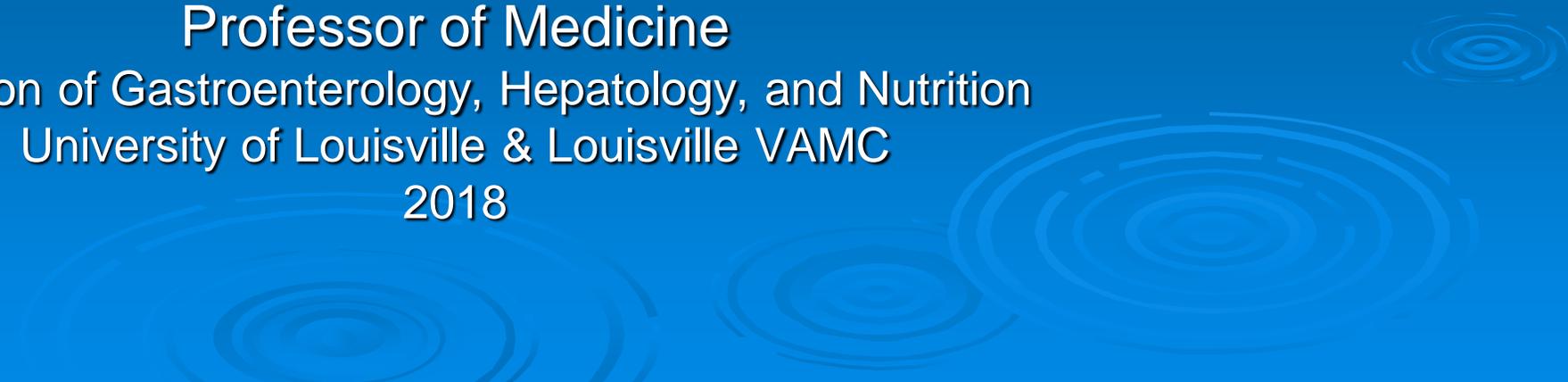


# Miscellaneous Basic Techniques in Endoscopy

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2018



# Ergonomics



# Ergonomics in Endoscopy

GASTROINTESTINAL ENDOSCOPY 2010;72:227-235

- Monitor: Optimal viewing angle is **15 to 25° below the eyes horizon**
  - middle of the screen at or below eye level
  - center of monitor adjustable between 93 and 162 cm (36.6-63.8 inches)
- Optimal monitor distance not formally studied in GI endoscopy,
  - depend on monitor size, image clarity, and endoscopist preference
  - between 52 and 182 cm (20.5-63.8 inches).
- Endoscope insertion tube should be held by the right hand between **elbow height and 10 cm below elbow height**
  - procedure table adjustable between 85 and 120 cm (33.5-47.2 inches)

# Ergonomics in Endoscopy

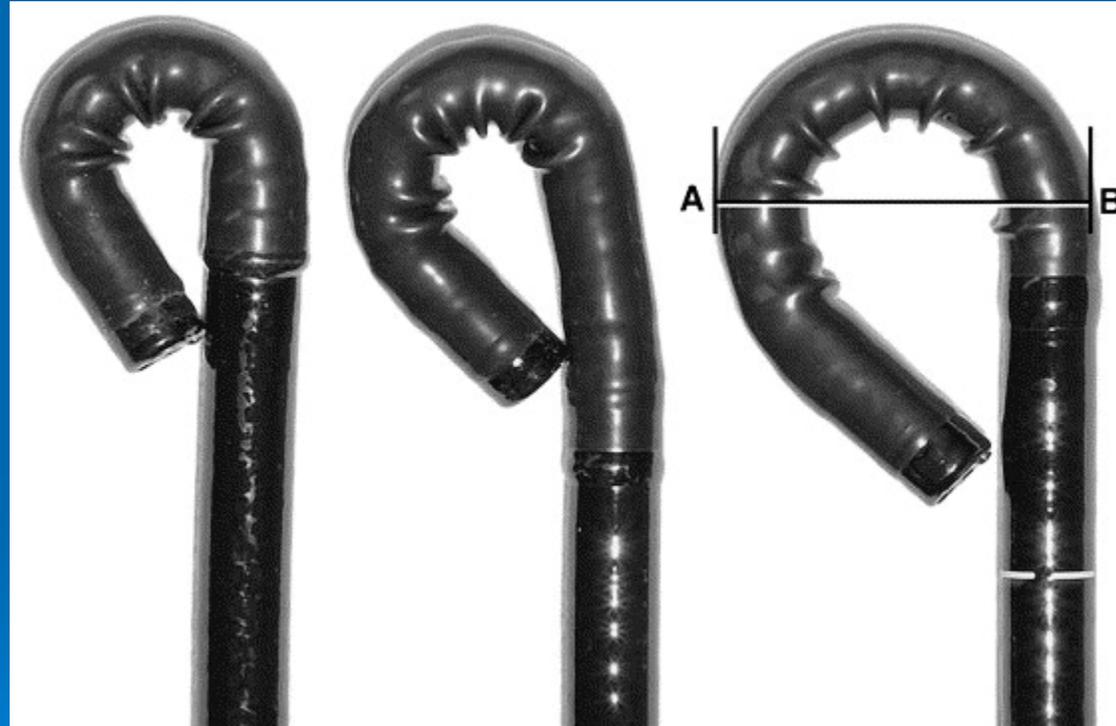
GASTROINTESTINAL ENDOSCOPY 2010;72:227-235

- Use of lead aprons not systematically studied in ERCP
  - a 9.1 kg lead apron can apply a load of 2068 kPa (300 lb per square inch) in the intervertebral disc space,
  - a 2-piece lead apron load distributes the load between the spine and pelvis
- Cushioned mats may decrease standing fatigue
  - cause minor postural instability, leading to subtle movements of the muscles that can increase blood flow to the legs

# Angulation of Endoscopes (Degrees)

	<b>UP</b>	<b>DOWN</b>	<b>Right &amp; Left</b>
<b>EGD</b>	210	90	100 & 100
<b>Colon/FS</b>	180	180	160 & 160
<b>Duodenoscope</b>	120	90	110 & 90
<b>Enteroscope</b>	180	180	160 & 160

# Full Retro-flexion and Retro-flexion Radius



# Extraction



# Timing for Endoscopy in Ingested Foreign Bodies

GASTROINTESTINAL ENDOSCOPY Volume 73, No. 6 : 2011

## ➤ Emergent endoscopy (ASAP)

- Patients with esophageal obstruction (ie, unable to manage secretions)
- Disk batteries in the esophagus
- Sharp-pointed objects in the esophagus

## ➤ Urgent endoscopy (in a.m.)

- Esophageal foreign objects that are not sharp-pointed
- Esophageal food impaction in patients without complete obstruction
- Sharp-pointed objects in the stomach or duodenum
- Objects > 6 cm in length at or above the proximal duodenum
- Magnets within endoscopic reach
- Batteries in stomach with GI symptoms.

## ➤ Non-urgent endoscopy (> 12 h)

- Coins in the esophagus may be observed for 12-24 hours before endoscopic removal in an asymptomatic patient
- Objects in the stomach with diameter larger than 2.5 cm
- Disk batteries and cylindrical batteries that are in the stomach of patients without signs of GI injury may be observed for as long as 48 hours.
- Batteries remaining in the stomach longer than 48 hours should be removed.

# Overtubes

## ➤ Types

- **Short overtube:** airway protection/easy re-intubation
  - Foreign body and banding
- **Long overtube (>50 cm) :**
  - EGD/Foreign body: Protection of EG junction from “sharps”,
  - Enteroscopy: balloon assisted, spiral, or push.
  - Colonoscopy: To prevent colonic “loop” formation.
- **Retrieval-hood:** protect in sharp object removal

## ➤ Placement: overtubes should be mounted over

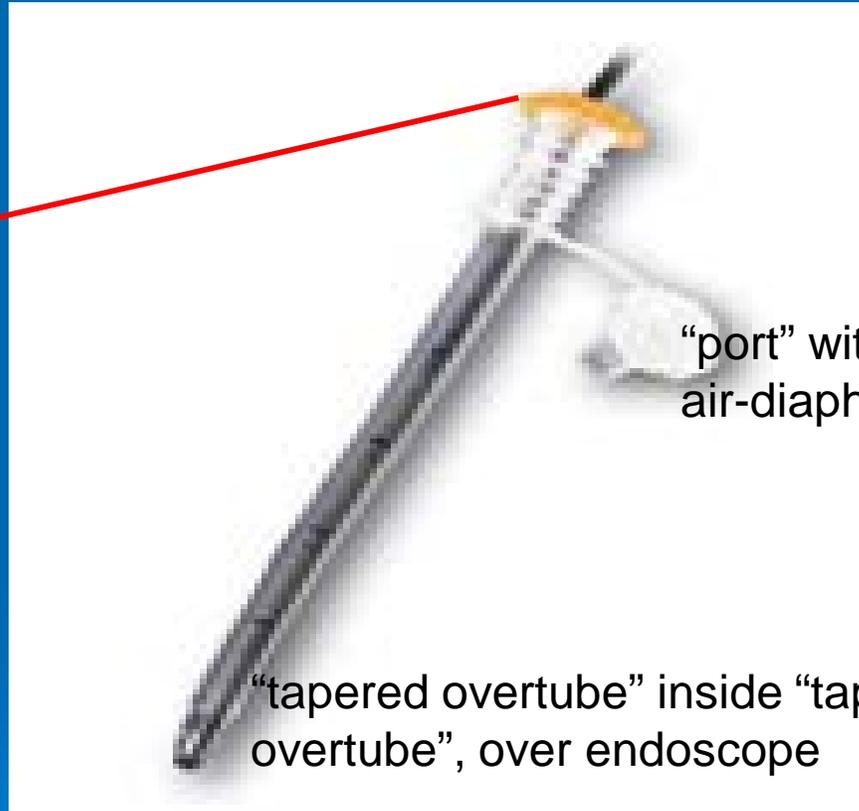
- Closely fitting and well lubricated endoscope (large diameter therapeutic) or
- Closely fitting dilator (Savary, Malloney, or Hurst).

# US Endoscopy Overtube

## Foreign-body Removal

**Yellow ring:**  
Regular scope

**Salmon ring:**  
Therapeutic scope



“port” with  
air-diaphragm



Endoscopy  
Retrieval-Hood  
(Meditherapy)

“tapered overtube” inside “tapered  
overtube”, over endoscope

# Foreign Body Overtubes

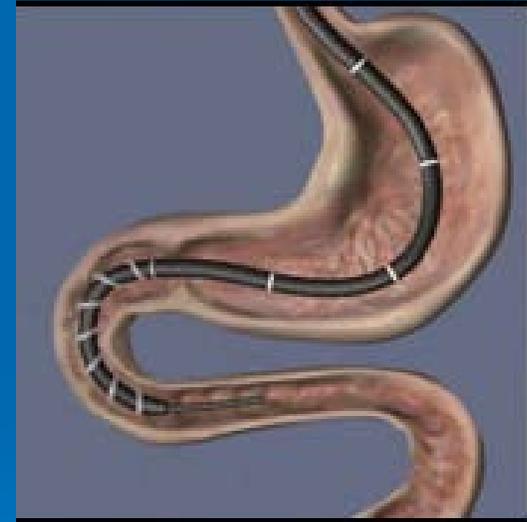
## ➤ Short: (US Endoscopy cat # 00711147)

- For removal of esophageal foreign body or removal of non-cutting gastric foreign body (polyp).
- Depending of distance from gums to obstruction, will be mounted over properly fitting endoscope (short distance to obstruction).
- Color coded: **Yellow** = regular scope; **Salmon** = T-scope

## ➤ Long: (US Endoscopy cat # 00711149)

- For removal of “sharp” gastric foreign bodies.
- Can be mounted in any properly fitting scope.
- Color coded: **Yellow** = regular scope; **Salmon** = T-scope

# Endo-Ease® Endoluminal Advancement System Spiral Enteroscopy



# Tissue Sampling & Documentation



# Optimal Tissue Sampling

- **Forceps Bx:** (8-10 Bx to evaluate for Cancer or patchy disease)
  - A) **Esophagus:** Push, open, pull, turn, suction, & bite.
  - B) **Barrett's:**
    - Only if > 1 cm above gastric folds with esophagus decompressed;
    - Jumbo forceps (Therapeutic scope), 4 quads q 1-2 cm.
  - C) **Eosinophilic Esophagitis:**
    - 4 @ 2 cm above EGJ, 4 @ mid-esophagus, 4 @ 2-3 cm below UES, plus
    - 4 from stomach & 4 from duodenum to R/O Eosinophilic Gastroenteritis or other disorder.
    - To distinguish from PPI responsive EoE (PPI-REE), treat with PPI x 2-3 months without steroid use, and repeat biopsies.
  - D) **Sprue:** Jumbo forceps (T-scope);
    - 8-10 Biopsies,
    - at least 1 in bulb, all others in 2<sup>nd</sup> portion of D and beyond.

