GI ENDOSCOPY

Professional Practical activity (PPA)

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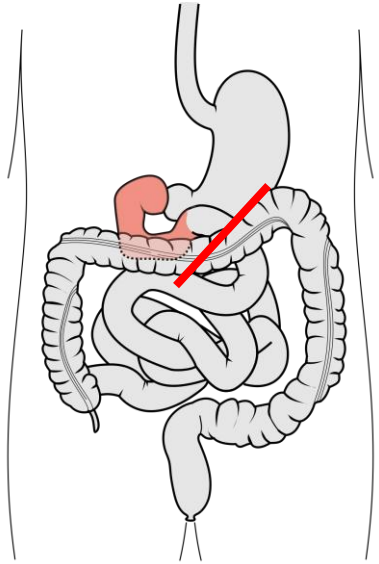
CCL-F – Roma May 3°, 2019

ENDOSCOPY: insertion of a probe into a hollow organ

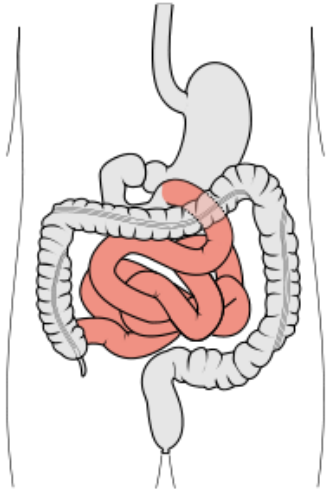
- **Diagnostic endoscopy:** the aim of the procedure is purely to visualize a part of the gastrointestinal tract in order to aid diagnosis.

- **Therapeutic endoscopy:** medical term for an endoscopic procedure during which treatment is carried out via the **endoscope**.

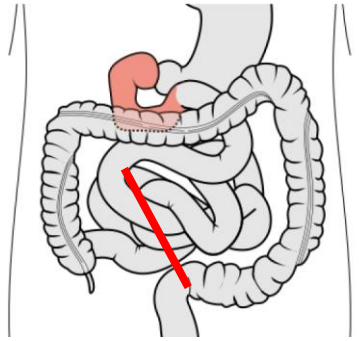
DIAGNOSTIC ENDOSCOPY



- Upper endoscopy (*gastroscopy*)



- Videocapsule endoscopy



- Lower endoscopy (*colonoscopy*)

MAGNIFICATION ENDOSCOPY AND CHROMOENDOSCOPY

The ability to **magnify endoscopic** images in real-time permits visualization of mucosal details that cannot be seen with standard endoscopy.

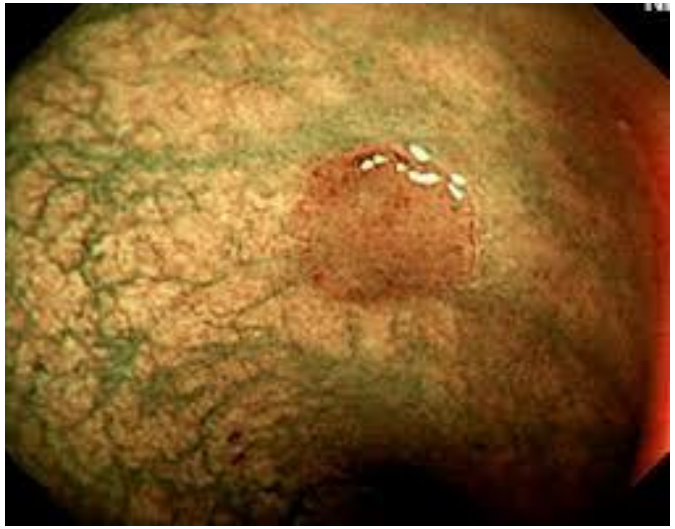
- Magnification endoscopes include an adjustable focusing mechanism that permits standard endoscopic views and the ability to enlarge the image from 1.5X to 150X

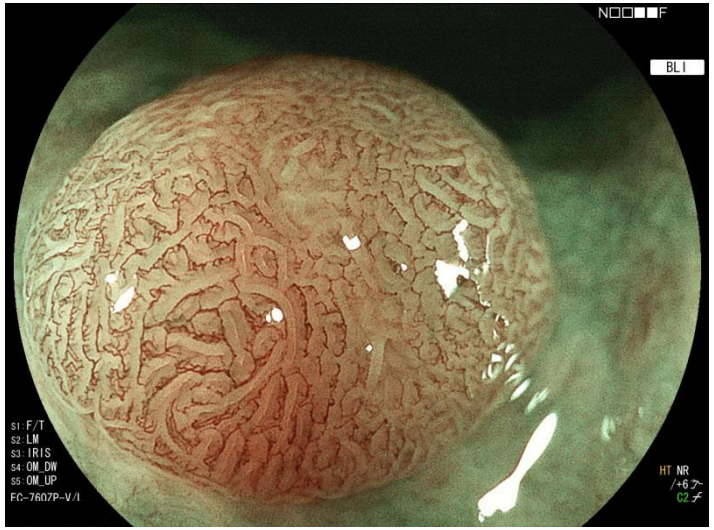
The images can be further enhanced by :

- **Virtual chromoendoscopy (VCE)** refers to electronic endoscopic imaging technologies that provide detailed contrast enhancement of the mucosal surface and blood vessels. The aim of VCE technologies is to provide enhanced visualization of tissues without the need for dyes, enabling the endoscopist to differentiate between benign or malignant lesions in real time during endoscopic examination.
- **Dye-based Chromoendoscopy** with the topical application of stains or pigments

Virtual chromoendoscopy

- Narrow Band Imaging (NBI, Olympus)
- Fujinon Intelligent Chromoendoscopy (FICE, BLI, LCI Fujinon)
- i-Scan (Pentax)





Chromoendoscopy

Topical application of stains or pigments to improve tissue localization, characterization, or diagnosis during endoscopy

- Vital stains: absorbed across specific epithelial cell membranes (e.g. Lugol, methylene blue)

- Contrast stains: highlight mucosal irregularities by permeating mucosal crevices (e.g. indigo carmine)

Communication from the ASGE Standards of Practice Committee

GUIDELINE

Guidelines for sedation and anesthesia in GI endoscopy

Prepared by: ASGE STANDARDS OF PRACTICE COMMITTEE

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The ASGE guidelines for sedation and anesthesia in GI endoscopy were reviewed and endorsed by the American Association for the Study of Liver Diseases, the American College of Gastroenterology, and the American Gastroenterological Association.

This document was reviewed and approved by the Governing Board of the American Society for Gastrointestinal Endoscopy.

Digestive Endoscopy 2018; **30**: 433–440 doi: 10.1111/den.13184

Guideline

Guidelines for Gastroenterological Endoscopy in Patients Undergoing Antithrombotic Treatment: 2017 Appendix on Anticoagulants Including Direct Oral Anticoagulants

Mototsugu Kato,[1] Noriya Uedo,[1] Seiji Hokimoto,[1] Masahiro Ieko,[1] Kazuhide Higuchi,[1] Kazunari Murakami[1] and Kazuma Fujimoto[2]

Upper Endoscopy

Whatever the precise indication, it is usually appropriate to examine the entire **esophagus**, **stomach** and **proximal duodenum**, wherever possible.

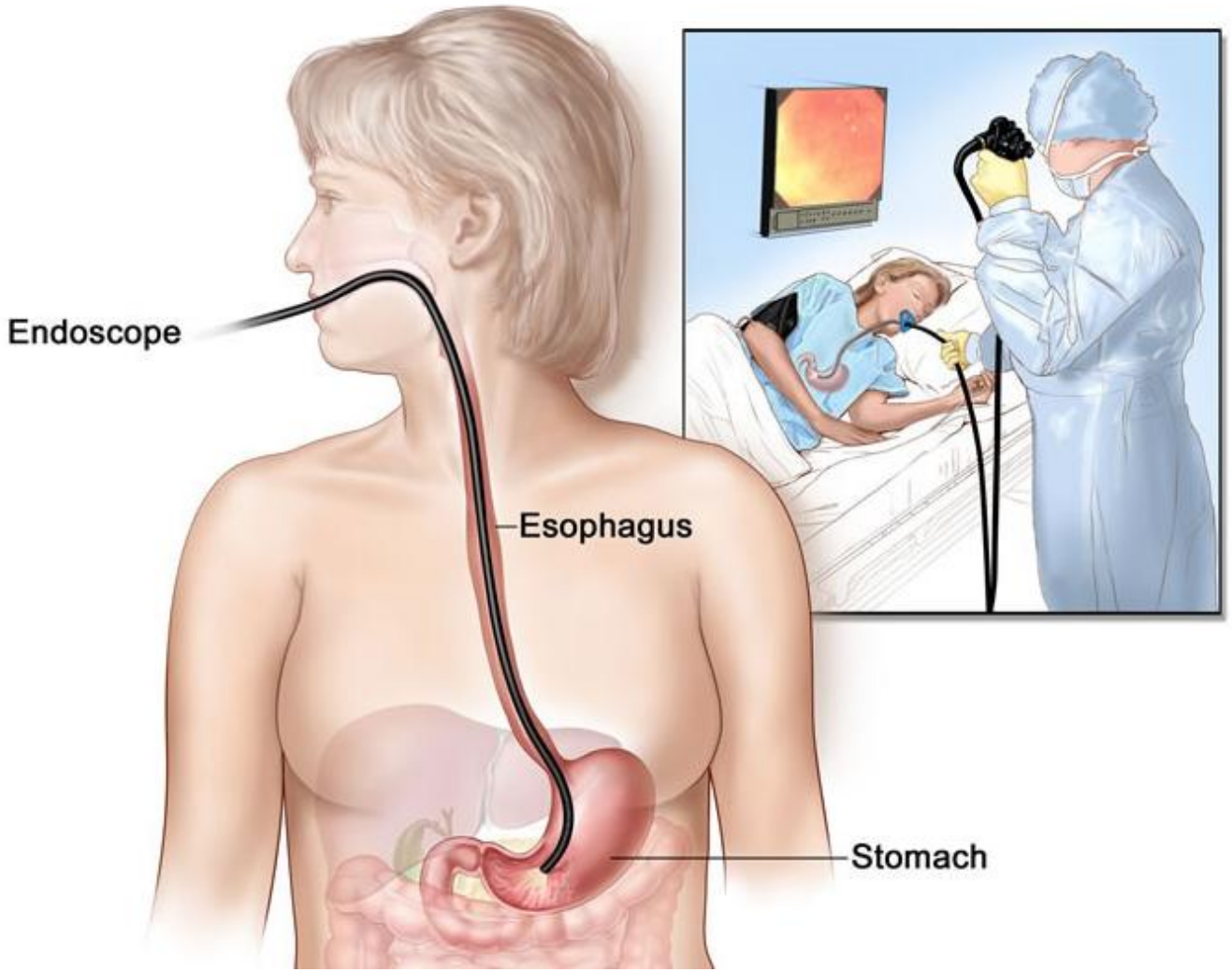
It is important to develop a systematic routine to reduce the possibility of missing any area.

• ***Always advance the instrument under direct vision***, using air insufflation and suction as required, and slowing as necessary during active peristalsis.

• ***Mucosal views are often optimal during instrument withdrawal***, when the organs are fully distended with air, but inspection during insertion is also important. ***Lesions noted during insertion are best examined in detail*** (and sampled for histology or cytology) following a complete routine survey of other areas.

• ***As well as being systematic in survey, be precise in movements and decisive in making a "mental map"*** of what is being seen. A careful and complete examination can be achieved in less than **5–10 minutes** by avoiding unnecessary movements and repeated examinations of the same area.

Gastroscopy



https://www.youtube.com/watch?v=Aeq4Q8xgXvg

Digestive and Liver Disease 51 (2019) 335–339

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journal homepage: www.elsevier.com/locate/dld

Meta-Analysis

Diagnostic yield of upper endoscopy according to appropriateness: A systematic review

Angelo Zullo[a,*], Raffaele Manta[b], Vincenzo De Francesco[c], Giulia Fiorini[d], Cesare Hassan[a], Dino Vaira[d]

2017/2018

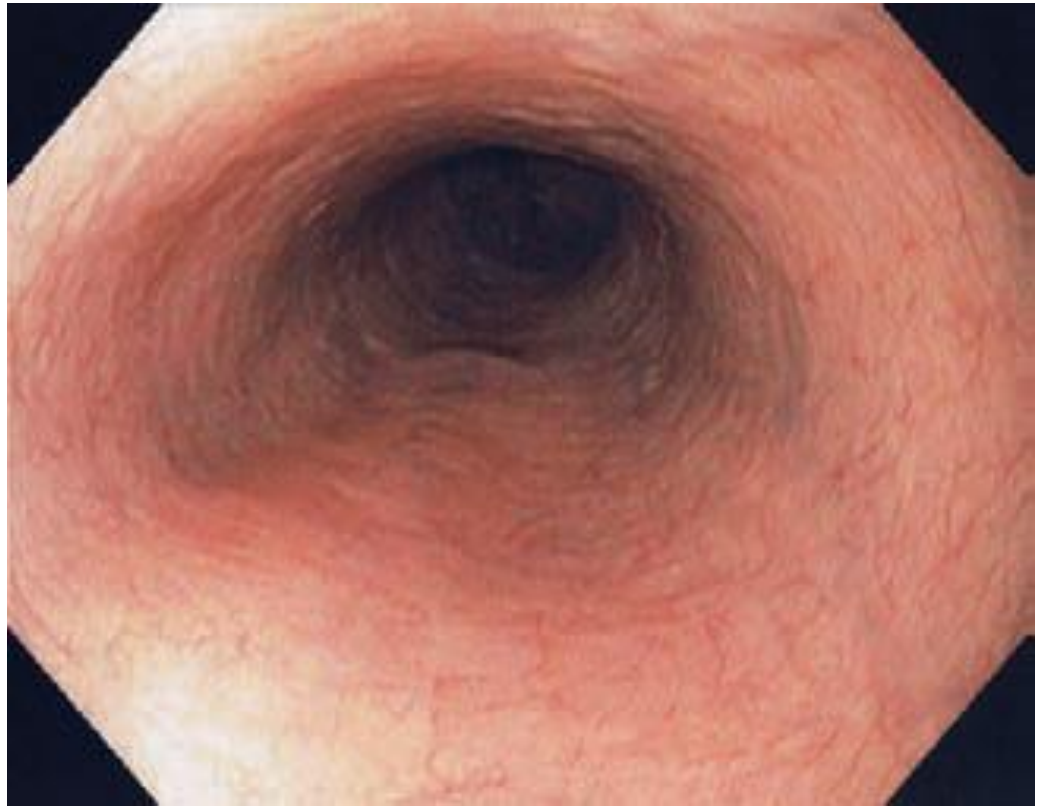
Guidelines

OPEN ACCESS

Quality standards in upper gastrointestinal endoscopy: a position statement of the British Society of Gastroenterology (BSG) and Association of Upper Gastrointestinal Surgeons of Great Britain and Ireland (AUGIS)

Sabina Beg,[1] Krish Ragunath,[1] Andrew Wyman,[2] Matthew Banks,[3] Nigel Trudgill,[4] Mark D Pritchard,[5] Stuart Riley,[6] John Anderson,[7] Helen Griffiths,[8] Pradeep Bhandari,[9] Phillip Kaye,[10] Andrew Veitch[11]

Esophagus



The esophageal mucosa has a whitish appearance typical for squamous mucosa with a delicate vascular pattern

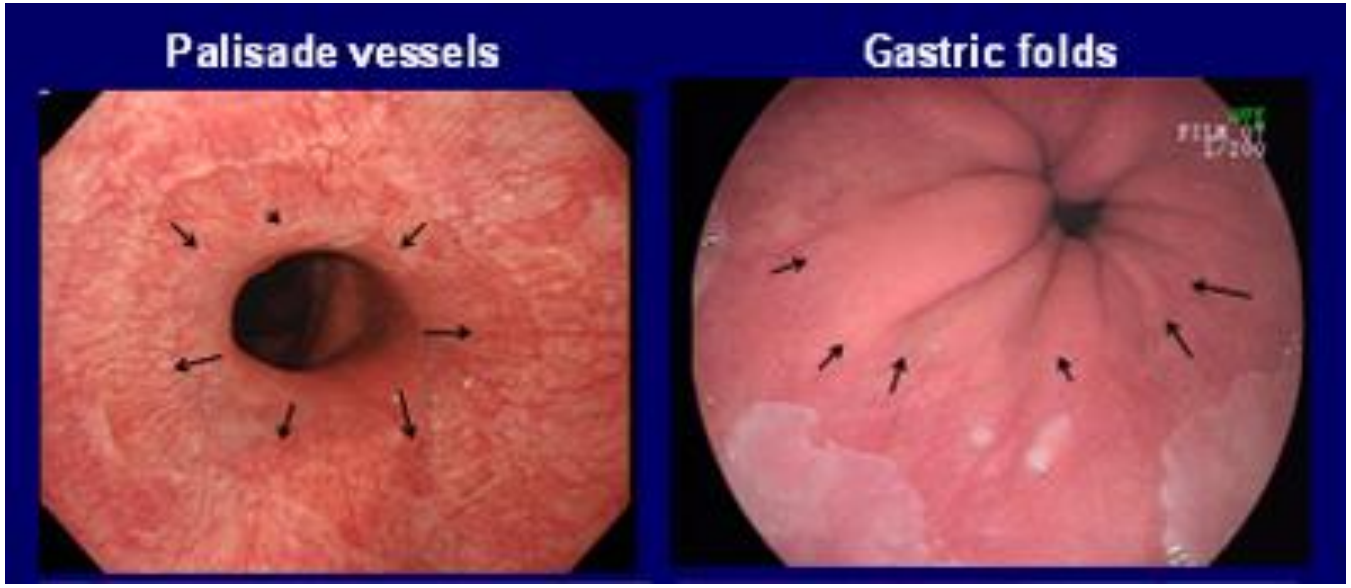
Muscular tube 20 to 23 cm in length, functioning as a conduit from the oropharynx to the stomach. It begins at the level of the sixth cervical vertebra and at approximately 15 to 17 cm on the standard endoscope

The most common esophageal abnormalities encountered by endoscopists relate to:

- erosive reflux disease and its complications,
- primary neoplasms
- opportunistic infections.

Esophagus

The **gastroesophageal junction** (GEJ) is defined as the point where the distal esophagus joins the proximal stomach (cardia) and is identified by the proximal end of gastric mucosal folds and the distal end of longitudinal blood vessels along the lower esophagus



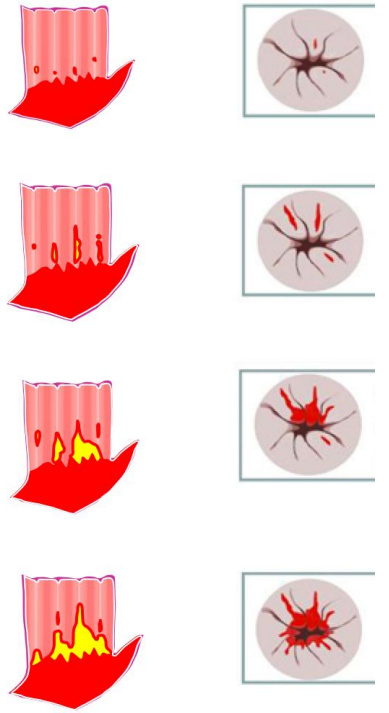
The **squamo-columnar junction** (**SCJ** or Z-line) is the visible line formed by the juxtaposition of squamous and columnar epithelia.

Reflux Esophagitis

The endoscopic findings of reflux esophagitis are erosions or ulcerations involving the region from the distal esophagus to the *Z* line with a streaky pattern of spread, which are the result of esophageal mucosal injury and inflammation by acid and/or bile exposure

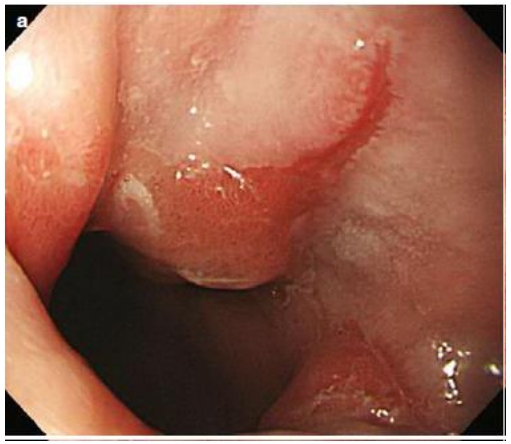
The extent and severity of mucosal injury can be assessed endoscopically. The **Los Angeles classification** quantifies the length and circumference of mucosal breaks in the reflux esophagitis.

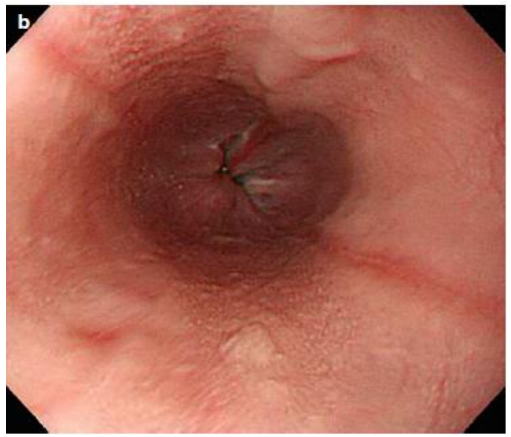
Grade	Description
A	≥1 mucosal break no longer than 5 mm without continuation between mucosal folds
B	≥1 mucosal break longer than 5 mm without continuation between mucosal folds
C	≥1 mucosal break that is continuous between the tops of two or more mucosal folds but that involves less than 75 % of the circumference
D	≥1 mucosal break that involves at least 75 % of the esophageal circumference



Reflux Esophagitis

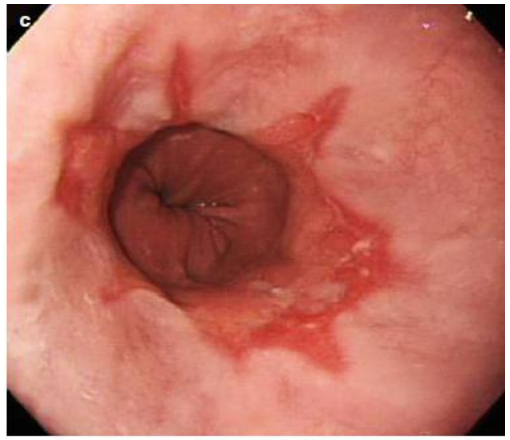
Grade A, single-linear erosion (<5 mm in length)

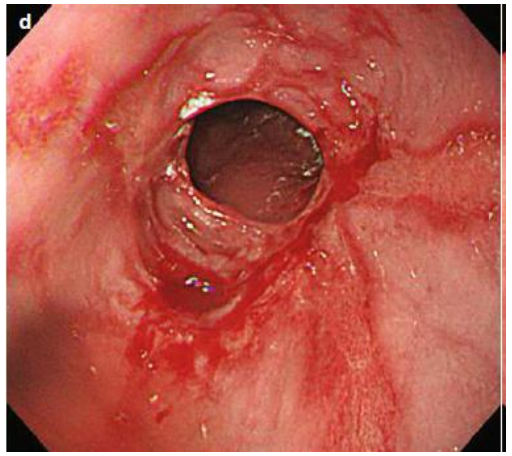




Grade B, multiple linear erosions and erythematous streaks (>5 mm in length)

Grade C, linear ulcers are becoming circumferential

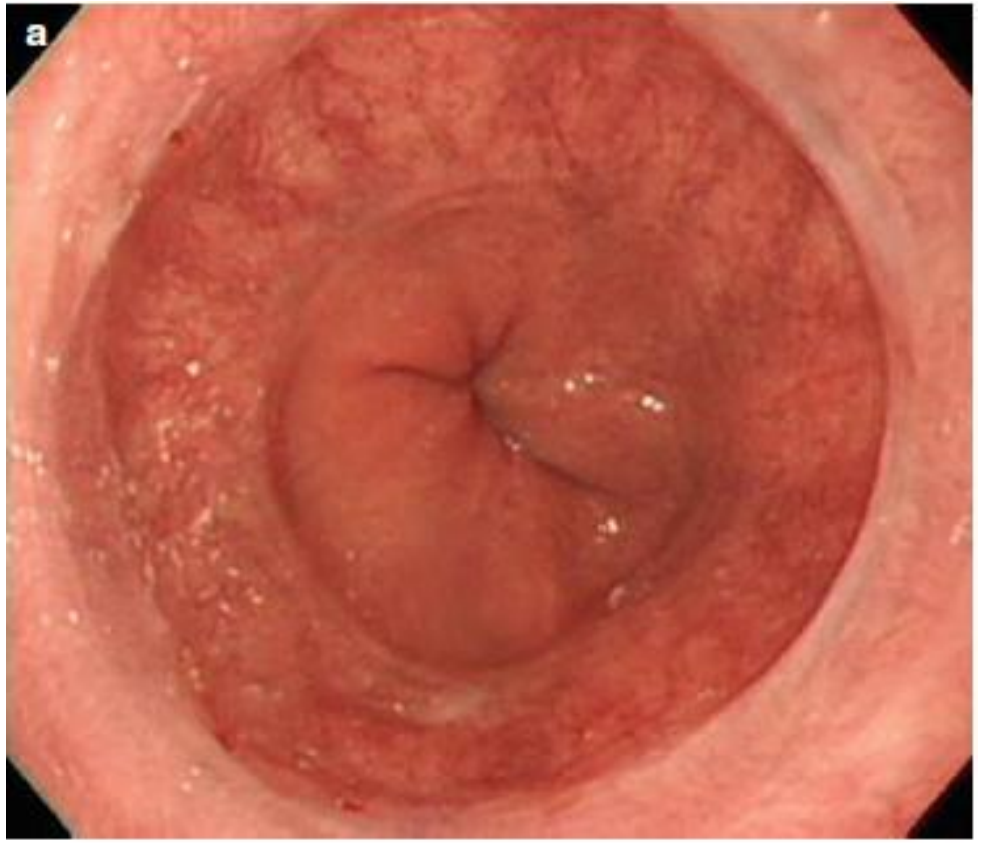




Grade D, severe disease with circumferential deep ulceration at the gastroesophageal junction above a patulous sphincter

Los Angeles classification of reflux esophagitis.

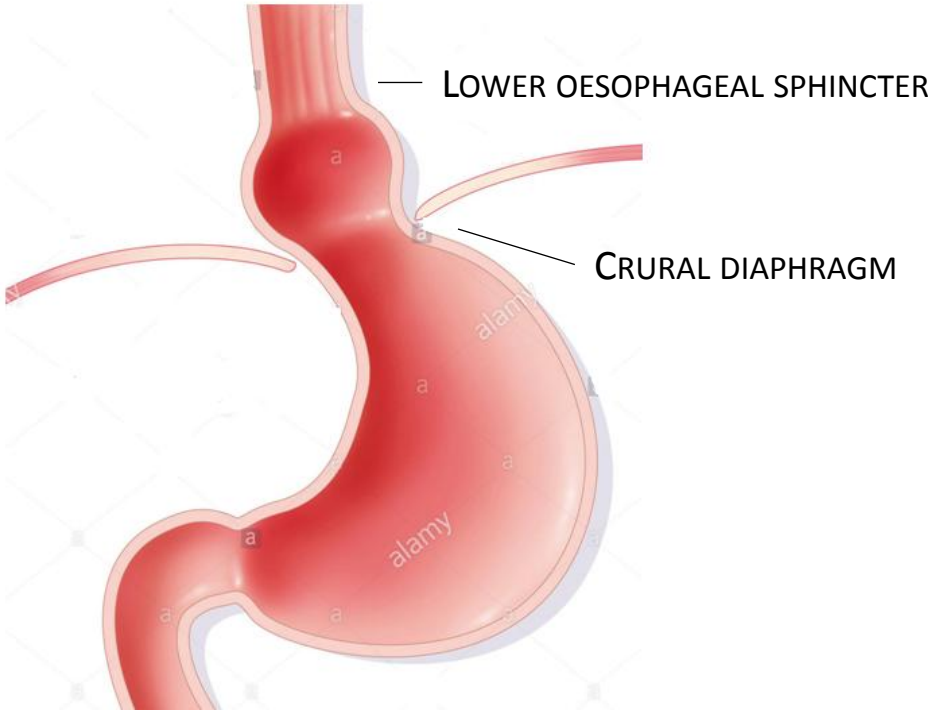
Esophagitis- Hiatal ernia



Hiatal hernia is defined as herniation of a portion of the stomach through the diaphragmatic esophageal hiatus.

