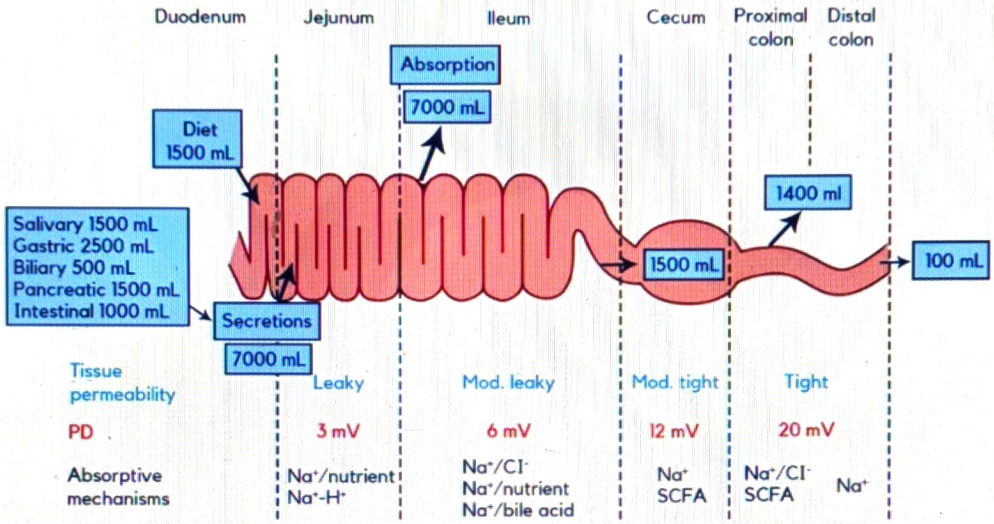
APPROACH TO A PATIENT WITH GASTROINTESTINAL DISEASE

- Basic Approach to Gastrointestinal Disease The basic approach involves a structural orientation to consider all possible causes for a patient's symptoms. This typically follows the digestive tract from top to bottom: esophagus, stomach, pancreas, biliary tract, liver, small bowel, and large bowel. A systematic approach helps prevent missing common diagnoses.

Fluid Balance in the Body 00:01:20



- Daily fluid intake: approximately 2500 ML.
- Total fluid from diet: about 8500 ML (including secretions).
- Fluid secretions per day:
  - Biliary: 500 ML (the least).
  - Small bowel: 1000 ML.
  - Pancreatic: 2500 ML.
  - Stomach: 2500 ML (the maximum).
  - Salivary: 2500 ML.
- Approximately 7000 ML enters the small bowel.
- Around 2500 ML reaches the cecum after absorption.
- Further absorption occurs in the colon.
- Ultimately, only about 100 ML is excreted in stool.

Gross Concepts of GI Tract Function and Disease Classifications 00:05:20

- Beyond motility and structural issues, the GI system involves vascular supply, microbiota, immune cells, and neuro-muscular interactions. GI diseases can be broadly classified by seven mechanisms:
  - Secretory Disorders: Problems with fluid secretion.
  - Absorption Disorders: Problems with fluid absorption.
  - Impaired Blood Flow: Issues with vascular supply to the GI tract (e.g., ischemic).
  - Infiltrative/Immune-Based Disorders: Infiltration of immune cells or autoimmune conditions.
  - Structural Causes: Obvious physical abnormalities like strictures or neoplasms.

- Motility-Related Disorders: Issues with gut transit.
- Functional Disorders: Conditions without an obvious organic cause, often related to motility and the enteric nervous system, or visceral hypersensitivity.

Malabsorption 00:10:27

- Definition: Malabsorption is a problem with absorption across the intestinal wall due to surface problems.
- Vs. Maldigestion: Maldigestion is a problem with digestion, often due to enzyme deficiency or abnormal enzymes, occurring intraluminally or at the brush border.
- Causes of Malabsorption (classified by anatomical location/system):
    - Gastric Causes: Atrophic gastritis, autoimmune gastritis, previous gastric surgery.
    - Biliary Causes: Obstructive biliary tumors, primary biliary cholangitis (impaired bile secretion).
    - Pancreatic Causes: Isolated enzyme deficiency, pancreatic insufficiency (chronic pancreatitis, obstructive lesions).
    - Liver Causes: Portal hypertension, cirrhosis (impaired bile).
- Intestinal Causes: These are numerous and complex, including:
    - Amyloidosis, autoimmune enteropathy, celiac disease, collagenous sprue, congenital intestinal defects, Crohn's disease, cell deficiency, enteroendocrine cell deficiency, APECED syndrome.
    - Enterokinase deficiency, infectious gastroenteritis, cryoglobulinemic causes, allergy, GvHD (graft-versus-host disease), hypolactasia, intestinal bile acid malabsorption, intestinal infections.
    - Lymphomas (small bowel and other types), ischemia, post-surgery complications, non-granulomatous chronic idiopathic enteric colitis, post-infection malabsorption.
    - Primary immunodeficiency, radiation enteritis, refractory sprue, sarcoidosis, SIBO (Small Intestinal Bacterial Overgrowth), tropical sprue.
        - Intestinal Causes (simplified by wall layers and lumen):
    - Infiltrative Causes (abnormal/normal cells): Mast cells, eosinophils, no cells (e.g., CVID immunodeficiency), collagen or lymphocytes getting deposited.
    - Inflammatory Causes: Crohn's disease, sarcoidosis.
    - Neoplastic Infiltration.
    - Infections: Tropical sprue can be inflammatory/infectious.
    - Intraluminal Causes: Increased bacteria (e.g., SIBO).
        - Beyond the Wall Causes:
        - Ischemic Causes.
- Lymphatic Causes:
    - Primary intestinal lymphangiectasia.
    - Secondary (solid tumors, lymphoma, thoracic duct damage, cardiac causes due to back pressure/congestion).
- Systemic Causes: Neuroendocrine tumors, Addison's disease, diabetes, hypothyroidism, scleroderma, celiac-concrete-Candida syndrome.

Altered Secretion 00:20:00

- This can involve increased secretion:
  - Increased Gastric Secretion: Zollinger-Ellison syndrome.
  - Increased Secretion Secondary to Tumors: Neuroendocrine tumors, large villous adenomas (due to peptide secretion).

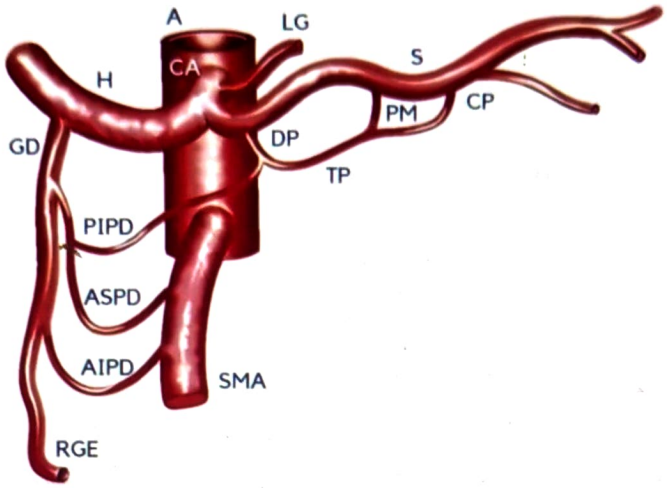
Altered Gut Transit 00:21:00

- This can be classified as mechanical or motility-related, and can involve increased transit.
- Mechanical Causes (from top to bottom):
  - Esophageal Occlusion: Stricture, neoplasm.
  - Gastric Outlet Obstruction: Peptic ulcer disease, gastric malignancy.
  - Small Intestinal Obstruction: Malignancy, stricture, but most commonly adhesions from previous surgery.
  - Colonic Obstruction: Most commonly colon cancer.
- Motility-Related Problems (by organ):
  - Esophagus: Achalasia, diffuse esophageal spasm, jackhammer esophagus.
  - Gastric: Gastroparesis.
  - Intestine: Obstruction due to enteric neuropathy or smooth muscle injury (neurogenic or myogenic cause).
  - Colon (Constipation): Diffusely impaired colonic propulsion, pelvic outflow obstruction (dyssynergia).