# Optimal Tissue Sampling

## ➤ **Forceps Bx: (8-10 Bx to evaluate for Cancer or patchy disease)**

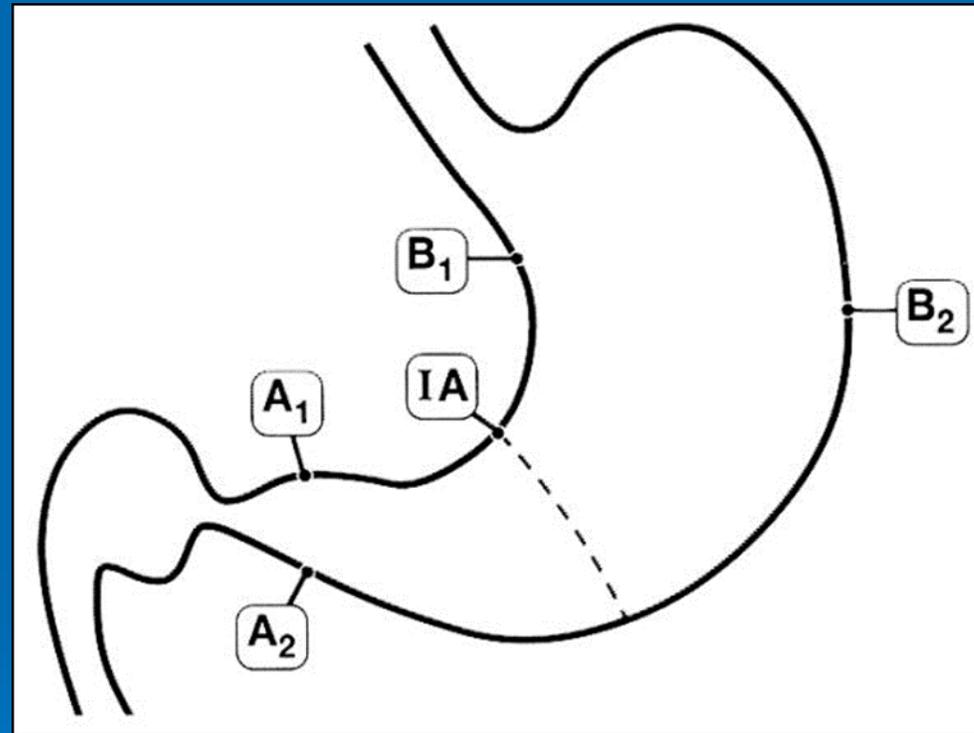
- **E) Gastritis or H. Pylori urease test:** before forceps touch formalin;
  - 2 each from non-eroded mucosa of antrum, angularis and body.
  - Histology: separate bottles for antrum, angularis and body Bx (just in case gastric metaplasia is found). Fundus optional and in separate bottle.
- **F) Viral/AFB/Fungal culture:** before touching formalin;
  - Place in 2 mL non-bacteriostatic saline
  - CMV-center, HSV-rim
- **G) Gastric polyp or Nodule:** Gastric pH and “mapping” with 2 Bx each of Body (g&l), Antrum (g&l) and Angularis (10 Bx in 5 bottles).
  - In Carcinoid: Obtain additionally “Fasting Gastrin” 5 days off PPI and separate Fundus Bx (to establish type A gastritis).
- **H) IBD surveillance:**
  - 4 quads q 10 cm, starting from cecum; then q 5 cm in distal 25 cm. Minimum 33 biopsies
  - Chromoscopy (best technique?).
- **I) Microscopic or Collagenous Colitis:** 2-4 from each: ascending, transverse, descending and sigmoid, plus any abnormalities.

# Gastric Intestinal Metaplasia

## Mapping of the Stomach

(Pelayo Correa)

2 Bx in each site,  
Each site in a bottle  
(total 10 bx)

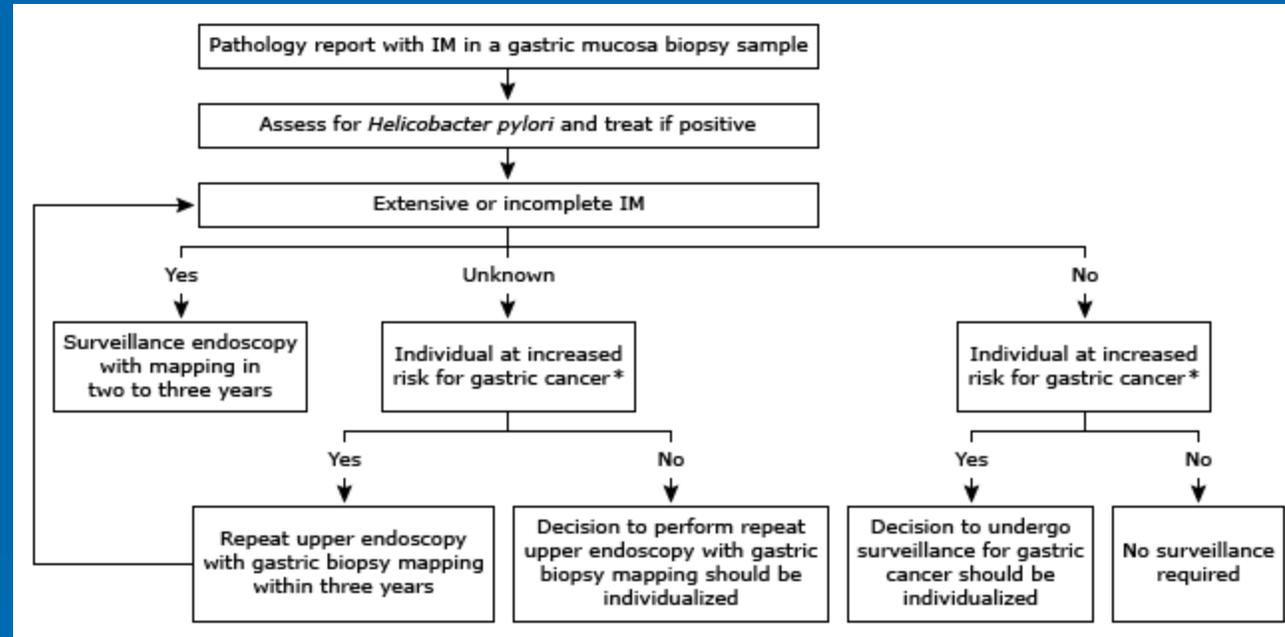


One specimen each should be obtained from:

- Antrum lesser (A1) and the greater curvature (A2), both within 2 to 3 cm from the pylorus;
- Corpus lesser curvature about 4 cm proximal to the angulus (B1);
- Corpus in the middle portion of the greater curvature, approximately 8 cm from the cardia (B2);
- Incisura angularis (IA).

# Management of Incomplete and/or Extensive Gastric Intestinal Metaplasia

(D. Morgan; UptoDate)



**Incomplete intestinal metaplasia:** presence of colonic epithelium with multiple, irregular mucin droplets of variable size in the cytoplasm and absence of a brush border.

**Extensive intestinal metaplasia:** involves at least two areas of the stomach (eg, antrum, incisura, corpus)

**Individuals at increased of gastric cancer:** those with a family history of gastric cancer; non-Caucasian race/ethnicity (African-Americans, Hispanics, and Asians); and first generation immigrants from high incidence regions (eg, Eastern Asia, mountainous Latin America).

# Gastric Polyps

- 70%-90% are fundic gland polyps (FGPs) or hyperplastic polyps.
- FGPs are associated with long-term PPI
  - Not associated with an increased risk of cancer in the absence of FAP (more common in antrum).
  - Remove FGPs  $\geq$  1 cm.
- Hyperplastic polyps have increased risk of gastric cancer.
  - Dysplastic elements and focal cancer have been found in 5% to 19%.
- Perform polypectomy of all gastric hyperplastic polyps  $\geq$  0.5 cm.
  - Size greater than 1 cm and pedunculated morphology are risk factors for dysplasia in hyperplastic polyps
- All Adenomas of the stomach should be endoscopically removed,
  - Recurrence is reported in 2.6% after complete endoscopic excision,
  - Gastric cancer has been found in 1.3% of patients during follow-up
  - Endoscopy is recommended 1 year after adenoma resection, with surveillance endoscopy every 3 to 5 years

# Gastric Polyps

Type	Number and Size	Site	Polyp Malignant Potential	Background Mucosa Malignant Potential	Management
Sporadic Fundic Gland	Multiple 1-5 mm	Upper & Lower body	Very low	Very low	Biopsy to confirm. No F/U.
FAP Fundic Gland	Multiple "carpet" < 1 cm	Upper & Lower body	Low	Low	Biopsy to confirm Resect $\geq$ 0.5 cm EGD q 2 years
Hyperplastic	Single 1-2 cm	Antrum	Low but significant	Low	Remove if dysplastic or symptoms. Eradicate H Pylori EGD in 1 year
	Multiple < 1 cm	Lower body	Low but significant	Low	Eradicate H Pylori EGD in 1 year
Adenoma	Single 1-2 cm	Antrum	High	Significant	Remove polyp Gastric "mapping" EGD in 1 year
Inflammatory Fibroid	Single 1-5 cm	Antrum	Very low	Very low	Biopsy to confirm Remove if obstructing No F/U