HIATUS HERNIA AND GERD

SEPARATION OF 2 SPHINCTERS



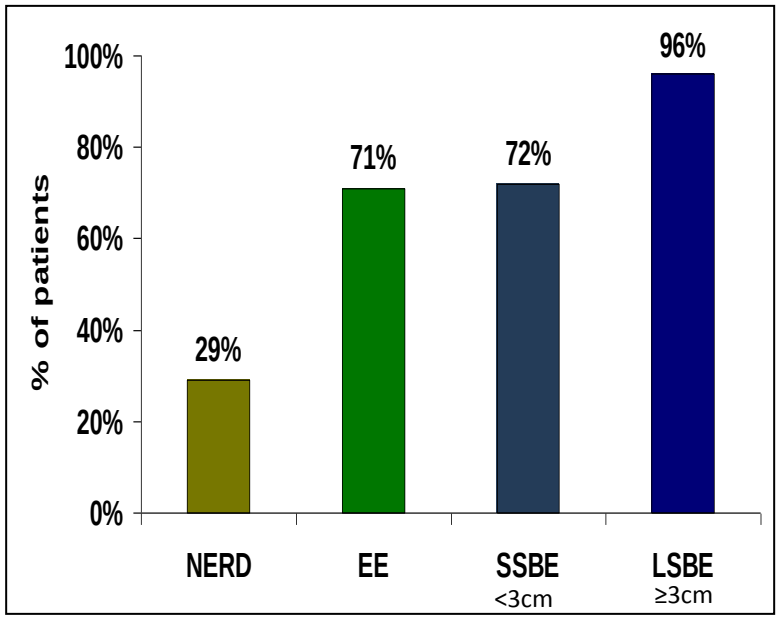
1. Impaired defense against straining-induced peaks in abdominal pressure: more strain-induced reflux

2. Re-reflux from hiatal sac during swallows: prolonged esophageal acid clearance

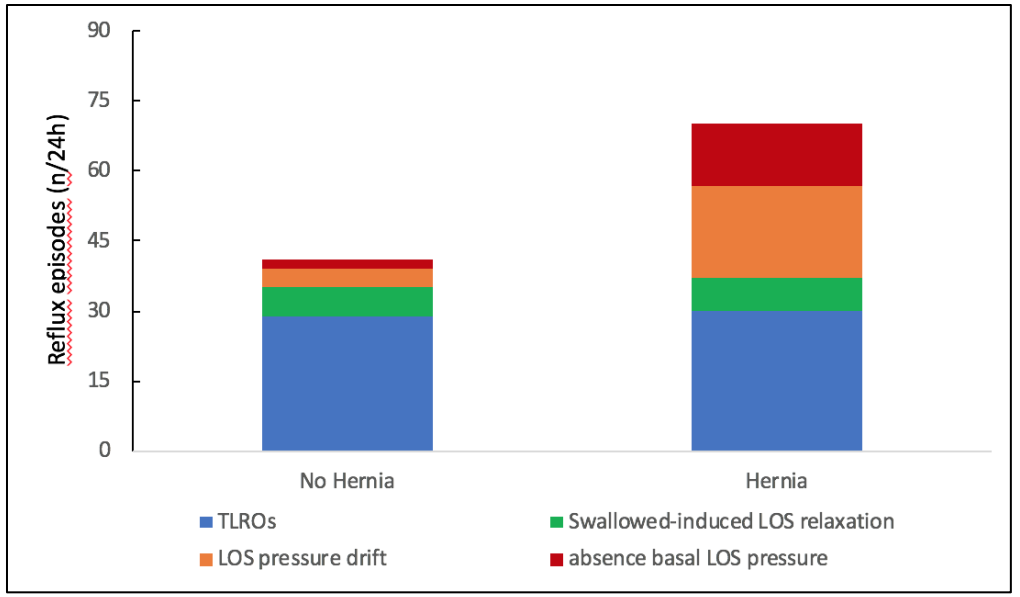
3. Increased compliance of esophageal junction: larger volume of refluxate

HIATAL HERNIA

Distribution



Mechanisms of reflux



Barrett's esophagus

Barrett's esophagus is a condition in which the squamous epithelium of the distal esophagus is substituted with an intestinal-type columnar epithelium

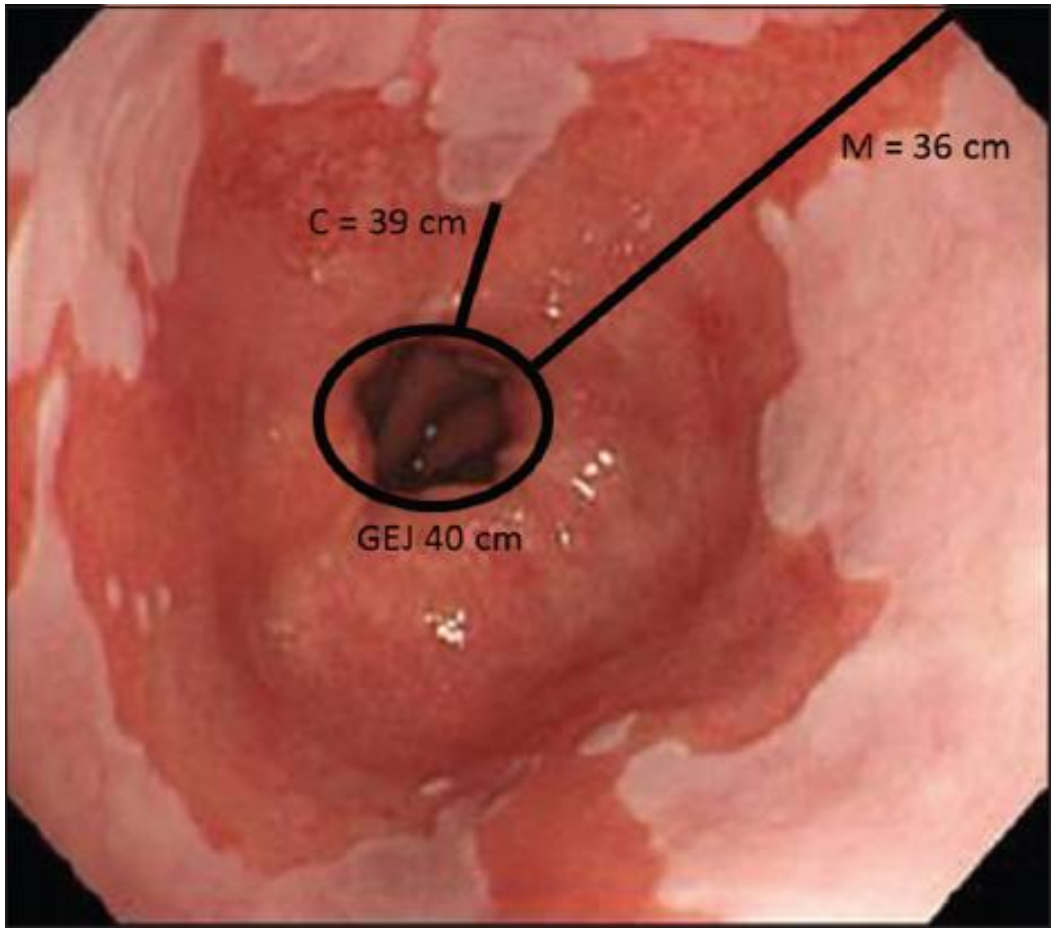
Endoscopy is the most accurate tool for the detection and diagnosis of Barrett's esophagus.

The importance of the finding and thus the necessity of identifying it, confirming it by biopsy, and monitoring its progression lie in the approximately 10% risk of adenocarcinoma formation in the columnar-lined esophagus.

The **Prague classification** was developed to standardize the classification of Barrett's esophagus. In this classification, both the maximal length (M) (including tongues) of Barrett's esophagus and the length of the circumferential Barrett's segment (C) are measured during endoscopic examination

Barrett's esophagus

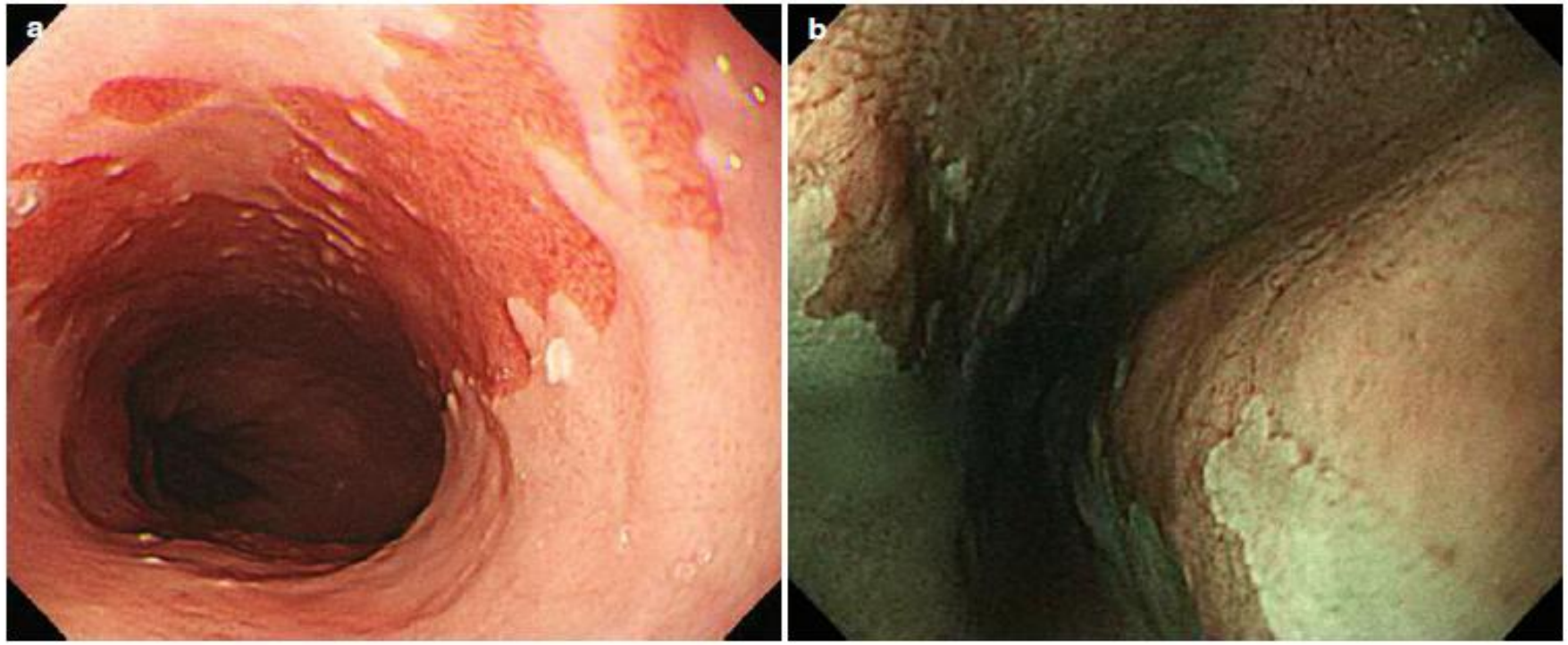
Barrett's esophagus is a condition in which the squamous epithelium of the distal esophagus is substituted with an intestinal-type columnar epithelium



The Prague classification of Barrett's esophagus.
The maximal length **(*M*)** of Barrett's esophagus and the length of the circumferential Barrett's segment **(*C*)** are measured during endoscopy.

These numbers can then be used to track the length of the Barrett's segment over time

Barrett's esophagus



Barrett's esophagus. The distal esophagus is lined with metaplastic columnar epithelium. The squamocolumnar junction migrated to a level of 34 cm from the incisor. (**a**) conventional white light endoscopy image. (**b**) narrow band image of Barret's epithelium.

Barrett's esophagus

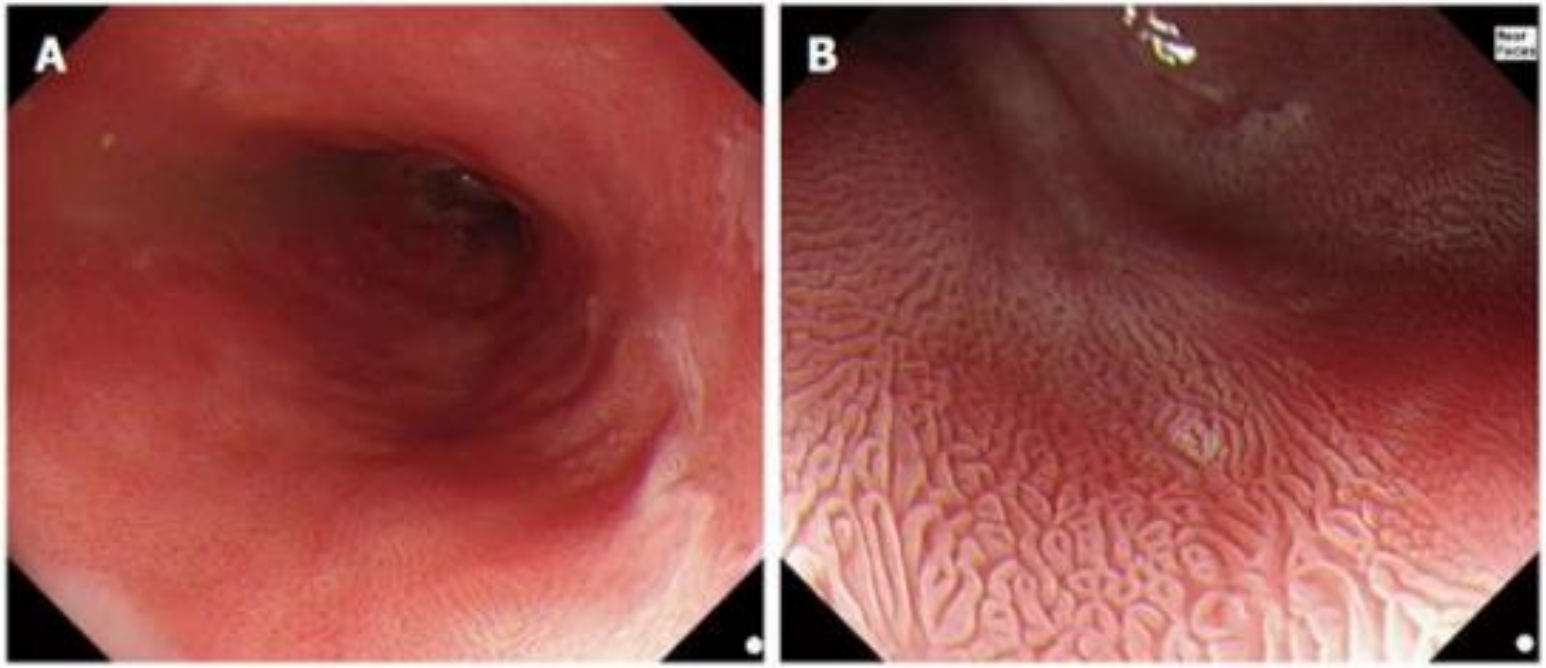


Figure 1 Acetic acid mechanism of action. A: Non-dysplastic Barrett's with HDWL; B: Non dysplastic BE following AAC (Olympus Lucera ELITE processor, GIFHQ290 gastroscope).

Barrett's esophagus

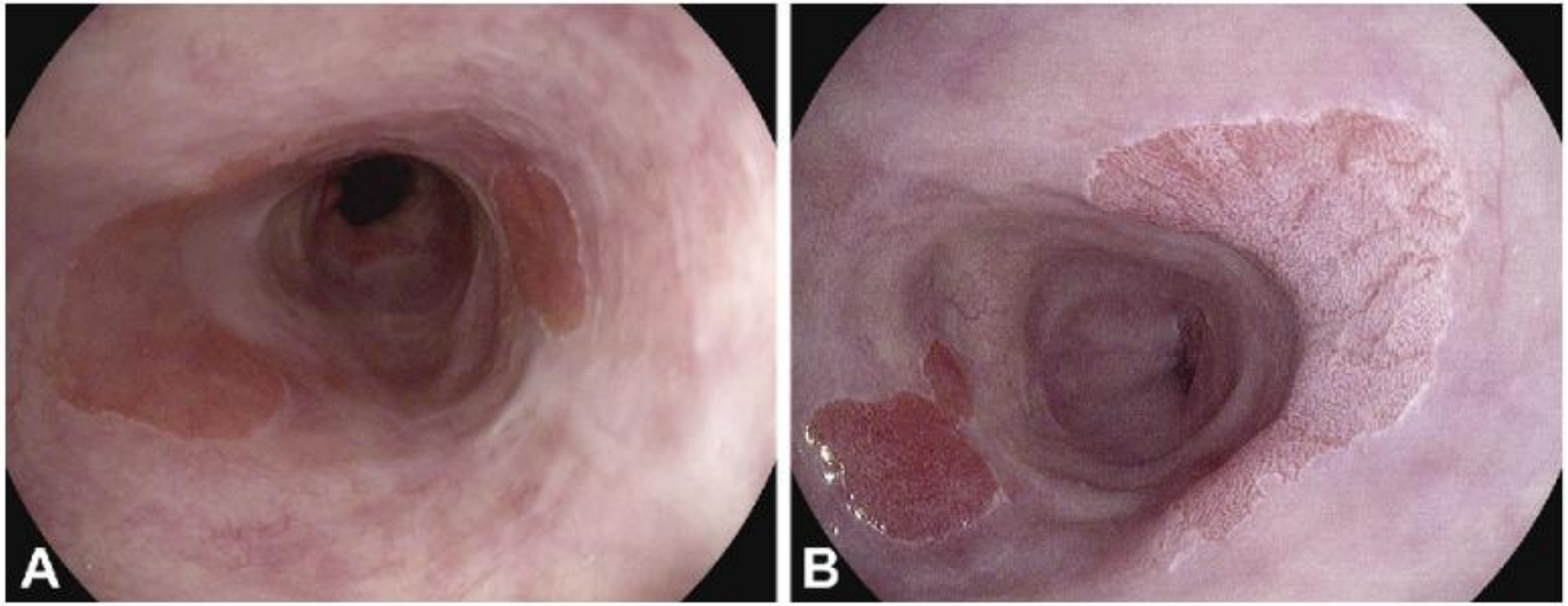


Fig 2. A, Barrett's esophagus on white-light endoscopy. B, Same patient as 2A after acetic acid chromoendoscopy showing normal Barrett's island on the right and dysplastic island (loss of acetowhitening) on the left.

Barrett's esophagus

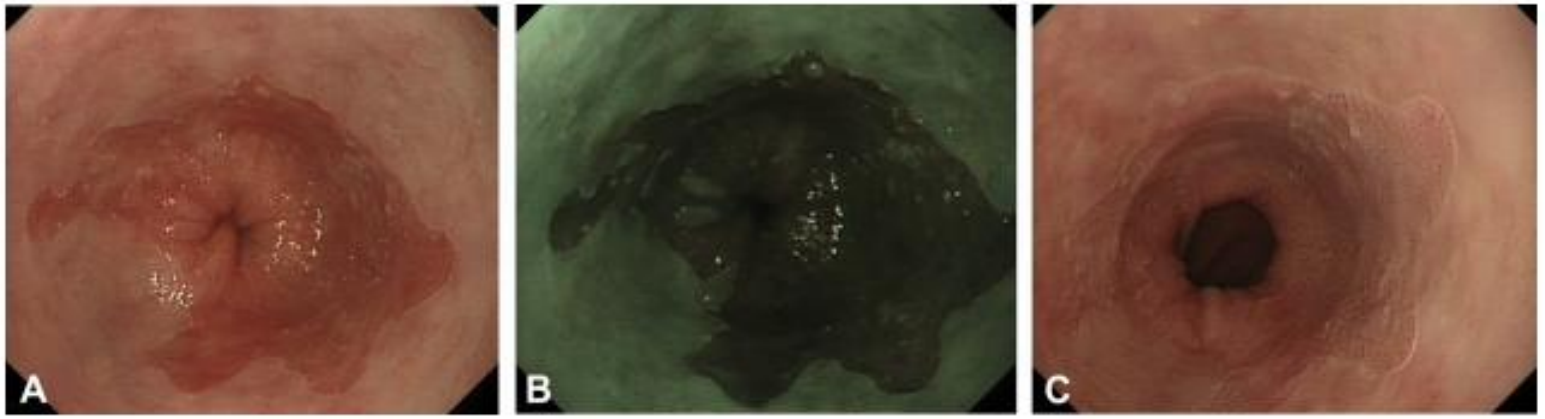


Figure 2. Imaging within a nondysplastic segment of Barrett's esophagus. **A,** White-light imaging. **B,** Narrow-band imaging. **C,** Acetic acid chromoendoscopy.

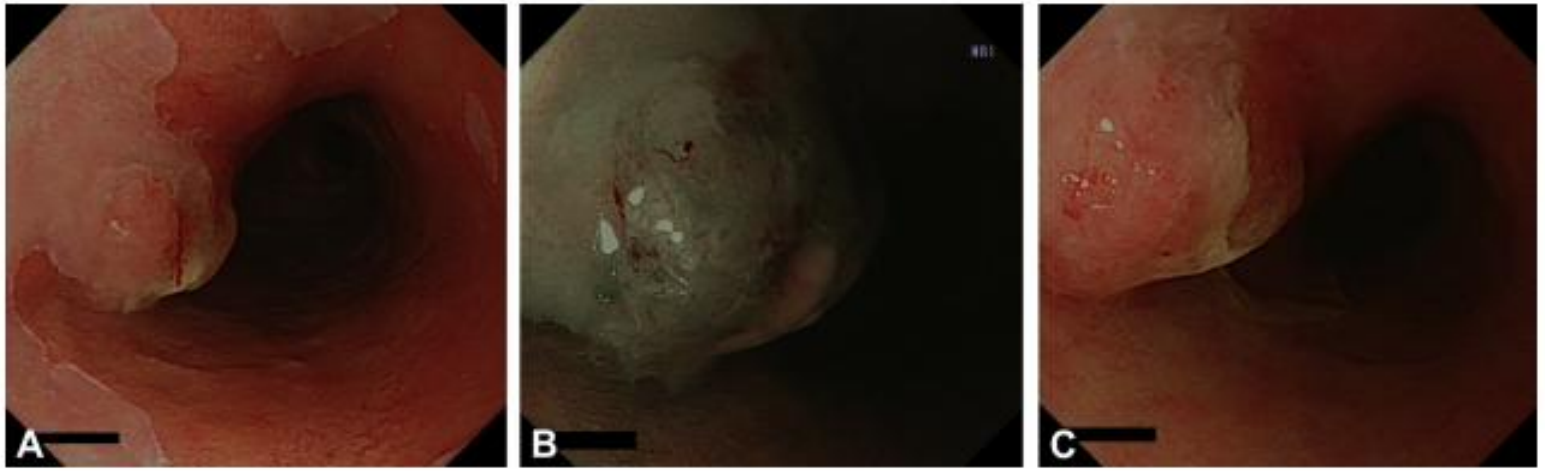


Figure 3. Imaging of a nodule (histology proven adenocarcinoma) within segment of Barrett's esophagus. **A,** White-light imaging. **B,** Narrow-band imaging. **C,** Acetic acid chromoendoscopy.

Digestive Diseases and Sciences (2018) 63:2122–2128
https://doi.org/10.1007/s10620-018-5070-z

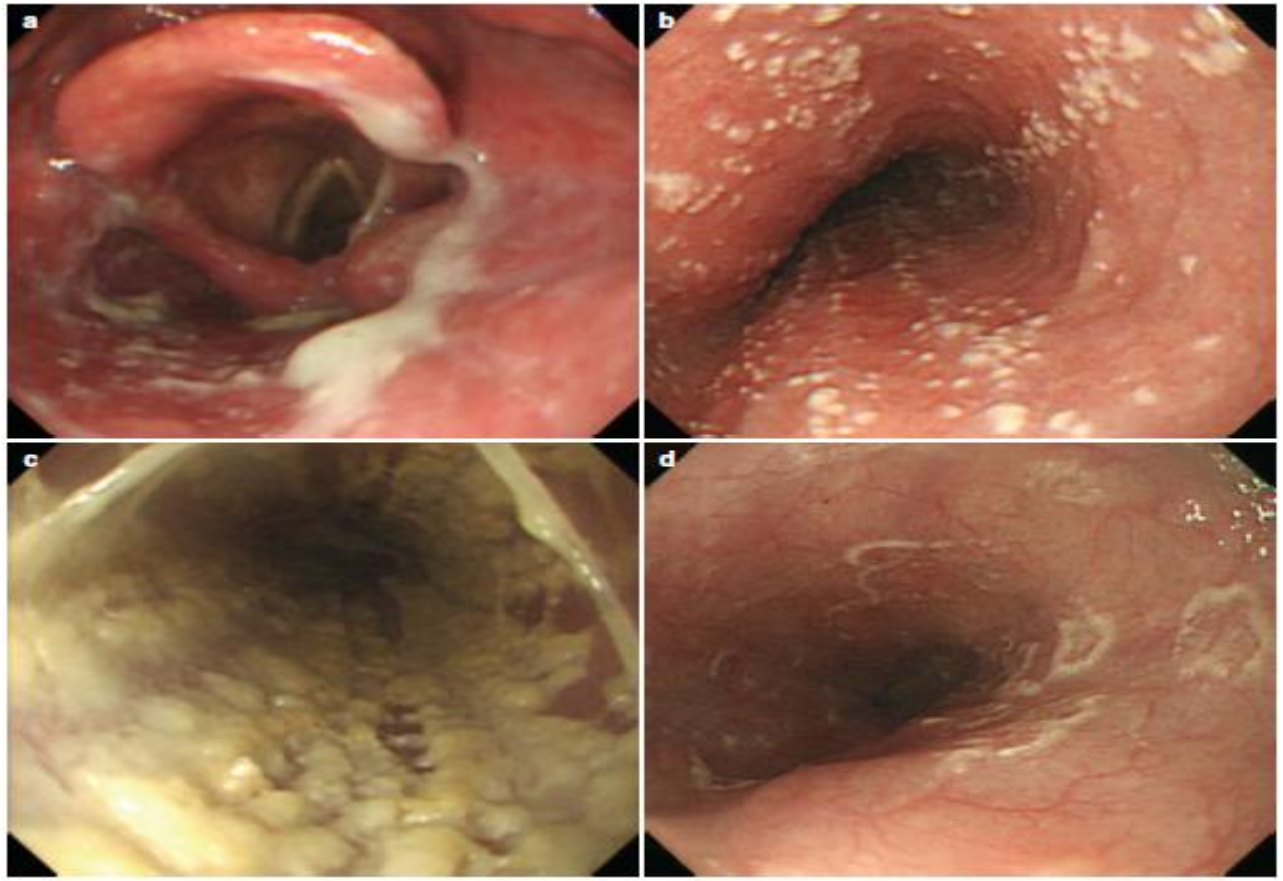
REVIEW

Clinical Guidelines Update on the Diagnosis and Management of Barrett's Esophagus

Michelle Clermont[1] · Gary W. Falk[1]