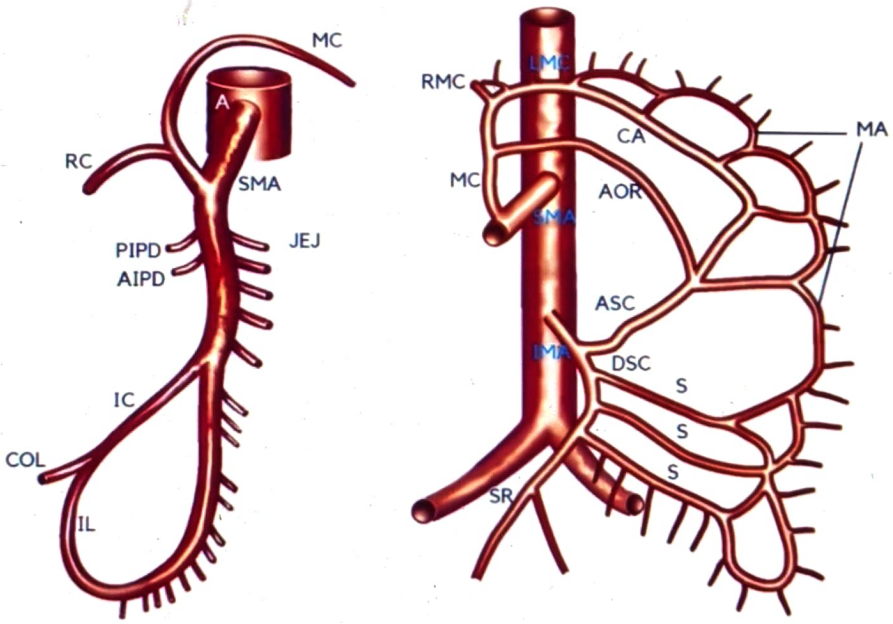
Increased Gut Transit 00:22:37

- Rapid gastric emptying (post-vagotomy, dumping syndrome, cyclic vomiting), exaggerated intestinal/colonic motility (irritable bowel syndrome).
- Immune Dysregulation and Microbiota
  - Immune dysregulation can manifest as increased immune cells or autoimmune conditions at the gut level.
  - Examples: Celiac disease, allergic eosinophilic gastroenteritis/esophagitis, ulcerative colitis, Crohn's disease, microscopic colitis (lymphocytic, collagenous).
  - Alterations in Gut Microbiome (Dysbiosis): Important factor, acting as a flaring agent or trigger in immune-dysregulated conditions like IBD, celiac disease, and IBS. Microbiome and immune dysregulation are closely related.
- Altered Blood Flow/Ischemia
  - Causes: Blockage in celiac/superior mesenteric artery, arterial embolus/thrombosis, venous thrombosis, shock-related hypoperfusion.
  - Consequences: Mucosal injury, hemorrhage, perforation (superficial to transmural), intestinal strictures in chronic ischemia.
  - Radiation enterocolitis can also exhibit reduced mucosal blood flow.
- Most Common Type of Intestinal Ischemia: Colonic ischemia. Followed by acute mesenteric ischemia, then focal segmental ischemia or chronic mesenteric ischemia.

- Celiac Artery and its Branches: Left gastric, splenic, common hepatic (gives gastroduodenal). Thrombosis can cause gastroparetic symptoms.



- Superior Mesenteric Artery (SMA) Branches: Middle colic, right colic, jejunal, ileal, ileocolic.



- Inferior Mesenteric Artery (IMA): Arises below SMA.
- Anastomoses between SMA and IMA:
  - Arc of Riolan (near the mesentery).
  - Marginal artery of Drummond (closest to the wall of the colon).
  - Central anastomotic artery (between Arc of Riolan and marginal artery of Drummond).
- Dense anastomoses mean that if a significant block (e.g., SMA block) occurs, these vessels enlarge to become dominant blood flow pathways.
- Common Causes of Acute Mesenteric Ischemia (AMI): Acute is more common than chronic, arterial more common than venous.
  - Most Common: SMA embolus.
  - Followed by: Thrombotic causes (occlusive disease), non-occlusive mesenteric ischemia (NOMI), mesenteric venous thrombosis, focal segmental ischemia.

Neoplastic Causes 00:30:30

- Neoplasms can occur in any GI organ (upper GI, lower GI, pancreas, liver) and are a recognized cause of GI disease.
- Functional Causes These are conditions without obvious organic abnormalities, occurring after ruling out other organic causes (secretion, malabsorption, blood flow, immune dysregulation, motility, neoplastic). Examples include functional heartburn, functional dyspepsia, and irritable bowel syndrome (IBS), which involve an interplay of microbiota, visceral hypersensitivity, and sometimes unexplainable causes.
- Genetic Influences Genetic factors play a role in some GI conditions:
  - Peutz-Jeghers syndrome, acromion-adrenal insufficiency syndrome.
  - Polyposis, inflammatory bowel disease (especially in younger age groups).
  - Vascular anomalies (e.g., Osler-Weber-Rendu syndrome).
  - Liver conditions (e.g., Wilson's disease, hemochromatosis).
  - Malignancies can have genetic propensities.
  - Rare genetic motility syndromes.
  - Familial clustering is observed in functional bowel disorders, possibly due to a psychological component.

Approach to a Patient with GI Disease 00:35:30

- The general approach involves history, physical examination, and investigations.
- History: Essential for 70-90% of probable diagnoses.
  - Common Symptoms: Dysphagia, dyspepsia, abdominal pain, constipation, jaundice, etc..
  - Alarm Symptoms: Vary by presentation (e.g., dysphagia itself is alarming; heartburn with significant weight loss). Alarm symptoms indicate a need to look for an organic cause.
  - Differentiating Organic vs. Functional: Absence of nocturnal symptoms, no weight loss, or a history of psychiatric disorders can point towards functional or somatic conditions.
  - Question Interpretation (for exams): The beginning and end of a question, and phrases like "no history of something," can provide clues to rule out options and arrive at the correct answer.
- Physical Examination:
  - General: Vital signs, head-to-toe examination (skin, eyes, joints, neck, lymph nodes, respiratory, other systems).
  - Specific: Rectal examination, neuropathy examinations (for malnutrition), pelvic examination (for chronic abdominal pain in women).
  - Abdomen Examination: Inspection, auscultation, percussion, palpation (auscultation is now often done second).
- Pain Differentiation:
  - Musculoskeletal pain: Increases on tensing muscle (e.g., leg lift maneuver).
  - Visceral pain: Generalized discomfort.
  - Parietal pain/Peritonitis: Localized pain with involuntary guarding, rigidity, rebound tenderness.
  - Ischemic pain: Very severe pain disproportionate to actual tenderness.

- Investigations: Five broad categories:
  - Laboratory-based tests.
  - Procedure-based tests.
  - Biopsy results.
  - Imaging studies.
  - Functional tests.

Laboratory Tests 00:40:20

- Routine/Early Tests: Hemogram (CBC), RFD (renal function), LFT (liver function), EKG (with/without echo), viral markers, coagulation workup, inflammatory markers (e.g., CRP).
- Specific Tests:
  - Endocrine: Thyroid, cortisol, calcium levels (for endocrine manifestations).
  - Serological: Celiac disease (well-known), IBD (less so), connective tissue diseases (ANA profile), paraneoplastic dysmotility syndromes.
  - Hormone Levels: Suspected neuroendocrine neoplasia.
  - Intra-abdominal/Tumor Markers: CEA, CA 19-9, alpha-fetoprotein (for specific presentations).
  - Drug Monitoring: Therapeutic drug levels (e.g., TPMT in IBD, tacrolimus in liver transplant).
  - Pharmacogenetics: Genetic profiling for personalized medication (side effects, effective dosage, toxic dose).
- Fluid Examination:
  - Ascitic Fluid: Cell count (SAG), cytology (malignancy), culture (SBP).
  - Urine Samples: Carcinoid, porphyria, heavy metal toxins.
- Luminal Content Tests:
  - Esophageal: pH testing (24-hour pH study for pathological acidity: pH < 4 for > 5% of time), impedance study (diagnoses reflux regardless of acidity).
  - Duodenal Aspirates: Bacterial overgrowth, parasites.
  - Pancreatic Juice: Pancreatic function test (direct test measures bicarbonate for early exocrine insufficiency).
  - Stool Samples: Culture (bacterial pathogens), leukocyte, parasites, *Giardia* antigen, *C. difficile* PCR/antigen.
  - Fecal Calprotectin: Elevated in inflammatory conditions.
  - Stool Electrolytes/Osmolality: Diarrheal conditions.
  - Laxative Screen: In stool samples.
  - Fecal Immunological/DNA Tests: Emerging screening for colon cancer.
  - Fecal Fat Quantification: Possible malabsorption.

Pancreatic Function Tests 00:46:40

- Direct Tests: Measure exocrine pancreatic function (bicarbonate, amylase, trypsin) directly via duodenal aspiration. Requires duodenal intubation and IV hormones (secretin, CCK) to stimulate cells.
- Indirect Tests:

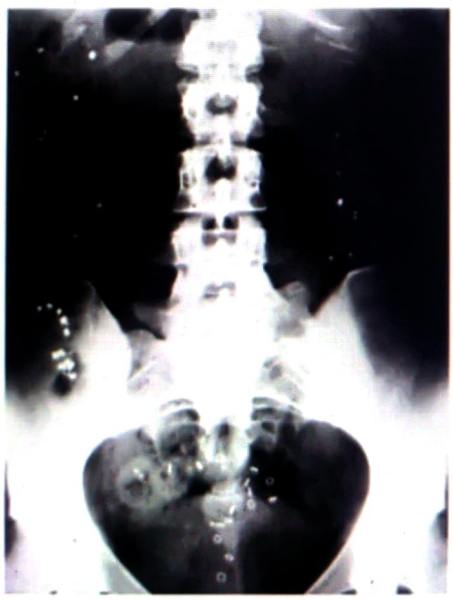
  - Requiring Intubation: Lundh meal test.
  - Tubeless: Fecal fat estimation, fecal chymotrypsin estimation, fecal elastase estimation, BT-PABA test, fluorescein dilaurate test (oral ingestion, serum/urine measurement). These are simpler for severe pancreatic dysfunction.
- Endoscopy
  - Upper GI Endoscopy (EGD): Visualization up to the jejunal flexure; biopsy for pathology.
  - Colonoscopy: Evaluation of the colon; biopsy.
- Small Bowel Evaluation (for previously enigmatic small bowel):
  - Capsule Endoscopy: Camera capsule transmits images as it passes through the small bowel; no therapeutic procedures possible.
  - Enteroscopes: Single balloon, double balloon, motorized (e.g., SpyGlass technology) for assessment and therapeutic maneuvers in the small bowel.
- Optical Biopsy: Enhanced endoscopic view using filters or chemical dyes to highlight abnormal tissue. Includes narrow-band imaging (NBI), chromoendoscopy, confocal laser endomicroscopy, optical coherence tomography (to see microscopic structures).