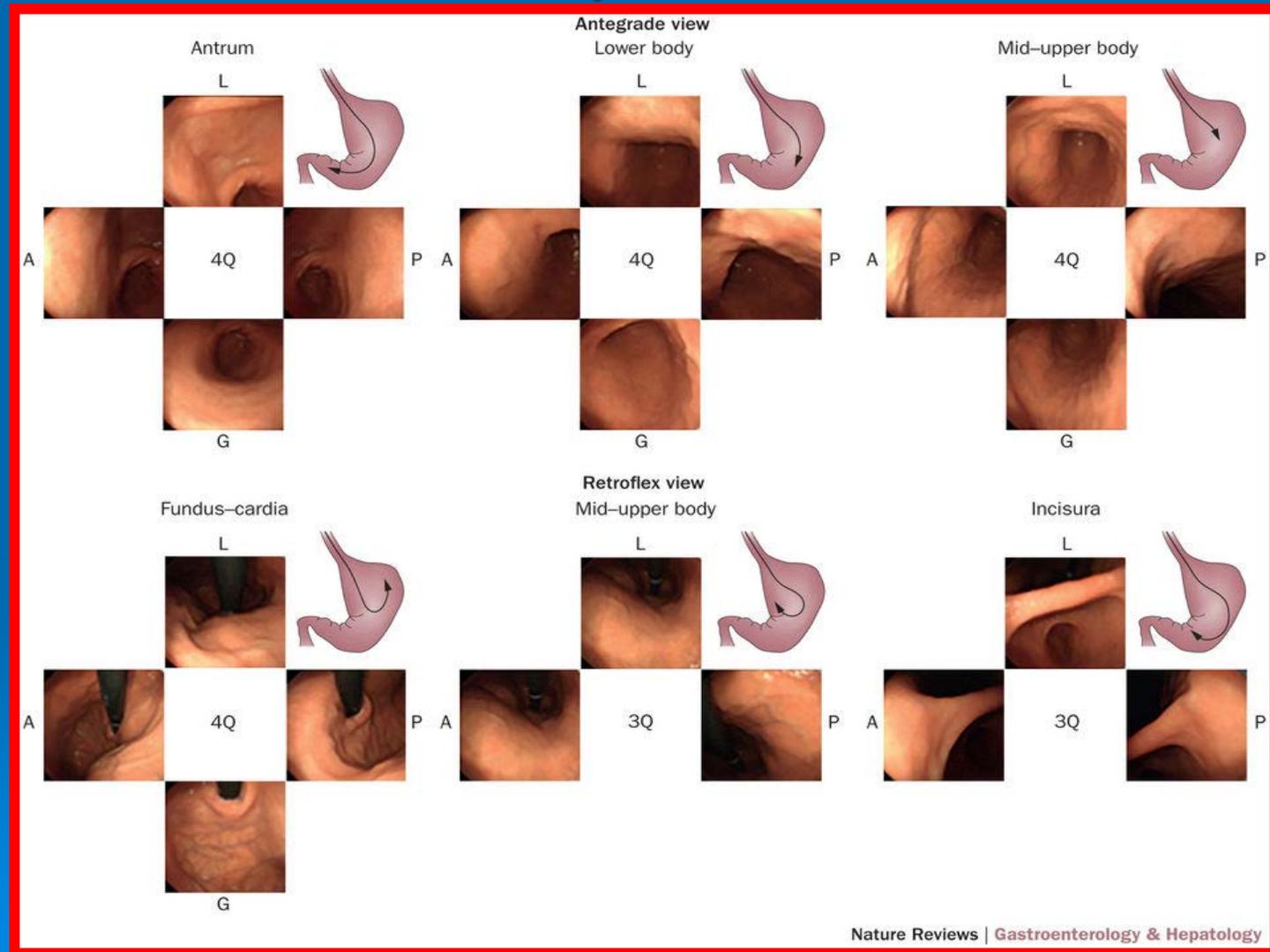
Polyps < 1 cm: 2 bites > 1 cm: 4 bites

# Optimal Tissue Sampling

- **Cytology** (air dry):
  - Fixate immediately after glass smear; do not “air dry”; cut brush and send in saline.
  - Increases Dx of Ca by 10-12 %, over Bx alone.
- **Liver Bx:** (plat  $\geq$  56 K, INR  $\leq$  1.7, if unplugged Bx)
  - a) 16 G needle  $>$  2.0 cm (ideally 3 cm);
  - b) 14-15 G needle  $>$  1.5 cm
  - c) 18 G (EUS): Rt + Lt lobe and 3-4 cm each
- At least 11 portal areas should be seen.
- Neoplasia: 18 G needle is adequate for diagnosis.

# Standard Gastric Photo-documentation

## 22 pictures



# Tattooing

- **Use:** To mark area in need of surgical removal, or in need of endoscopic follow up to assess completeness of treatment.
- **Material:** Should be done with permanent tattoo (india ink/ carbon particles).
  - Indocyanine green or methylene blue, last only hours or days.
- **Technique:** Tattoo opposite wall to the lesion with 0.2 to 0.3 ml/injection x 2-4 injections;
  - Inject saline to make a “pillow”, then
  - Inject inside the pillow the tattooing solution, or
  - Start “injecting” before touching mucosa
    - **CAUTION:** Larger volume injections can cause severe inflammatory reaction.

# GI-Supply SPOT GIS-44

spot



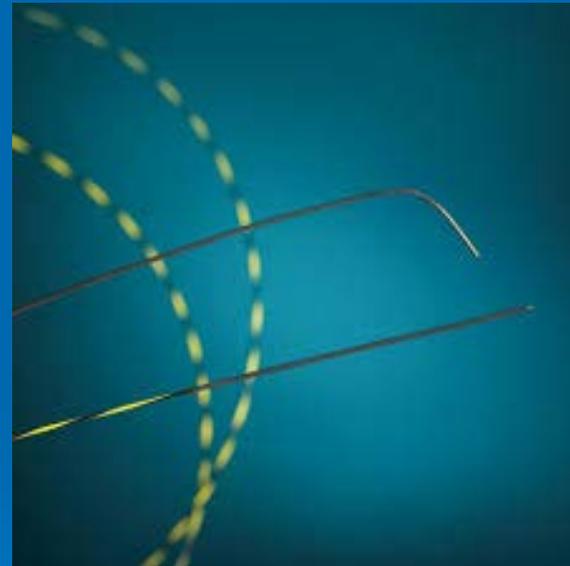
# Guidewires for Dilation & Tube Placement



# Guidewires



Savary guide-wire



Nitinol Jagwire

# Guidewires

- **Stiff monofilament “Savary-type”** :
- Has a coiled graded-flexibility spring end to minimize accidental trauma.
- Used with
  - “Savary” dilators,
  - Achalasia dilators, and
  - Direct trans-gastric-ostomy placement of gastro-jejunal tubes.

# Guidewires

- **Low stiffness, soft-end:**
- May be coiled-wire, or coated/sheated.
- Usually 0.035” diameter.
- Used for placement of:
  - feeding tubes (naso-jejunal, PEG, J-extension),
  - over guidewire balloon dilators (achalasia, TTS),
  - stents, and
  - decompression tubes.
- If used with electrocautery, should be “Nitinol-core coated guidewire” (to avoid “short circuit” and “capacitance coupling” electrical burns).

# Guidewires

- **Length of guidewire:** should be at least twice-the-length of the “port-to-tip” length of the endoscope. Shorter wire will be partially removed when scope is withdrawn.
  - > 240 cm for use with EGD scope, and
  - > 360 cm for use with regular length colonoscope.
- **Placement:** endoscopy with
  - fluoroscopy guidance, or
  - external reference “fix-point” Seldinger technique, to avoid in- or out-migration of the wire.

# Guidewires

## ➤ Tip Placement:

- Savary type on the distal antrum or in the second part of duodenum or other long and straight portion of the SB.
- NEVER advance a guidewire partially removed without:
  - endoscopic guidance for Savary stiff wire, or
  - either endoscopic or fluoroscopic guidance, for “low-stiffness soft-end wire”.

## ➤ Care:

- Savary-type guidewires should be coiled in large 12” diameter loop, for autoclave sterilization.
- **Guidewires that has been kinked, should not be re-utilized. If the “spring-coil” is not straight in the direction of the wire, destroy it.**

# Bougie Dilators Measurements and Types

## ➤ Measurements:

- **French size** = 3 x mm of diameter (15 mm = 45 Fr, 18 mm = 54 Fr)
- **American measurement markins** (blue ink) = # cm from tip of dilator to the place marked (not useful)
- **European measurement markins** (red ink) = # cm from first point of maximal diameter to the place marked.

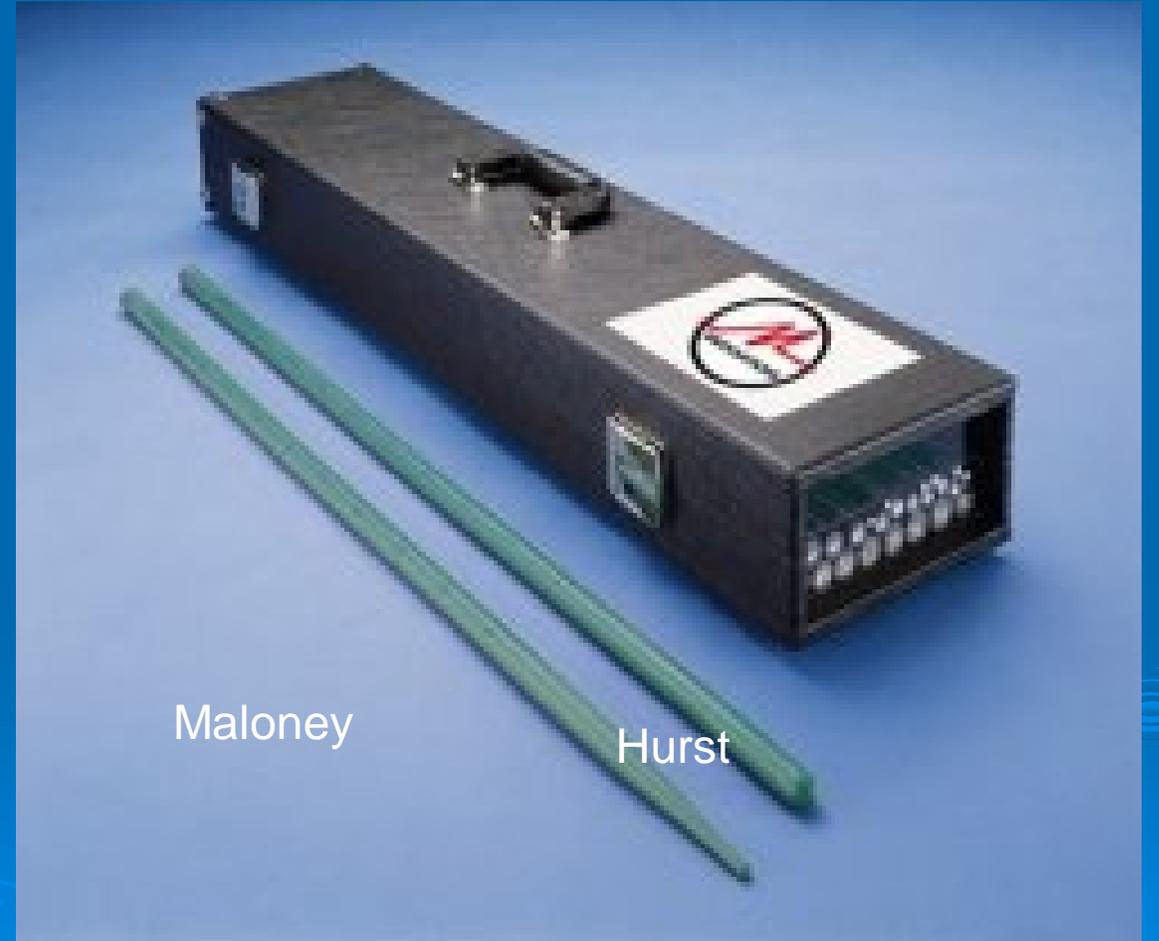
## ➤ Types:

- **Savary-Gilliard** (Cook) or **American** (Conmed): tapered tip and placed over guidewire.
- **Hurst**: blunt tip; fluoro guided Bougie.
- **Maloney**: tapered tip; fluoro guided Bougie.
- **Optical**: tapered tip & transparent; over guidewire or visually guided by intradilator endoscope.
- *Eder-Puestow: Retired.*

# Dilators Types



Savary



Maloney

Hurst

# Optical Dilator (Ethicon)



OD016 14mm - 15mm - 16mm (42-45-48 French) Small

OD018 16mm - 17mm - 18mm (48-51-54 French) Medium

OD020 18mm - 19mm - 20mm (54-57-60 French) Large

# Eder- Puestow Dilator



# Pneumatic & Hydrostatic Dilators

- Achalasia Pneumatic Dilators
  - over guidewire + Fluoroscopy
  - 30, 35, and 40 mm (3 - 3.5 - 4 cm)
- TTS Hydrostatic Dilators (+/- guidewire)
  - Esophageal
  - Pyloric
  - Colonic
  - Diameter from 6 to 20 mm (2 cm)

# Balloon Dilators

**Achalasia - Pneumatic**



**TTS - Hydrostatic**



# Achalasia Balloon Dilation Technique

Boeckxstaens GE et al. N Engl J Med 2011

- Dilate with 3 cm balloon, 8 psi, x 1 minute
- 1-3 weeks later, dilate with 3 or 3.5 cm balloon x 1 minute, irrespective of symptoms.
- Depending on symptoms, dilate 4 weeks later with 3.5 or 4 cm balloon.
- Perforation risk is 4%.