Non reflux esophagitis

Opportunistic infectious esophagitis



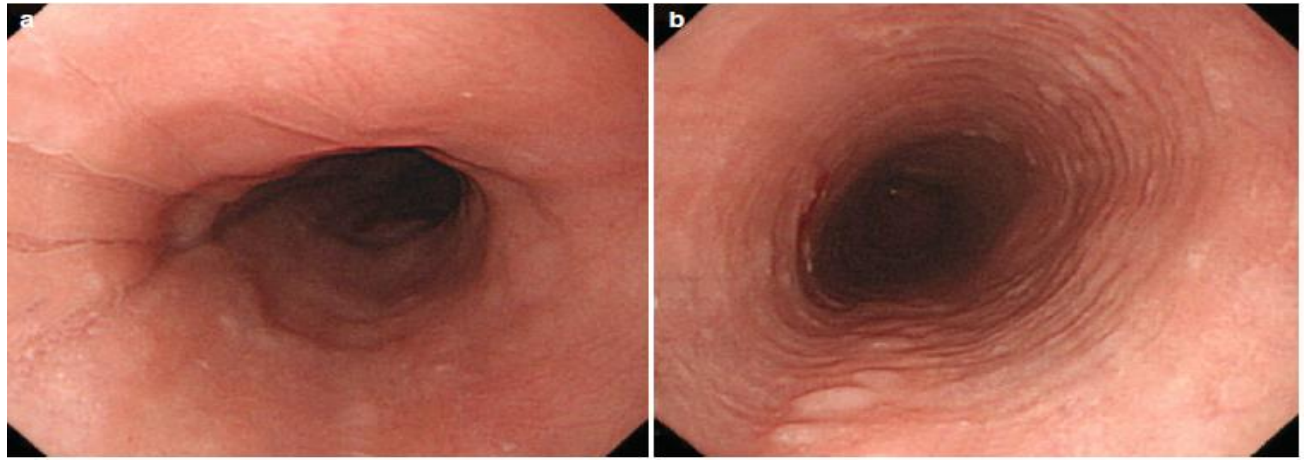
Candida esophagitis. (**a**) Coexisting pharyngeal lesions help to diagnose Candida esophagitis. (**b**) Multiple white plaques. (**c**) Diffuse membranous white material. (**d**) Atypical lesions which resemble herpetic esophagitis

Non reflux esophagitis

Example of noninfectious esophagitis

Eosinophilic Esophagitis

Eosinophilic esophagitis is a recently recognized disease and can be defined as an allergic inflammatory condition of the esophagus. Characteristic symptoms include dysphagia, food impaction, or heartburn. To confirm the diagnosis, a minimum of 15 eosinophils per high power field in esophageal biopsy is required. Although various findings such as ridges, linear furrows, white exudates, or multiple rings can be found at endoscopy, cases with normally appearing mucosa are not rare



Eosinophilic esophagitis. (**a**) Linear furrows, (**b**) multiple rings

Esophageal Cancer

Early esophageal cancer is defined as a cancer confined to mucosa or submucosa irrespective of lymphnode metastasis

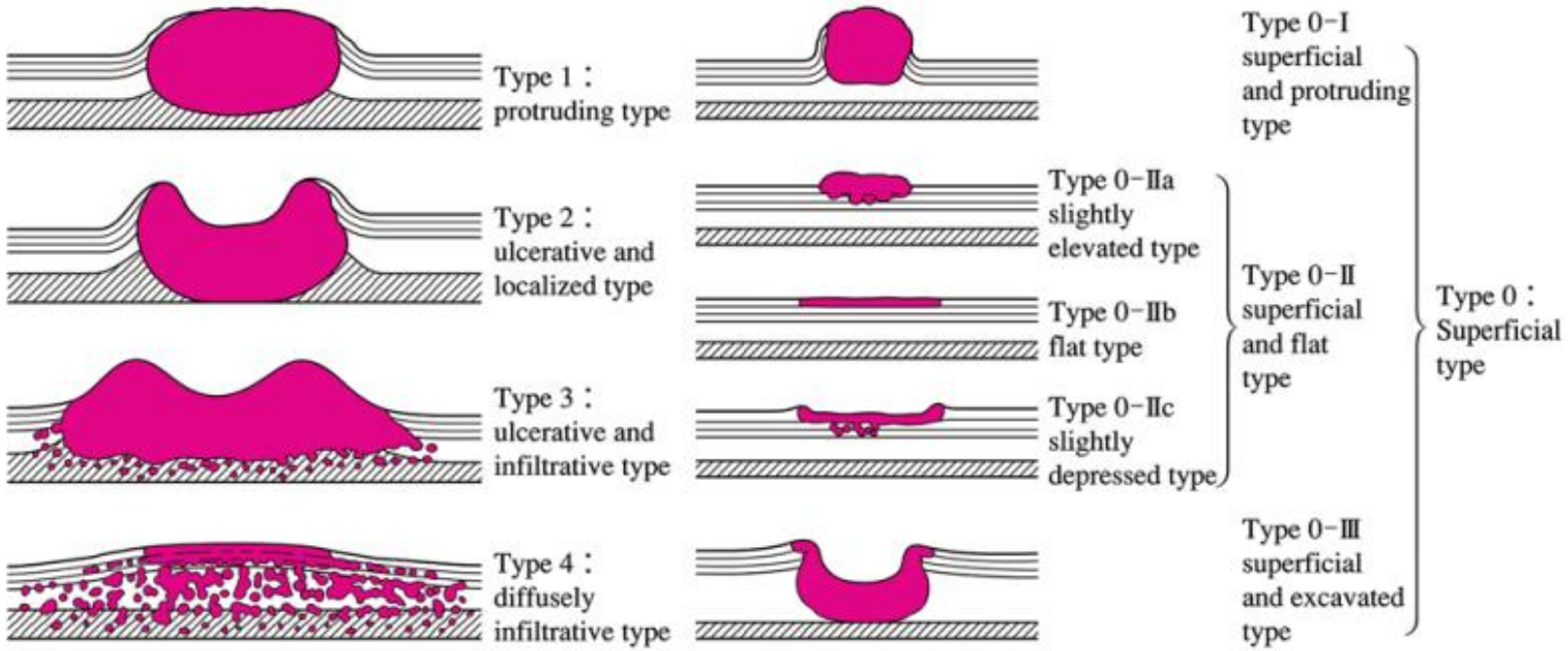
Advanced esophageal cancer is defined as an esophageal cancer invading beyond the proper muscle layer of the esophagus

The 5-year survival rate for advanced esophageal cancer is only 10–20 %, but in superficial esophageal cancer, the 5-year survival rate exceeds 90 %.

Squamous cell carcinoma is the most common esophageal tumor, which can occur in all esophageal tracts.

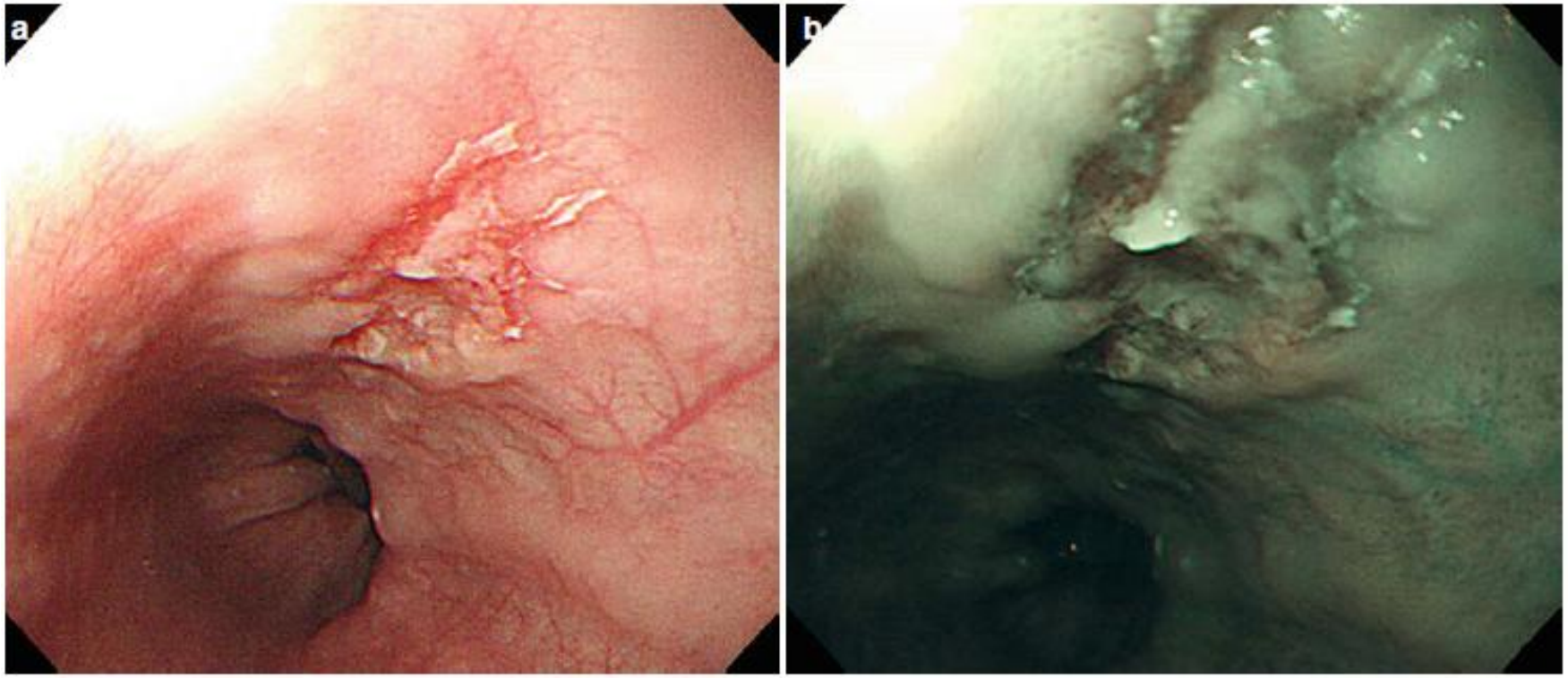
Adenocarcinomas account for less than 30 % of esophageal cancers, but their incidence is rising sharply. It can occur predominantly in the lower esophagus (Barrett).

Esophageal cancer



Japanese Society for Esophageal Diseases. Guidelines for the Clinical and Pathologic Studies on Carcinoma of the Esophagus (in Japanese). 8th ed. Kanehara Shuppan, Tokyo, 1992; 34.

Esophageal Cancer



Superficial esophageal cancer. A linear ulcerative lesion with irregular margin is noted (**a**). The mucosal change is prominent with NBI (**b**). It was diagnosed as ulcer-type squamous epithelial carcinoma of the esophagus

Esophageal cancer

Esophageal squamous cell carcinoma

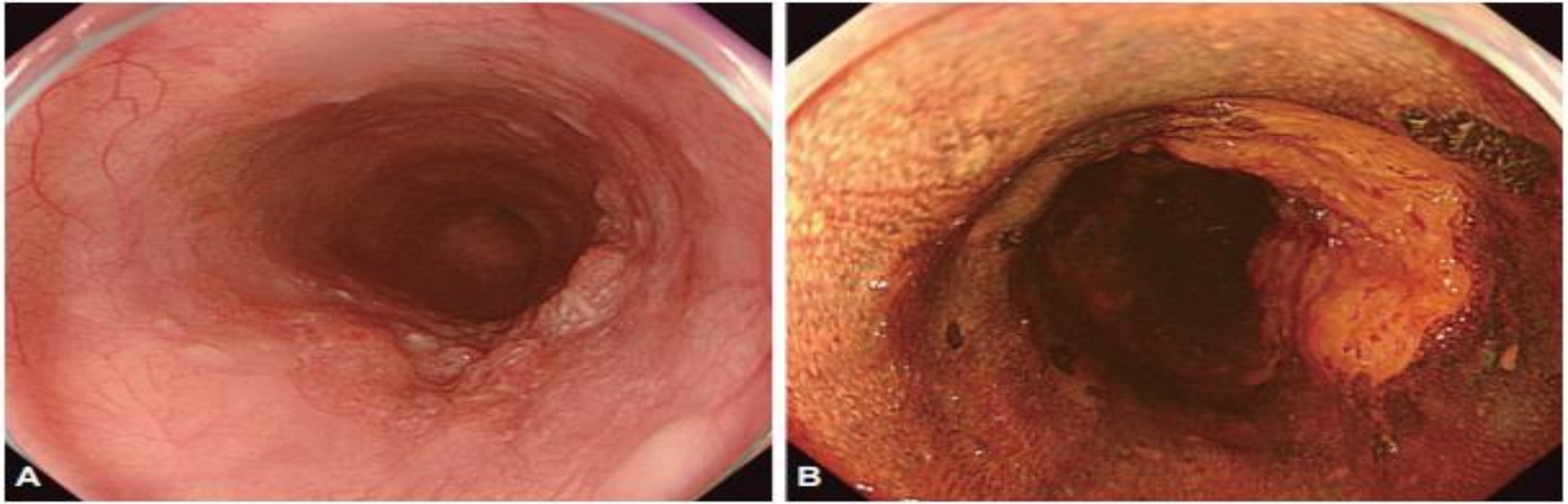
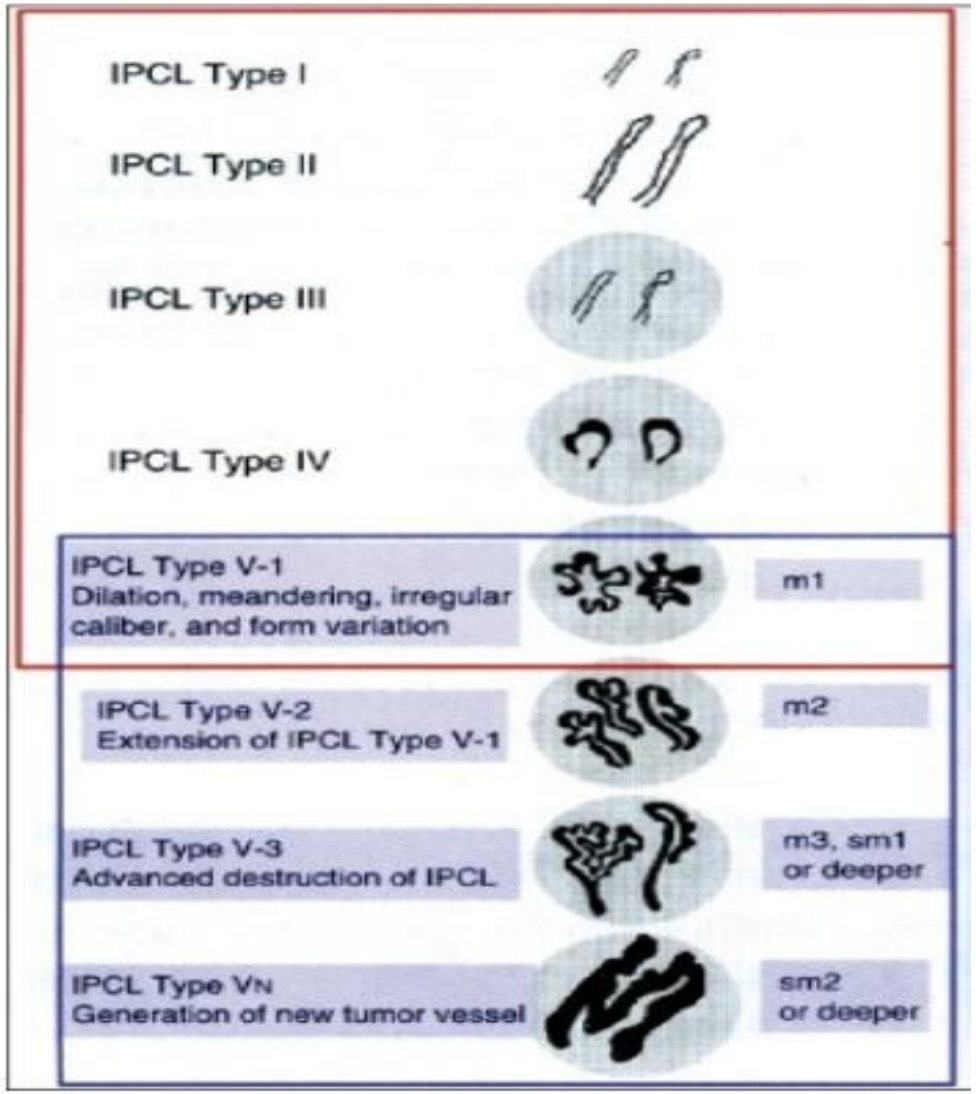
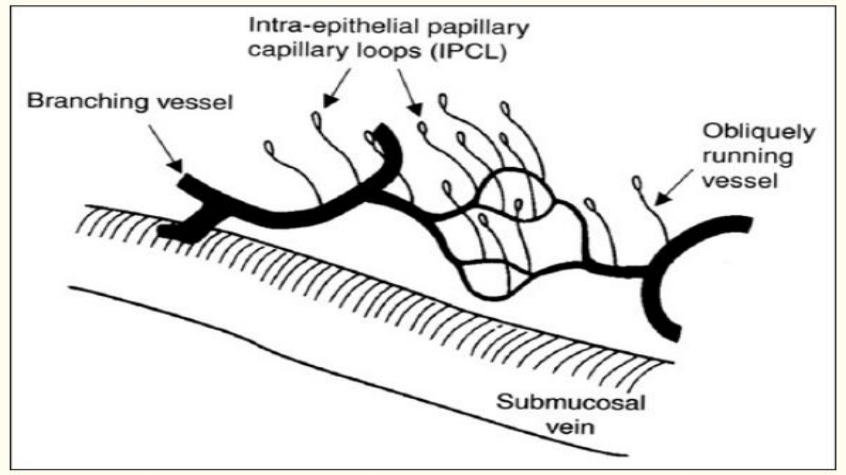


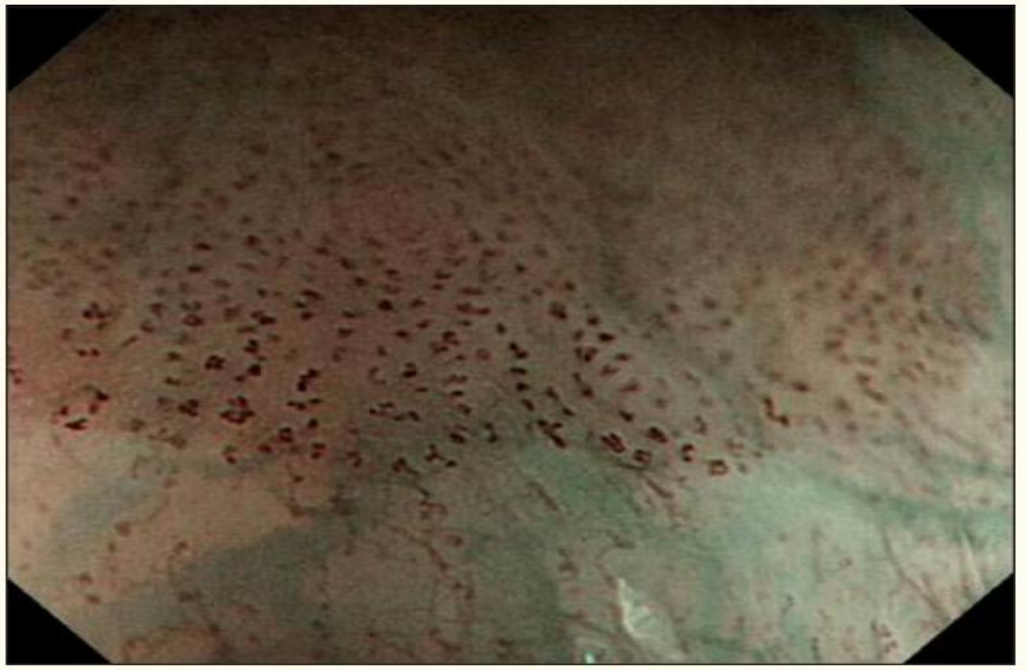
Fig. 3. Esophageal squamous cell carcinoma. (A) A depressed lesion with irregular nodularity and redness is noted at the mid esophagus. (B) With iodine staining, it is shown as an iodine-void area with a well-defined boundary.

Esophageal cancer

Esophageal squamous cell carcinoma







Endoscopic resection of esophageal cancer

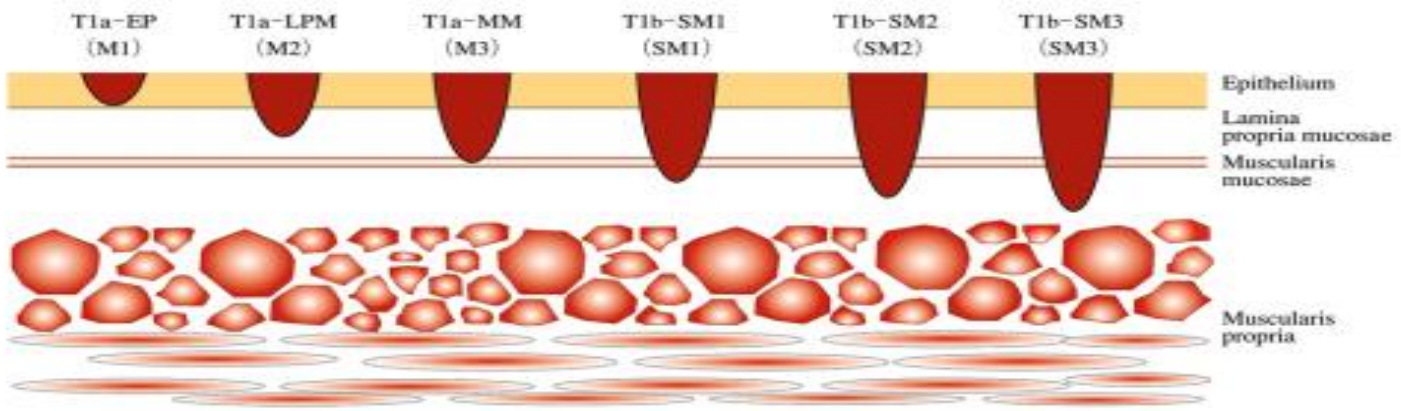


Fig. 1-3 Subclassification for superficial cancer (modified from the guidelines for esophageal cancer treatment)

Note 1: Early esophageal cancer: T1a can be designated as early cancer of the esophagus regardless of the presence or absence of lymph node or distant organ metastasis. e.g.: early esophageal cancer: T1aNxMx.
Note 2: Superficial esophageal cancer: T1a and T1b are designated as superficial cancer regardless of lymph node or distant organ metastasis.
e.g.: superficial esophageal cancer: T1NxMx
Note 3: Formerly used subclassification of superficial type generally corresponds to the following.
M1: T1a-EP, M2: T1a-LPM, M3: T1a-MM, SM1: T1b-SM1, SM 2: T1b-SM2, SM 3: T1b-SM3
Note 4: In endoscopically resected specimens, a tumor invading the submucosa to a depth of 200 μm or less from the lamina muscularis mucosae is classified as T1b-SM1, while a tumor extending more than 200 μm is classified as T1b-SM2, since the distance of the submucosal layer is unknown.

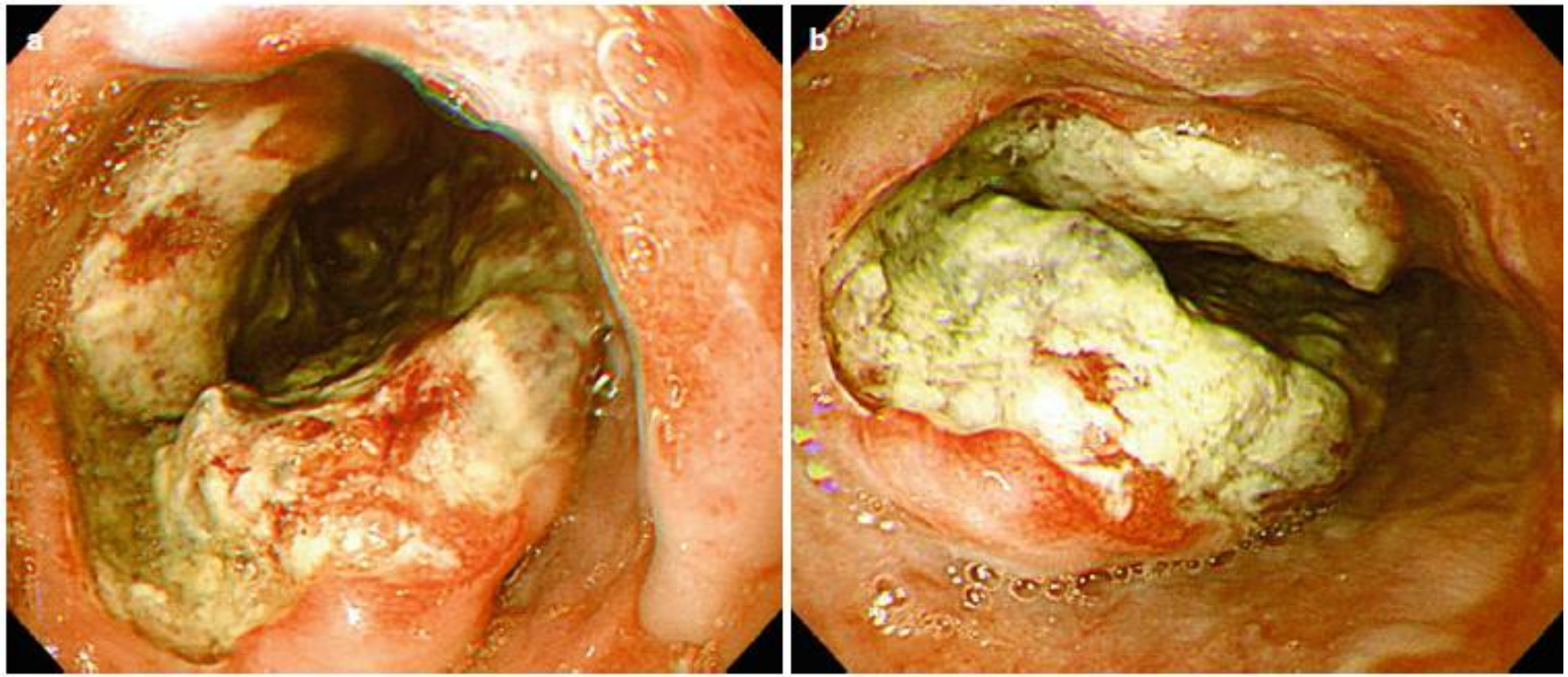
Curativity A (pCur A)	pT1a-EP or pT1a-LPM with pR0.
Curativity B (pCur B)	pT1a-EP or pT1a-LPM with pRX. pT1a-MM or pT1b-SM1 with pR0 or pRX.
Curativity C (pCur C)	pT1b-SM2, positive micro vascular permeation despite depth of invasion, pR1 or pR2.

→ Complete removal of the tumor is strongly believed.

