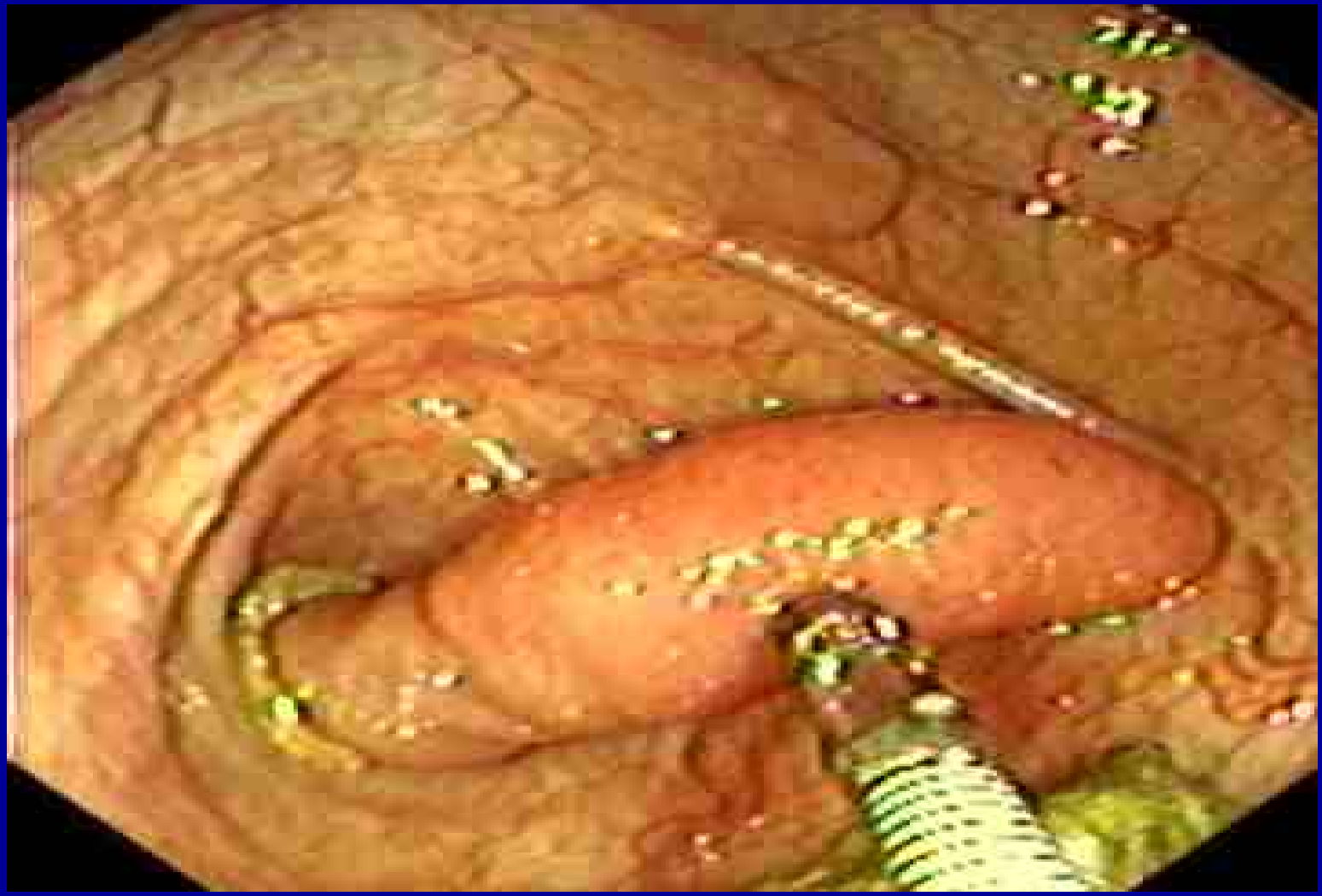
	Difficult polyps	Technical pearls
Morphology	Sessile >1 cm	Use IAP
	On top of folds, carpet-shaped (LST) or villous	Use IAP and EMR
Size	<1.5 cm	Resect *in toto* (except cecum)
	Large (>3 cm)	Use IAP and perform piecemeal polypectomy
		Use APC to eliminate remaining tissue
	Big head	Use diluted epinephrine in head
	Thick pedicle	Use clips or loops
Number	Multiple	Send to pathologist separately; resect when going in (if small) or when going out (if large)
		If more than 10, resect on separate occasions (≥1 colonoscopy)
Location	Right colon and cecum	Do not use hot biopsy
		Take air out before catching or snaring the polyp
	Behind folds	Inject distally first
	Difficult endoscope position	Change position: 5 o'clock position
		Use abdominal compression
		Have assistant hold the endosocpe
	Suspicious appearing polyp or large, incompletely resected	Mark the polyp site (eg, tattoo with India ink)