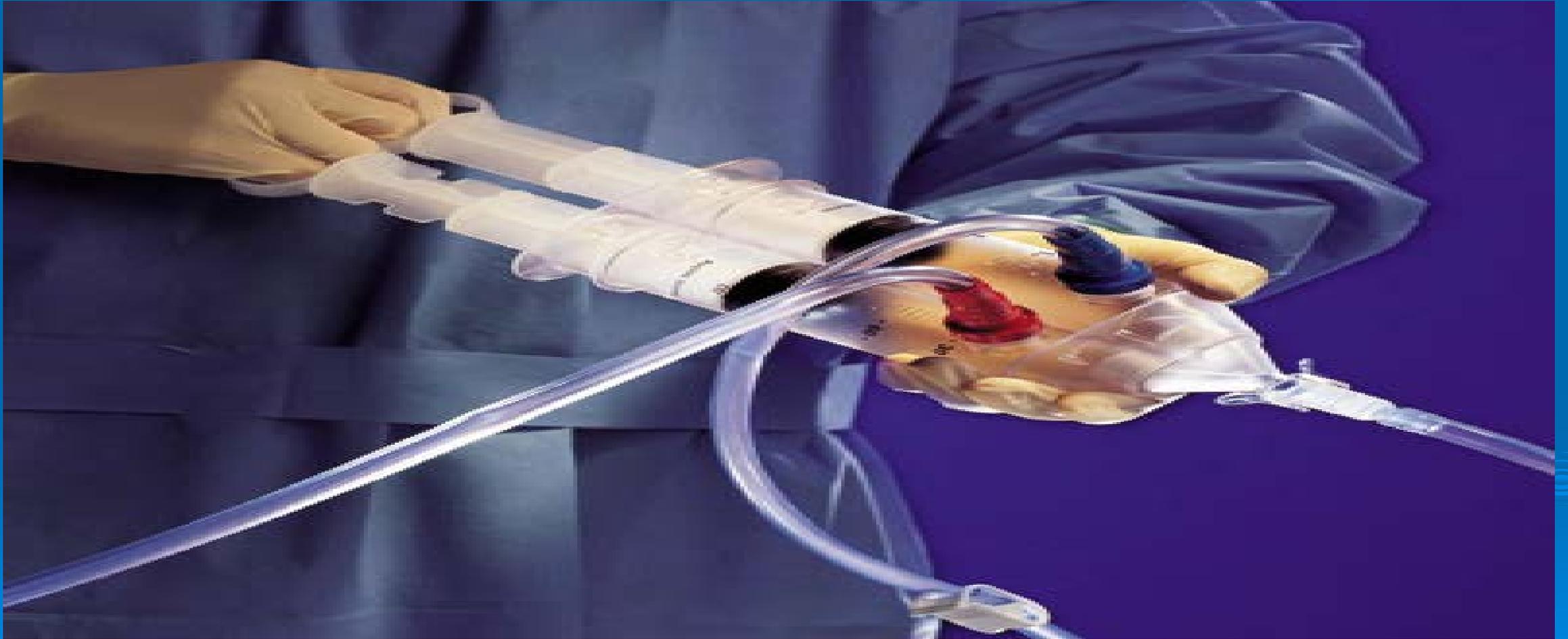
# Bleeding Control



# Gastric Lavage

- Large-lumen tube needed to remove clots.
- Easy-Lav tube 34 Fr is most commonly used.
- Rounded tip makes insertion easy.
- **DO NOT ANESTHETIZE PHARYNX.**
- Stomach must be “primed” with 350 ml luke-warm water before starting sequential irrigation-removal with “dual syringe”.

# Ballard Medical “Easy-Lav” Closed Gastric Lavage Tube

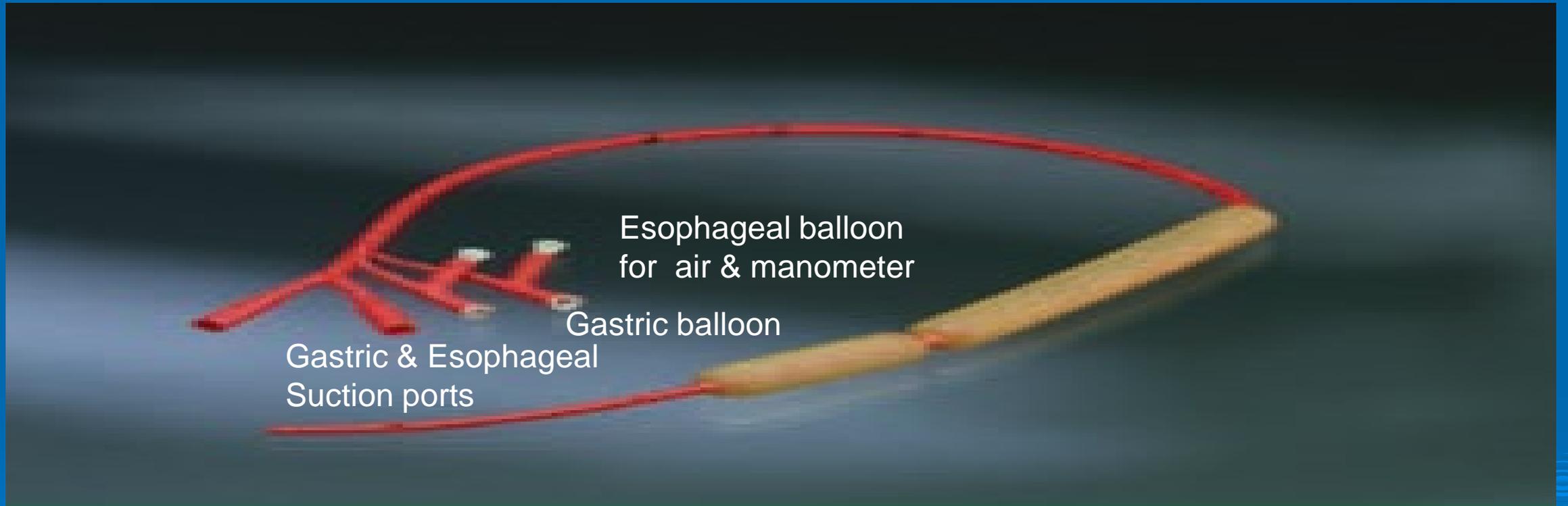


# Gastric Lavage

- Usual volume is 1- 2 gallons of lukewarm tap water.
- Place “collecting” red bag inside large trash plastic container, to empty bag frequently.
- Have suction apparatus available in the mouth all the time, for any fluid overflow or vomit.

# BARD-Medical Minnesota Tube

Cat # 0092220



Minnesota Tube

# Direct Pressure Technique

## Minnesota Tube

### ➤ Has:

- a) *Volume* filled “gastric balloon” (500 ml),
- b) *Pressure* filled “esophageal balloon” (40 mm Hg),
- c) Gastric suction/lavage port,
- d) Esophageal suction/lavage port

➤ Patient should be intubated (airway protection in case of tube migration)

➤ Ideally placed under fluoroscopy

# Minnesota Tube

- Test gastric balloon outside the body, measuring pressure response to 100, 200, 300, 400, & 500 mL air (make a “volume-pressure” table)
- Change from “baseline” gastric balloon “volume to pressure” relation (outside the body vs inside the stomach) of 15 mm Hg or more, suggest misplacement (esophagus or duodenum) or small stomach (partial gastrectomy). **STOP**. (could use small scope to verify that balloon is in stomach, before inflation)
- First inflate only the gastric balloon to full size, and then place well fitting and properly strapped football helmet.
  - Deflate every 6-12 hours to check for re-bleed
- Traction:
  - Pull M-tube to “snug” tension and tape it to helmet’s face-frame, or
  - Attach tube to a rope running over pulley with a 500-1000 gm weight at other end of rope.
- Keep scissors at bedside.



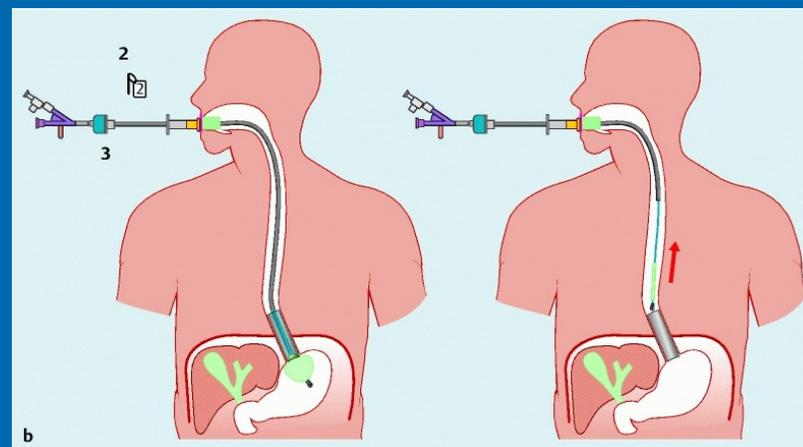
# Minnesota Tube

- Treat with Octreotide/Somatostatin drip and “intestinal decontamination” (**Ceftriaxone IV x 7 days**)
- Lavage through esophageal port to see if bleeding persists.
- If bleeding persists, inflate esophageal balloon to 40 mm Hg.
- Once bleeding is controlled, decrease by 5 mm Hg every 1-2 h with goal of 25 mmHg; increase by 5 mm Hg if re-bleed
  - Recheck pressure every hour
  - Deflate for 5 min every 6 hours, and retest if bleeding returns.
  - Repeat EGD if needed.
- Correct coagulopathy:
  - FFP 15 cc/kg; if INR still  $> 1.7$  give rFVII 40 mcg/kg IV;
  - platelets if  $< 50K$ : give 1 single donor pack, or 1 unit random pooled per each 10 kg of weight.
- Consult Surgery and Interventional Radiology

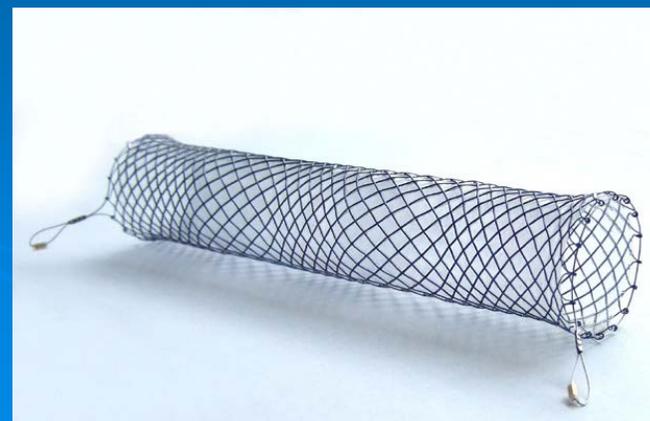
# Direct Pressure Technique

## **Self-Expandable Stents in Esophageal Variceal Hemorrhage**

- Approximately 60 case series: 100% bleed control.
- Used mostly as “bridge therapy” to TIPS; removed after 9-11 days. (Hubmann R et al. Endoscopy 2006;38:896-901)
- There is an ongoing prospective study comparing with balloon tamponade.
- Supported by Baveno VI (potentially as efficacious and safer than balloon tamponade) (de Franchis R.; J of Hepatol 2015;DOI: <http://dx.doi.org/10.1016/j.jhep.2015.05.022> )
- Has been used as “definitive treatment” in a few (up to 214 days) (Holster IL et al. Endoscopy 2013;45:485-488)