Histopathology 00:52:20

- Integral part using biopsies with special stains to diagnose inflammatory, infectious, neoplastic conditions.
- Specific Biopsies: Deep rectal biopsies (amyloidosis), liver biopsy (intrahepatic disease, liver mass lesions).
- Imaging-Guided Biopsies: CT-guided or ultrasound-guided for inaccessible tissues.

Imaging Studies 00:53:10

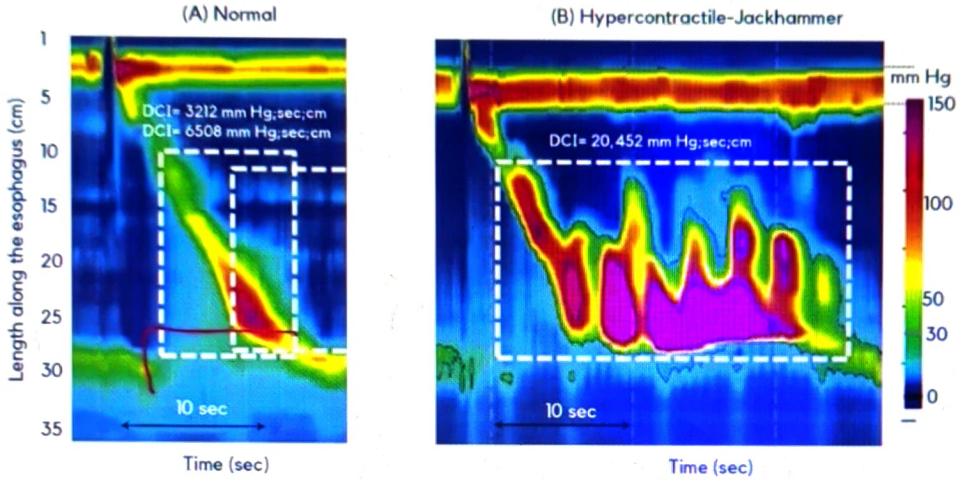
- Evolution: From plain X-rays (chest, abdomen), barium studies (positive/negative contrast), to ultrasound, CT, MRI (with various protocols), and PET CT.
- Applications: Diagnosing conditions, metastatic spread.
- X-ray Abdomen: Used for diagnosing slow transit and pelvic outflow obstruction in constipation by tracking radiopaque markers.



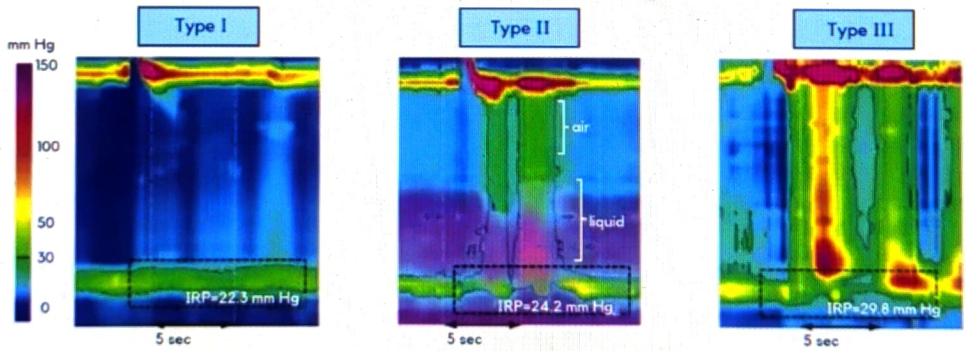
- Interventional Radiology: Angiography and interventions for mesenteric ischemia, embolization/stenting for liver malignancies, percutaneous transhepatic biliary drainage (PTBD).

Functional Testing 00:54:56

- These are primarily motility activity tests.
- Manometry:



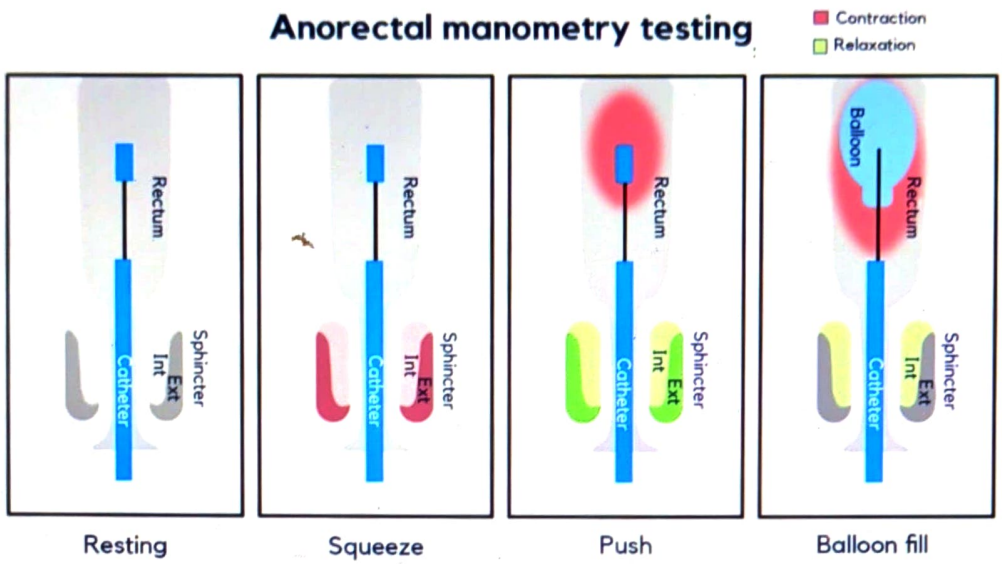
- Esophageal Manometry: For suspected esophageal dysmotility (e.g., achalasia types 1, 2, 3; jackhammer esophagus, diffuse esophageal spasm). Measures lower esophageal sphincter (LES) relaxation (IRP) and peristalsis.



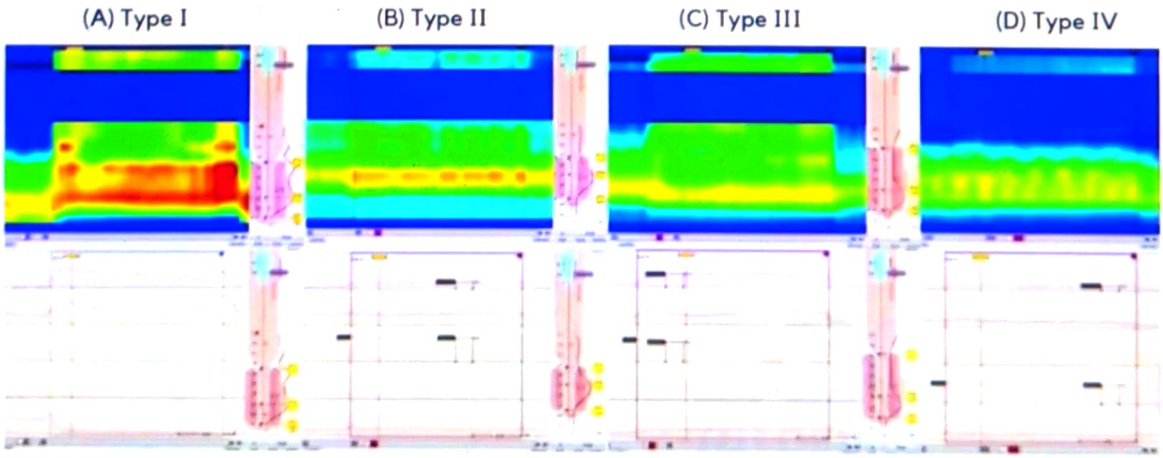
Small Intestinal Manometry 01:01:00

- For small bowel dysmotility (e.g., pseudo-obstruction, colonic inertia). Interpreted as neuropathic, myopathic, or obstructive patterns based on migrating motor complexes (MMC).
  - MMC Phases: Phase 1 (quiescence, max absorption), Phase 2 (abrupt bursts), Phase 3 (persistent high amplitude contractions, max transit of undigested material).
  - Neuropathic Pattern: Abnormal propagation/absence of MMC, uncoordinated high-frequency/amplitude waves, failure to convert to fed pattern, or early return of Phase 3.
  - Myopathic Pattern: Low amplitude pressure waves (< 20 mmHg) during Phase 3.
  - Obstructive Pattern: Postprandial clustered or simultaneous prolonged pressure waves.
- Colonic Manometry: For evaluating colonic inertia.
- Anorectal Manometry: Assesses anorectal functionality, using a catheter with a balloon.

- Measurements: Resting pressures, squeeze pressures (sphincter contraction), pushing movement (rectal contraction, anal relaxation normally).



- Defecation Dyssynergia (4 types): Abnormal patterns where normal coordination is lost.
  - Type 1: Adequate rectal propulsive pressure but paradoxical anal contraction (anal remains closed).
  - Type 2: Unable to generate adequate rectal propulsive pressure AND paradoxical anal contraction.
  - Type 3: Adequate rectal propulsive pressure but inadequate anal sphincter relaxation (weak opening).
  - Type 4: Unable to generate adequate rectal propulsive pressure AND inadequate anal sphincter relaxation.



(A) The patient with Type I DD is able to generate an adequate propulsive force but with a paradoxical increase in anal sphincter
(B) The patient with Type II DD is unable to generate an adequate propulsive force and paradoxically increases the anal sphincter
(C) The patient with Type III DD is able to generate an adequate propulsive force, with absent or incomplete (<20%) anal sphincter relaxation
D) The patient with Type IV DD is unable to generate an adequate propulsive force with absent or incomplete anal sphincter relaxation

- Biliary Manometry: Assesses for diagnoses like sphincter of Oddi dysfunction (SOD). Uses modified Miluwakee Rome IV classification systems.
  - Biliary Type 1 (SOD stenosis): Biliary pain, duct diameter > 9mm, elevated serum aminotransferase (benefits from sphincterotomy).