→ Residual tumor

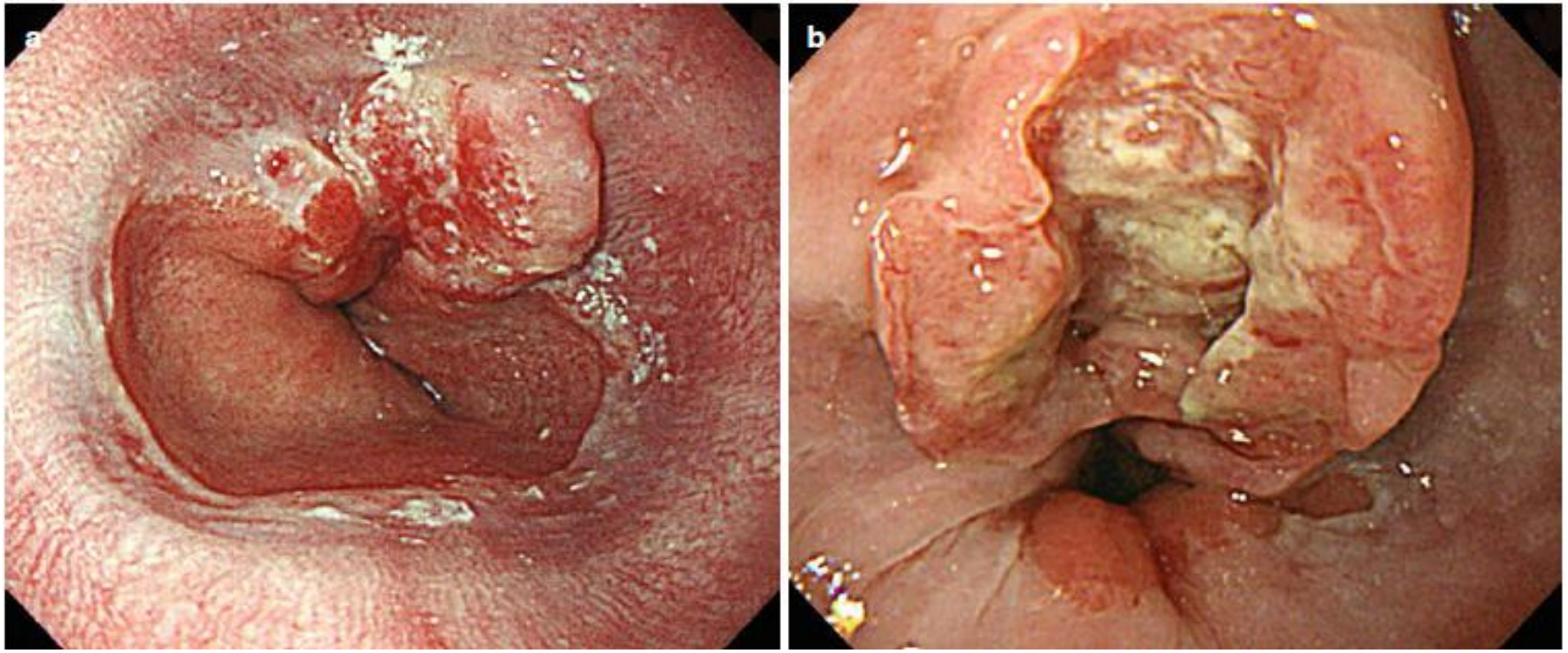
Japanese Classification of Esophageal Cancer, 11th Edition: part I

Esophageal Cancer



Advanced esophageal cancer. An ulcerative lesion of the mid-esophagus with heaped up margin. This lesion is an ulcerative and advanced esophageal cancer. It was histologically proven as squamous cell carcinoma

Esophageal Cancer



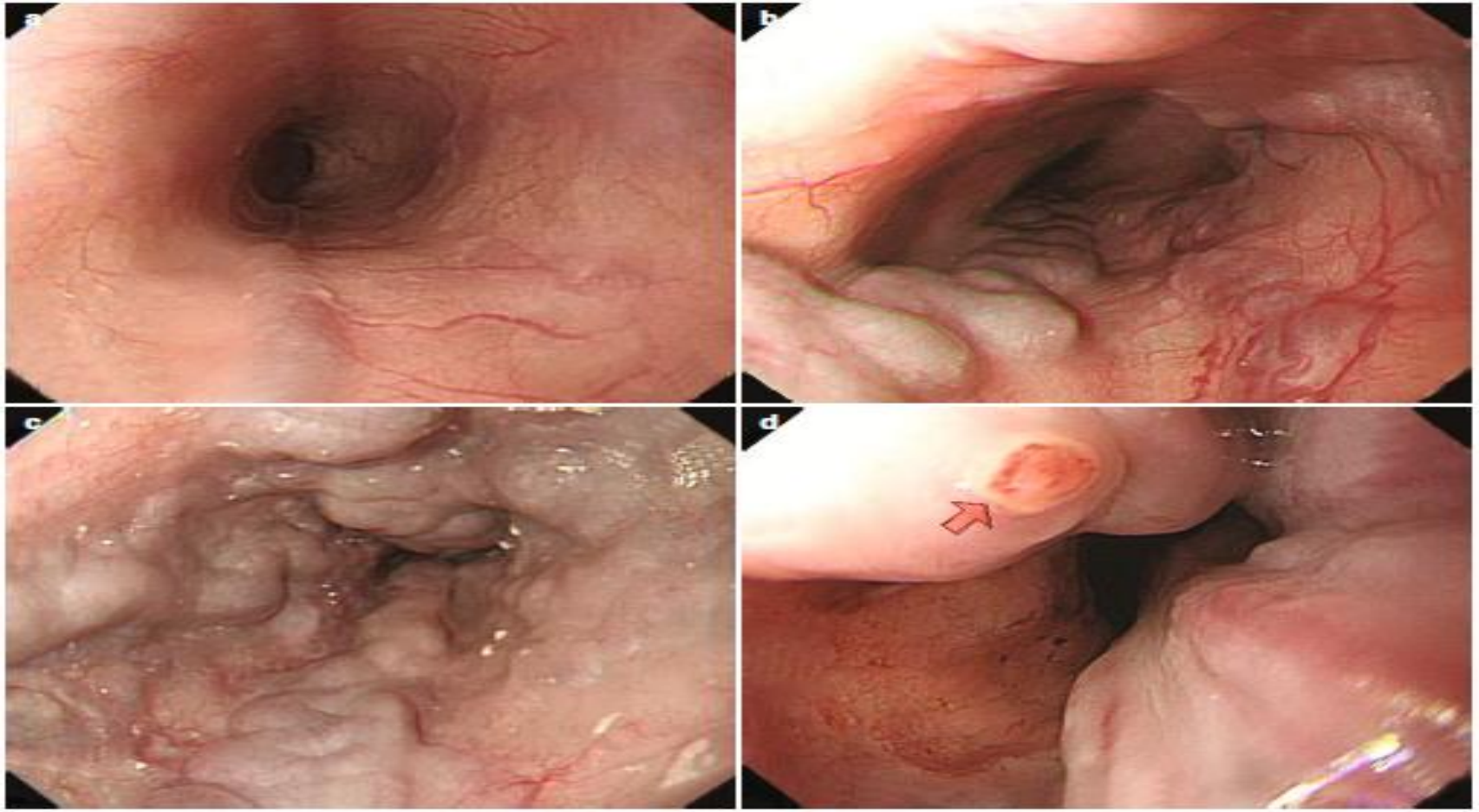
Advanced esophageal cancer. Esophageal adenocarcinoma cases in the GE junction area. An erythematous focal flat elevated lesion is noted (**a**). An ulcerative lesion with heaped up margin is noted (**b**)

Esophageal varices

The endoscopic appearance of esophageal varices differs according to their grade

Japanese Research Society for Portal Hypertension
General color
Blue
White
Form
F1 (small and straight varices)
F2 (enlarged tortuous varices, less than one-third of the lumen)
F3 (large and tortuous, more than one-third of the lumen)
Red color signs
Red color signs absent
Red wale markings
Cherry-red spots
Hematocystic spot
Diffuse redness
Proximal extension
Distal one-third
Extension to mid-esophagus
Extension to proximal one-third

Esophageal varices



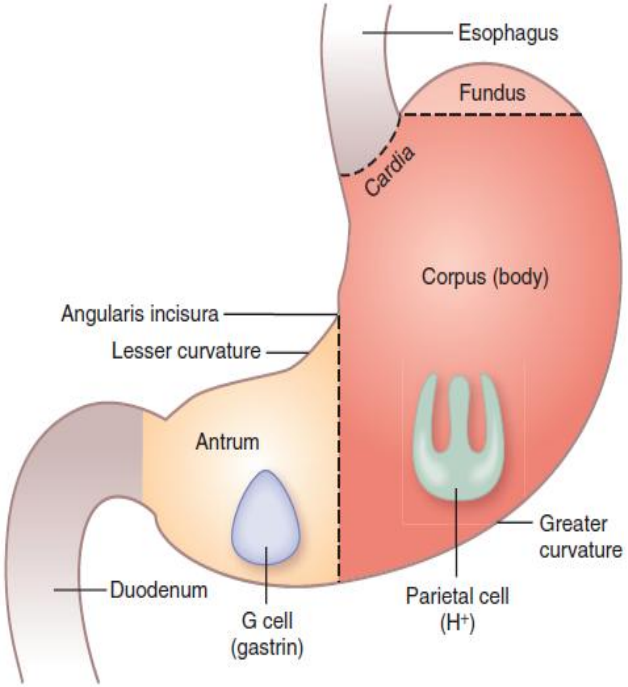
Esophageal varices. (**a**) Distended veins at the level of mucosa. (**b**) Large, tortuous varices. (**c**) Nodular thickening. (**d**) Red sign on the varix

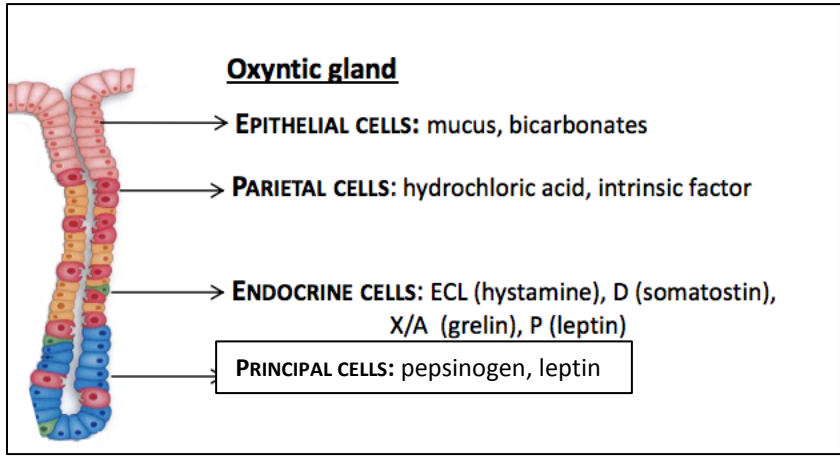
Stomach

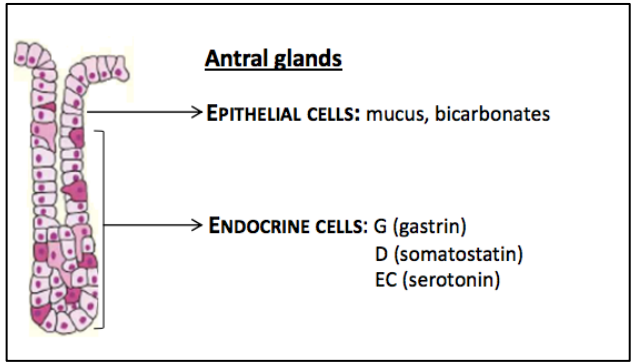
STOMACH CAN BE DIVIDED PHYSIOLOGICALLY, ANATOMICALLY AND ENDOSCOPICALLY.

Upon entering the stomach, one looks directly toward the greater curvature and encounters the gastric rugae. On close inspection, the mucosa has a subtle mosaic pattern, representing the areae gastricae. Gastric folds should flatten with full insufflation.

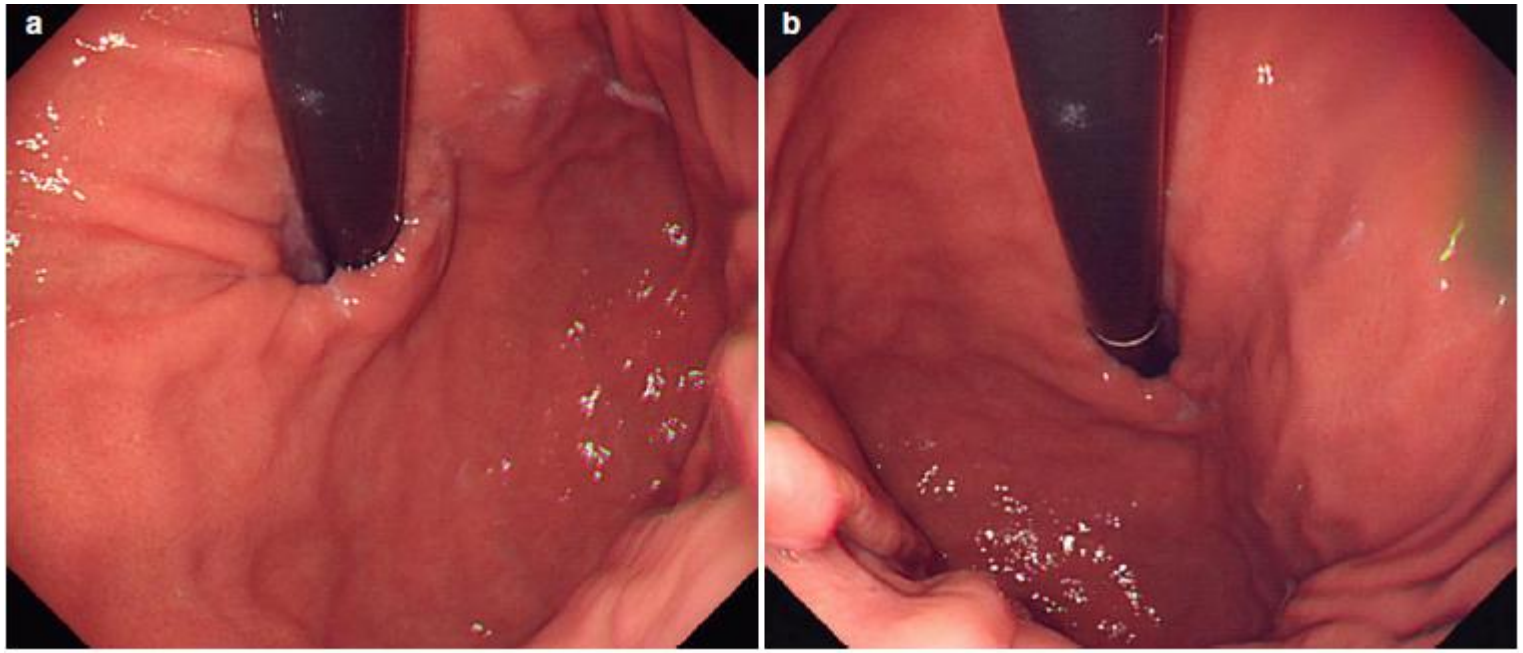
The incisura angularis (gastric notch), located on the distal lesser curvature, is an important landmark that helps to differentiate the gastric body from the antrum and not unexpectedly, given the histologic differences, the antral mucosa appears endoscopically different from the gastric body.





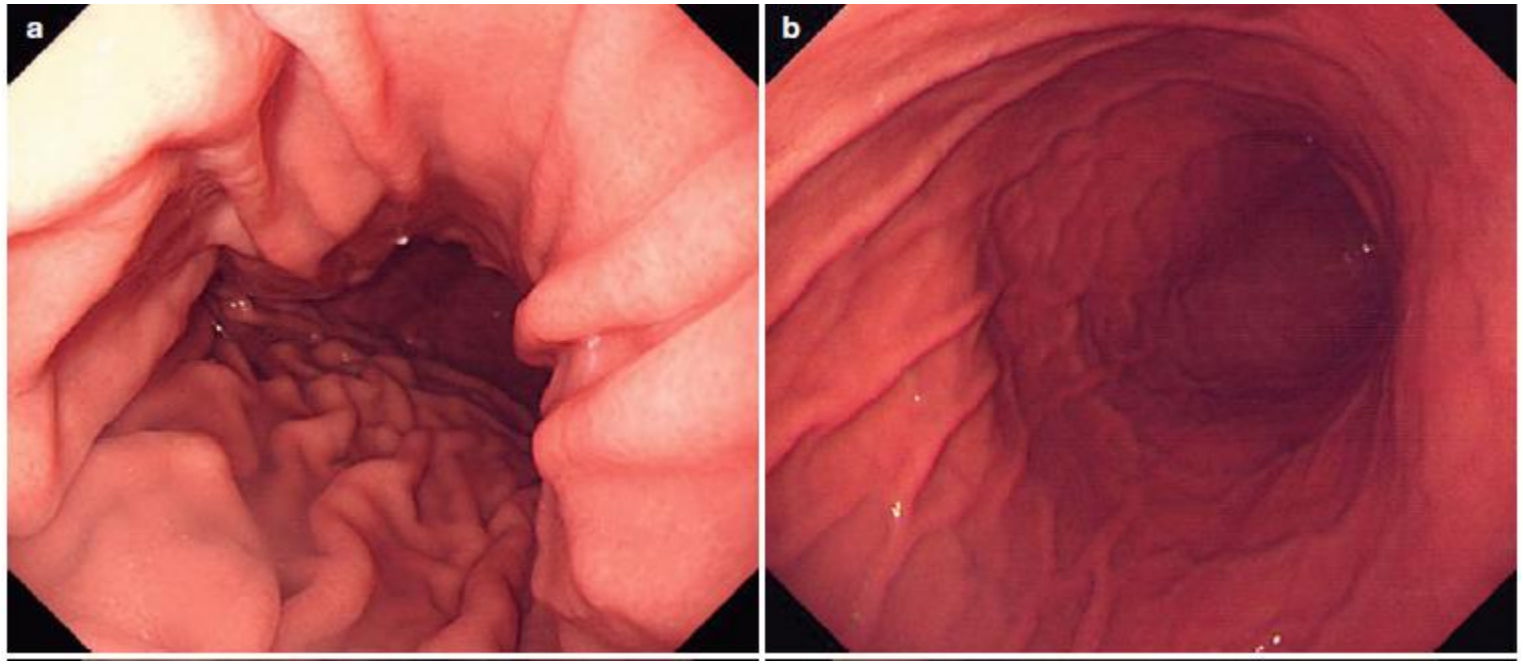


Cardia and fundus



Retroflexed view of the cardia and fundus

Body of the stomach

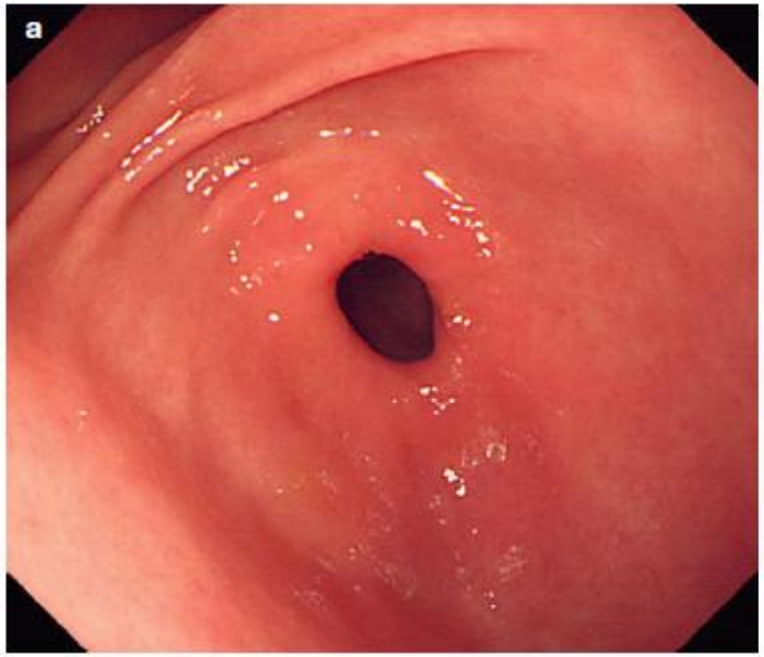


Collapsed body shows tortuous mucosal folds on the greater curvature side.

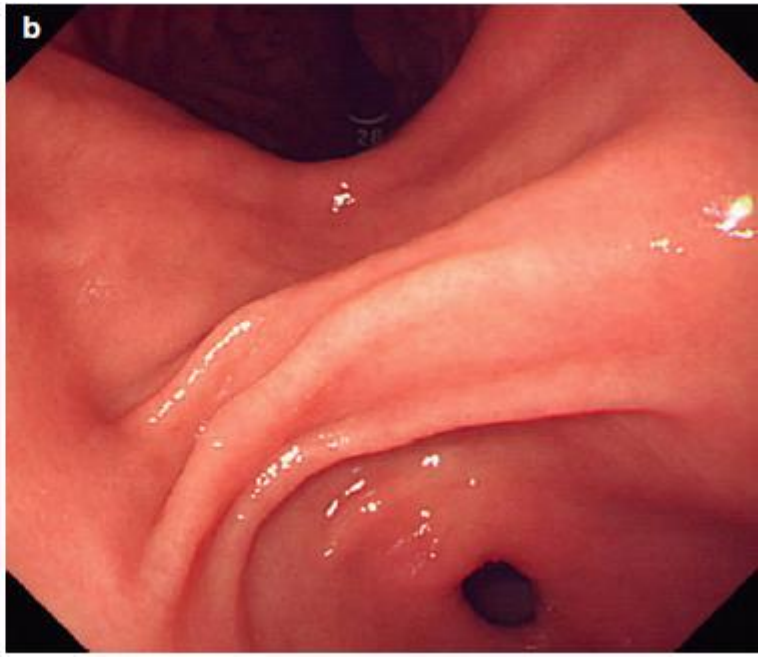
Distended body after air inflation shows straightening of mucosal folds.

Antrum

ANTRUM AND PYLORIC CHANNEL



ANTRUM AND INCISURA ANGULARIS



Gastropathy

One of the most common findings on upper endoscopy of the stomach is gastropathy.

Acute gastritis is a term covering a broad spectrum of entities that induce inflammatory changes in the gastric mucosa. Acute gastritis is commonly found in the antrum of the stomach and has the characteristic features of erythema and erosion. Furthermore, linear streaks can extend to the body of the stomach.

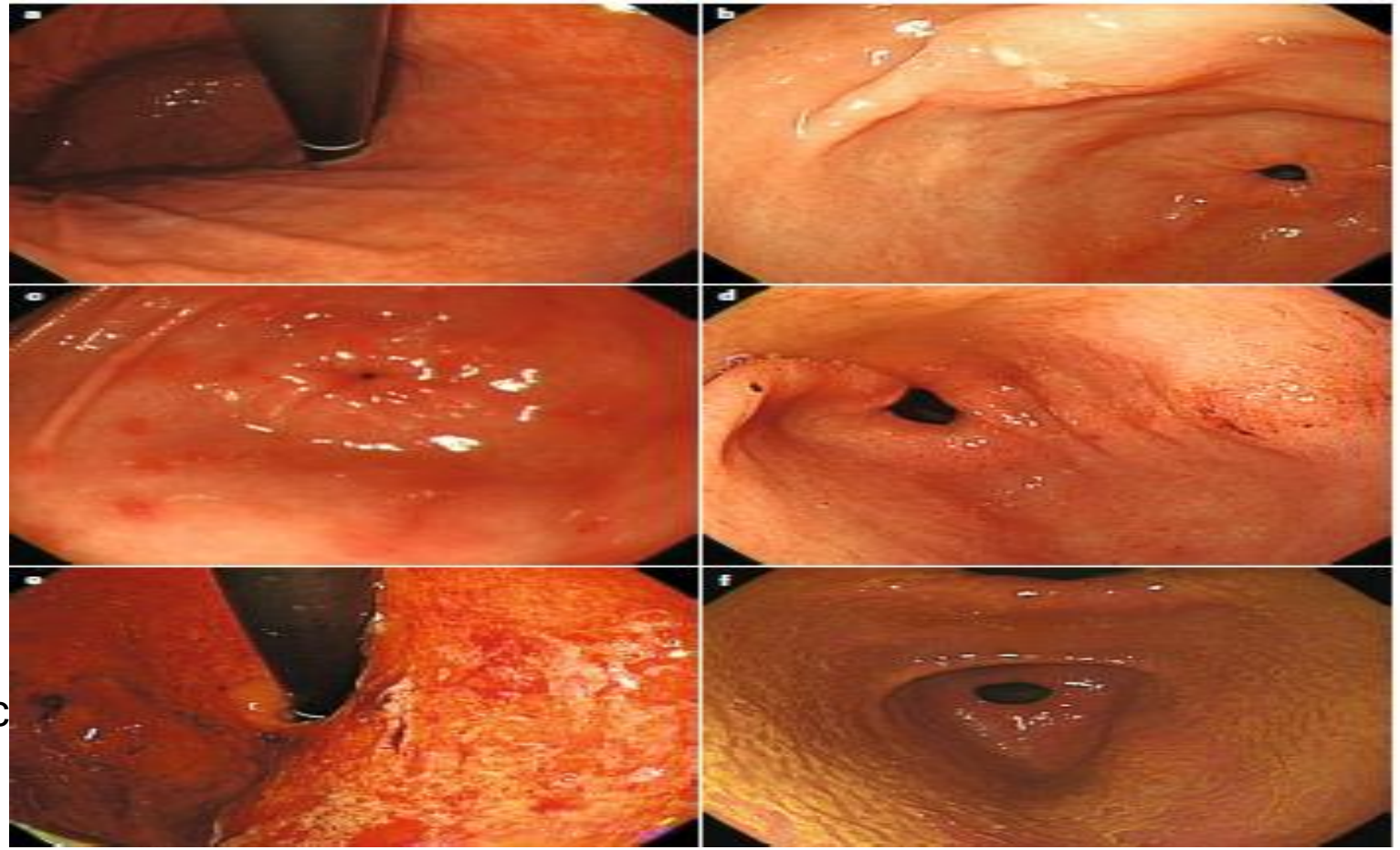
Chronic gastritis can be roughly divided into chronic non- atrophic gastritis and chronic atrophic gastritis.

In contrast to chronic non-atrophic gastritis, chronic atrophic gastritis is characterized by marked gastric atrophy with absent rugal folds and a prominent vascular pattern.

CURRENTLY, THE DIAGNOSIS OF GASTRITIS IS BASED ON HISTOLOGICAL EXAMINATION.

Endoscopic features of acute gastritis

(**a**) Linear streak



(**b**) raised mucosal edema

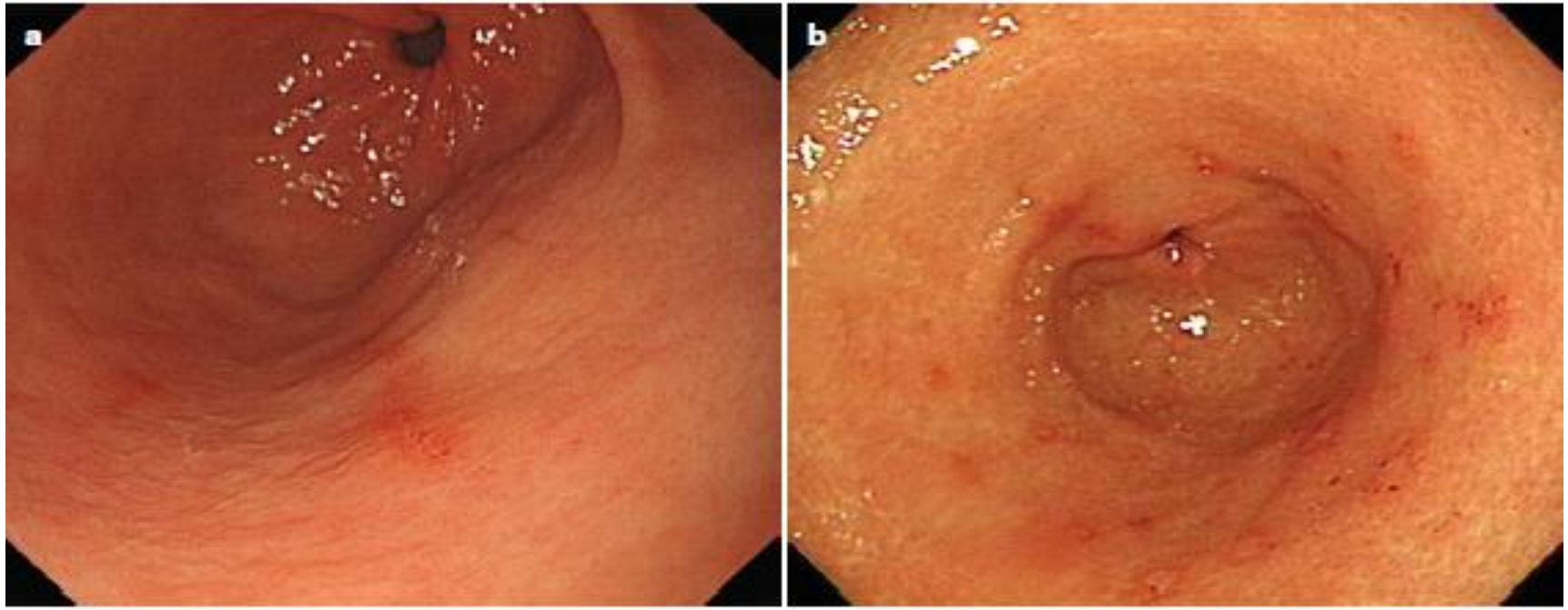
(**c**) flat and multiple erosions

(**d**) erosions arranged in a linear pattern

(**e**) severe hemorrhagic

(**f**) diffuse coating witl bile juice and mucosal edema.