SX-Ella Stent Danis 135 mm x 25 mm  
Nitinol covered with polyurethane foil



# Injectable Solutions

## ➤ Non-variceal hemostasis:

- Hypertonic solution is better than isotonic solution.
- Epinephrine 1/10000 improves immediate effect.
- Hypertonic solution causes sclerosis of arterioles.
- Preparation: 9 ml 5% NaCl + 1 ml 1/1000 epi = 4.5% NaCl with 1/10000 epineph
- Inject multiple 1 - 2 ml per injection around and in the lesion
- Needs complementation with:
  - thermo/electro-coagulation, or
  - 0.1-0.2 ml ethanol (max total 2 ml)(WE DO NOT USE THIS ADDITIVE)

## ➤ Prevention of Transmural burn or Perforation:

- Pre-coagulation Hemostatic pillow in SB or colon when applying thermo or electrocoagulation (Heater probe/BICAP/APC).
- **We use:** 9.75 ml 5% NaCl + 0.25 ml 1/1000 epi (1/40000 epi)

# Injectable Solutions

- **Submucosal “pillow”** for sessile polypectomy, or mucosectomy:
  - Type of Solutions to extend duration of pillow:
    - **Hypertonic solutions** (5% NaCl or D50) or
    - **Colloid solutions** (Voluven [HES: **6% hydroxyethyl starche**], hialuronic acid, 0.83% hydroxypropyl methylcellulose “Goniosoft”, glycerol, autologous blood).
      - **Voluven 500 mL + 3-5 mL Indigo Carmine**
      - **Eleview:** MCTs + Poloxamer 188 + Polyoxyl-hydroxystearate + Methylene blue in 10 mL ampules; maximal volume 50 mL (you can add 0.25 mL 1/1000 Epinephrine to minimize bleeding risk)
  - Low dose epinephrine (1/40000) decreases bleed.
  - Color enhances contrast (methylene blue).
  - Inject as needed to lift lesion; inject first away from endoscope, and then closer, to make the lesion to “face you”.
- **Thrombin:** Combination therapy of Epinephrine + Thrombin (600 to 1000 IU) lowers rebleeding from 20% to 4.5% (Kubba AK et al. Gastroenterol 1996;111:623-8). **Has risk of infection.**

# Injectable Solutions

## ➤ **Variceal Sclerosis:**

- 3% Na tetradecyl sulfate (max 10 mL), vs 5% ethanolamine (max 20 mL), vs 2.5% Na morrhuate (max 15 mL) are equivalent in efficacy and ulceration.
- We use either 5% Ethanolamine, or 1.5% Na Tetradecyl sulfate (4 mL + 4 mL of Dextrose 50%), or 2.5% Na morrhuate (5 ml of 5% morrhuate + 5 ml Saline)
- Volume:
  - Inject 1-2 ml/injection in esophageal varices, 23 gauge needle, or
  - 6-8 ml/injection in gastric varices,
  - for up to 30 ml of diluted morrhuate, 20 mL of diluted Na tetradecyl, or 20 ml of undiluted ethanolamine.
- Treat only distal 5 cm of esophagus.
- Intra- or para-variceal injection
- Repeat every 3 weeks until obliteration.
- PPI to heal post-sclerotherapy ulcers.

# Technique of Gastric Variceal Obliteration - Cyanoacrylate

- Immerse tip of scope and Inject channel with silicon oil or lipiodol.
- Use 21 G x 8 mm sclerotherapy needle.
- Patient and Staff should have eye protection.
- **Avoid suctioning.**
- Give antibiotic prophylaxis
- DERMABOND (0.5 mL/amp): prime needle injector with 1 mL 0.9% NaCl and inject until no resistance; then inject undiluted Dermabond using 2 mL Luer-lock syringe @ 1 mL/20 sec for 2-5 mL until resistance is met; then flush with 1 mL saline while removing catheter by pulling the scope. Repeat in other site if needed. Maximum 5 mL per session.

# Technique of Gastric Variceal Obliteration - Cyanoacrylate

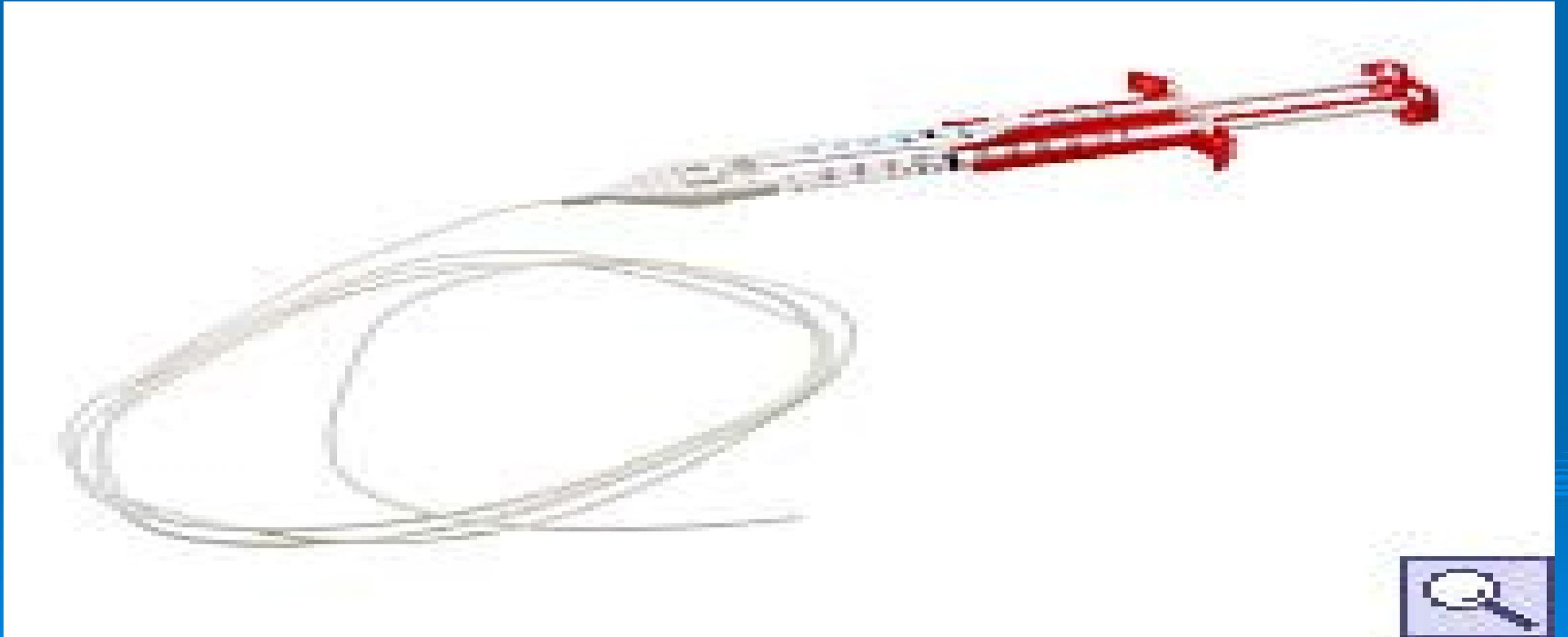
- **INDERMIL or HISTOACRYL (0.5 mL/amp):** Diluted 1:1 with Lipiodol; prime with 1 mL of lipiodol and inject until no resistance; then inject 0.5-1-2 mL of diluted mixture with 2 mL Luer-lock syringe, followed by 1 mL of sterile water while removing the catheter by pulling the scope. Repeat in other site if needed. Maximum 10 mL per session
- **DO NOT WITHDRAW CATHETER PULLING THROUGH SCOPE CHANNEL.** Leave catheter out, hanging several centimeters and remove scope. Then cut catheter close to entrance port and pull it out from the scope tip.
- Before procedure consider Dynamic CT looking for large spleno-renal or gastro-renal shunt that increase risk of embolization (0.7% have significant glue embolization)

# “Painting” Solutions

- **Fibrin Glue:** (Hemaseel, and Tisseel VH):
  - Presentation in 2 separate kits of 2 reactives each:
    - Kit 1) [human fibrinogen + bovine fibrinolysis inhibitor (aprotinin)],
    - Kit 2) [human thrombin + Ca chloride], in different vials.
  - Needs double lumen applicator or consecutive application.
  - Comes in 1, 2, & 5 ml pack making 2, 4, & 10 ml solution, to cover 8, 16, & 40 cm<sup>2</sup>, respectively.
  - Takes 10-20 min to reconstitute at 37 °C, and has to be used within 4 hours.
  - Uses “warmer with magnetic agitator” (FIBRINOTHERM).
  - CAUTIONS:
    - Do not use Betadine/iodine solution, to clean vial’s rubber-cap.
    - “Flush” from applicator with air (not saline).
    - Not approved for injection in tissue or vessels (risk of viral infection and anaphylaxis).
  - **Good for surface-bleeding from tumors.**

# DUAL LUMEN CATH 180 CM

Duplocath 180 (Baxter cath # 921021)  
Haemacure (micromedics) REF H-DL18



# Hemospray

Endoscopy 2011;43:291-295



- Hemospray catheter gun: 21 g powder syringe + CO<sub>2</sub> propeller canister
  - Fire from 1-2 cm distance
  - Observe 5 min; re-spray if needed.
  - Maximun 150 g (7 canisters)
- Patients (20): Forrest 1a (1) (spurting) + Forrest 1b (19) (oozing)
  - mean age 60 (37-85);
  - melena 20, hematemesis 7;
  - GU in 6, DU in 14
- Hemospray
  - applications: 1 in 85%; 2 in 15%;
  - syringes: 1 in 65%, 2 in 25%, > 2 in 10%
- Hemostasis:
  - At 24h = 95%; (Initial failure in Forrest 1a)
  - At 72h = 85%;

# TTS Endoscopic Hemoclips



# Through the Scope Endoscopic Hemoclipping

- Cause immediate hemostasis without tissue damage; closes vessel.
  - Success: 84-95% - Rebleeding: 5.6-7.5%
- There are different sizes, with opening angles of 90° and 135°.
  - Olympus: Reusable & **QuickClip 2** (rotates);
  - Boston-Scientific: **Resolution Clip** (re-opens)
  - Wilson-Cook: Tri-Clip and **Instinct** (re-opens, rotates, MR conditional)
  - InScope Multi-Clip applier (Ethicon Endosurgery; Cincinnati, Ohio).