- Biliary Type 2 (Functional biliary sphincter disorder): Biliary pain + one objective criterion (duct diameter or enzyme elevation).
- Biliary Type 3 (Pure functional pain): Biliary pain only.

Modified Milwaukee and Rome IV Classification Systems for Biliary SOD

Modified Milwaukee	Rome IV	Features
Biliary type I	SO stenosis	Biliary pain Duct diameter >9 mm Serum ALT or AST elevation
Biliary type II	Functional billary sphincter disorder	Biliary pain One of the objective criteria noted above
Biliary type III	Functional pain	Biliary pain only

- Wireless Motility Capsule (WMC): Measures transit and contractile activity in stomach, small bowel, and large bowel, recording temperature, pH, and pressure. pH changes help identify location (e.g., entry into small bowel or colon).
- Endoluminal Functional Lumen Imaging Probe (FLIP): Assesses distensibility of sphincters and esophageal contraction patterns (repetitive anterograde/retrograde).

Breath Tests 01:01:13

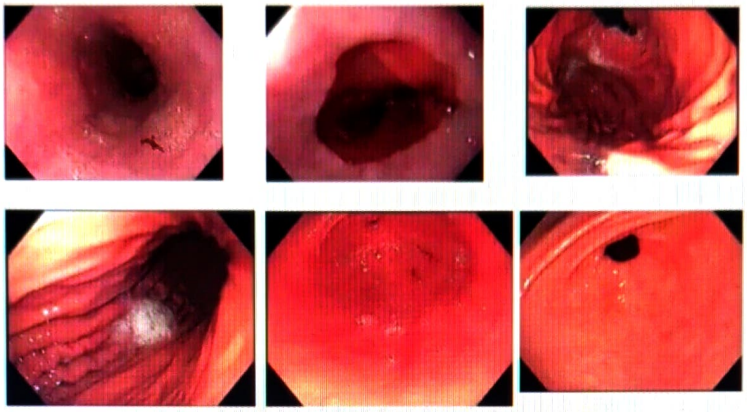
- Urea Breath Test: For *H. pylori* evaluation.
- Gastric Emptying Breath Test: Alternative to scintigraphy.
- Carbohydrate Challenge Tests (with mono/oligosaccharides):
  - Lactose, Fructose, Sucrose, Sorbitol: For carbohydrate malabsorption.
  - Glucose Hydrogen Breath Test: Best for SIBO.
  - Lactulose Hydrogen Breath Test: For assessing SIBO and overall oral-cecal transit time.
- Principle of Breath Tests: Oral intake of substance -> malabsorbed portion reaches colon -> fermented by microbiota -> produces hydrogen/methane -> exhaled via lungs -> measured in breath (PPM increase > 20 is significant).

APPROACH TO A PATIENT WITH GASTROINTESTINAL DISEASE

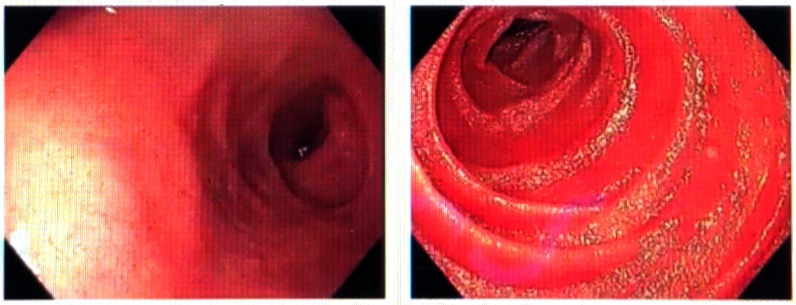
- **Basic Approach**
  - Structural orientation to symptoms
  - Digestive tract assessment: esophagus, stomach, pancreas, biliary tract, liver, small bowel, large bowel
  - Systematic approach to avoid missed diagnoses
- **Fluid Balance in the Body**
  - Daily fluid intake: ~2500 ML
  - Total fluid from diet: ~8500 ML
  - Daily fluid secretions:
    - Biliary: 500 ML
    - Small bowel: 1000 ML
    - Pancreatic: 2500 ML
    - Stomach: 2500 ML
    - Salivary: 2500 ML
  - ~7000 ML enters small bowel
  - ~2500 ML reaches cecum after absorption
  - Further absorption in colon
  - ~100 ML excreted in stool
- **Gross Concepts of GI Tract Function**
  - Beyond motility and structure: vascular supply, microbiota, immune cells, neuro-muscular interactions
  - :
    - Secretory Disorders
    - Absorption Disorders
    - Impaired Blood Flow
    - Infiltrative/Immune-Based Disorders
    - Structural Causes
    - Motility-Related Disorders
    - Functional Disorders
- **Malabsorption**
  - Definition: Absorption issues across intestinal wall
  - Distinction: Malabsorption vs. Maldigestion (enzyme issues)
  - :
    - Gastric: Atrophic gastritis, surgery
    - Biliary: Obstructive tumors
    - Pancreatic: Enzyme deficiencies
    - Liver: Portal hypertension
    - Intestinal: Various conditions (e.g., celiac, Crohn's)
  - :
    - Infiltrative causes (e.g., lymphocytes)
    - Inflammatory (e.g., Crohn's)
    - Neoplastic infiltration
    - Infections
    - Intraluminal (e.g., SIBO)
- **Altered Secretion**
  - Increased secretion conditions:
    - Zollinger-Ellison syndrome
    - Neuroendocrine tumors
- **Altered Gut Transit**
  - Classification: Mechanical vs. Motility-related
  - :
    - Esophageal occlusion
    - Gastric outlet obstruction
    - Small intestinal obstruction
    - Colonic obstruction
  - :
    - Esophagus: Achalasia, spasms
    - Gastric: Gastroparesis
    - Intestine: Neurogenic/myogenic issues
    - Colon: Constipation
- **Increased Gut Transit**
  - Rapid gastric emptying, exaggerated intestinal motility
  - Immune dysregulation: Increased immune cells, autoimmune conditions
  - Dysbiosis: Alterations in gut microbiome, triggers for IBD, celiac, IBS
  - Altered blood flow/ischemia: Blockages and consequences
- **Neoplastic Causes**
  - Neoplasms

BASIC ENDOSCOPIC PICTURES AND PROCEDURES

1. Normal Upper GI Endoscopy Pictures 00:00:10



- **Esophageal Mucosa:** Normal appearance, with the lumen visible.
- **Gastroesophageal (GE) Junction:** Shows squamous mucosa transitioning to columnar mucosa.
- **Fundus of the Stomach:** Best viewed in a **retroflexed position**; allows appreciation of the greater curvature and the scope entering the hiatus.
- **Lesser and Greater Curvature:** Normal prominent folds are visible.
- **Antrum:** Seen with pillars and the incision above.
- **Duodenum:** D1 (bulb) and D2 are visible.

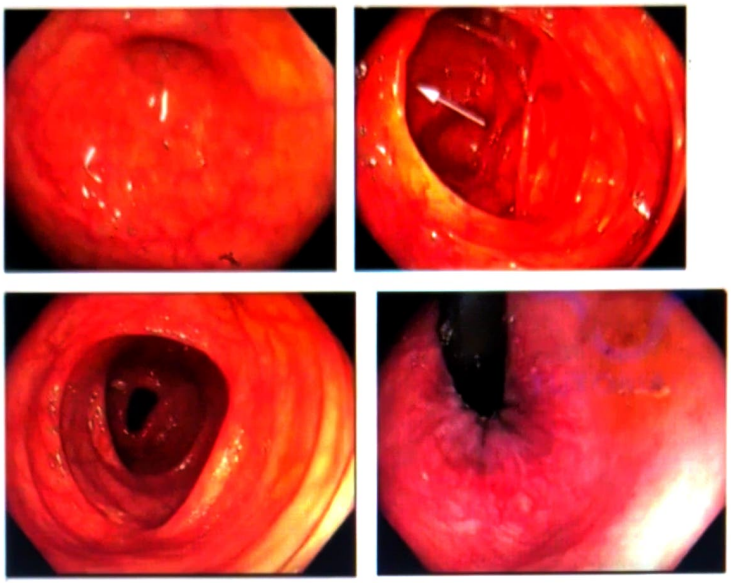


- A complete upper GI endoscope should include at least **eight pictures** covering these areas.

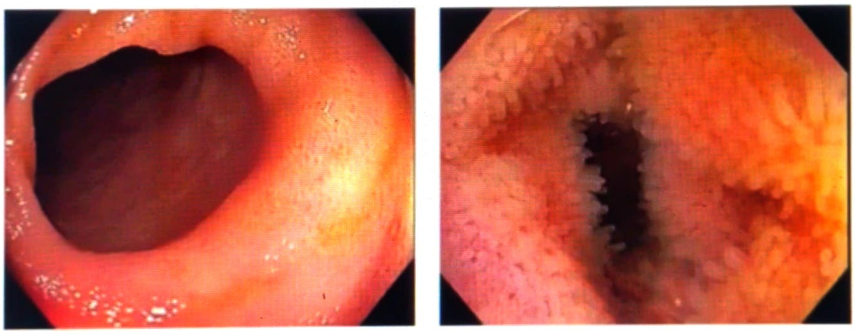
2. Retroflexed Position 00:02:06

- This position allows the scope to turn on itself to view areas like the fundus of the stomach.
- It is used in **only two spots in the body**: the **stomach fundus** and the **anal area**.
- In the anal area, it helps assess hemorrhoids or other perianal pathologies, showing the rectum, anal opening, and the scope.