COLONOSCOPY
Is A Gas!

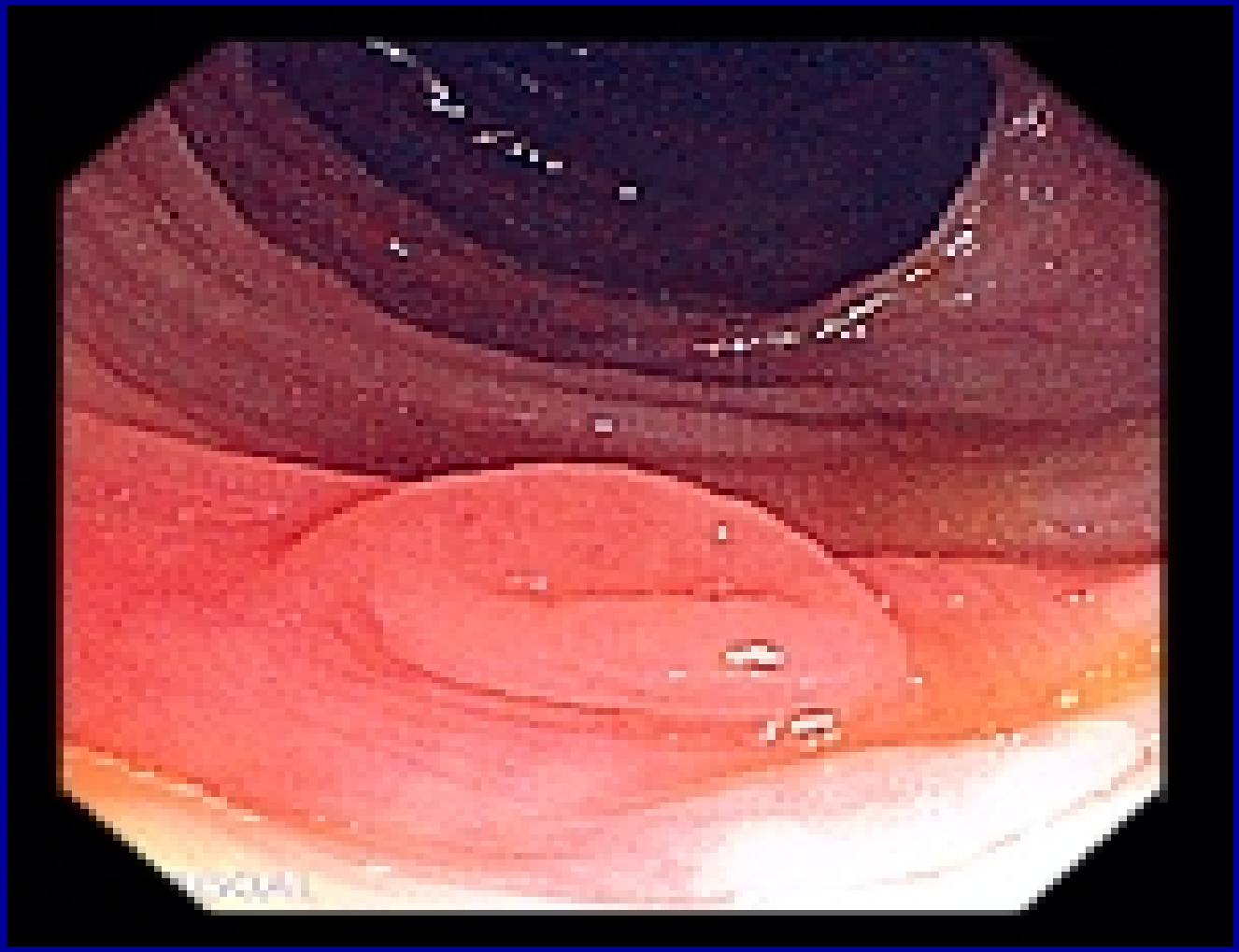




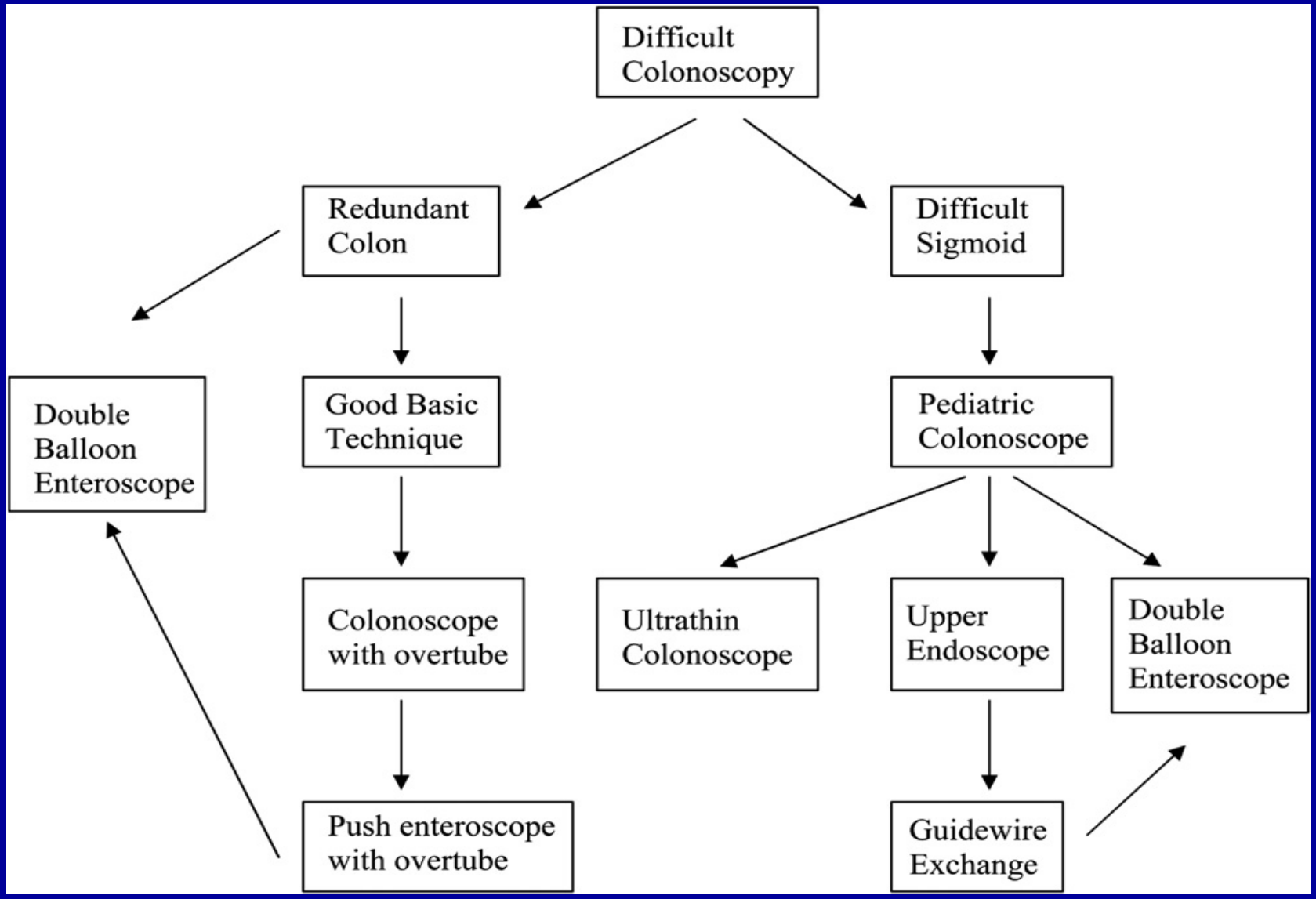


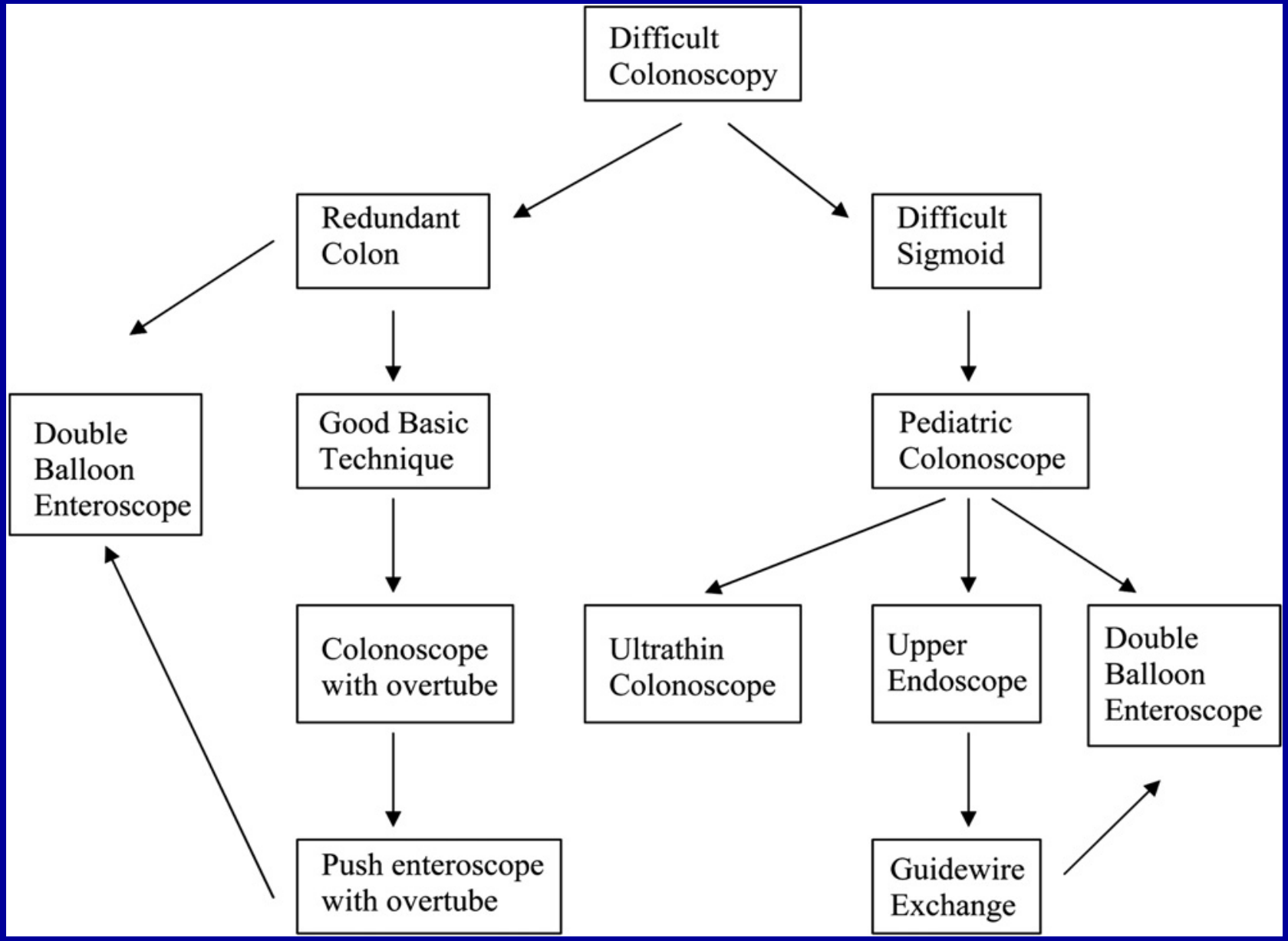