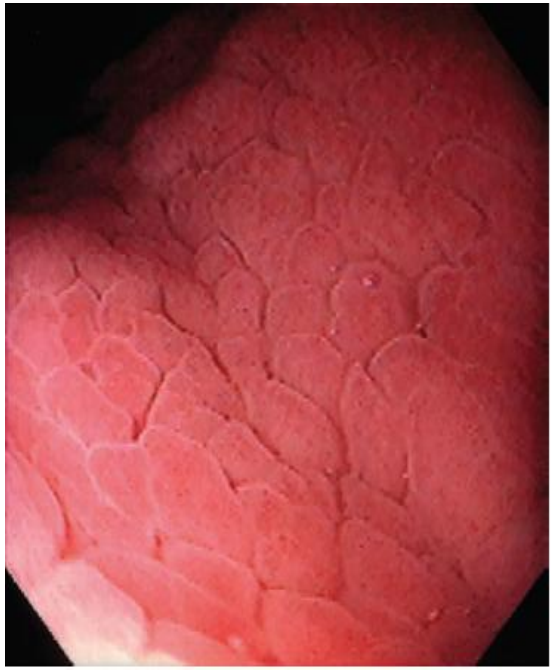
Chronic non-atrophic gastritis



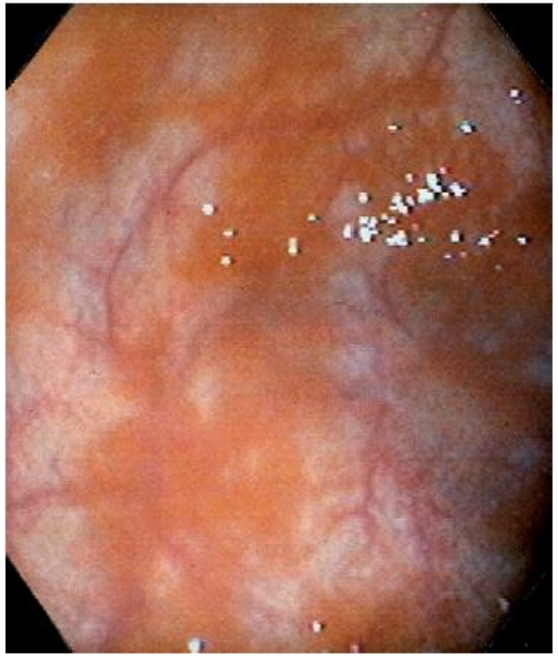
a) Flat and erythematous lesions on the antrum

(**b**) Multiple erosions on the antrum

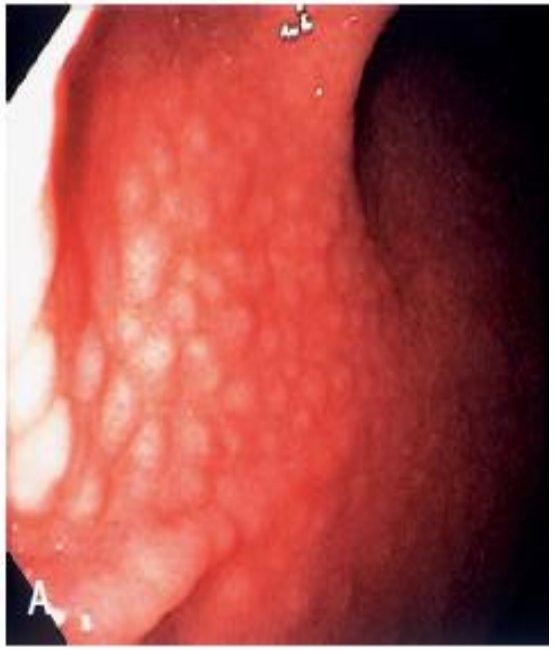
Helicobacter Pylori gastritis



Mild superficial gastritis results in erythema and prominence of the areae gastricae

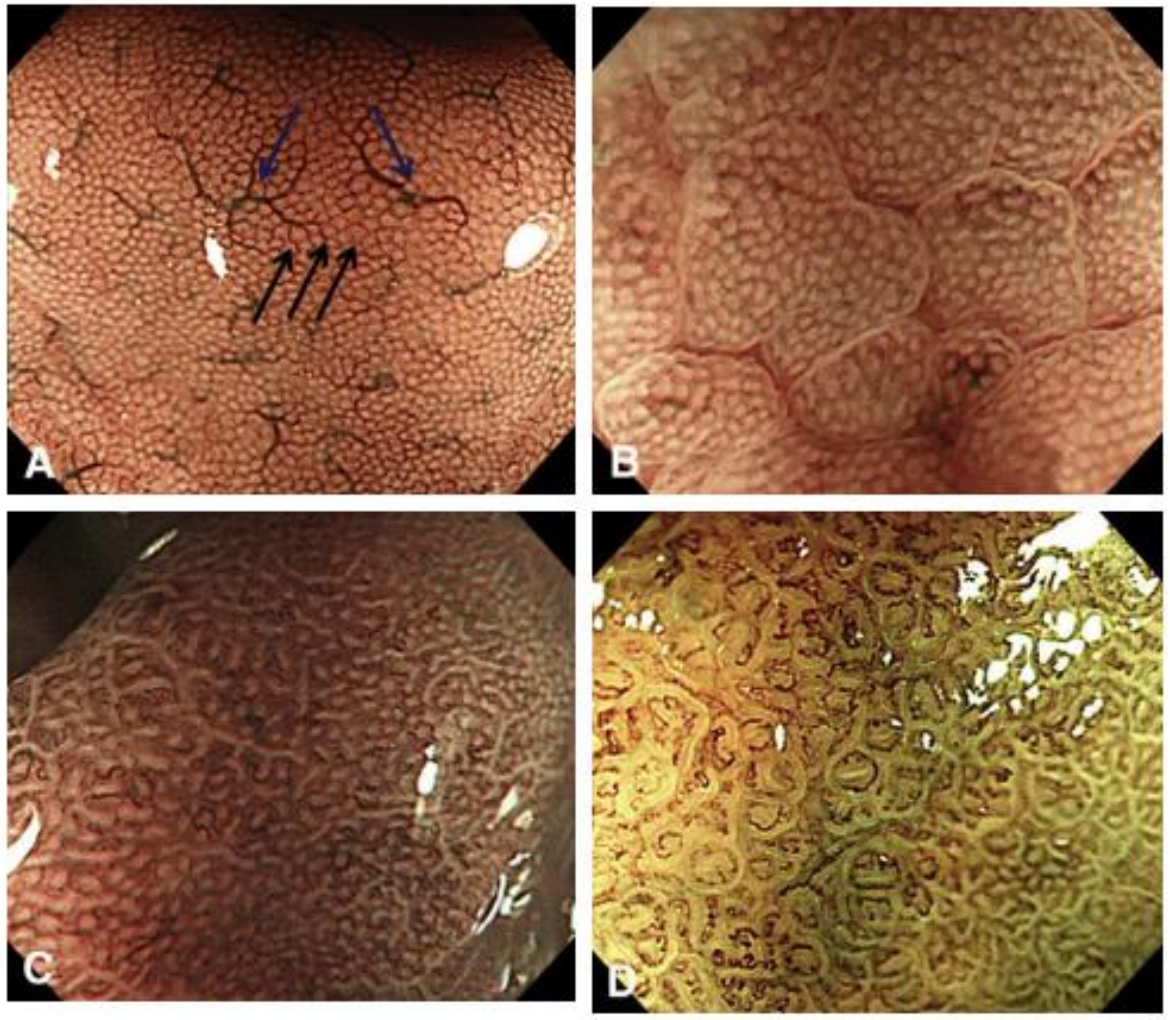


Patchy areas of inflammation in the proximal gastric body are well demarcated by the surrounding atrophic mucosa.



There is marked nodularity of the anterior wall of the gastric body when viewed from this angle. This has been termed a “chicken skin” appearance

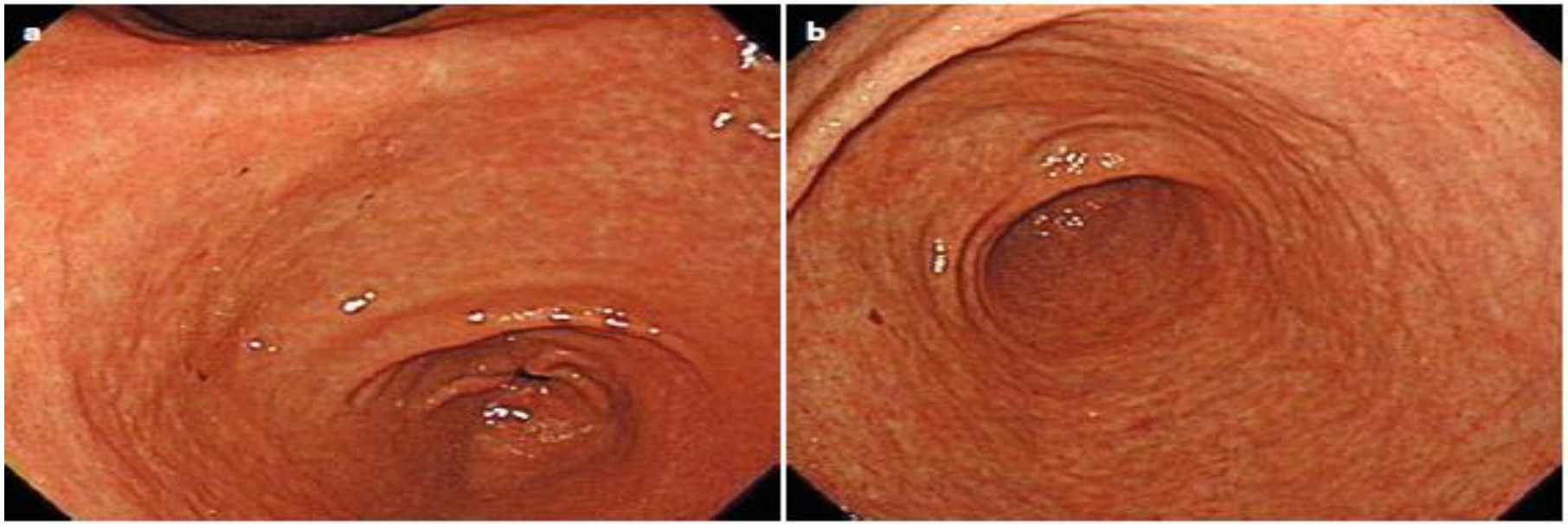
Helicobacter Pylori gastritis



Mucosal patterns in the corpus seen with NBI:
(A) Normal pattern -presence of small, round pits surrounded by **regular subepithelial capillary networks (SECNs),** which are regularly interspersed with collecting venules.
Abnormal gastric mucosal patterns type 1 **(B)**, slightly enlarged, round pit with unclear or irregular SECNs; type 2 **(C)**, enlarged oval or prolonged pit with increased density of irregular vessels; and type 3 **(D)**, demarcated oval or tubulovillous pit with clearly visible coiled or wavy vessels.

Tahara T, Shibata T, Nakamura M, Yoshioka D, Okubo M, Arisawa T, et al. Gastric mucosal pattern by using magnifying narrow-band imaging endoscopy clearly distinguishes histological and serological severity of chronic gastritis. Gastrointest Endosc 2009

Chronic atrophic gastritis

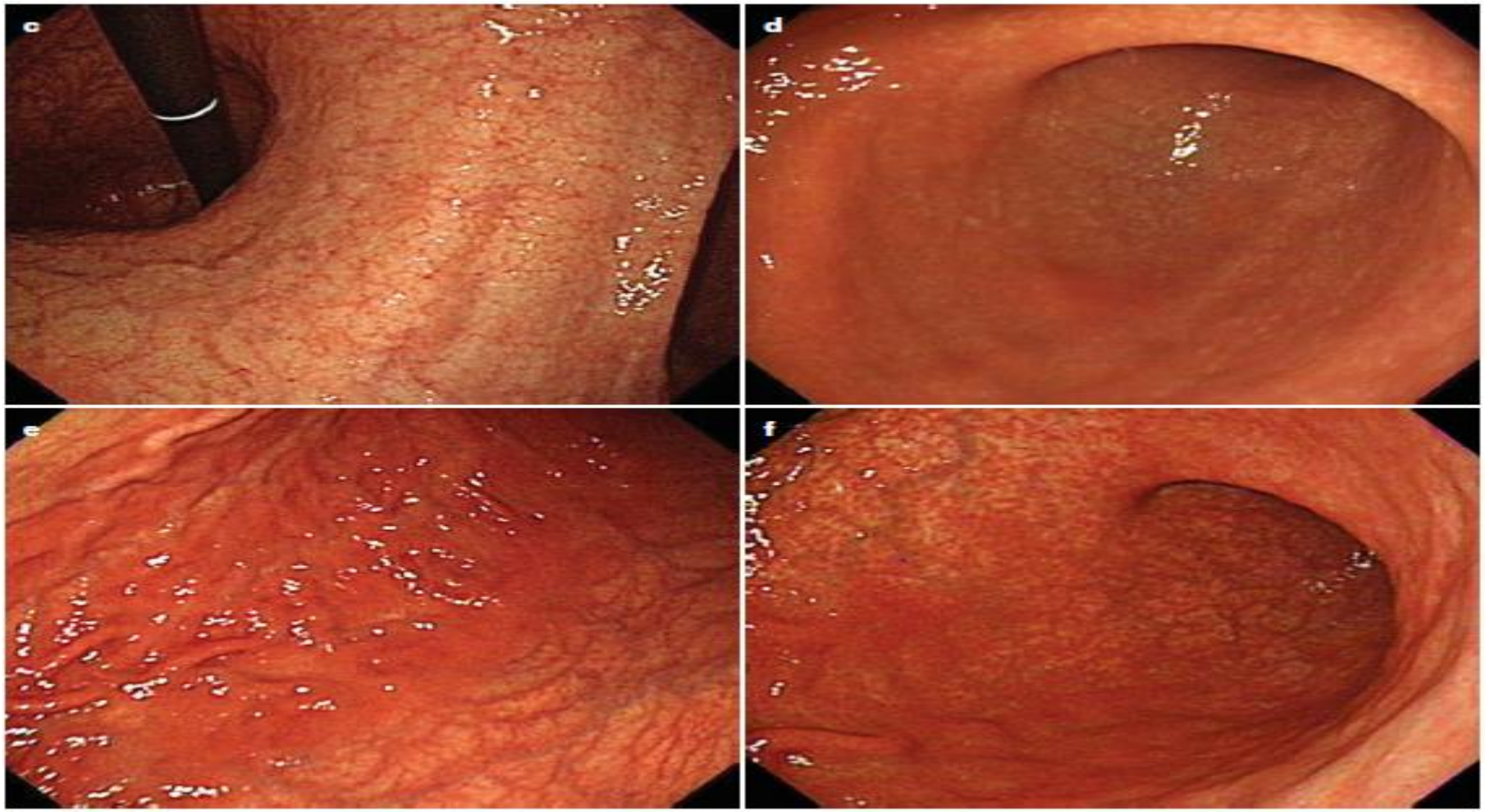


(**a**) Thinning of the antral gastric mucosa

(**b**) loss of moisture and red and white color changes

Chronic atrophic gastritis

(**c**) whitish color change of the mucosa

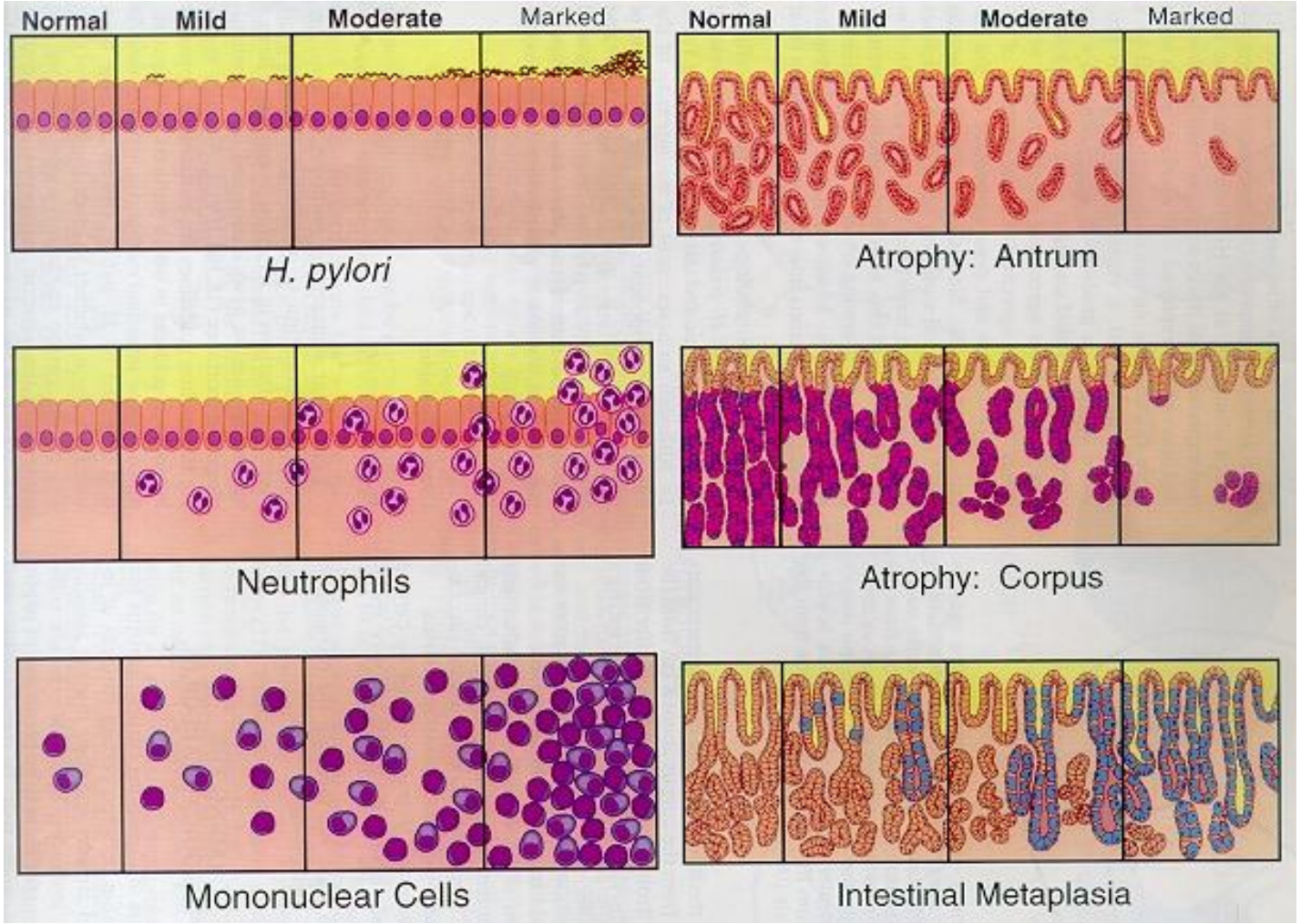


(**d**) loss of mucosal moisture and change to a white color

(**e** , **f**) prominent vascularity and loss of rugal folds in the body

GASTRITIS: "Sydney System"

DIAGNOSIS OF GASTRITIS IS BASED ON HISTOLOGICAL EXAMINATION !!!!



Each parameter scoring from 0 to 3 ➡ **STAGING**

Gastric Ulcer

Gastric ulcers are defects or breaks in the gastric mucosa. Gastric ulcers penetrate through the muscularis mucosae in contrast to erosions.

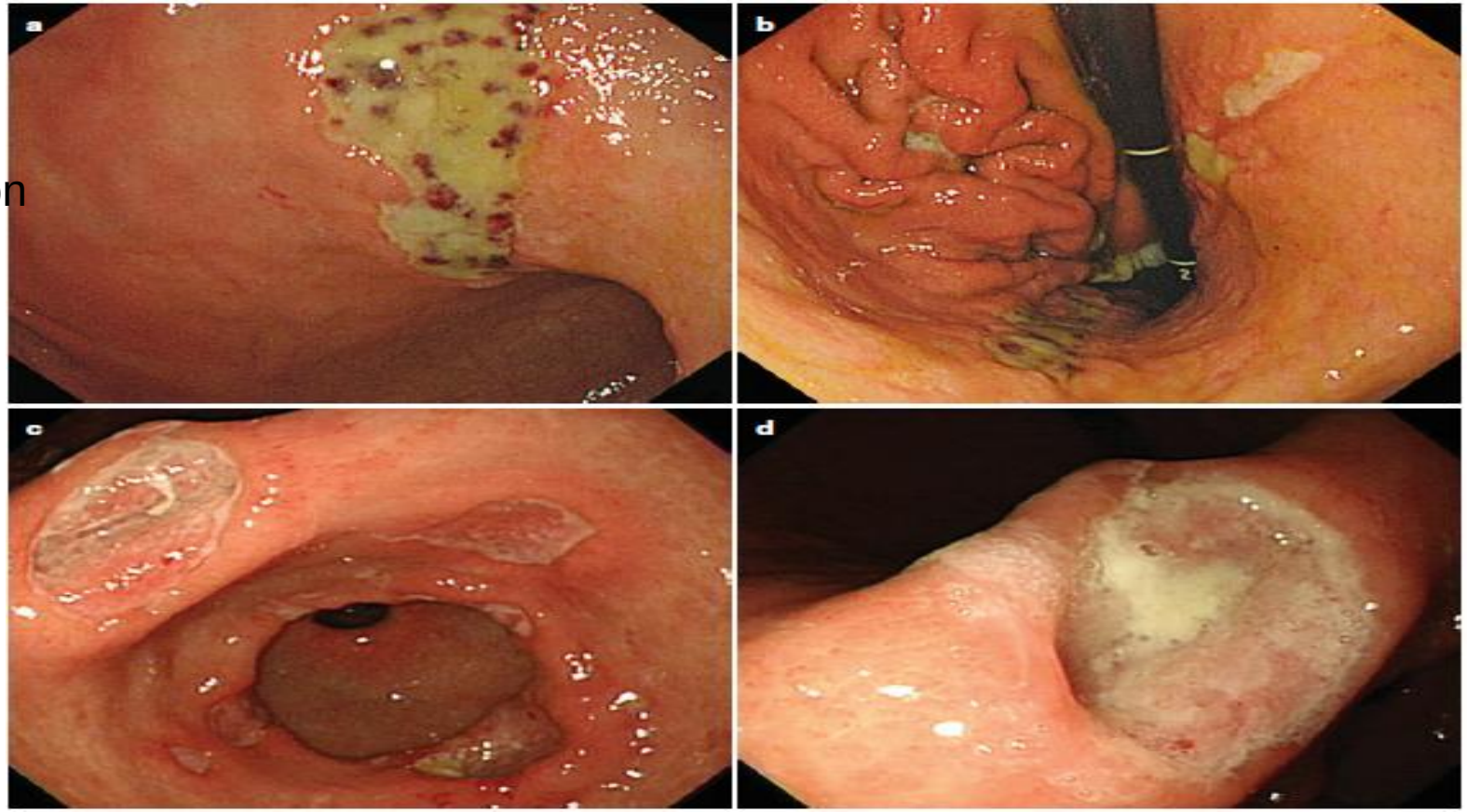
Gastric ulcers can vary in size from 5 mm to several centimeters and may lead to complications such as gastrointestinal (GI) bleeding, obstruction, penetration and perforation.

H. pylori infection, nonsteroidal anti-inflammatory drug (NSAID) use, and aspirin use are the
most common causes.

Biopsies at the margins of ulcer are mandatory to exclude gastric cancer

Gastric Ulcer

(**a**) longitudinal ulceration with multiple hematin on the base

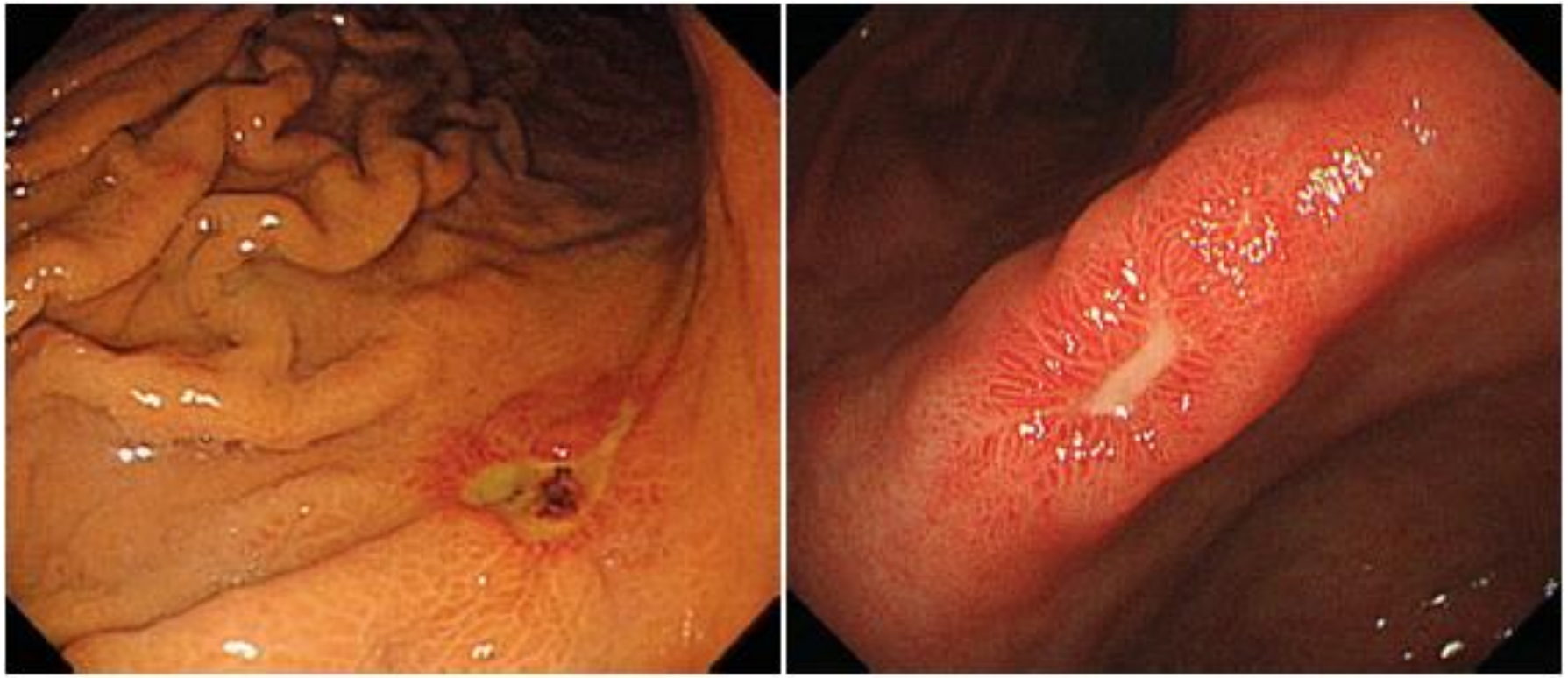


(**b**) multiple and longitudinal ulcerations on the body of stomach

(**c**) multiple round ulcerations on the antrum

(**d**) round and regular shaped ulceration covered by thin exudate on the angle

Gastric Ulcer



Endoscopic features of healing gastric ulcers

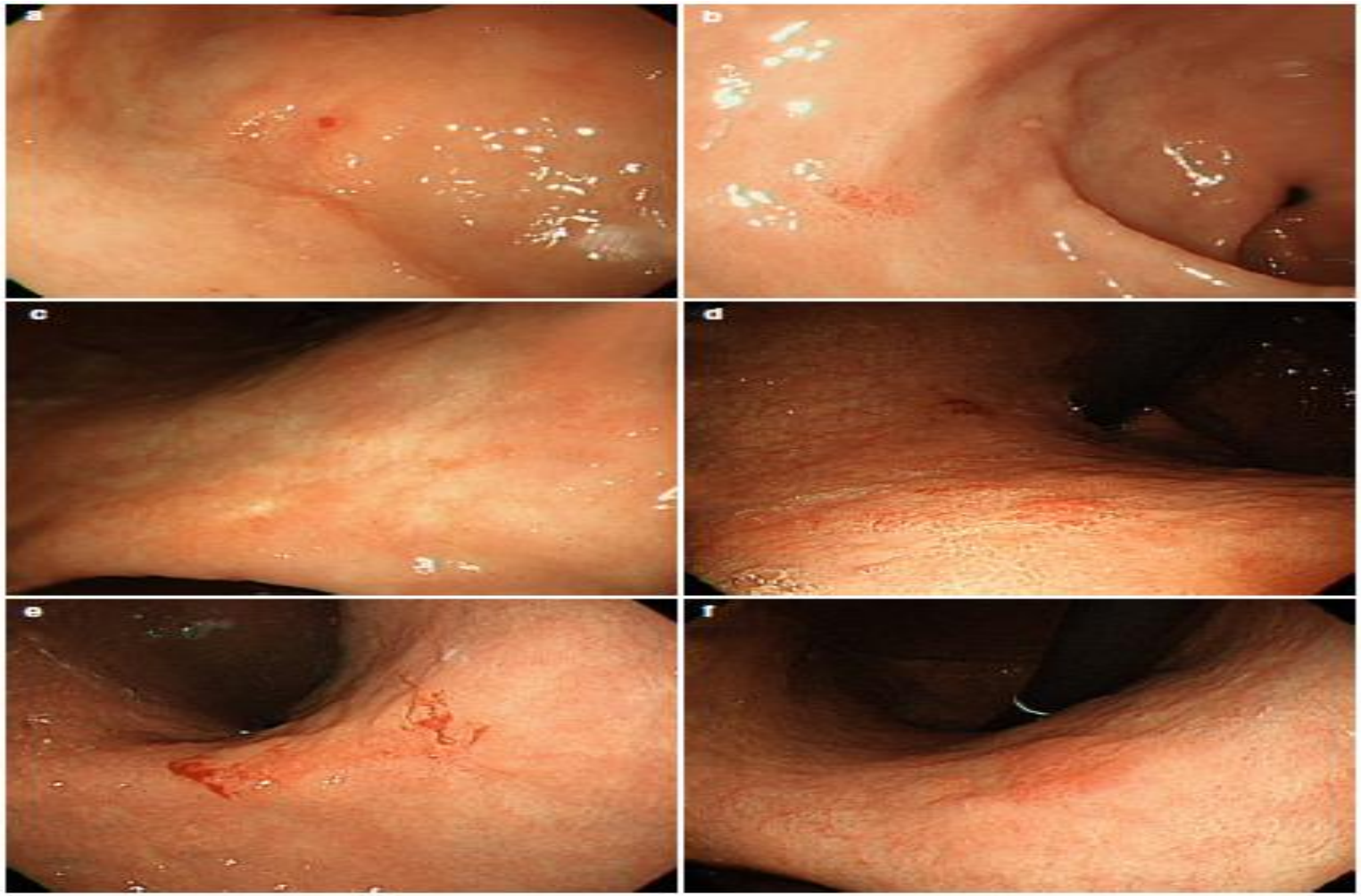
Early gastric cancer

Early gastric cancer (EGC) is defined as the tumor confined to mucosa or submucosa irrespective of lymph node metastasis and discriminated in terms of better long-term survival from advanced gastric cancer (AGC) which invades deeper than submucosal layer.