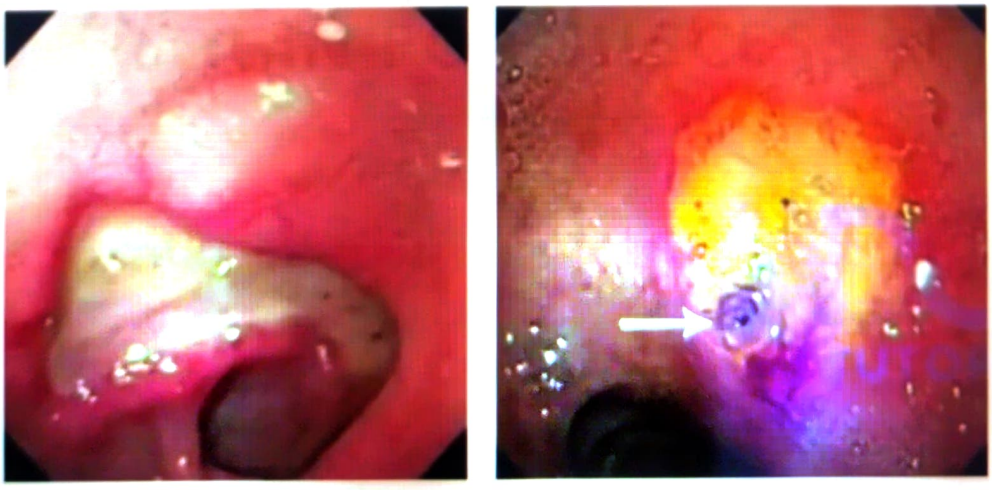
3. Normal Colonoscopy Pictures 00:04:29



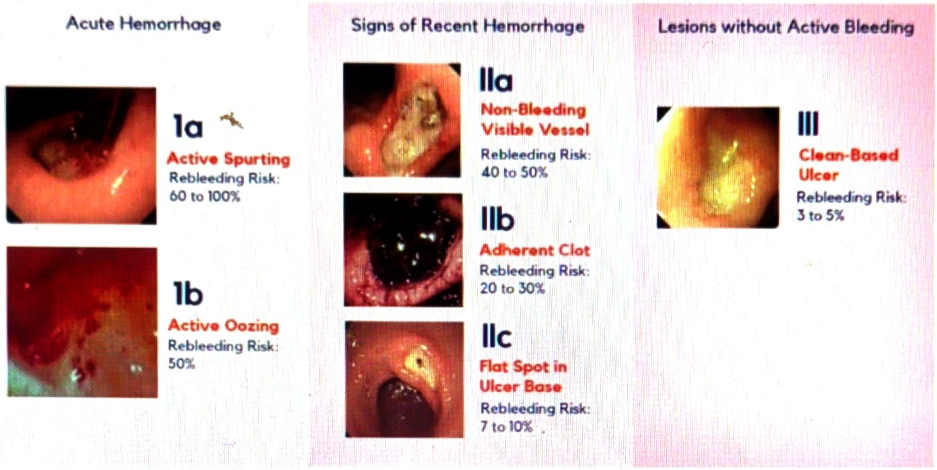
- **Cecum:** Identified with an arrow pointing towards the terminal ileum.
- **Transverse Colon:** Shows normal folds.
- **Terminal Ileum:** Normally appears with villi, which can be appreciated better on higher magnification.



4. Pathological Diagnoses: Ulcers 00:05:40



- **Duodenal Ulcer:** May be clean-based with no other abnormal findings, or can present with a non-bleeding visible vessel.
- **Forrest Classification for Bleeding Ulcers:** This classification is crucial for predicting re-bleeding rates and guiding treatment.

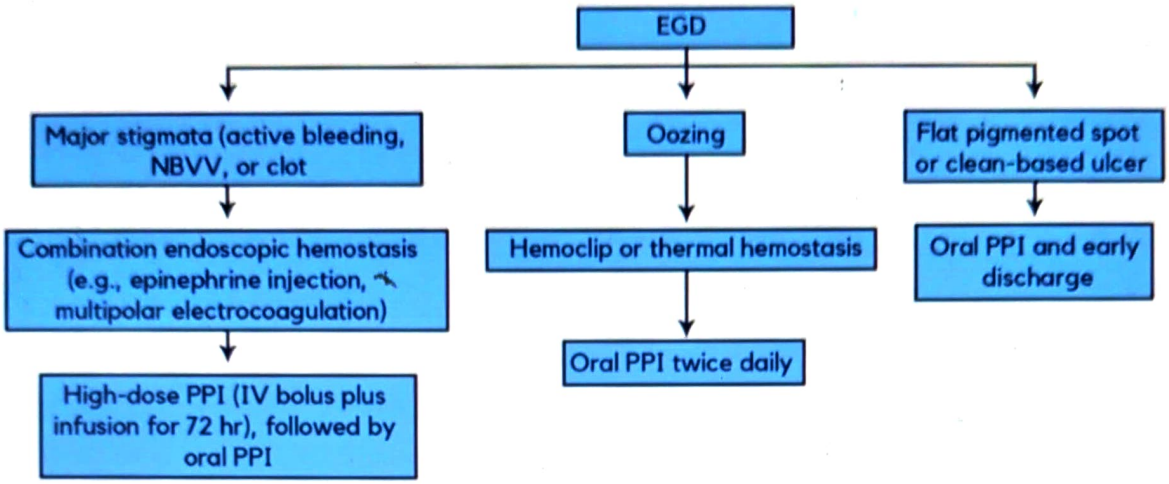


  - **Type 1 (Active Hemorrhage):**
    - **1a:** Spurting bleeding (re-bleeding rate 90%).
    - **1b:** Oozing blood (re-bleeding rate slightly less than 2a/2b).
  - **Type 2 (Signs of Recent Hemorrhage):**
    - **2a:** Non-bleeding visible vessel (re-bleeding rate 50%).
    - **2b:** Adherent clot (re-bleeding rate 33%). **Note:** Type 2b has a higher re-bleeding rate than 1b, which is a paradoxical finding and an important MCQ question.
    - **2c:** Flat spot/single pigmented spot.
  - **Type 3:** Clean-based ulcer (least re-bleeding rate, 2-3%, allowing early discharge).
- **Re-bleeding Rates Post-Endoscopic Procedure:** For 1a and 2a ulcers, the re-bleeding rate is reduced from 90% and 50% to 15-30% after endoscopic management. For 1b and 2b, it reduces to 0-5%.

Endoscopic Stigma (Forrest Class)	Frequency (%)	Risk of Rebleeding (%)	Risk of Rebleeding After Endoscopic Hemostasis (%)*
Active arterial bleeding (IA)	12	90	15-30
Nonbleeding visible vessel (IIA)	22	50	15-30
Adherent dot (IIB)	10	33	0-5
Oozing without stigmata (IB)	14	10-14†	0-5
Flat spot (IIC)	10	10-25†	0
Clean base (III)	32	3	N/A

Reduction in bleeding risk is without the administration of a PPI.
The risk depends on whether arterial blood flow is detected before endoscopic hemostasis. N/A, Not applicable.

- **Treatment Modalities based on Forrest Classification:**



- **Clean-based ulcer (Type 3) or Flat pigmented spot (Type 2c):** Oral PPI and early discharge.
- **Oozing (Type 1b):** Hemoclip or thermal ablation, followed by oral PPI.
- **Active bleeding (Type 1a), Non-bleeding visible vessel (Type 2a), or Clot (Type 2b):** Combined endoscopic hemostasis (epinephrine injection, coagulation, or hemoclip) with high-dose PPI infusion for 72 hours, followed by oral PPI.

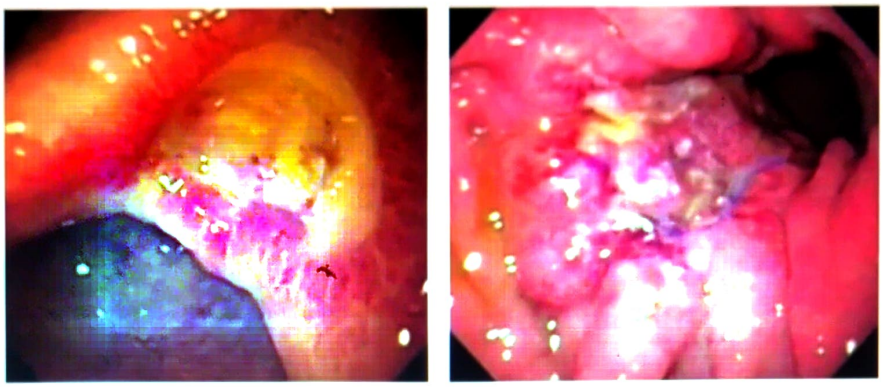
5. Rockall Scoring System 00:10:42

Rockall Scoring system				
	Points			
Variable	0	1	2	3
Age (r)	<60	60-79	≥80	-
Pulse rate (beats/min)	<100	≥100	-	-
Systolic blood pressure (mm Hg)	Normal	≥100	<100	-
Comorbidity	None	-	Ischemic heart disease, cardiac failure, other major illness	Renal failure, hepatic failure, metastatic cancer
Diagnosis	Mallory Weiss tear or no lesion observed	All other benign diagnoses	Malignarit lesion	-
Endoscopic stigmata of recent hemorrhage	No stigmata or dark spot in ulcer bose	-	Blood in UGI tract, adherent clot, visible vessel, active bleeding	-
Total Score	Frequency (% of Total)	Rebleeding Rate (%)	Mortality Rate (%)	
0	4.9	4.9	0	
1	9.5	3.4	0	
2	11.4	5.3	0.2	
3	15.0	11.2	2.9	
4	17.9	14.1	5.3	
5	15.3	24.1	10.8	
6	10.6	32.9	17.3	
7	9.0	43.8	27.0	
>8	6.4	41.8	41.1	

Modified from Rockall TA, Logan RF, Devlin HB, Northfield TC. Selection of patients for early discharge or outpatient care after acute upper gastrointestinal haemorrhage. National Audit of Acute Upper Gastrointestinal Haemorrhage. Lancet 1996; 347:1138-40.