MOUNT SINAI
SCHOOL OF
MEDICINE



THANKS.


Difficult Colonoscopy
Redundant Colon
Difficult Sigmoid
Double Balloon Enteroscope
Good Basic Technique
Pediatric Colonoscope
Colonoscope with overtube
Ultrathin Colonoscope
Upper Endoscope
Double Balloon Enteroscope
Push enteroscope with overtube
Guidewire Exchange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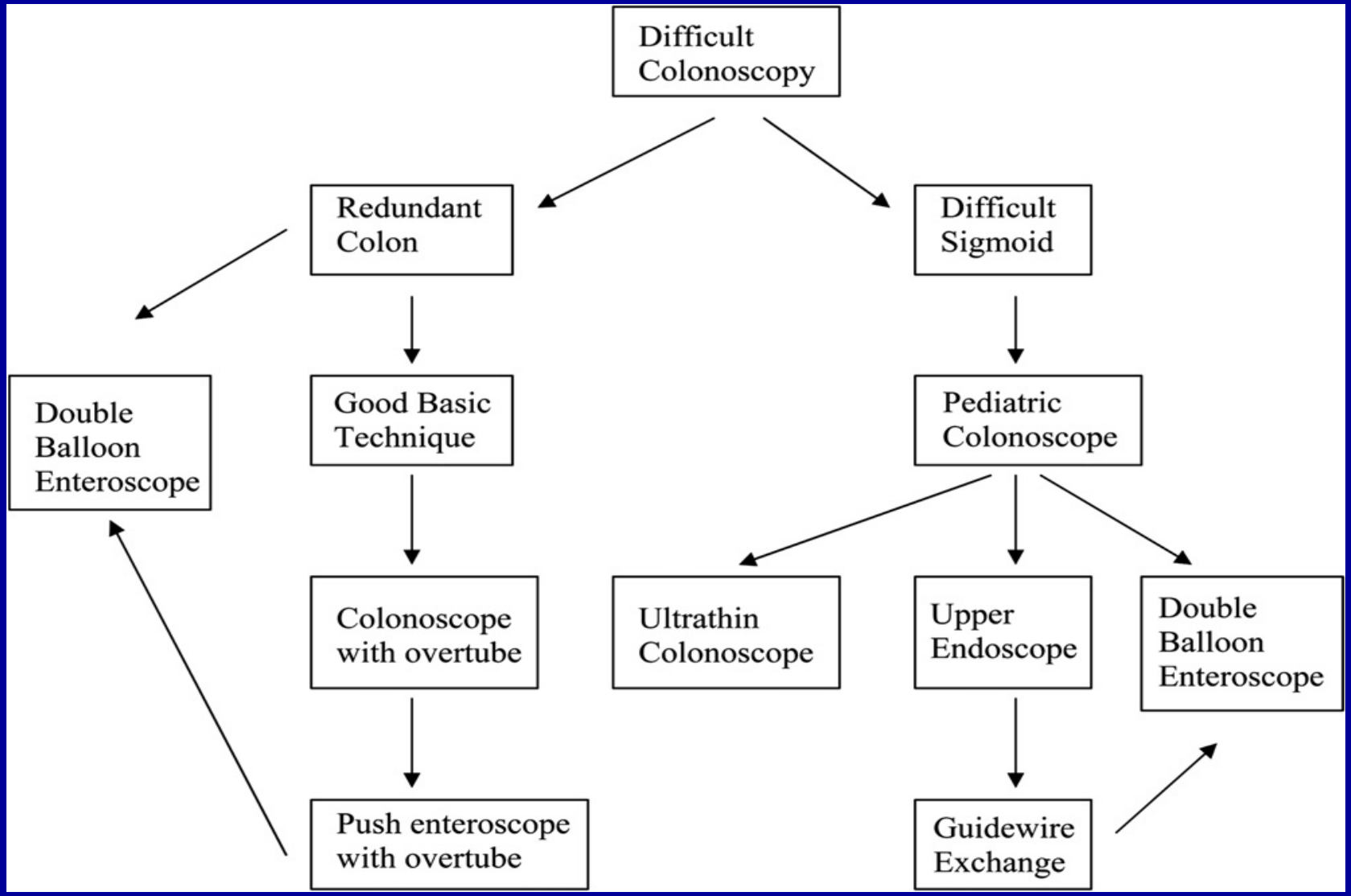