In endoscopic finding, EGC has diverse morphologies according to depth of tumor invasion from subtle mucosal changes such as a smooth surface protrusion, shallow mucosal depression, flat mucosal discoloration, or erythematous mucosal change.

The tumor size is not the factor which can discriminate it from AGC.

Early gastric cancer



EGC. (**a** – **f**) Irregular surface granularity, scar change, hyperemia, or discoloration are common findings in EGC

F1000Research F1000Research 2018, 7(F1000 Faculty Rev):715 Last updated: 08 JUN 2018

Check for updates

REVIEW

The evolving role of endoscopy in the diagnosis of premalignant gastric lesions [version 1; referees: 4 approved]

William Waddingham [1,2], David Graham[1], Matthew Banks[1], Marnix Jansen[2,3]

Superficial chronic gastritis

↓ 50%

Atrophic chronic gastritis

↓ 40%

Intestinal Metaplasia

↓ 8%

Dysplasia

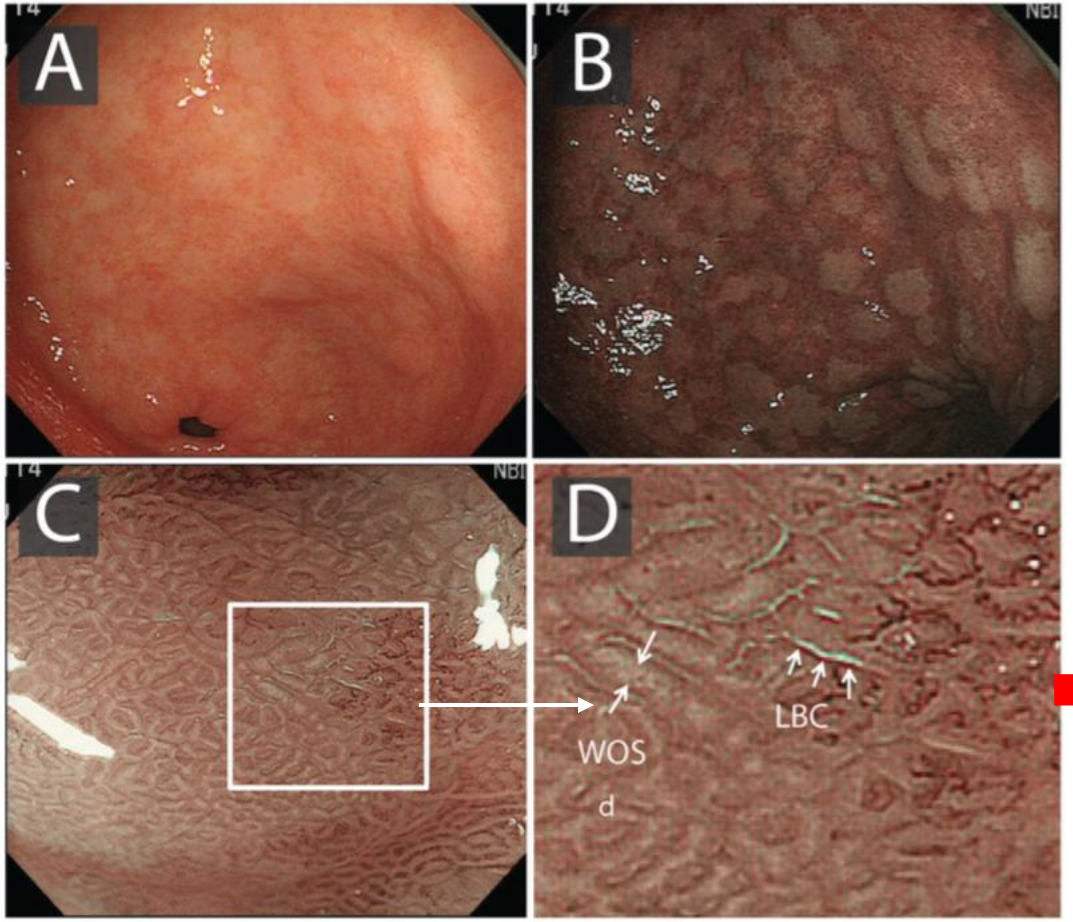
↓ <1%

ADENOCARCINOMA

White light endoscopy image

Narrow band imaging

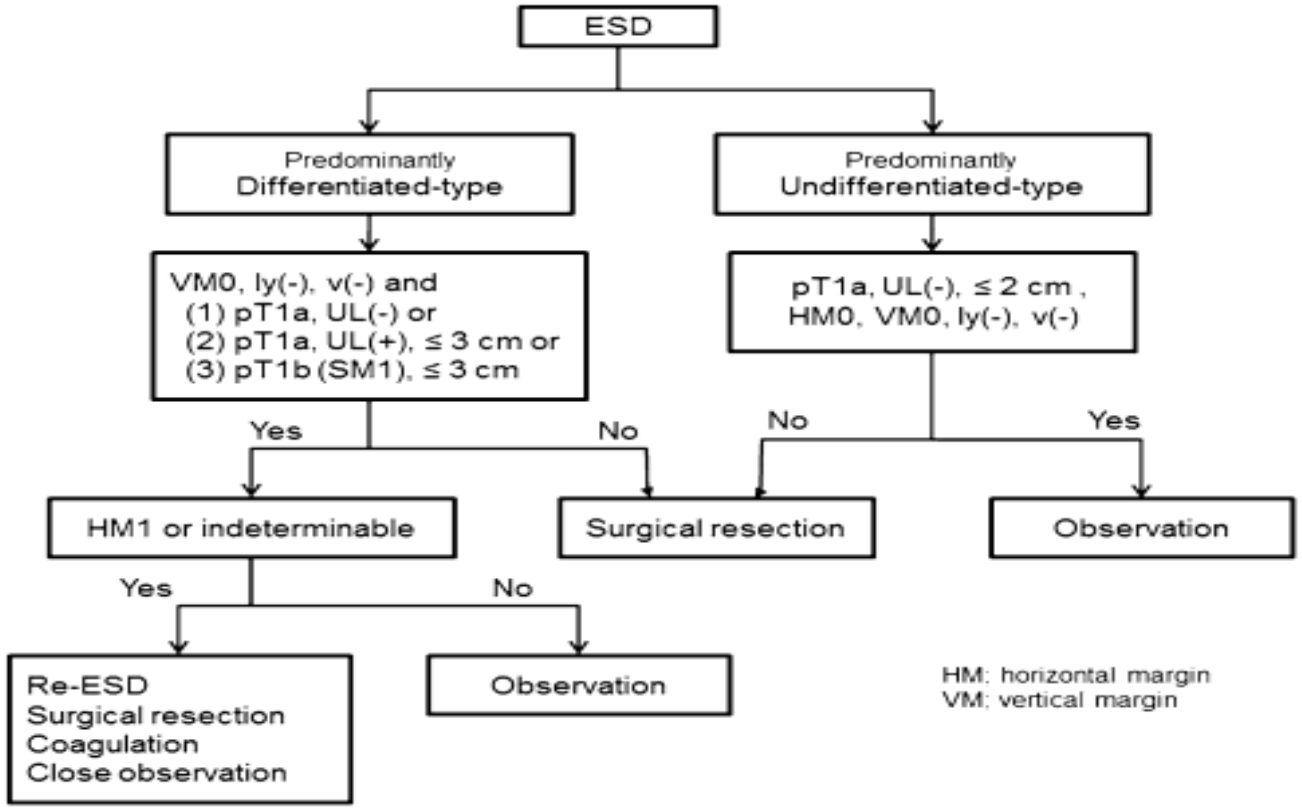
Magnication endoscopy



→ TARGETED BIOPSIES

Endoscopic resection of gastric cancer

Fig. 7 Algorithm showing treatment of early gastric cancer according to the histopathologic findings of the specimens resected by ESD



Curative resection:

The resection is determined as curative when all of the following conditions are fulfilled:
en bloc resection, tumor size <2 cm, histologically of differentiated type, pT1a, negative horizontal margin (HM0), negative vertical margin (VM0) and no lymphovascular infiltration (ly(-), v(-)).

Japanese gastric cancer treatment guidelines 2014 (ver. 4)

Advanced Gastric Cancers

In advanced gastric cancer (AGC), the lesion extends beyond the proper muscle layer. The classification suggested by Borrmann in 1926 is commonly used, and this classification
divides AGC into four types (types 1–4) according to the macroscopic appearance. Lesions that are difficult to define are classified into type 5, which accounts for 15 % of all AGCs

Type 1: A polypoid tumor, sharply demarcated from the surrounding mucosa, usually attached on a wide base.

Type 2: An ulcerated carcinoma with sharply demarcated and raised margins

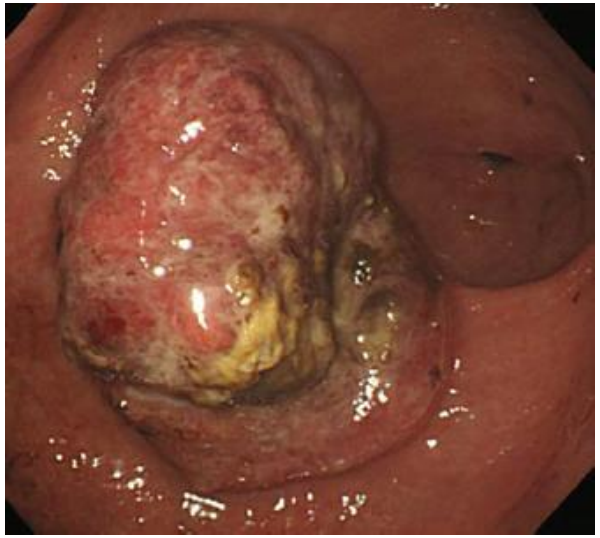
Type 3: An ulcerated carcinoma without definite limits, infiltrating the surrounding wall

Type 4: A diffusely infiltrating carcinoma in which ulceration is usually not a marked feature

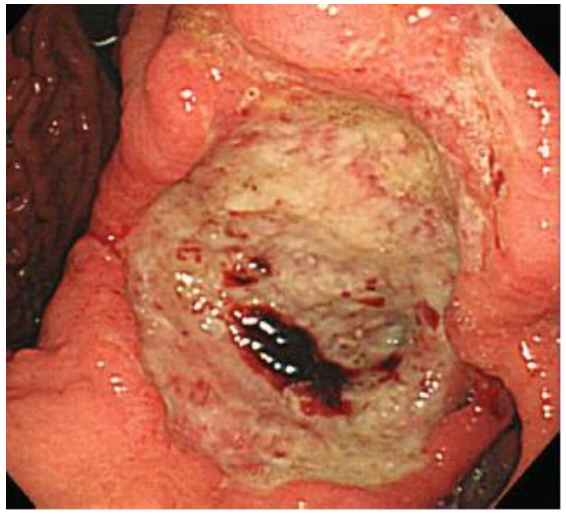
Type 5: Non-classifiable carcinomas that cannot be classified into any of the aforementioned types

Advanced Gastric Cancers

Polypoid tumor



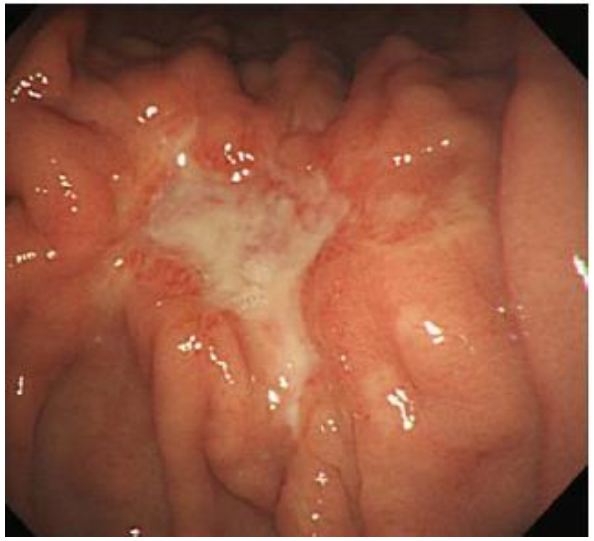
Typical cases of type 1 AGC



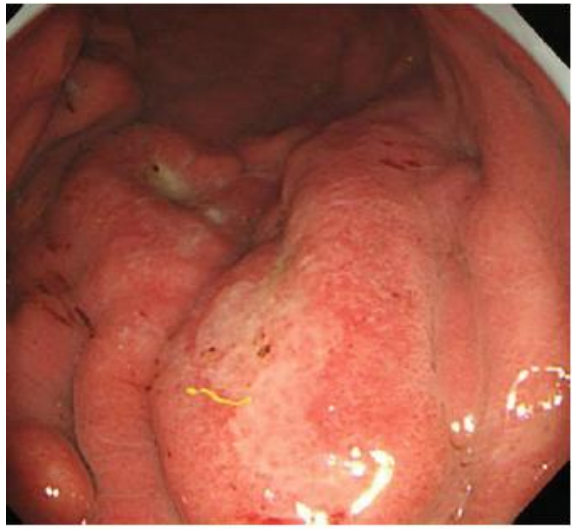
Typical cases of type 2 AGC

Ulcerated carcinoma with definite limits

Ulcerated carcinoma without definite limits



Typical cases of type 3 AGC



Typical cases of type 4 AGC

Diffusely infiltrating carcinoma

Gastrointestinal Stromal Tumor (GIST)

Gastrointestinal stromal tumors (GISTs) are the most common mesenchymal tumor of the gastrointestinal tract and are believed to originate from the interstitial cells of Cajal regulating gastrointestinal motility.

The range of clinical feature of GISTs ranges from symptomatic bleeding to incidental detection during a routine endoscopy.

In general, 10%-30% of GISTs are clinically malignant, but all GISTs are alleged to have some degree of malignant potential.

Prognostication of gastrointestinal stromal tumor atdifferent sites by tumor size and mitotic rate based on follow-up studies of over 1700 gastrointestinal stromal tumors prior to imatinib

Tumor parameters			Percentage of patients with progressive disease during long-term follow-up and quantitative characterization of the risk for metastasis			
Group	Size	Mitotic rate	Gastric GISTs	Small intestinal GISTs	Duodenal GISTs	Rectal GISTs
1	≤ 2 cm	≤ 5/50HPFs	0 none			
2	> 2 ≤ 5 cm		1.9 (very low)	4.3 (low)	8.3 (low)	8.5 (low)
3a	> 5 ≤ 10 cm		3.6 (low)	24 (moderate)	34 (high) [1]	57 (high) [1]
3b	> 10 cm		12 (moderate)	52 (high)		
4	≤ 2 cm	> 5/50HPFs	0[1]	50[1]	[2]	54 (high)
5	> 2 ≤ 5 cm		16 (moderate)	73 (high)	50 (high)	52 (high)
6a	> 5 ≤ 10 cm		55 (high)	85 (high)	86 (high) [1]	71 (high) [1]
6b	> 10 cm		86 (high)	90 (high)		

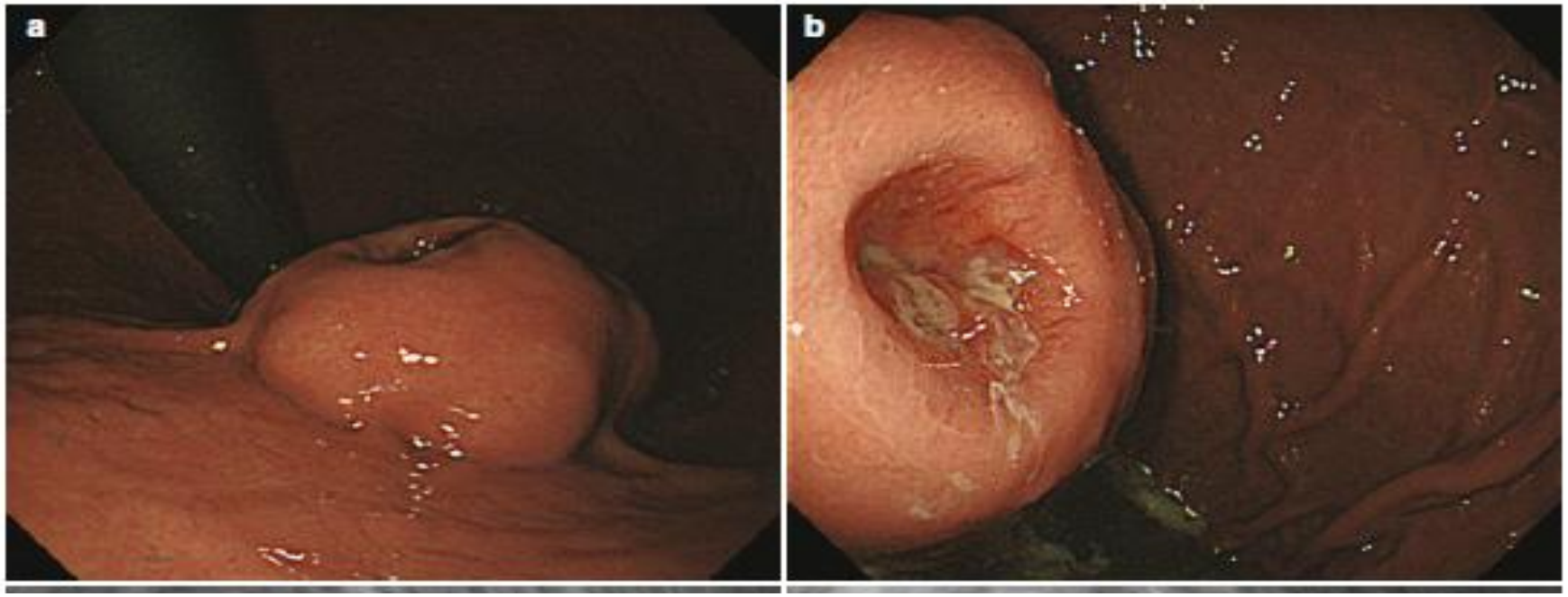
[1]Small number of cases. Groups combined or prognostic prediction less certain;
[2]No tumors encountered with these parameters. (Adopted from Miettinen et al[4]). HPF: High power field; 50 high: Power fields equal approximately 5 mm^2; GIST: Gastrointestinal stromal tumor.

Gastrointestinal Stromal Tumor (GIST)

Figure 1

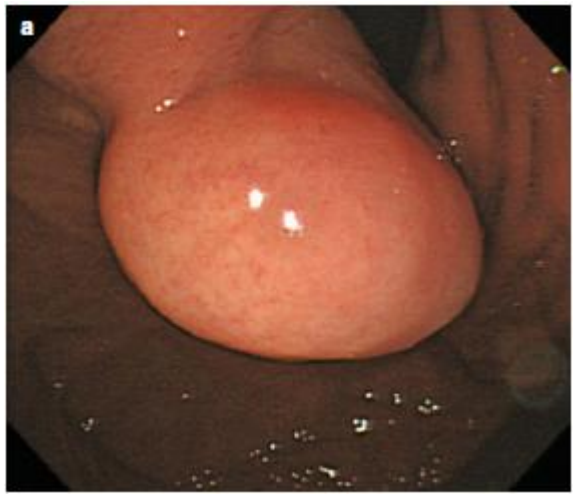
Features of gastrointestinal stromal tumors. A: An approximately 2-cm elevated lesion covered with nearly intact mucosa was observed at the cardia; B: EUS demonstrated a 21-mm, generally homogenous hypoechoic, well circumscribed pear-shaped lesion originating from the inner circular layer of the proper muscle layer. Inside the lesion, a hyperechoic septum-like structure was noticed; C: There was a small deep focal ulceration at the center of the gastrointestinal stromal tumor (GIST) (white arrows).

Gastrointestinal Stromal Tumor (GIST)

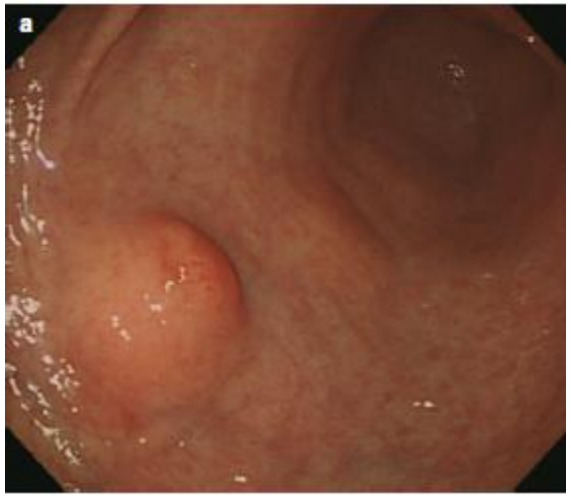


Subepithelial tumor with central umbilication and ulcer on the posterior wall of the upper body.

Other Subepithelial Lesions



Leiomyoma. Are benign tumors composed of well differentiated smooth muscle cells.



Lipoma. are benign, slow-growing lesions that rarely ulcerate and cause bleeding. Endoscopically, gastric lipomas typically appear as smooth submucosal masses with a yellowish hue when compared with the surrounding tissue.

Portal Hypertensive Gastropathy

Portal hypertensive gastropathy is the term used to describe the endoscopic appearance of gastric mucosa, with a characteristic mosaic-like pattern with or without red spots, seen in
patients with cirrhotic or noncirrhotic portal hypertension.

This type of lesion is thought to occur mainly in the body and the fundus of the stomach but is also seen rarely in the gastric antrum.

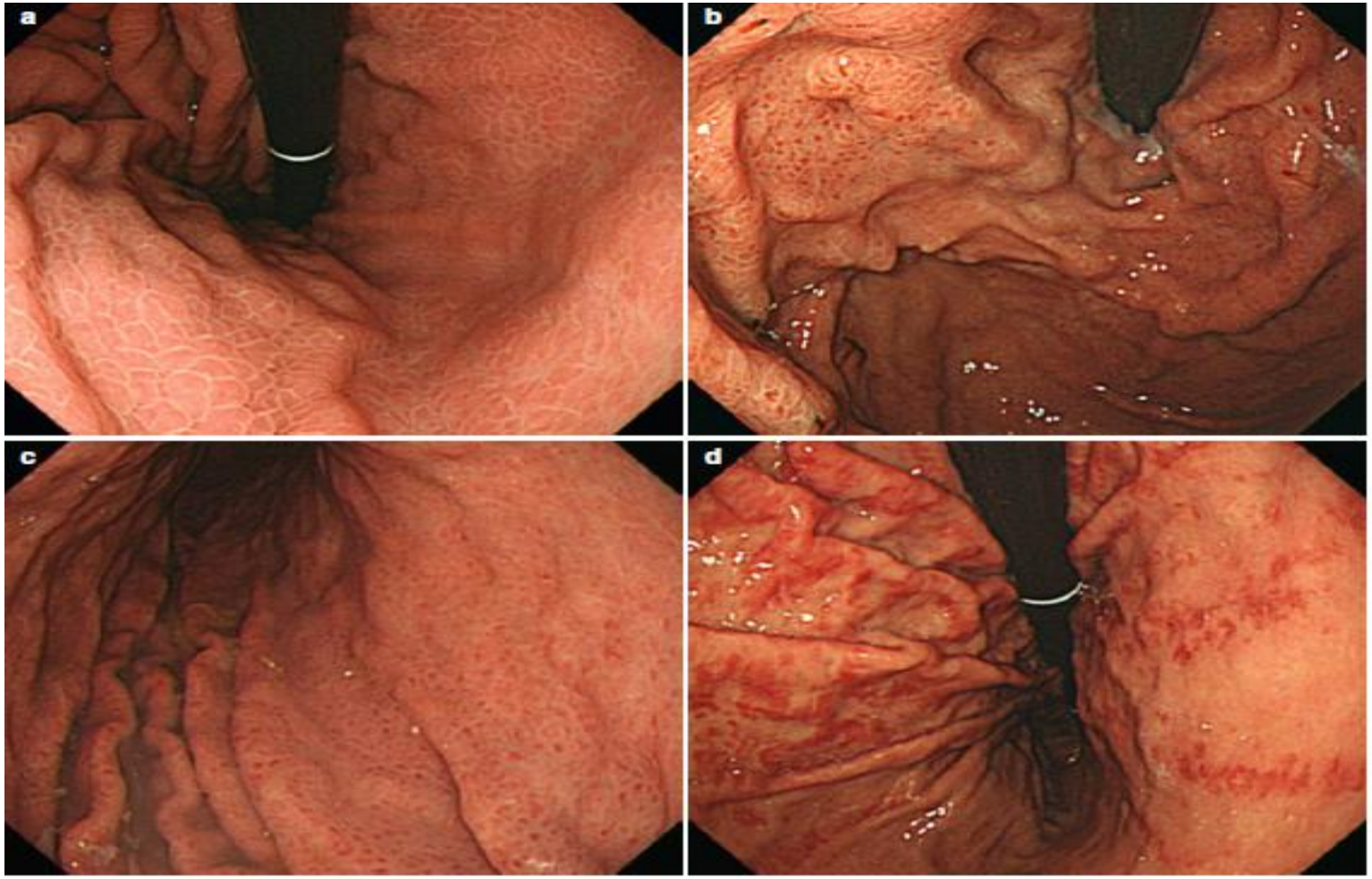
The severity and the presence of portal hypertensive gastropathy do not have a linear correlation with the severity of portal hypertension.