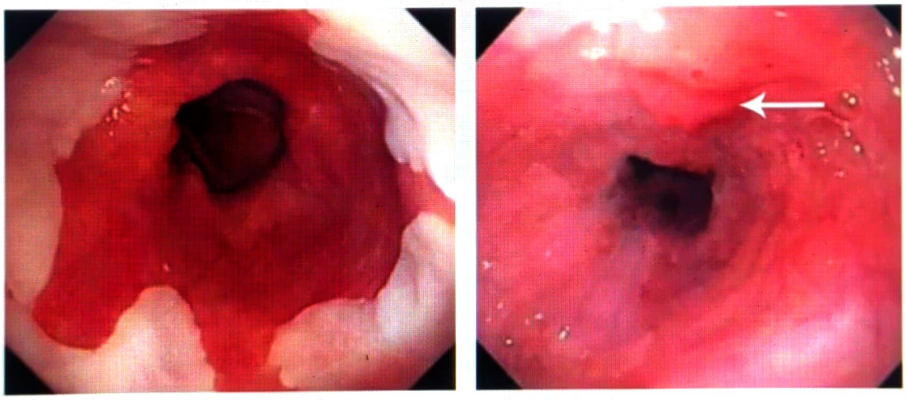
- Used for assessing bleeding patients.
- **Components:** A (age)), BPM (beats per minute), C (co-morbidities), D (diagnosis), E (endoscopic diagnosis).
- Variables are scored 0, 1, 2, or 3.
- **Co-morbidities:** Renal failure, hepatic failure, and metastatic cancer are given a score of 3 (higher risk). Heart failure and other major illnesses receive a score of 2.
- **Malignant diagnosis** generally receives a higher score than benign diagnoses.
- Re-bleeding rates increase as the Rockall score increases.

6. Gastric ulcer

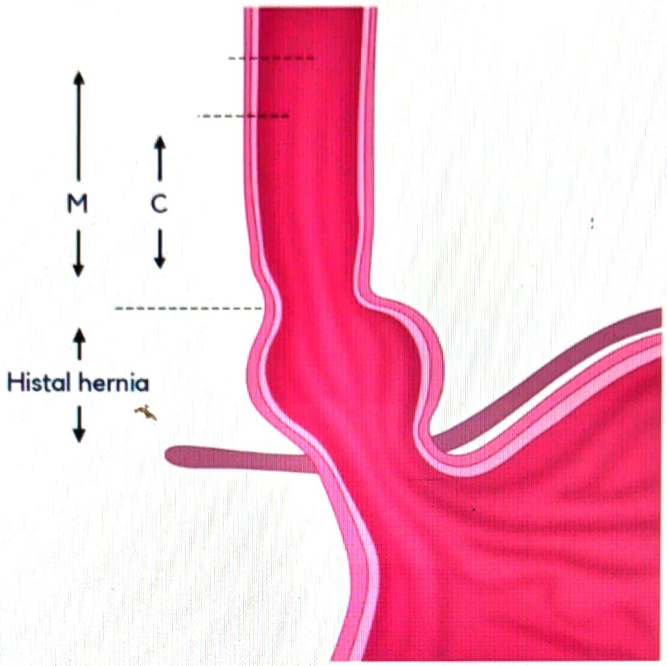


- Endoscopic pictures can show gastric cancer, often appearing as a malignant ulcer with **irregular borders and a bad surface base**, in contrast to a probable peptic ulcer.

7. Barrett's Esophagus 00:13:03



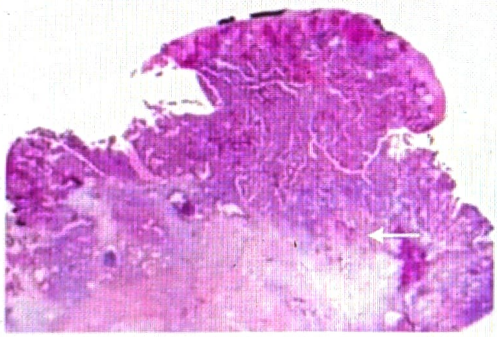
- **Definition: Metaplasia** where existing squamous epithelium is replaced by another type of epithelium, typically columnar (pseudo-pyloric, gastric, or colonic interstitial). Most studies accept columnar replacement as the defining factor.
- **Endoscopic Appearance**: Tongue-like projections are characteristic.
- **Prague Classification (C&M Classification)**: Used to measure the extent of Barrett's esophagus.
  - **Circumferential Extent (C)**: Distance from the diaphragmatic impression/gastric folds to the upper extreme of the squamous columnar junction.
  - **Maximum Extent (M)**: Distance from the diaphragmatic impression to the furthest tongue-like projection.
  - Example: cmM2.
- **Associated Findings**: Often seen with a **hiatus hernia** at the level of the diaphragmatic pinch/impression. Biopsies should be taken from nodular abnormalities in Barrett's epithelium.

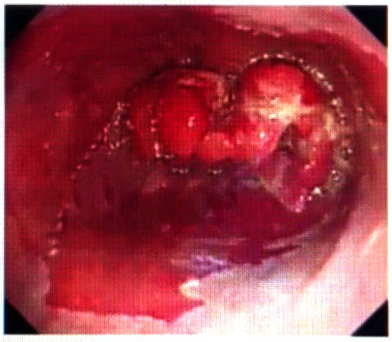


8. Hiatus Hernia

- **Classification: Hill's grade** ranges from 1 to 4, based on the tightness of the hiatus around a retroflexed scope.
- A length of **more than 3 cm** is considered significant.

9. Barrett's Esophagitis with Malignancy

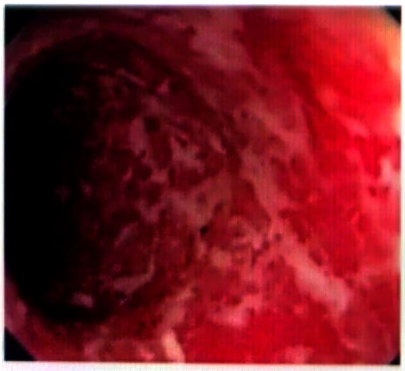


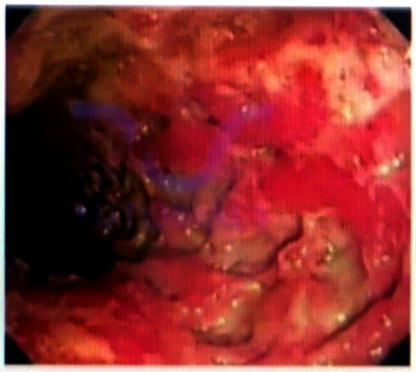


- An adenocarcinoma can be seen in a lighter tone within Barrett's esophagitis.

10. Inflammatory Bowel Disease (IBD): 00:16:48

Crohn's Disease and Ulcerative Colitis





- **Endoscopic Differentiation:**
  - **Ulcerative Colitis (UC):** Multiple superficial ulcers.
  - **Crohn's Disease (CD):** Deeper ulcers with surrounding erythema.

Crohn's Disease Classifications: 00:17:32

- **Severity Assessment:**
  - **Crohn's Disease Activity Index (CDAI):** involves components like stool count, abdominal pain, general well-being, extra-intestinal disease, opiate use, abdominal mass, hematocrit, and body weight below standard. Points are weighted, and the score indicates relapse or remission.

Crohn Disease Activity Index

Variable	Scale	Weight
Liquid or very soft stools	Stool count summed daily for 7 days	2
Abdominal pain	Sum of 7 days of daily ratings as: 0 = none, 1 mild, 2 moderate, 3 = severe	5
General well-being	Sum of 7 days of daily ratings as: 0 = generally well, 1 slightly below par, 2 poor, 3 = very poor, 4 = terrible	7
Features of extraintestinal disease	Any of the following present during the 7 days of daily ratings: a Arthritis or arthralgia b Skin or mouth lesions, including pyoderma gangrenosum, erythema nodosum, aphthous stomatitis c Iritis or uveitis d Anal fissure, fistula, or perirectal abscess e Other external fistula f Fever more than 100°F	20 each
Opiate use for diarrhea	0 = no, 1 = yes	30
Abdominal mass	0=none, 2 questionable, 5 = definite	10
Hematocrit value (%):	Males: 47-hematocrit Females: 42-hematocrit	6
% Body weight below standard	100x [1-(body weight/standard weight)]	1

*To calculate the CDAI, the scale is multiplied by the weighting factor for each variable, and then all 8 weighted variables are added.