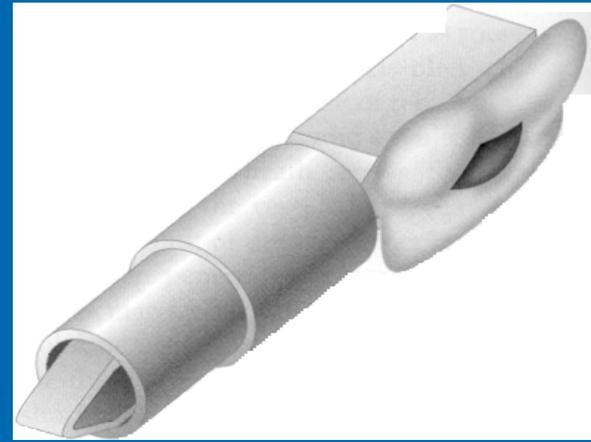
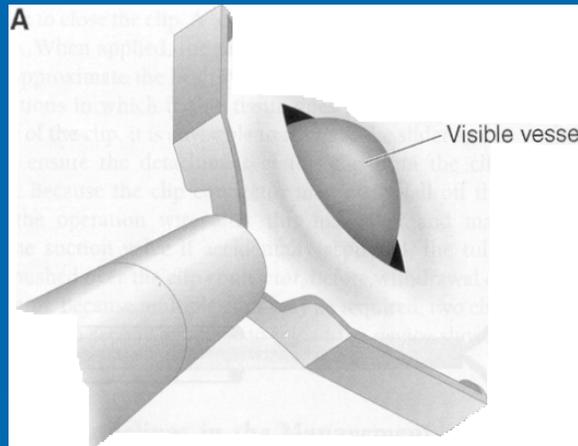
# TTS Hemoclips

	<b>QuickClip2</b> Olympus	<b>QuickClipPro</b> Olympus	<b>Resolution</b> Boston Scientific	<b>Instinct</b> Cook Medical
Jaw span (mm)	7-11	11	11	16
Rotation	Yes	Yes	Limited (sheath off)	yes
Reopens	No	Yes	Yes	Yes
Retention length	2 weeks	Not stated	4 weeks	Not stated

# Through the Scope Endoscopic Hemoclipping Indications

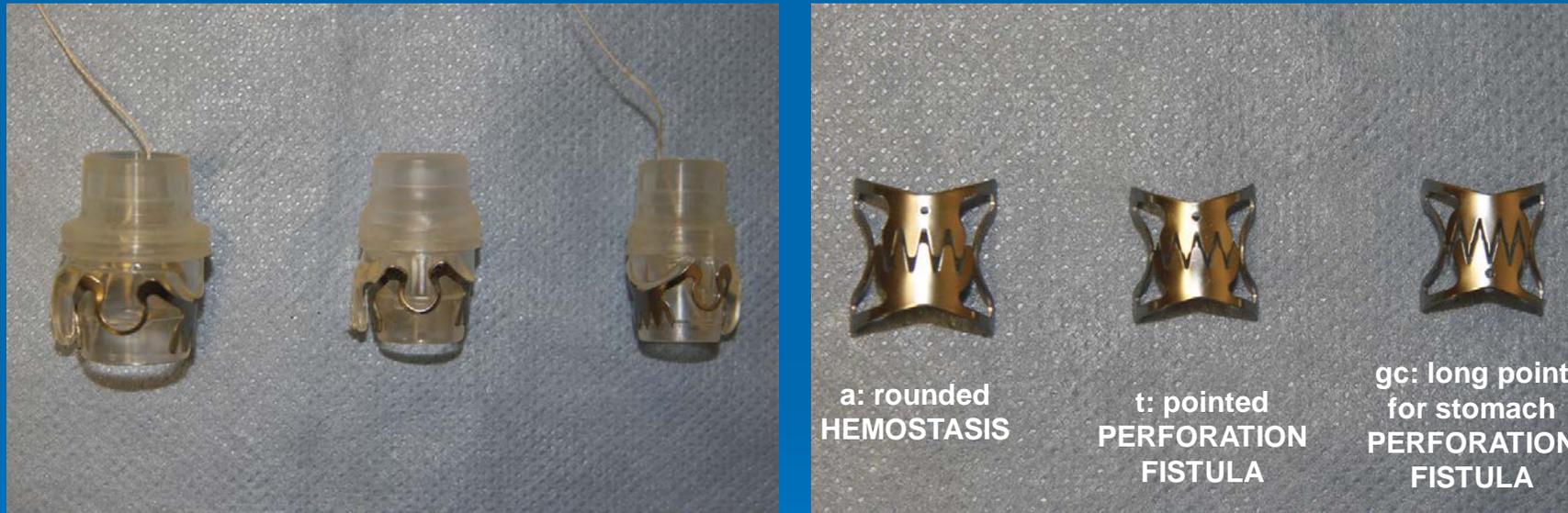
- Hemostasis for:
  - Mucosal/submucosal defect < 3 cm (Mallory-Weiss).
  - Bleeding ulcers.
  - Bleeding artery < 2 mm (Dieulafoy).
  - Polypectomy site up to 1.5 cm diam (pre- or post-polypectomy).
  - Diverticula.
  - Post variceal-sclerotherapy/banding bleed.
- Anchoring temporary gastric stimulator leads or jejunal tubes.
- Closure of GI tract perforations < 3 cm, to be treated conservatively.
- Endoscopic marking (fluoro, stent placement, radiation, embolization, resection)

# Hemoclip Technique



In bleeding ulcers, because the bleeding comes from a lateral opening in an arteriole, hemoclips have to be placed at both sides of the arteriolar opening. The true direction of the arteriole is difficult to assess without doppler, hence, **3 to 4 hemoclips are needed to surround the lesion.**

# Over-the-scope clip (OTSC) (Ovesco; Tübingen, Germany)



Full-thickness closure of defects of as large as 27 mm.  
Available in depths of 3 and 6 mm; 3 teeth shapes; rounded for hemostasis (a)  
and sharp for perforation/fistula (t & gc); longer point (gc) for stomach.

# Padlock Clip

US Endoscopy

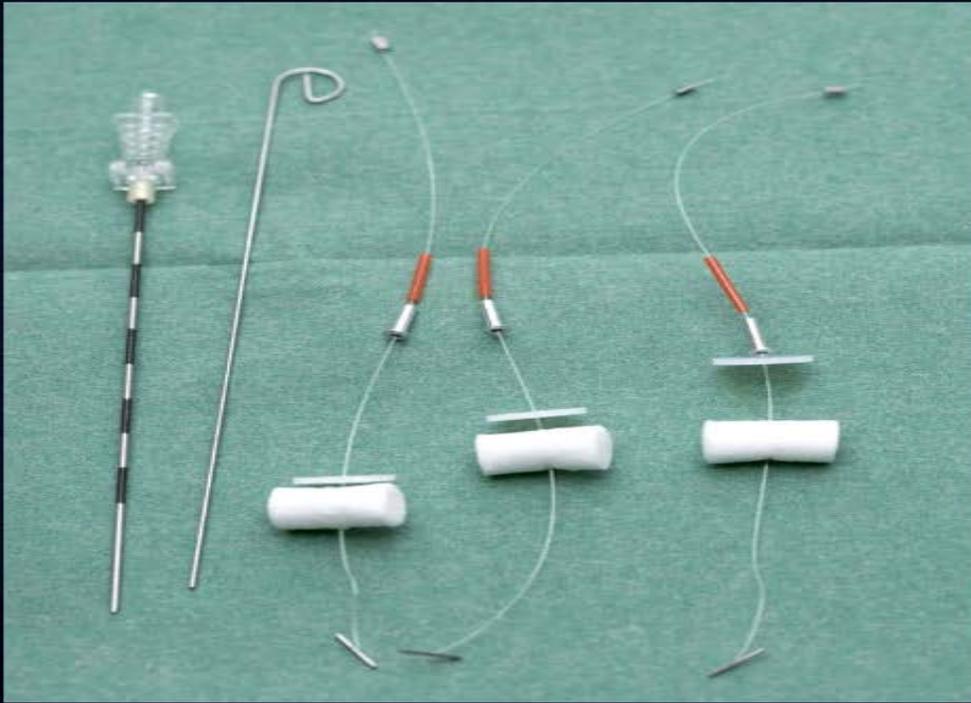


# Miscellaneous



# T - Fasteners

1



# T - Fasteners

## ➤ Indications:

- Brown-Muller PEG placement
- Risk of pulling out PEG (demented/ agitated)
- Risk of large panniculum separating PEG

## ➤ Technique:

- Silk-metal tread loaded in needle and kept under tension
- Perpendicular puncture until gastric penetration
- Deliver by pushing plunger; secure outside collapsing metal cylinder.

# Duodenal Aspiration Catheter



# Duodenal Aspiration

- Indication: collection of fluid to diagnose
  - bacterial overgrowth,
  - intestinal parasites (protozoa),
  - bile crystals.
- Technique:
  - Clear endoscope channel of all fluid.
  - Advance endoscope directly to duodenum, without suction of esophagus, stomach, or duodenum fluid.
  - Advance aspiration catheter to duodenum, and pull control-wire to partially open “umbrella”. Inflate & deflate lumen to allow suction.
  - Connect tube to suction aspiration trap. Obtain:
    - A) Pure fluid for quantitative bacterial culture (Dx=  $10^5$ /mL)
    - B) Pure fluid after intravenous Kinevac, for bile crystals,
    - C) Pure or “saline wash” fluid for parasites (order by name)

# Antibiotics and Anticoagulants



# Antibiotic Prophylaxis Required

ASGE 2015 & AHA 2007

(Circulation 2007;115:1-19)

Procedure	Diagnosis	Regimen (1 hour pre-procedure)
<b>Liver Biopsy</b>	-Bilio-Enteric anastomosis -PSC w recurrent infection ?	-Cefazolin 2 g if < 120 kg; 3 g if > 120 kg IV, once -Aztreonam 2 gm IV+ Vancomycin weight based IV, once
<b>ERCP</b>	-Suspected biliary obstruction with anticipated incomplete drainage (PSC, hilar stricture), or post-Liver Transplant* or with cholangitis. -Pancreatic pseudocyst communicating to duct -Trans-papillary or transmural pseudocyst drainage	-Cefazolin 0.5-1 g IV q 4h -Aztreonam 2 gm q 4h IV+ Vancomycin weight based IV once -Continue antibiotics for 5 days*.
<b>EUS with FNA</b>	-Cystic lesion along GI tract, pancreatic or peri-pancreatic, or in mediastinum;	-Cefazolin weight based IV q 4h -Aztreonam 2 gm q 4h IV+ Vancomycin weight based IV once -Continue antibiotics for 3-5 days*.
<b>PEG</b>	-Everybody	-Cefazolin 2 g if < 120 kg; 3 g if > 120 kg IV + oral care -Clindamycin 600 + Levofloxa 500 IV once
<b>Colonoscopy</b>	-Continuous Ambulatory Peritoneal Dialysis	-Ampicillin 1 gm IV + Gentamycin IV
<b>Any or None</b>	-Cirrhotic with GI bleed	-Ceftriaxone 1 gm IV qd x 7 days -Cipro 500 mg po BID x 7 days

\* Even after complete drainage

# Antibiotics for Risk of Enterococci Endocarditis After Cholangitis

- 1) Prosthetic cardiac valve,
- 2) History of previous IE,
- 3) Cardiac transplant recipients who develop cardiac valvulopathy,
- 4) Congenital heart disease (CHD), including:
  - (a) those with unrepaired cyanotic CHD (including palliative shunts and conduits),
  - (b) those with completely repaired CHD with prosthetic material or device, placed surgically or by catheter, for the first 6 months after the procedure, and
  - (c) those with repaired CHD with residual defects at the site or adjacent to the site of a prosthetic patch or device.
  