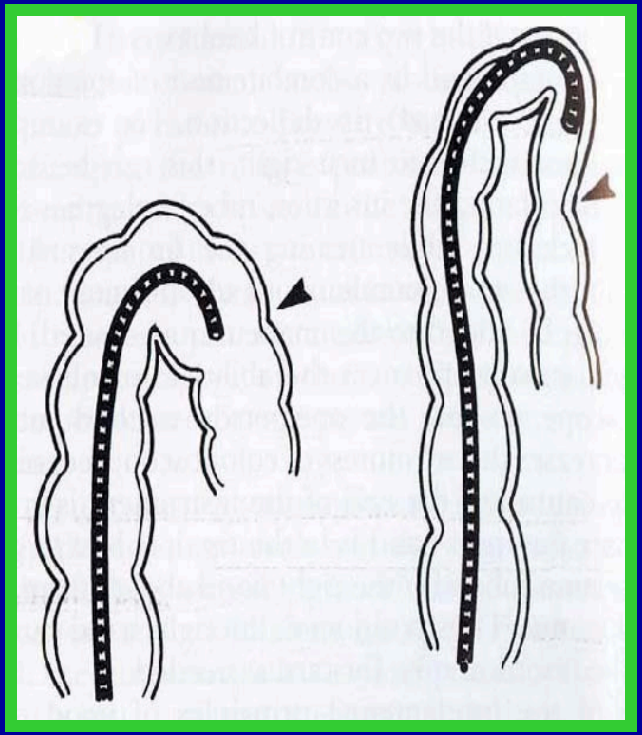

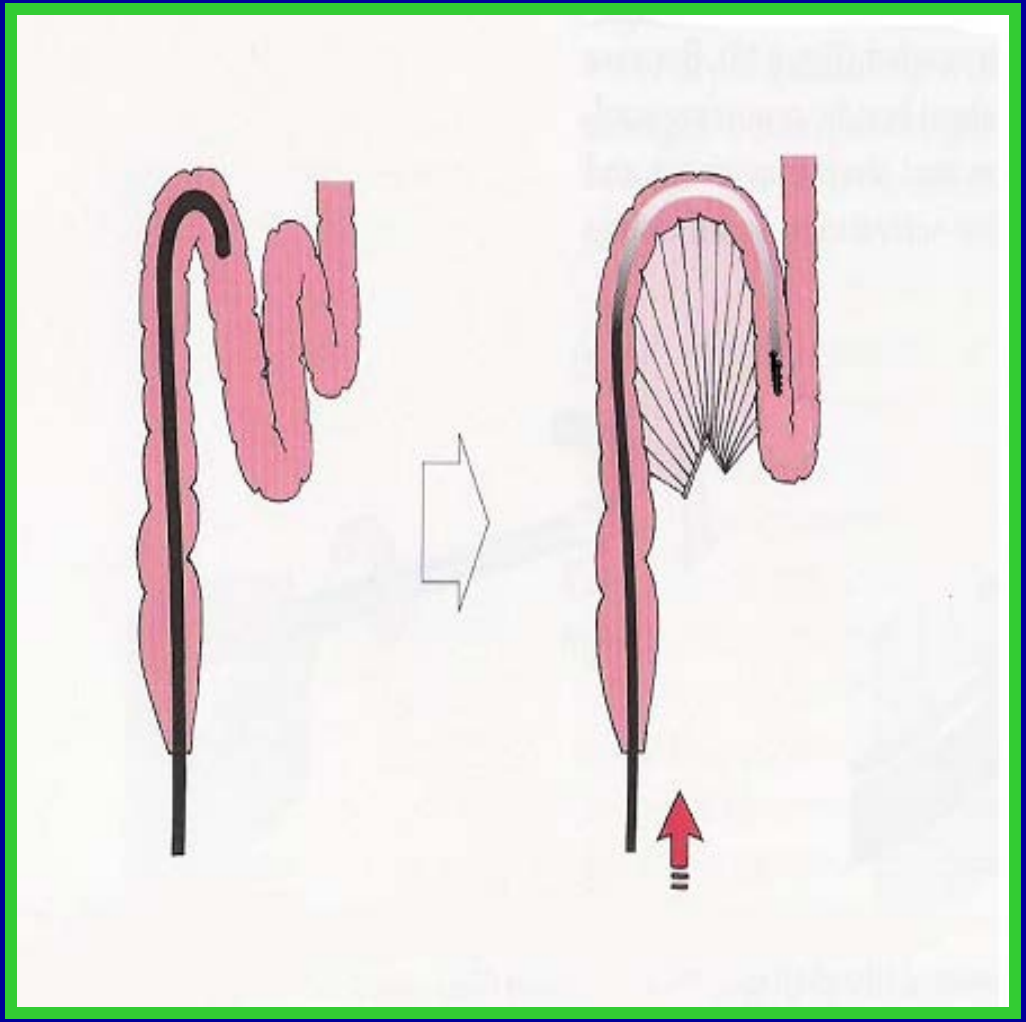

New ideas/articles

- Lubricants
- Unsedated colonoscopy
- Deeply sedated (propofol)
- Chromoendoscopy

Physical Process for Electrocoagulation

Physical Process
Desiccation (Coagulation)

- **Slow heating** of tissue in **close contact**, then **fluid loss with bubbling**, then **steam release with cooling**, then **slow heating** of tissue in close contact, then …
- The effect of Desiccation/Coagulation, is HEMOSTASIS.
- Best Instrument: Microbipolar (no fulguration).
- Alternative: Monopolar coagulation @ 20-30 W, or Blend-cut with high-CREST (3 or more) @ 20-40 W
- If setting is too low, may desiccate too deep.
- If too high and monopolar, may give deep fulguration.
- Pressing on wall increases burn depth **(pull in Hot Bx.)**

Physical Process
Fulguration

- **Electrode not in contact** with tissue (or insulated by desiccated tissue): **ionization** of surrounding air, then **long spark** with high current density, then **superficial coagulation**, then (if you continue) **deep necrosis with black eschar**
- Best instrument: Argon Plasma Coagulator @ 40-60 W.
- Alternative: Monopolar coagulation, or Blend-cut with high-CREST at high setting.
- High risk of transmural necrosis with prolonged burn (continuous “painting” in APC).

Physical Process
Cutting

- In low resistant tissue (GI mucosa): **Initial desiccation**, then **increased tissue resistance**, then **short spark**, then **very rapid tissue heating**, then **intracellular boiling**, then **cell explosion**, then **steam release**, then **desiccation**, then increased tissue resistance, then, …
- Needs water in tissue (not desiccated) and **loose contact** (short sparks).
- Works better with high-continuous energy 60-100 Watts