- **Harvey Bradshaw Index (HBI):** A simpler clinical scoring system for severity.
  - **Components:** General well-being, abdominal pain, number of stools per day, abdominal mass, and complications (arthralgia, uveitis, erythema nodosum, aphthous ulcers, vaginal fissures, fistulas, abscess, pyoderma gangrenosum). Each complication scores 1 point.
  - **Remission:** Score < 3.
  - **Relapse:** Score > 7.
- **Overall Classification (Montreal Classification):** Describes the behavior of the disease.
  - **Age (A):** A1 (<16 years), A2 (17-40 years), A3 (>40 years).
  - **Location (L):** L1 (terminal ileum), L2 (colon), L3 (ileocolonic), L4 (upper GI).
  - **Behavior (B):** B1 (non-structuring, non-penetrating), B2 (structuring), B3 (penetrating).
  - **Modifier (P):** Perianal disease.
  - Example: Crohn's Disease A3 L3 B2 P.
  - **Endoscopic Scoring (Simple Endoscopic Scoring system by Deperno et al.):** Grades endoscopic findings.
  - **Components:** Size/diameter of the ulcer, ulcerated surface, affected surface (including mild edema), and narrowing.
  - Ulcers > 2 cm are considered very large.

- Narrowing is graded: 3 if scope unable to pass, 1 if single and scope passes.

Ulcerative Colitis Classifications: 00:23:06

- **Severity Scoring:**
  - **Truelove and Witts Classification:**

Truelove and Witts Classification of the Severity of UC
MILD
less than 4 stools/day, without or with only small amounts of blood
No fever
No tachycardia
Mild anemia
ESR less than 30 mm/hr
MODERATE
Intermediate between mild and severe
SEVERE
more than 6 stools/day, with blood
Fever more than 37.5°C
Heart rate more than 90/min
Anemia with Hgb level less than 75% of normal
ESR more than 30 mm/hr
ESR, erythrocyte sedimentation rate.

    - Common for severity.
    - **Components:** Stool frequency, fever, heart rate, anemia, and ESR.
    - Classifies patients as mild, moderate, or severe. **CRP is NOT included.**
- **Mayo Scoring:**

Mayo Score for the Severity of UC	
Score	**Criteria**
STOOL FREQUENCY	
0	Normal
1	1-2 stools/day more than normal
2	3-4 stools/day more than normal
3	5 or more stools/day more than normal
RECTAL BLEEDING	
0	None
1	Streaks of blood with stool less than half the time
2	Obvious blood with stool most of the time
3	Blood alone passed
MUCOSAL APPEARANCE	
0	Normal
1	Mild disease (erythema, decreased vascular pattern, mild friability)
2	Moderate disease (marked erythema, absent vascular pattern, friability, erosions)
3	Severe disease (spontaneous bleeding, ulceration)
PHYSICIAN GLOBAL ASSESSMENT	
0	Normal
1	Mild disease
2	Moderate disease
3	Severe disease

Mayo score: Range, 0-12.

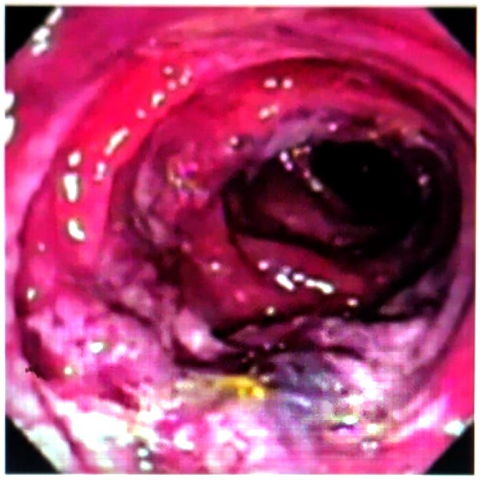
- Includes clinical and endoscopic parameters.
  - **Components:** Stool frequency, rectal bleeding, **mucosal appearance (endoscopic classification)**, and physician global assessment.
  - Score ranges from 0 to 12.
  - **Mayo Endoscopic Score:** Grades mucosal appearance.
    - ✓ **0:** Normal.
    - ✓ **1 (Mild):** Erythema, decreased vascular pattern, friability.
    - ✓ **2 (Moderate):** Marked erythema, absent vascular pattern, friability, erosions.
    - ✓ **3 (Severe):** Spontaneous bleeding, ulceration.
- **Overall Classification (Montreal Classification for UC):** Similar to Crohn's.
- **Extent of Disease (E):** E1 (proctitis), E2 (left-sided colitis), E3 (pan-colitis).
- **Severity (S):** S1 (mild), S2 (moderate), S3 (severe).
- Severity criteria (for S3): ≥ 6 bloody stools, pulse rate > 90 bpm, temperature > 37.5°C, Hb < 10.5 g/dL, ESR > 30 mm/hr.
- Montreal classification for UC is written as **E and S** (e.g., E3S3), unlike Crohn's which is A, L, and B.

- **Fulminant Colitis:** A severe form of colitis where the patient appears **toxic with fever (>101°F), tachycardia, abdominal distension, signs of peritonitis (localized/generalized), and leukocytosis.**
  - **Stool frequency is NOT a reliable component** for diagnosis, as patients may have less stool output or even be constipated due to ileus.
- **Toxic Megacolon:** Primarily a **radiological diagnosis**, showing a colon diameter of **more than 6 cm** (especially transverse colon) in a critically ill patient.

11. Other Colonic Pathologies 00:29:57

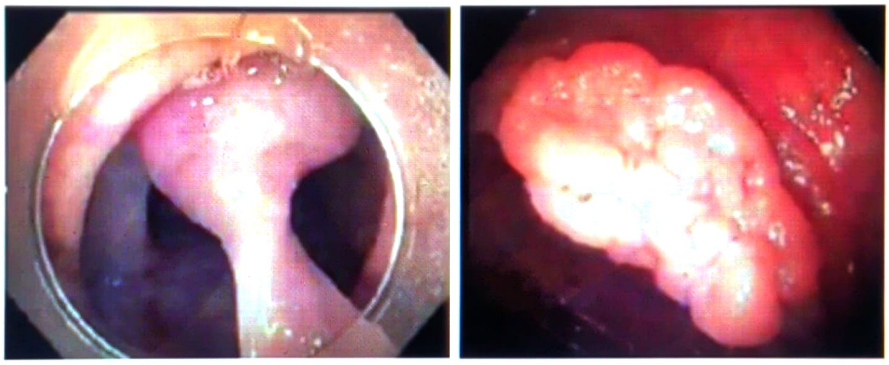


- **Pseudomembranous Colitis:**
  - Classic endoscopic picture of pseudo-membranes, usually secondary to *Clostridium difficile*, often with a history of antibiotic use and loose/bloody stools.
- **Ischemic Colitis:**

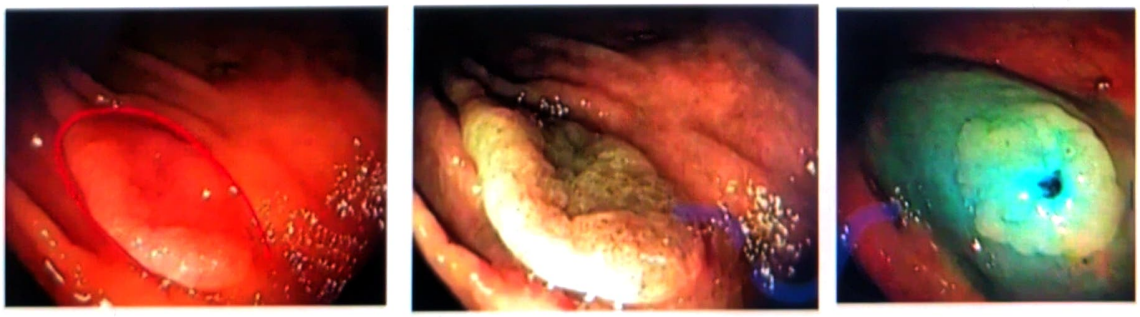


- Diffuse erythema, linear ulcerations, and subepithelial hemorrhages, especially in patients with shock.

- **Polyps:**



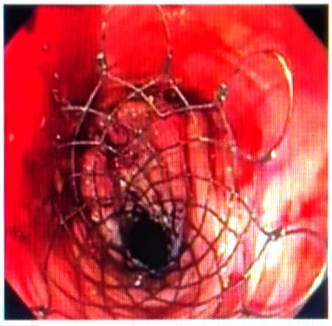
- **Pedunculated Polyp:** Has a distinct stock (peduncle).
- **Sessile/Widespread Polyp:** Base is more widespread.
- **Paris Classification:** Used to classify polyps based on elevation, flatness, or excavation.
- **Flat Serrated Polyp:** Can be seen with NBI (Narrow Band Imaging) technology or after methylene blue injection.

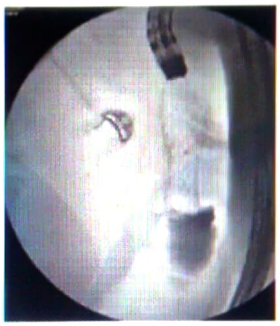


- **Colonic Carcinoma:** Can present as a circumferential luminal obstruction with a small opening. Metal stents can be placed endoscopically for relief of obstruction, often followed by single-stage surgery.