- **When: in case of cholangitis or before ERCP.**
  
- **What to give: Agent active against enterococci, such as penicillin, ampicillin, piperacillin, or vancomycin**

# Warfarin & Endoscopy

ASGE 2009

Type	Anticipated Procedure	Thrombotic Risk	Action
<b>URGENT Procedure</b>	-GI bleed treatment (Hemostasis)	<b>Any</b>	Give FFP or 1-2 mg Vitamin K IV until INR 1.5-2.5
<b>ELECTIVE LOW RISK Procedure</b>	-EGD, Colon, Enterosc, EUS, ERCP w/o sphincterot, Forceps Biopsy, Diagnostic Balloon –assisted enteroscopy, Capsule endoscopy, Enteral stent without dilation	<b>Any</b>	Proceed if INR is not Supratherapeutic
<b>ELECTIVE HIGH RISK Procedure</b>	-Polypectomy, Dilation, FNA, Sphincterotomy, Variceal treatment, PEG, Therapeutic Balloon-assisted enteroscopy, Hemostasis, Tumor ablation, Cystogastrostomy	<b>Low</b> DVT, Bioprosthetic valve, Mechanical Aortic valve, Atrial fib w/o valvular disease and uncomplicated	-Discontinue Warfarin 2-3 d (3-5 d in A Fib) before procedure, until INR < 1.5 -Reinstitute in evening after procedure.
<b>ELECTIVE HIGH RISK Procedure</b>	-Polypectomy, Dilation, FNA, Sphincterotomy, Variceal treatment, PEG, Therapeutic Balloon-assisted enteroscopy, Hemostasis, Tumor ablation, Cystogastrostomy	<b>HIGH</b> <b>A.Fib</b> w valv dz, or CHF, or EF< 35%, or TIA /Thrombotic event, or > 75y, or DM, or HBP. <b>Mech Valve</b> in Mitral position, or with pregnancy ,or with previous thromboembolia, or with thrombophilia synd, Acute Coronary S, Coronary stent < 1y, Non-stented percutaneous coronary intervention after MI	-Discontinue warfarin 2-3 d before procedure; daily INR - <b>IV heparin</b> (or therapeutic SQ LMWH or UFH) when INR < 2. -D/C IV heparin 4-6 h before; restart 2-6 h after -Restart Warfarin in evening after procedure; continue heparin until INR >= 2

Class	Agent	Peak (hour)	Half-life (hour)	Bio-availability (%)	Dosing	Reversal agents (see below for HASHTI)	Recommendations to discontinue before procedure																				
Vitamin K antagonist	Warfarin	72–96	20–60	100	Daily	1. Vitamin K (IV/PO) 1–10 mg (Takes 6 (IV) to 24 (PO) hours to reverse) 2. Fresh Frozen Plasma 10–30 ml/kg (1 unit≈250 ml) 3. Prothombin Complex Concentrates 25–50 units/kg IV	Discontinue 5 days before procedure																				
Xa inhibitor	Rivaroxaban (Xarelto)	2.5–4	5–9 (9–13 if elderly)	80	Daily or b.i.d.	1. Supportive Treatment 2. Factor VIIa 3. Prothombin Complex Concentrates 25–50 units/kg IV	Discontinue 24 h before procedure																				
	Apixaban (Eliquis)	3	8–13	~66	b.i.d.	1. Supportive Treatment 2. Factor VIIa 3. Prothombin Complex Concentrates 25–50 units/kg IV	Discontinue 24 h before procedure if low risk of bleeding or 48 h before procedure if high risk bleeding																				
Direct thrombin inhibitor	Dabigatran (Pradaxa)	2–3	13–27 (Depending on CrCl— See table on right)	6.5	Daily or b.i.d.	1. Supportive Blood Products/HASHTI 2. Prothombin Complex Concentrates 3. Consider rVIIa 4. Hemodialysis	<table border="1"> <thead> <tr> <th>Renal Clearance (mL/min)</th> <th>Half Life (h)</th> <th>Standard Bleeding Risk*</th> <th>High Bleeding Risk*</th> </tr> </thead> <tbody> <tr> <td>&gt; 80</td> <td>13 (11-22)</td> <td>24 h</td> <td>2 – 4 days</td> </tr> <tr> <td>50 - 80</td> <td>15 (12-34)</td> <td>24 h</td> <td>2 – 4 days</td> </tr> <tr> <td>30 - 50</td> <td>18 (13-23)</td> <td>&gt;= 48 h</td> <td>4 days</td> </tr> <tr> <td>&lt; 30</td> <td>27 (22-35)</td> <td>2 – 5 day</td> <td>&gt; 5 days</td> </tr> </tbody> </table>	Renal Clearance (mL/min)	Half Life (h)	Standard Bleeding Risk*	High Bleeding Risk*	> 80	13 (11-22)	24 h	2 – 4 days	50 - 80	15 (12-34)	24 h	2 – 4 days	30 - 50	18 (13-23)	>= 48 h	4 days	< 30	27 (22-35)	2 – 5 day	> 5 days
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< 30	27 (22-35)	2 – 5 day	> 5 days																								
	Bivalirudin (Angiomax)	0.5–3	0.5	100	Intravenous	1. Supportive Blood Products/HASHTI 2. Consider rVIIa (90 mcg/kg for up to 2 doses) 3. Hemodialysis	Discontinue before induction of anesthesia in a patient with normal renal function																				
	Argatroban	1–3	39–51 min	100	Intravenous	1. Supportive Blood Products/HASHTI 2. Prothombin Complex Concentrates 3. Consider rVIIa 4. Hemodialysis	Discontinue 4–6 h before induction of anesthesia in a patient with normal hepatic function																				

**HASHTI**

1. Hold further doses of anticoagulant
2. Consider Antidote
3. Supportive treatment: volume resuscitation, inotropes as needed
4. Local or surgical Hemostatic measures: topical agents (aminocaproic acid, tranexamic acid)
5. Transfusion (red cells, platelets, FFP as indicated)
6. Investigate for bleeding source

Class	Agent	Peak (hour)	Half-life (hour)	Bio-availability (%)	Dosing	Reversal agents (see below for HASHTI)	Recommendations to discontinue before procedure
Thienopyridine antiplatelet agent	Clopidogrel (Plavix)	1	7–8	> 50	Daily	1. HASHTI 2. Platelet Transfusion 3. Case Reports of Methylprednisolone and desmopressin	Discontinue 5–10 days before procedure
	Ticlopidine (Ticlid)	2	12	> 80	b.i.d.	1. HASHTI 2. Platelet Transfusion	Discontinue 5–10 days before procedure
	Prasugrel (Effient)	0.5	2–15	> 79	Daily	1. HASHTI 2. Platelet Transfusion	Discontinue 5–10 days before procedure
	Ticagrelor (Brillinta)	1.5	7–8.5	> 36	Daily or BID	1. HASHTI 2. Platelet Transfusion	Discontinue 5–10 days before procedure
	Dipyrimadole (Persantine)	1.25	7–10	50–75	q.i.d.	1. HASHTI 2. Platelet Transfusion 3. Aminophylline for Dipyrimadole overdose	Discontinue 7 days before procedure
	(Aggrenox (Extended release dipyrimadole+aspirin))	2	13.6	50–75	b.i.d.	1. HASHTI 2. Platelet Transfusion	Discontinue 7 days before procedure

#### HASHTI

1. Hold further doses of anticoagulant
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Class	Agent	Peak (hour)	Half-life (hour)	Bio-availability (%)	Dosing	Reversal agents (see below for HASHTI)	Recommendations to discontinue before procedure
Glycoprotein IIB/IIIA inhibitors	Abciximab (ReoPro)	2	0.5	100	Intravenous	1. HASHTI 2. Platelet Transfusion	12–24 h before procedure (24 ideal)
	Eptifibatide (Integrilin)	4–6	2.5	100	Intravenous	1. HASHTI 2. Platelet Transfusion	2–4 h before procedure
	Tirofiban (Aggrastat)	2	2	100	Intravenous	1. HASHTI 2. Platelet Transfusion 3. Dialysis	Can be stopped at the moment of skin incision without harmful effects
Low-molecular weight heparin	Dalteparin (Fragmin)	3–5	2.2	87	Subcutaneous	1. HASHTI 2. Protamine sulfate (1 mg/100 units Dalteparin in previous 8 h) 3. Consider rVIIa	Last dose should be given 24 h before procedure
	Tinzaparin (Innohep)	4–5	3.9	90 for Xa 67 for IIa	Subcutaneous	1. HASHTI 2. Protamine sulfate (1 mg/100 units Tinzaparin in previous 8 h) 3. Consider rVIIa	Last dose should be given 24 h before procedure
	Fondaparinux (Arixtra)	2	17–21	100	Subcutaneous	1. HASHTI 2. Protamine sulfate 3. Consider rVIIa	Last dose should be given 24 h before procedure and resume 6 h after procedure

#### **HASHTI**

- 1. Hold further doses of anticoagulant**
- 2. Consider Antidote**
- 3. Supportive treatment: volume resuscitation, inotropes as needed**
- 4. Local or surgical Hemostatic measures: topical agents (aminocaproic acid, tranexamic acid)**
- 5. Transfusion (red cells, platelets, FFP as indicated)**
- 6. Investigate for bleeding source**

# Colonoscopy Prep Concepts



# *Colon Preparation*

## *Purpose*

- Improve Visualization:
  - Remove stool from lumen and wall.
  - Avoid obscuring of lenses/ camera and light beam.
  - Minimize “missed lesion rate”.
- Remove hydrogen, methane, and other explosive gasses.
- Shorten procedure time.
- Limit Costs.

# *Risk of Explosive Gases*

- Fatal Colonic Explosion after colon prep with Mannitol (Bigard et al. Gastroenterology 1979;77:1307-10)
- Colon explosion with perforation after APC treatment in unprep colon (enemas only) (Soussan et al. Gastrointest Endosc 2003;57:412-3)
- **REMEMBER: Use of Lactulose or Sorbitol can cause flammable gases.**

# *Instruments and Risk of Explosion*

## ➤ **RISKY:**

- Monopolar Electrocautery (“hot” snare & “hot” biopsy)
- Bipolar Electrocautery (BICAP)
- Argon Plasma Coag.
- Laser

## ➤ **NOT RISKY**

- Biopsy and “cold” snare
- Heater Probe
- Injection hemostasis
- Endo-loop
- Hemo-clip
- Band-ligation

# Effect of Colon-prep on Colonoscopy

## ➤ **Poor colonoscopy prep:**

- increases risk of missed polyps.
- increases cost by increasing the number of aborted exams and early re-examinations.

## ➤ **Poor colonoscopy prep and use of fermentable carbohydrates (sorbitol, lactulose, mannitol):**

- increase risk of colonic explosion.

# *Oral Colon Irrigation Solutions*

- Work by flushing the colon with large volume of clear fluid.
- Based in principle that small bowel contents have to remain isotonic to plasma, hence, non-absorbable solutes will draw a “mandatory volume” to the cecum to keep isotonicity.
- All preps work better when split in 2 days, or when given all on day of exam;
- Last dose should be, ideally, no more than 5 h before colonoscopy.

# Oral Irrigation Solutions

- Iso-osmotic solutions (balanced-PEG) need only additional fluid ingestion to cover insensible losses (0.5 mL/kg/h) and urine output (50 mL/hour) until exam time.
- Hypertonic solutions require ingestion of substantial amounts of fluids to cover fluid volume needed to reach isotonicity and also the volume needed to cover insensible losses and urine output.
- Na Phosphate has additional contraindications in heart failure, kidney disease, electrolyte disorders, ascites, megacolon and inability to drink extra fluids (debilitated or elderly).
- Avoid Na Phosphate in patients taking ACE inh., ARBs, & NSAIDs (increased risk of “phosphate nephropathy”).
- Suprep, in two 6 oz bottles has: 492 mEq Na, 72 mEq K, 26 mmol Mg, 898 mOsm; risk in CKD, cirrhosis and CHF.
- High dose Mg Citrate risky in CKD.