Classification of portal hypertensive gastropathy

Degree	Portal hypertensive gastropathy
Mild	Mosaic pattern without red spots
Moderate	Typical mosaic pattern and infrequent red spots
Severe	Numerous red spots

Portal Hypertensive Gastropathy

Mild



Moderate

Moderate

Severe

Gastric Varices

Gastric varices may have the appearance of a subepithelial mass or large tortuous gastric fold and multiple grapelike nodules on endoscopy. Close examination may reveal a bluish hue seen with venous structures

Endoscopic examination may reveal the presence of portal hypertensive gastropathy and probing the varices with closed biopsy forceps will reveal a pillow sign.

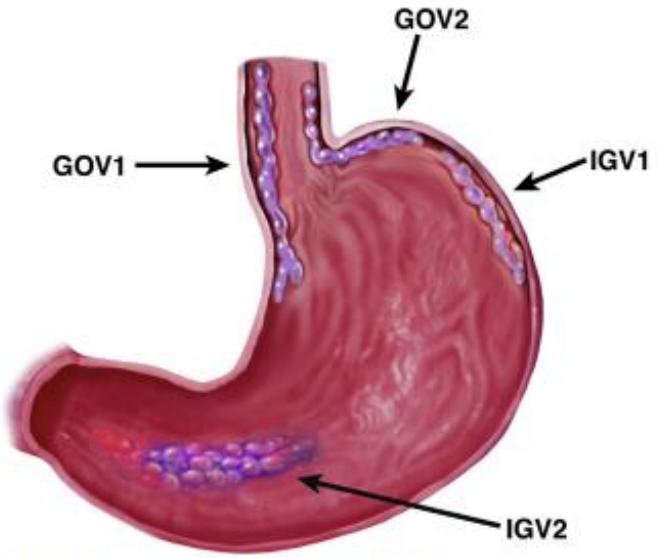
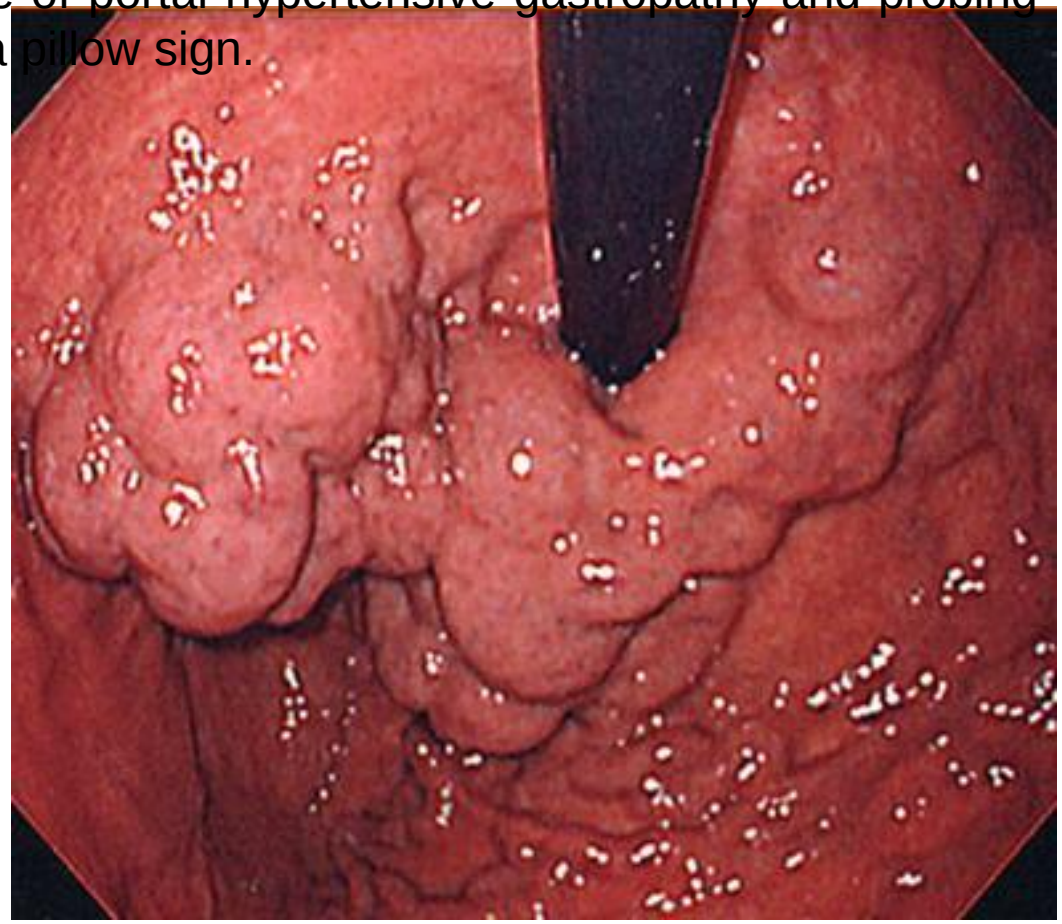


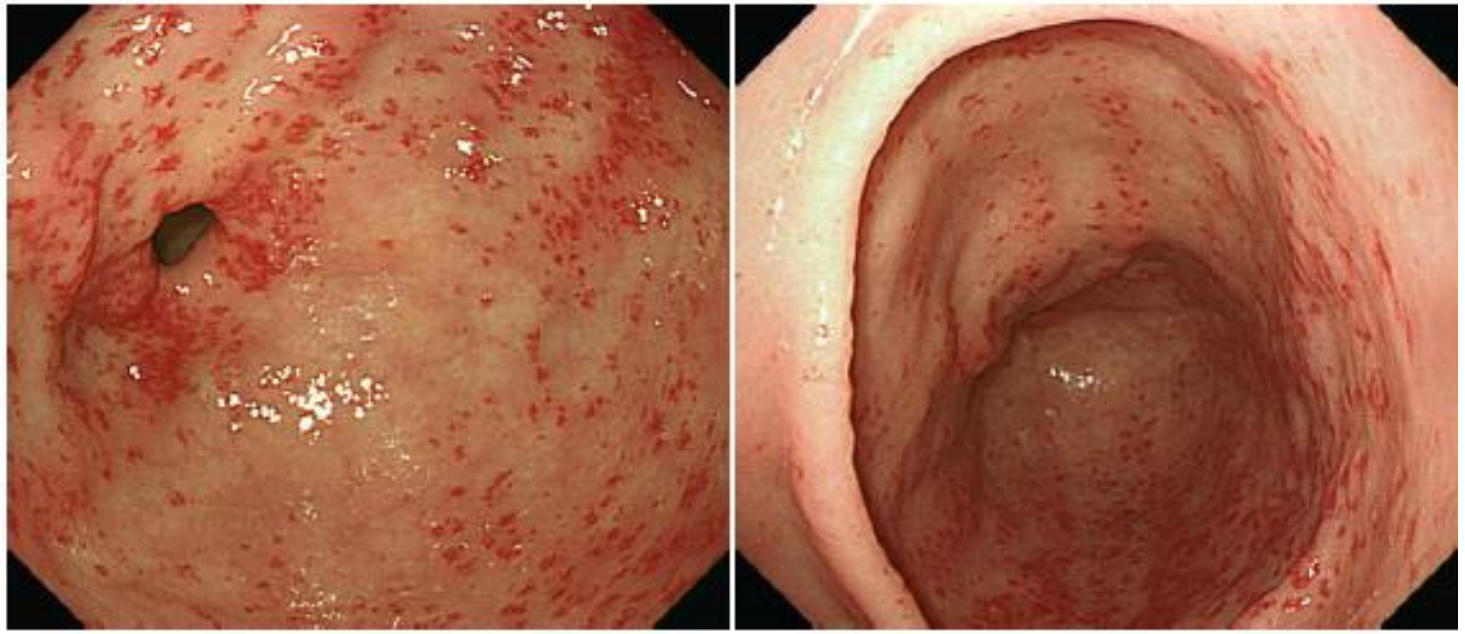
Figure 1. Sarin's classification of GV. Modified with permission from the American Gastroenterological Association (AGA) Institute Gastroslides – Cirrhosis and Portal Hypertension.



Tortuous folds and multiple grapelike nodules in the gastric fundus.

Gastric antral vascular ectasia (GAVE)

GAVE is a term used for the typical endoscopic findings of red stripes, separated by normal mucosa, due to extensive telangiectatic lesions.
It is thought to develop from intramural vascular shunts as a response to portal hypertension.



GAVE also has been observed in a variety of autoimmune diseases and connective tissue diseases including atrophic gastritis, scleroderma, hypothyroidism, pernicious anemia, and primary biliary cirrhosis.

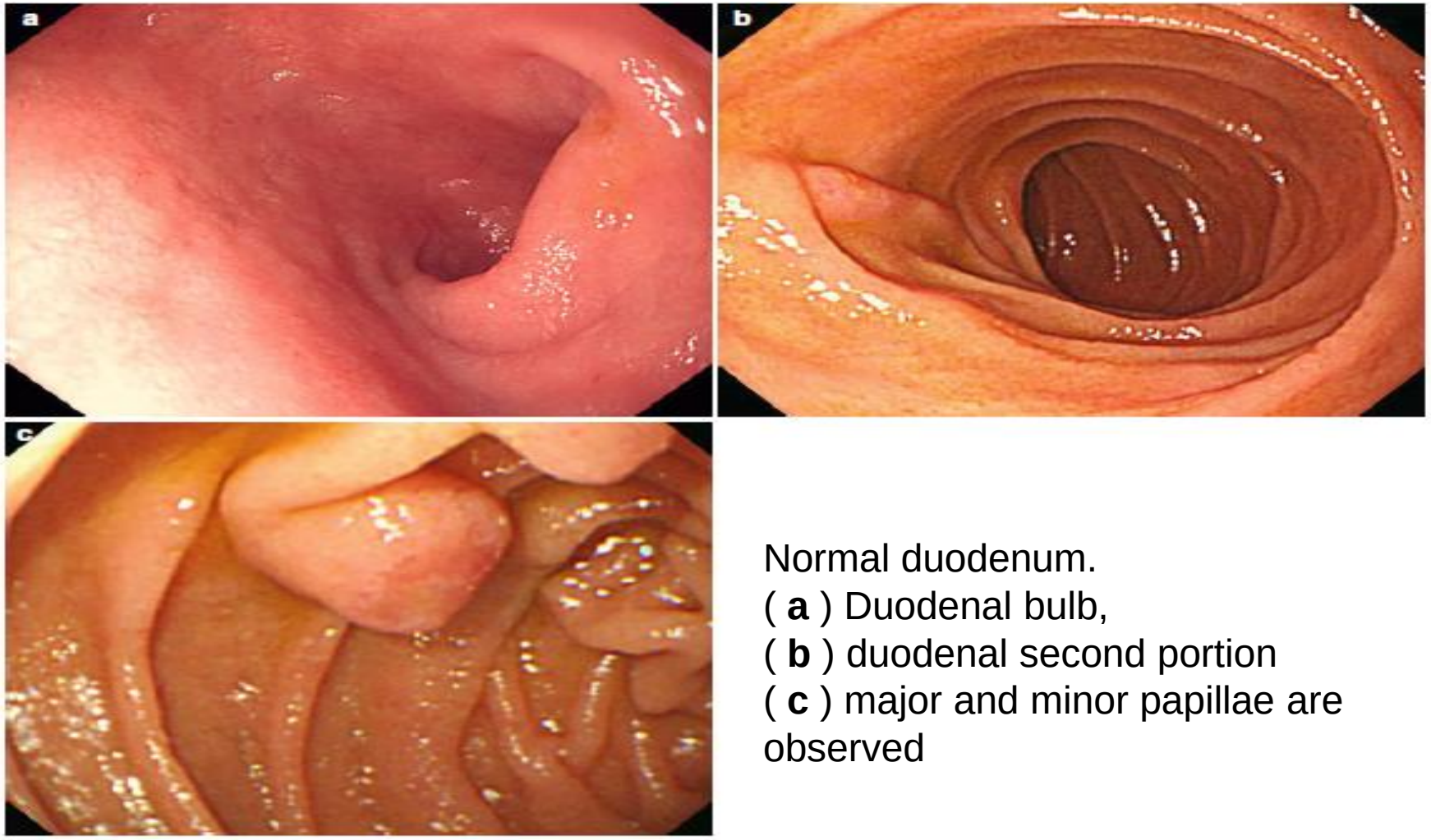
Duodenum

The duodenal bulb appears as a small, round cavity with a finely granular appearance. At the superior duodenal angle, which marks the junction of the first and second portions, Kerckring's valves, or the circular folds, become visible.

In contrast with the bulb, the mucosa of the second portion assumes a more granular and frequently whitish appearance.

The ampulla occasionally may be identified on the medial wall, especially when prominent.
Duodenal disease is generally limited to the bulb, where inflammatory disorders, erosions, and ulcers are found.

Duodenum

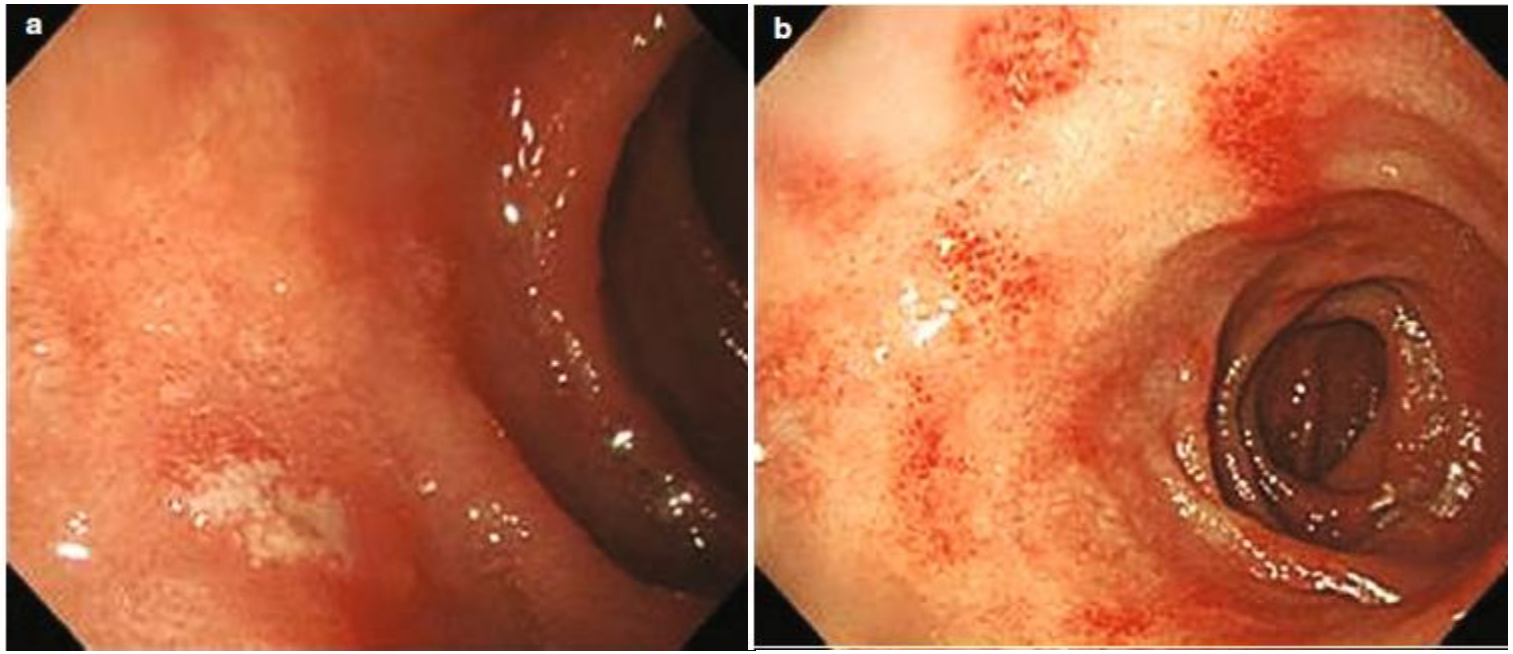


Normal duodenum.
(**a**) Duodenal bulb,
(**b**) duodenal second portion
(**c**) major and minor papillae are observed

Duodenitis

Duodenitis is inflammation of the duodenum. Endoscopic findings are erosions, erythema, and/or edema of duodenal mucosa.

H . pylori infection, prolonged use of medications such as NSAIDs, alcohol, or tobacco may lead to duodenitis.



(**a**) Erosive.

(**b**) Erythematous

Duodenal ulcer

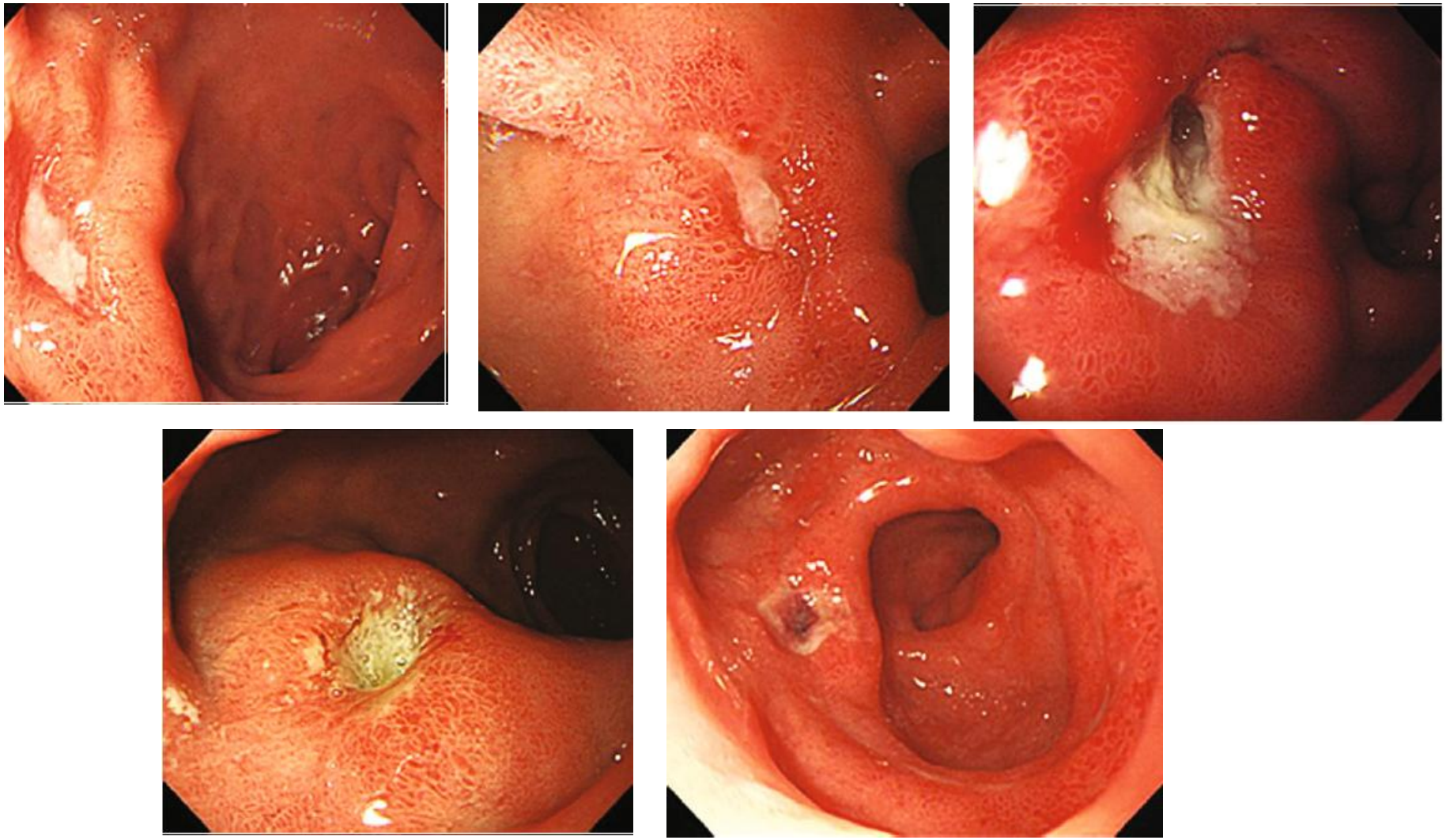
Duodenal ulcer is defined as >5 mm disruption of the mucosal integrity of the duodenum leading to a submucosal exposure with perceptible depth at endoscopy. In contrast, erosions are mucosal breaks without perceptible depth.

Endoscopy is the most useful diagnostic method enabling direct mucosal visualization and tissue biopsy.

H. pylori, infection and NSAIDs-related injuries are the major causes of duodenal ulcers.

Duodenal ulcers are usually located at duodenal bulb. Malignant duodenal ulcers are extremely rare.

Duodenal ulcer

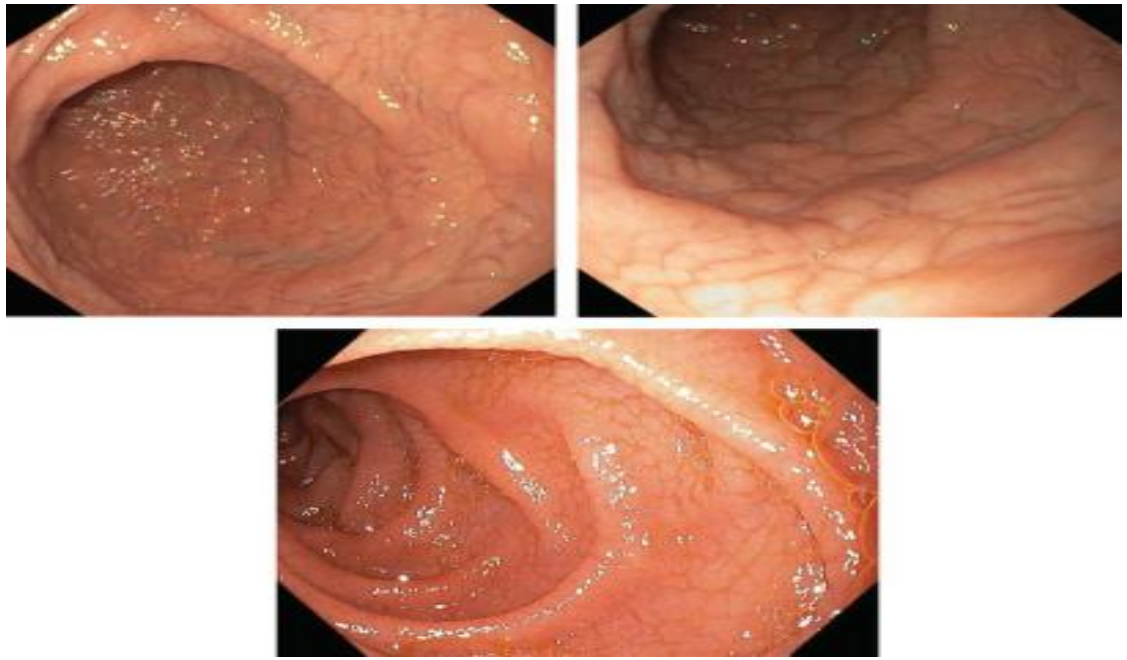


Different types of duodenal ulcer

Celiac Disease

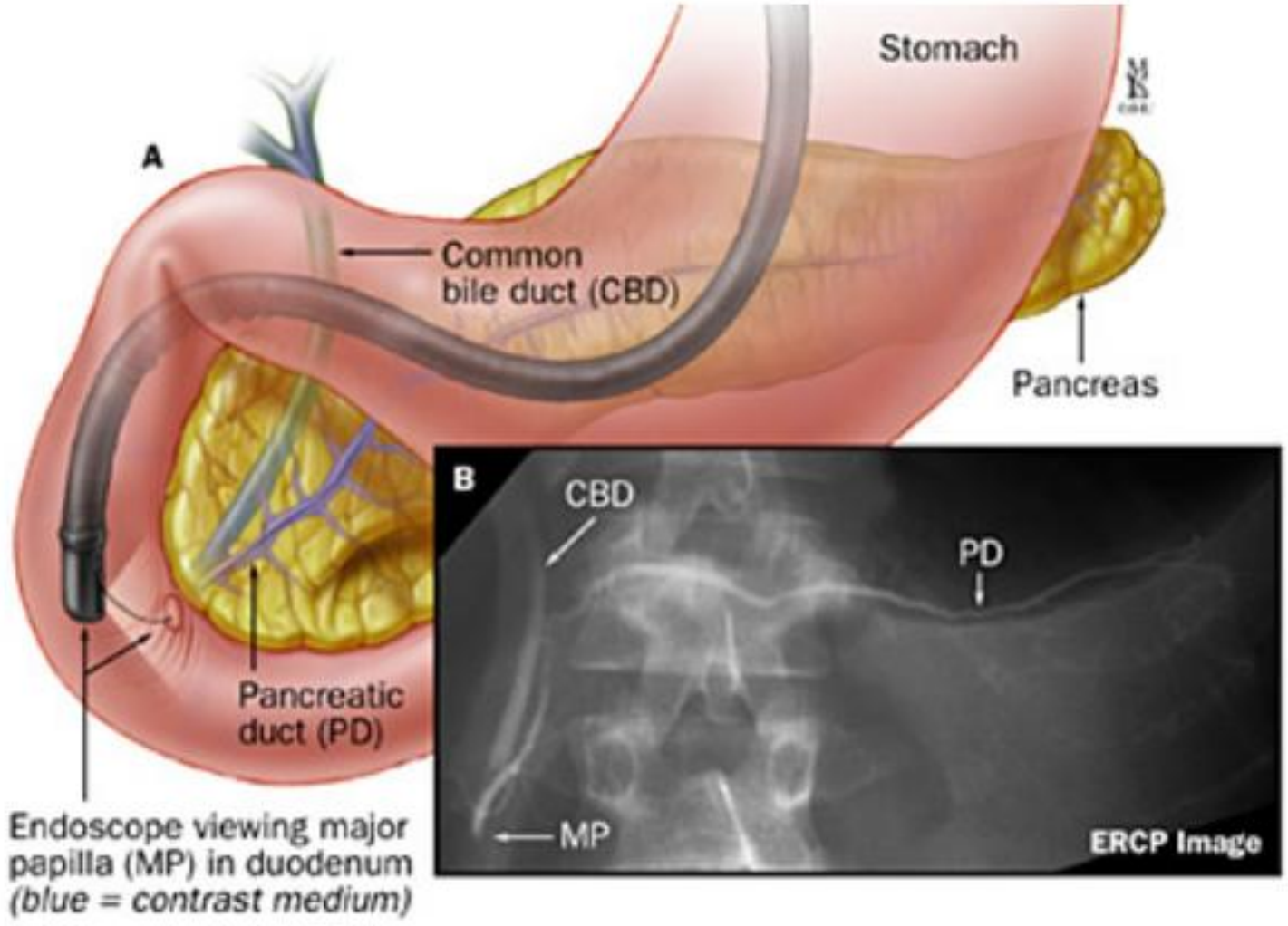
Typical endoscopic findings include a loss of Kerckring's folds, notching of folds, a mosaic pattern in the mucosa, and the visualization of the vascular pattern.

Endoscopic small bowel biopsy shows villous atrophy, intraepithelial lymphocytosis and crypt hyperplasia,, which is the diagnostic hallmark of celiac disease.