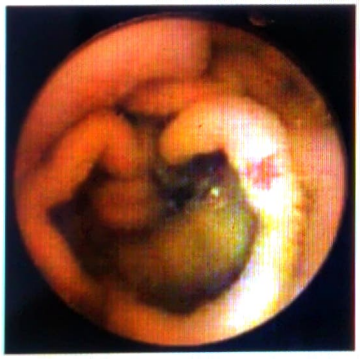


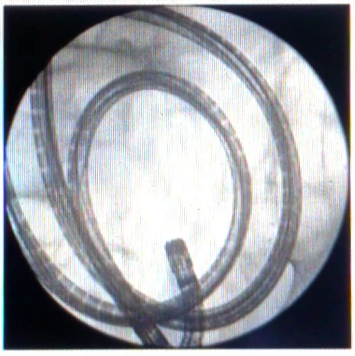






12. Small Bowel Endoscopy 00:33:07





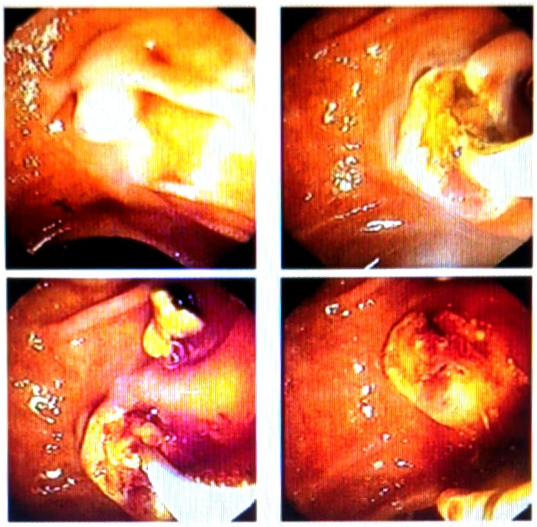
- **Capsule Endoscopy**: Recognizable by a broad background; used to assess the small bowel.
- **Enteroscopy**: Fluoroscopy picture shows loops of the scope negotiating the small bowel. Types include single balloon, double balloon, or spiral enteroscopes.

13. ERCP (Endoscopic Retrograde Cholangiopancreatography) 00:33:50

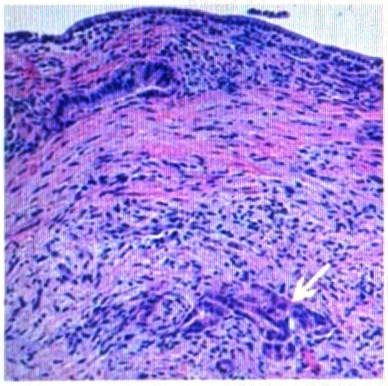




- **Fluoroscopy:** Shows the scope, guidewire, and contrast in the biliary/pancreatic ducts.
- **Findings:** Opacities in the CBD (common bile duct) indicate stones, and filling defects can be seen on cholangiogram. Normal papilla is seen at the D1/D2 junction.



- **Procedures:** Sphincterotomy for stone removal. Balloon cholangiogram provides detailed visualization.

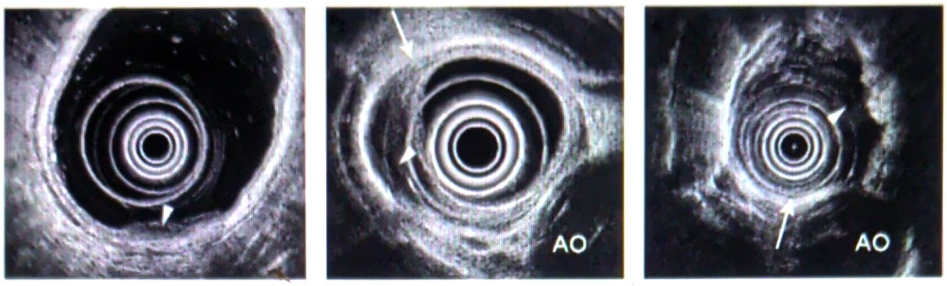




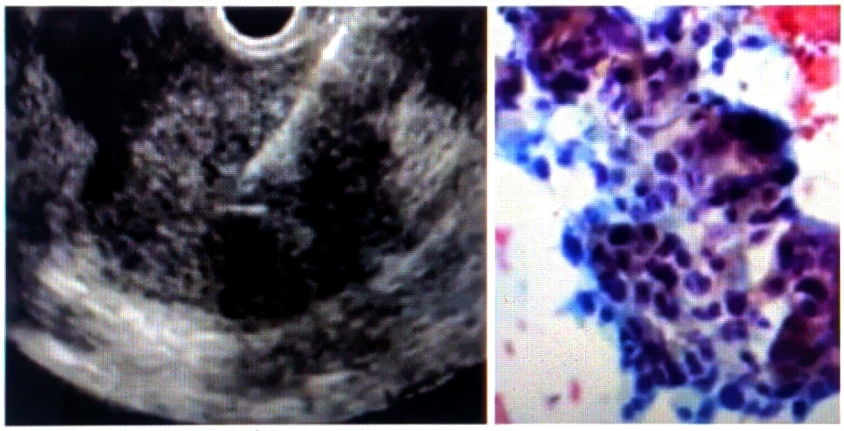
- **Cholangiocarcinoma:** May appear as a stricture on cholangiogram, confirmed by biopsy.
- **Bile Leak:** Identified by contrast leakage from a drain placed during ERCP. Treatment often involves stent placement.
- **Spyglass:** A recent advancement for biliary evaluation. A probe with a camera is passed through the ERCP scope, allowing direct visualization of lesions, biopsy, and even laser lithotripsy for large stones.



14. Endoscopic Ultrasound (EUS) 00:36:32

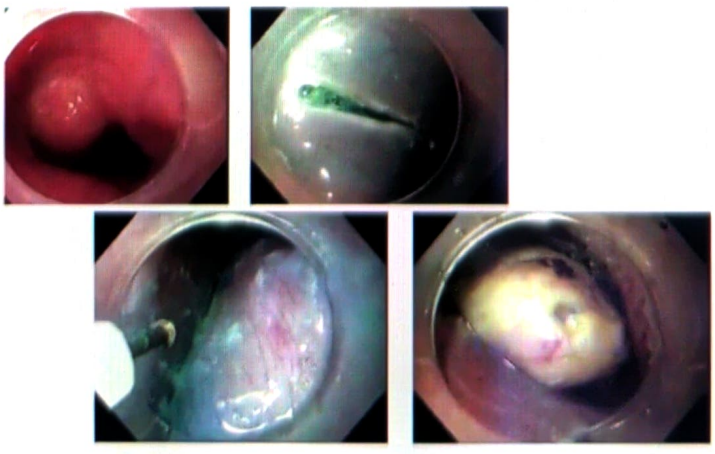


- **Types of Probes:**
  - **Radial Ultrasound:** Provides a circumferential view of the layers of the esophagus and adjacent structures (e.g., aorta).
  - **Linear Ultrasound:** Provides a linear cross-section view.
- **Advantages of Linear EUS:** Allows passage of a needle through the biopsy channel for **Fine Needle Aspiration (FNA)** from lesions, injection of sclerosing agents or glue. Thus, **therapeutic procedures are primarily done with linear EUS**, while both can be used for diagnostic purposes.

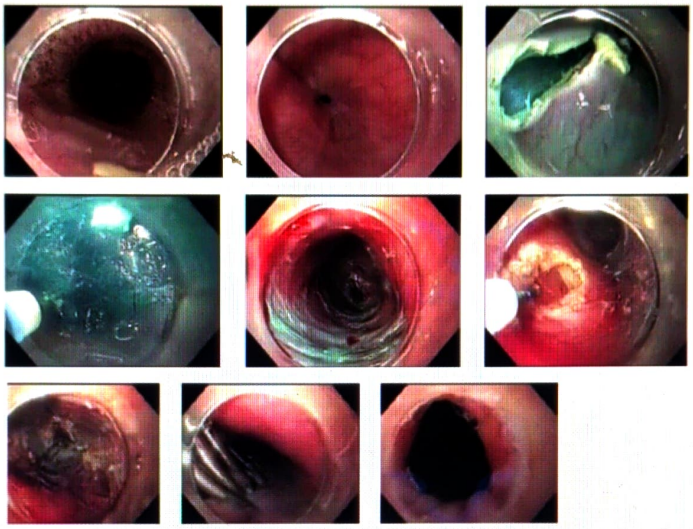


15. Third Space Endoscopy 00:38:40

- **Concept:** Creating a space between the mucosa and muscularis propria (submucosal space) or dissecting muscles to intervene either above or below this created space.
- **Procedures:**
  - **Endoscopic Submucosal Dissection (ESD):** Creating a submucosal space to dissect and remove subepithelial lesions or wider-based lesions in whole.



- **Per Oral Endoscopic Myotomy (POEM):** Cutting across muscles (myomectomy) in the created third space. Example: Tunnel formation, followed by myomectomy and closure with hemoclips.



- **Per Oral Endoscopic Tumor Ectomy (POET) / Endoscopic Full Thickness Dissection (EFCD):** Removing subepithelial masses or tumors after creating a third space, then closing the resulting rent.

- **NOTES (Natural Orifice Trans luminal Endoscopic Surgery):** Endoscopic procedures involving passage of the endoscope or accessories into or through the GI tract wall for therapeutic/diagnostic purposes, essentially mimicking surgical procedures.
- **Other Interventional Procedures:** Endoscopic necrosectomy and PEG (Percutaneous Endoscopic Gastrostomy) placement are interventional but not strictly "third space" procedures.

16. Newer Closure Techniques 00:43:36

- After large incisions or resections, closure techniques are vital.
- **Endoscopic Clips:** Hemoclips (for closing rents, stopping bleeding), Over-the-scope-clips (Ovesco clip) for larger defects.
- **Endoscopic Suturing:** Evolving branch, used in some institutes, for closing large defects, stent migration, or bariatric procedures (e.g., Apollo industry technique).

17. EMR (Endoscopic Mucosal Resection) vs. ESD 00:44:07

- **EMR:** Resection of wider-based lesions (polyps) that do not involve the submucosa, often in piecemeal or whole.
- **ESD:** Submucosal space is created, and the lesion is removed from there, often preferred for **larger lesions.**