# Osmolar Loads of Colon-Preparation Solutions

- *NuLytely or Golytely* = 1160 mOsm/ 4 L
- *NuLytely or Golytely* = 870 mOsm/ 3 L
- *Suprep 2 x 6 oz* = 898 mOsm/ 336 mL
- *Fleet Phosphosoda* = 807 mOsm/ 90 mL
- *Visicol Osmoprep* = 820 mOsm/ 40 tab
- *Visicol Osmoprep* = 660 mOsm/ 32 tab
- *Visicol Osmoprep* = 575 mOsm/ 28 tab
- *Mg Citrate 3 x 300 mL* = 720 mOsm/ 900 mL
- *Mg Citrate 2 x 300 mL* = 480 mOsm/ 600 mL
- *Prepopik 2 x 5 oz* = 470 mOsm/ 295 mL

# Volume of Fluid

	Needed for Isotonicity (mL)	Presented to Cecum (mL)
NuLytely/Colyte 4 L	0	4000
Fleet Phosphosoda 90 mL	2690	2780
Visicol Osmoprep 40 tablets	2820	2820
Visicol Osmoprep 32 tablets	2275	2275
Visicol Osmoprep 28 tablets	1980	1980
Mg Citrate: 3 bot x 300mL	1582	2480
Mg Citrate: 2 bot x 300mL	1055	1655
Prepopik: 2 pack + 300 mL water	1320	1620 +
Suprep: 2 x 896 mL once diluted	2200	3096

All patients need additional fluids of [0.5 mL/kg/h + 50 mL/h] from the start of colon prep until the time of the procedure.

# *Oral Colon Irrigation Solutions Safety*

- When used properly in healthy patients, all colon preps are safe.
- Nulytely and Trilyte are sulfate-free and better tasting than Golytely.
- Na Phosphate causes hypo-kalemia and hypo-calcemia in more than half of elderly patients.
- Na Phosphate should not be used in patients with significant cardiac, renal, or liver disease, nor in the debilitated.
- Avoid Na Phosphate in patients taking ACE inh., ARBs, & NSAIDs (increased risk of “phosphate nephropathy”).
- Suprep has not been tested in patients with cardiac, renal nor liver disease.
- Prepopik should be avoided in heart failure, renal insufficiency, end-stage liver disease, or electrolyte abnormalities.
- Gatorade (or Oral Rehydration Solution) decreases NaP-induced volume-depletion and improves prep quality.
- Aphthous-like lesions can occur with NaP prep, which can cause confusion with IBD.

# Some Equivalent Preps

(expected > 90% Good/Excellent)

<b>Breakfast, day before Exam</b>	<b>Noon, day before Exam</b>	<b>6 PM, day before exam</b>	<b>AM of Exam-day (finish 3h before leaving home)</b>
Regular	Clear or full liquid diet	[PEG 3L or PEG 2 L] + Bisacodyl 20 mg + clear liquids	PEG 1 L (4 glasses)
Regular	Clear or full liquid diet	[PEG 4 L or PEG 2 L] + Bisacodyl 20 mg + clear liquids	Mg Citrate 300 ml + Gatorade 16 oz (2 glasses)
Regular	Clear or full liquid diet	NaP 45 ml + Gatorade 2.85 L (3 Qt = 96 oz = 12 glasses)	NaP 45 ml + Gatorade 0.95 L (1 Qt = 32 oz = 4 glasses)
Regular	Clear or full liquid diet & Mg Citrate 300 ml + Gatorade 32 oz	Mg Citrate 300 ml + Gatorade 32 oz (2 glasses)	Mg Citrate 300 ml + Gatorade 16 oz (2 glasses).
Regular	Clear or full liquid diet	Suprep 16 oz. + Gatorade 96 oz or 12 glasses	Suprep 16 oz + Gatorade 24 oz (3 glasses)
Regular	Clear or full liquid diet	Prepopic 1 pack in 150 mL water + Gatorade 3 Qt or 96 oz or 12 glasses	Prepopic 1 pack in 150 mL water + Gatorade 32 oz or 1 Qt or 4 glasses

The volume of Gatorade in the evening covers needs for insensible losses & urine output

# Conclusions

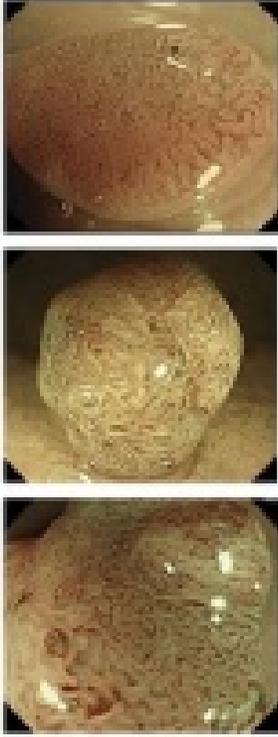
- Colon Preps work better when they are divided in two-days, with a PM + AM dose, or when given the day of the exam.
- Clear- or full-liquid diet should start at least at lunch time on day before exam.
- AM dose in second day, should be ingested completely at least 3 hours before leaving home (approximately 5 hours before the procedure)
- When taking NaP prep, 3.5 L of Gatorade decreases volume depletion.
- Poor preps increase the cost of colonoscopy, and “missed lesion rate”.

# International NBI Classification (NICE)

	Type 1	Type 2	Type 3
<b>Color</b>	Same or lighter than background	Browner relative to background (verify color arises from vessels)	Brown to dark-brown relative to background; sometimes patchy whiter areas
<b>Vessels</b>	None or isolated lacy vessels may be present cursing across the lesion	Thick white vessels surrounding white structures	Has area(s) with markedly distorted or missing vessels
<b>Surface Pattern</b>	Dark spots surrounded by white	Oval, tubular or branched white structures surrounded by brown vessels	Distortion or absence of pattern
<b>Most Likely Pathology</b>	<b>Hyperplastic or Sessile Serrated adenoma</b>	<b>Adenoma</b>	<b>Deep submucosal invasive cancer</b>

# NBI NICE Classification

Typical endoscopic findings of NICE classification

	Type 1	Type 2	Type 3
Endoscopic findings	 <p>Three endoscopic images of Type 1 NICE lesions. The top image shows a smooth, reddish, lobulated polypoid structure. The middle image shows a similar structure with a slightly more irregular surface. The bottom image shows a larger, more rounded polypoid structure with a smooth surface.</p>	 <p>Three endoscopic images of Type 2 NICE lesions. The top image shows a lobulated, reddish, polypoid structure with a granular surface. The middle image shows a similar structure with a more rounded, lobulated appearance. The bottom image shows a larger, more rounded polypoid structure with a granular surface.</p>	 <p>Three endoscopic images of Type 3 NICE lesions. The top image shows a lobulated, reddish, polypoid structure with a granular surface and some ulceration. The middle image shows a similar structure with a more rounded, lobulated appearance and some ulceration. The bottom image shows a larger, more rounded polypoid structure with a granular surface and some ulceration.</p>



# ***Oral Colon Irrigation Solutions Comparisons***

- **All preps work better when split in 2 days, or when given all on day of exam.**
- **PROTOCOL (split prep):**
  - **Clear liquids are started at noon,**
  - **1<sup>st</sup> split dose of prep is given at 6 pm, and**
  - **2<sup>nd</sup> split dose is given 5 hours before the procedure.**
- **A two-day Split dose PEG Prep (3 L or 4 L) is superior to the two-day split-dose Phosphosoda prep.**
- **A 3-dose, one-day Mg Citrate Prep is superior to the two-day Phosphosoda Prep**

# *Oral Colon Irrigation Solutions Comparisons*

- If used as in “paper insert”, colonoscopy prep with split-dose (2-day) liquid Phosphosoda gives better cleansing than with Visicol/Osmoprep (2-day).
- Pre-treatment with Mg Citrate or Bisacodyl, makes 2-Liter of PEG prep equivalent to 4-Liters of PEG alone (force of the flow).
- Visicol/Osmoprep 28 tablets is equivalent or better than 40 tablets.
- Gatorade (or ORS) decreases NaP-induced volume-depletion and improves prep quality.

# *Fluid needs for Iso-tonicity (fluid deficit) in mL*

- *Nulytely or Golytely (any volume) = 0*
- *Fleet Phosphosoda 90 mL = 2690*
- *Visicol Osmoprep 40 tabs = 2820*
- *Visicol Osmoprep 32 tab = 2275*
- *Visicol Osmoprep 28 tabs = 1980*
- *Mg Citrate 900 mL = 1582*
- *Mg Citrate 600 mL = 1055*

# Volume Presented to Cecum

- NuLytely or GoLytely 4L 4000 mL
- NuLytely or GoLytely 3 L 3000 mL
- Fleet Phosphosoda 90 mL 2780 mL
- Visicol Osmoprep 40 tablets 2820 mL
- Visicol Osmoprep 32 tablets 2275 mL
- Visicol Osmoprep 28 tablets 1980 mL
- Mg Citrate 3 x 300mL 2480 mL
- Mg Citrate 2 x 300 mL 1655 mL

# InScope Multi-Clip Applier



# Clopidogrel & Warfarin in GI Bleed

- Main goal is early therapeutic endoscopy with minimal or no interruption of anticoagulant/antiplatelet therapy.
- Consult with Cardiologist.
- Evaluate:
  - risk of continuous/recurrent bleed and severity of hemorrhage, vs
  - risk of thrombosis.
- WARFARIN
  - Give FFP until INR is 1.5-2.5; alternatively, Vitamin K 1-2 mg by slow IV.
  - In high risk for thrombosis consider IV heparin
    - Atrial Fibrillation with any of the following:
      - Valve dz, prosthetic valve, CHF, E/F < 35%, Thrombotic event, DM, HBP, > 75 y
    - Mechanical valve with any of the following:
      - Mitral position, pregnancy, previous thromboembolism, thrombophilia syndrome
    - Coronary Stent < 1 y old
    - Acute Coronary Syndrome
    - Non-stented percutaneous coronary intervention after MI.

# Clopidogrel & Warfarin in GI Bleed

## ➤ CLOPIDOGREL:

- After **percutaneous coronary intervention without stent**, risk is highest for **12 months**.
- In **drug eluting coronary stent**, risk is highest for initial 6 months, and remains high for **1 year**.
- In **bare stents** risk is highest for **1 month**.
- **In highest risk, maximal discontinuation of clopidogrel should be 5 days.**
- Continue or add ASA (+ PPI) while off clopidogrel during “highest” risk period.

# Endoscopy in Acute MI

- In patients with GI bleed leading to acute MI, patients are more likely to require endoscopic therapy than patients in whom GIB developed after being treated for acute MI (odds ratio 3.9; 95% CI, 1.8-8.5).
- The benefit of endoscopy in the patient with significant GIB in the setting of acute MI is supported by a decision analysis that showed that upper endoscopy before cardiac catheterization was beneficial in patients who presented with overt GIB in the setting of ACS, reducing overall deaths from 600 to 97 per 10,000 patients,
- **Endoscopy was not beneficial in patients who presented with occult GIB and acute MI.**

# TOPICS

- Endoscopy Ergonomics
- Overtubes
- Gastric Lavage
- Minnesota Tube
- Guidewires
- Tattooing
- Injectable Solutions
- Clips
- Duodenal Aspiration
- Dilators Measurements
- Antibiotic Prophylaxis
- Anticoagulants
- Ingested Foreign Bodies
- T-fasteners
- Tissue Sampling
- Angulation of endoscopes
- Colon Prep

# Risk of Endoscopy

		Risk
EGD		
	Cardiopulmonary events	1/170-1/10000
	Mortality	0-1/2000
	Bleeding	0.5-4%
	Perforation	1/2500-1/1100
	Perforation if dilating	0.1-0.4%
PEG	Overall	4.9-10.3%
	Mortality	0.53%
	Wound infection	7-26%
Colonoscopy		
	Polyp and cancer miss rate	6-17%
	Cardiopulmonary complications	0.9%
	Perforation	0.01-0.1%
	Bleeding	0.1-0.6%
	Post polypectomy syndrome	0.003-0.1%
	Mortality	0.007%

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