Endoscopic appearance of celiac disease

ERCP (Endoscopic retrograde cholangiopancreatography)



https://www.youtube.com/watch?v=Obs81QtdG_k&t=1s

How to measure quality in endoscopic retrograde cholangiopancreatography (ERCP)

Ann Transl Med 2018;6(13):265

Alexander Krumov Katzarov, Zdravko Ivanov Dunkov, Ivan Popadiin, Krum Sotirov Katzarov

Digestive Endoscopy 2018; **30**: 149–173 doi: 10.1111/den.13001

Guideline

Japan Gastroenterological Endoscopy Society guidelines for endoscopic sphincterotomy

Shomei Ryozawa, Takao Itoi, Akio Katanuma, Yoshinobu Okabe, Hironari Kato, Jun Horaguchi, Naotaka Fujita, Kenjiro Yasuda, Toshio Tsuyuguchi and Kazuma Fujimoto

Japan Gastroenterological Endoscopy Society, Tokyo, Japan

Guideline

Thieme

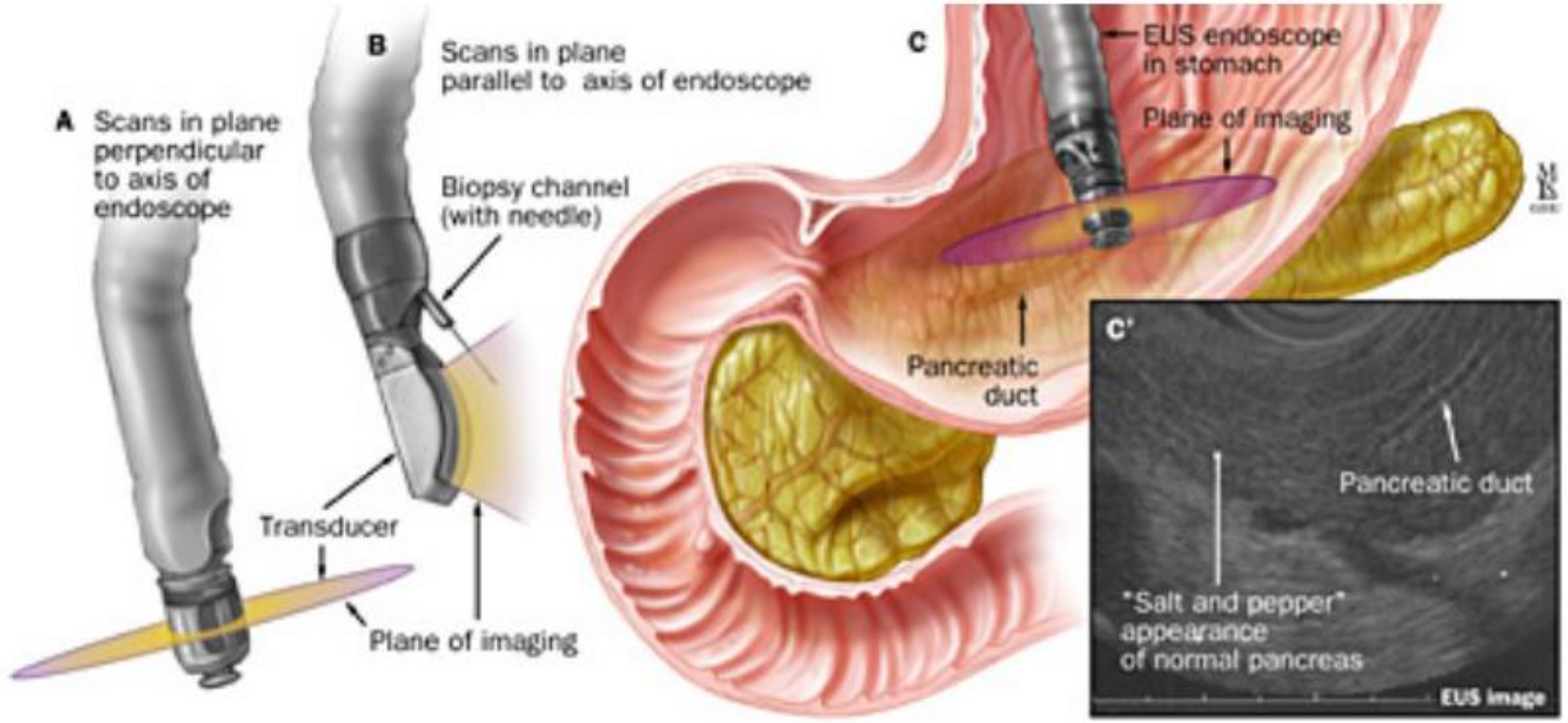
Endoscopic management of common bile duct stones: European Society of Gastrointestinal Endoscopy (ESGE) guideline

ESGE

ENDOSCOPIC ULTRASOUND (**EUS**) or **ECHO-ENDOSCOPY**

- Medical procedure in which endoscopy is combined with ultasound to obtain images of the internal abdominal organs.
- It can be used to visualize the walls of these organs (esophagus, stomach, duodenum and rectum), or to look at adjacent structures (pancreas, biliary tract), that can be biopsied by fine needle aspiration. Combined with Doppler imaging, nearby blood vessels can also be evaluated.
- Endoscopic ultrasonography is most commonly used in the upper digestive tract .
- For the patient, the procedure feels almost identical to the endoscopic procedure without the ultrasound part, unless ultrasound-guided biopsy of deeper structures is performed. Endoscopic ultrasound is performed with the patient sedated.

Endoscopic Ultrasound (EUS) - fine needle aspiration (FNA)



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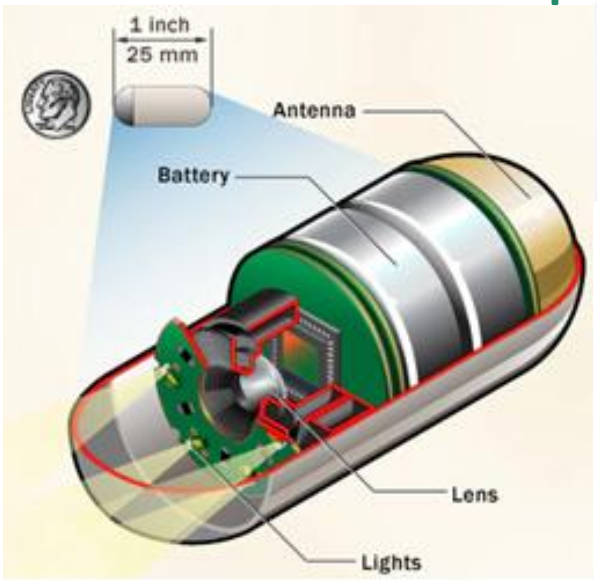
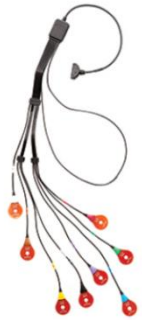
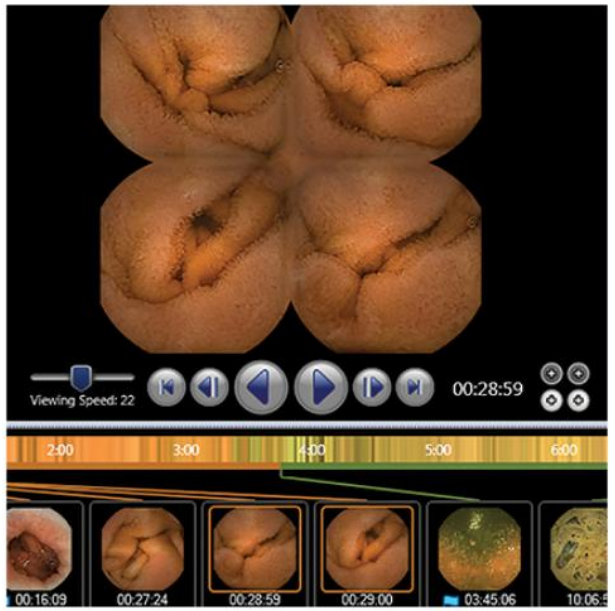
Capsule endoscopy





2 to 6 images per second



- Outpatient procedure
- 3 days low fiber diet, 2 L PEG and 12 h fasting
- Last at least 8 hours, the patient may continue daily activities
- Able to drink clear fluids 2 hours after swallowing the capsule
- The capsule will be eliminated within 2 or 3 days.
- The patient has to note when the capsule is excreted. It is not necessary to retrieve it.

Capsule endoscopy

ABSOLUTE CONTROINDICATONS

- Known or suspected GI obstruction, strictures, or fistulas.

RELATIVE CONTROINDICATONS

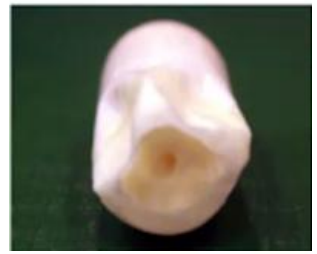
- Pregnancy
- Pacemaker
- Zenker diverticulum, swallowing difficulty or gastroparesis

COMPLICATIONS

- Capsule retention
- Aspiration

LIMITATIONS

Purely diagnostic and is not used to biopsy or treat any conditions.



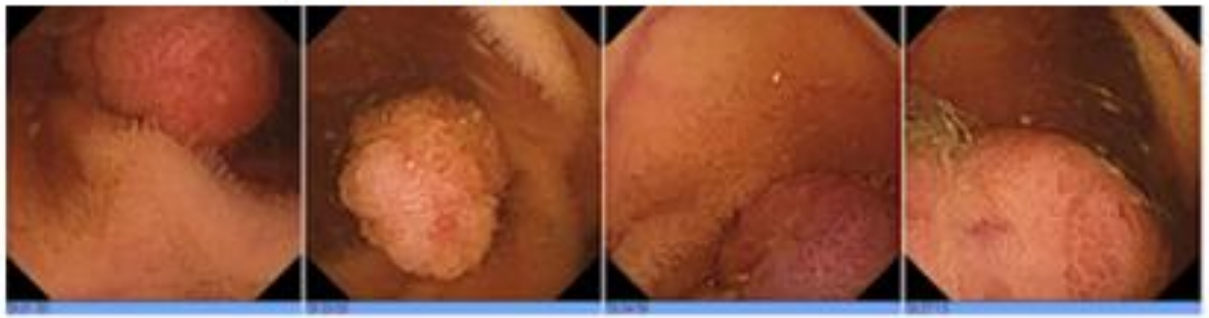
Capsule endoscopy and enteroscopy

SAPIENZA UNIVERSITÀ DI ROMA

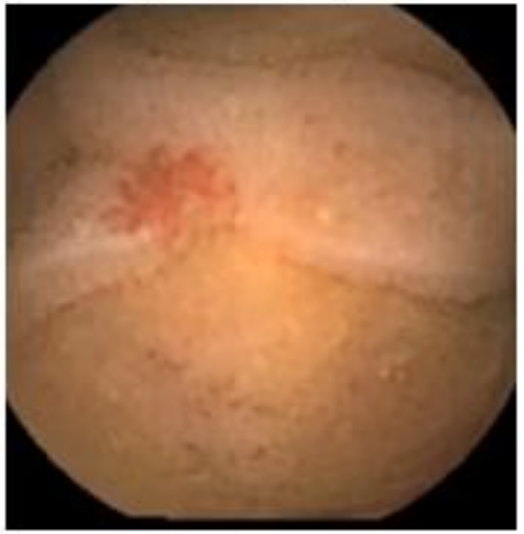
INDICATIONS

- Obscure GI bleeding (after negative EGDS and RSCS)
- Supsected Crohn's disease
- Surveillance in patients with polyposis syndromes
- Suspected small-intestine tumors
- Refractory malabsorptive syndrome (eg, celiac disease)

Peutz–Jeghers syndrome polyps



Angioectasia



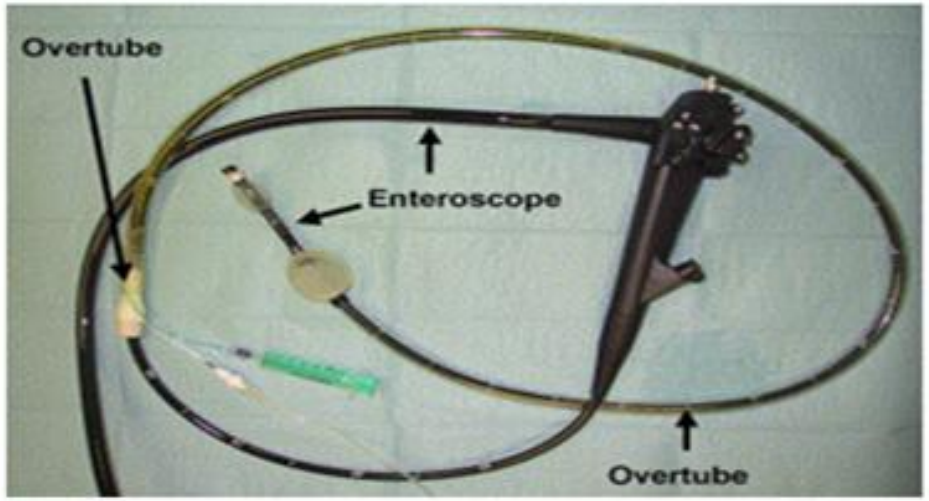
Gastroenterology 2017;152:497–514

GUIDELINE

Clinical Practice Guidelines for the Use of Video Capsule Endoscopy

Robert A. Enns,[1] Lawrence Hookey,[2] David Armstrong,[3] Charles N. Bernstein,[4] Steven J. Heitman,[5] Christopher Teshima,[6] Grigorios I. Leontiadis,[3] Frances Tse,[3] and Daniel Sadowski[7]

Enteroscopy

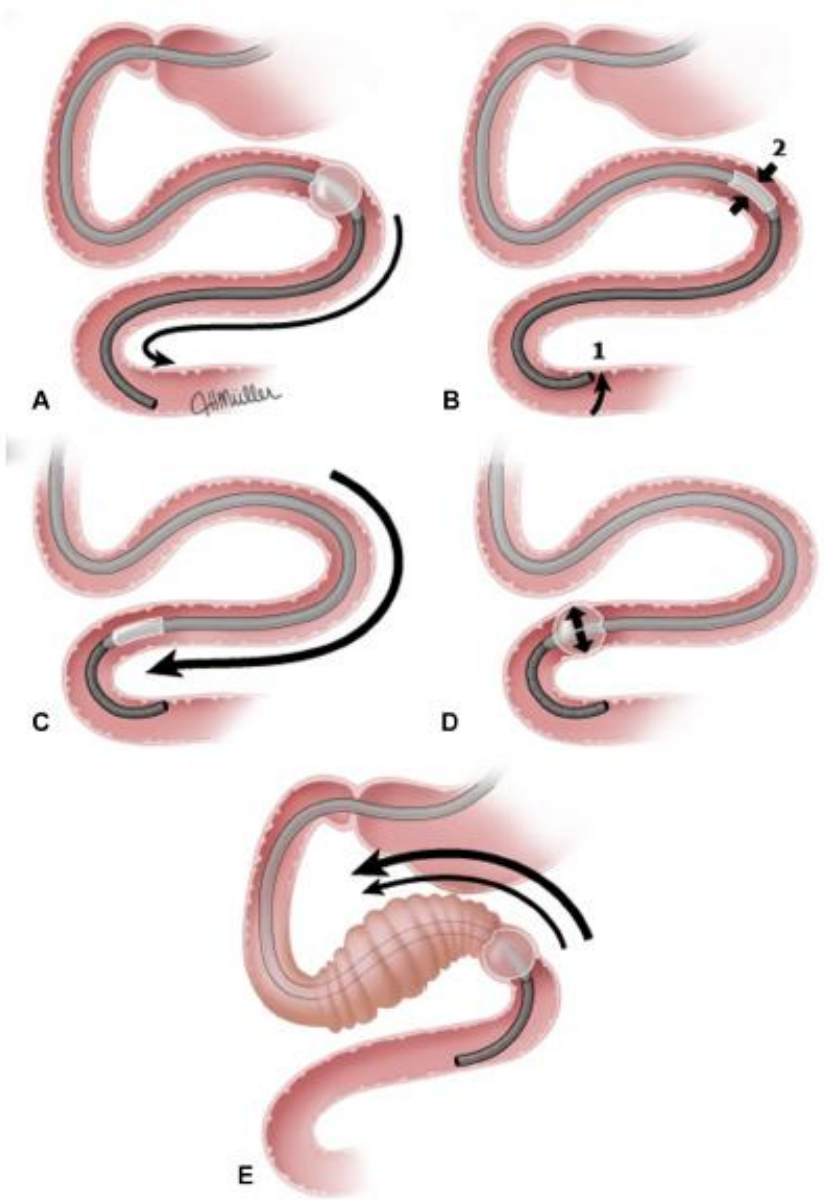


Flexible enteroscopy is labour–intensive and more invasive but allows real-time controlled observation with the option for **tissue sampling** and **endoscopic treatment.**

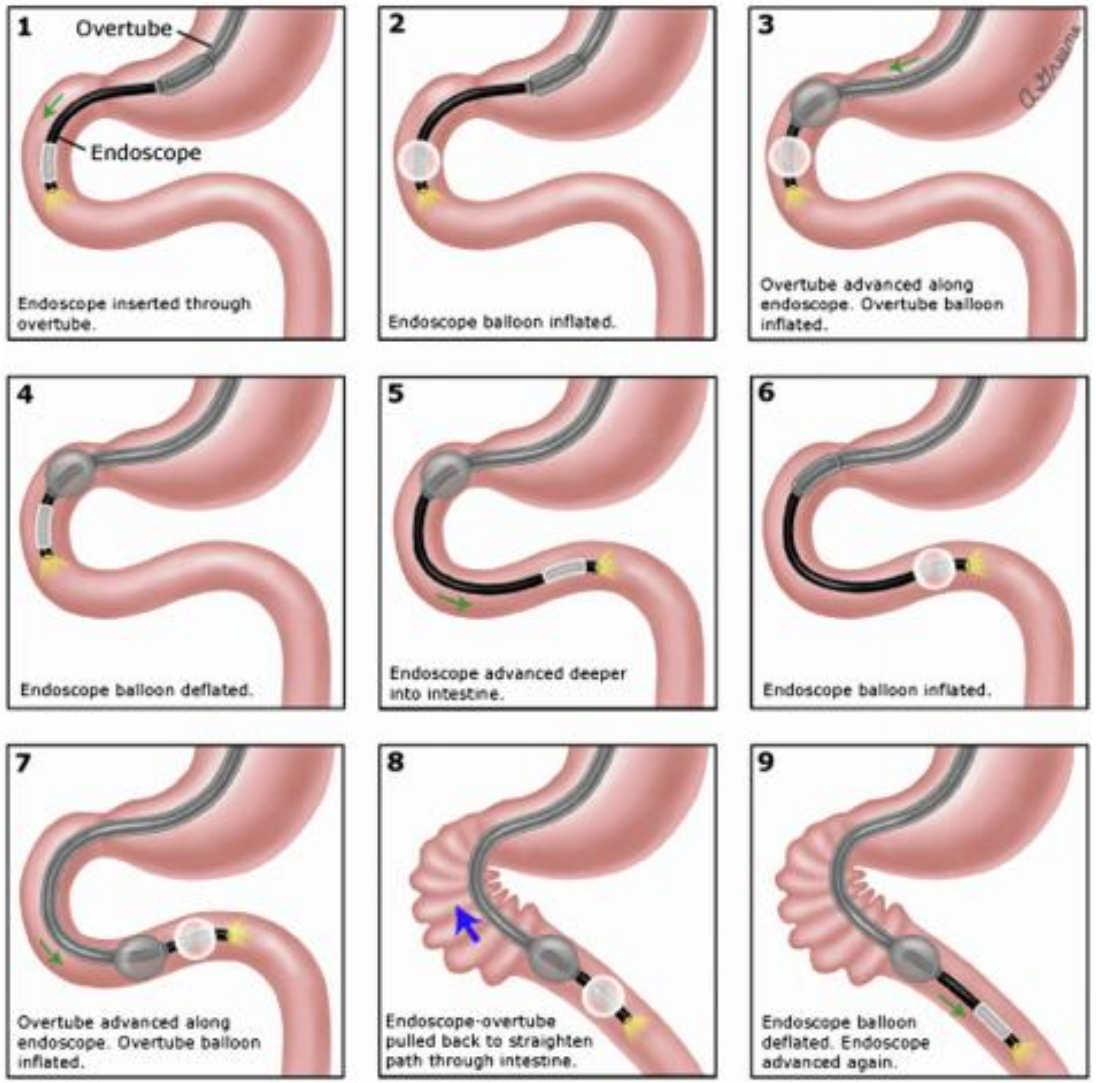
DIFFERENT TECHNIQUES

- Push enteroscopy
- Double-balloon enteroscopes
- Single-balloon enteroscopes
- Spiral enteroscopes
- On-demand enteroscope
- Intraoperative enteroscopy

Single-Baloon Enteroscopy (SBE)



Double-Baloon Enteroscopy (DBE)



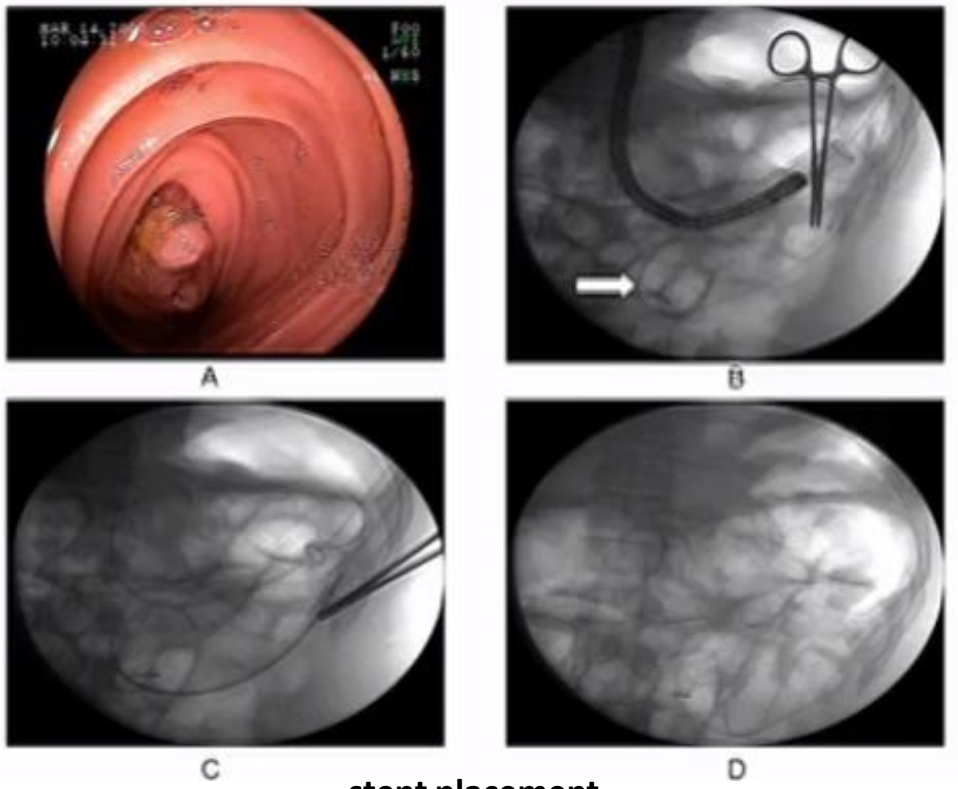
Enteroscopy

Preparation:
Oral Enteroscopy: NPO for 6 hours
Anal Enteroscopy: bowel preparation

Type of sedation:
Conscious sedation
General anesthesia

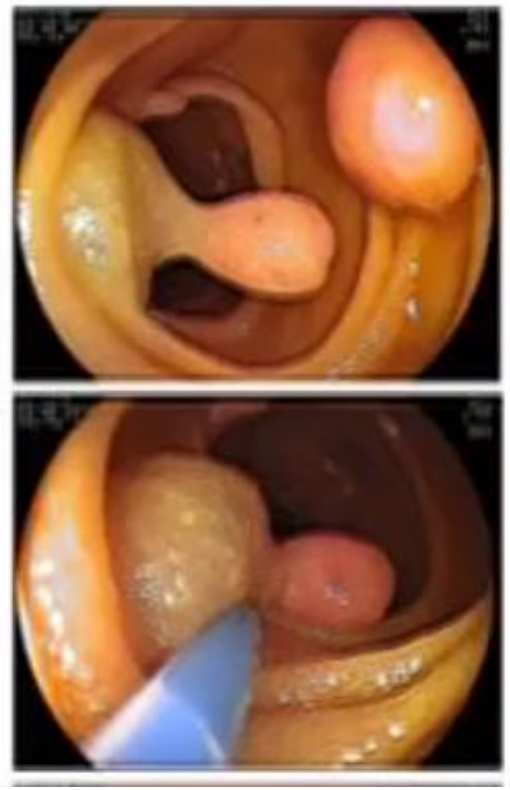
Fluoroscopy indications:
Dilatation of stricture, stent placement, estraction of foreing bodies

Complications of DBE (1.2%-1.6%):
-Pancreatitis (0.3%)
-Perforation
-Bleeding
-Necrosis (injection epinephrine)

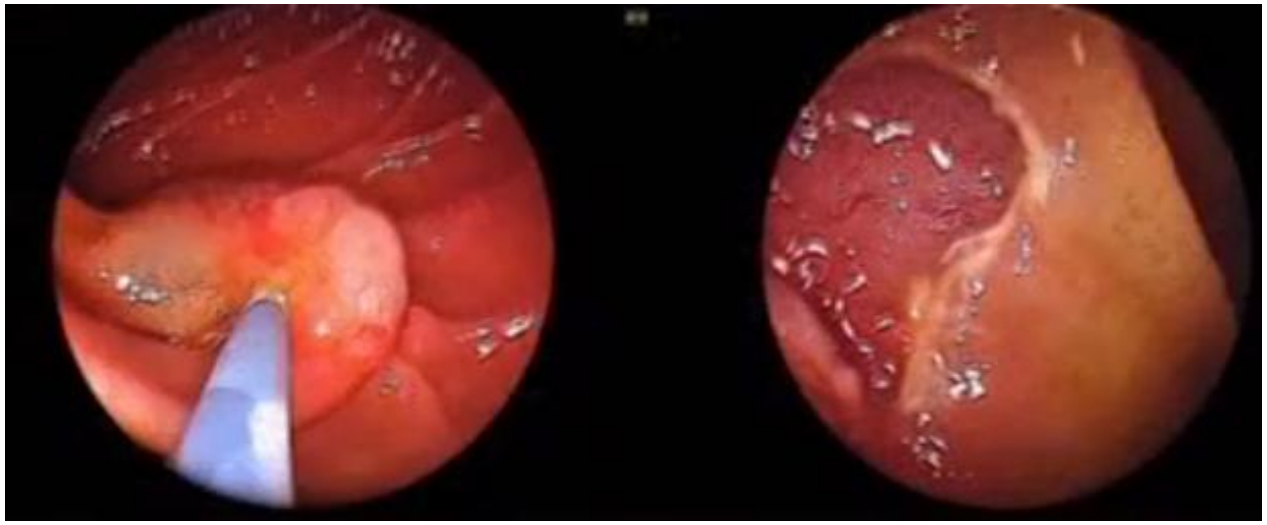


stent placement

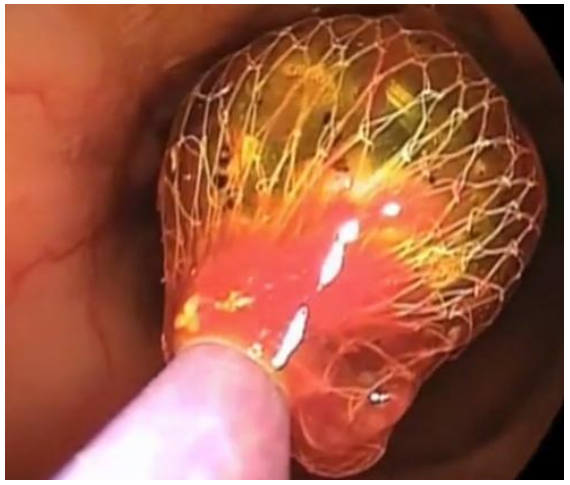
Enteroscopy



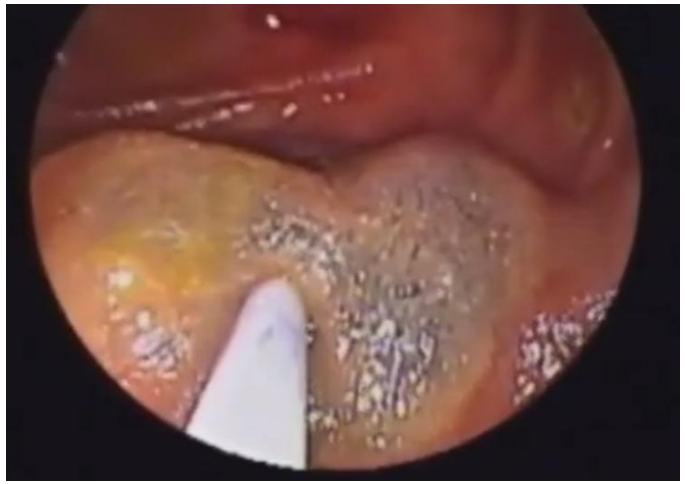
Polipectomy



Mucosectomy

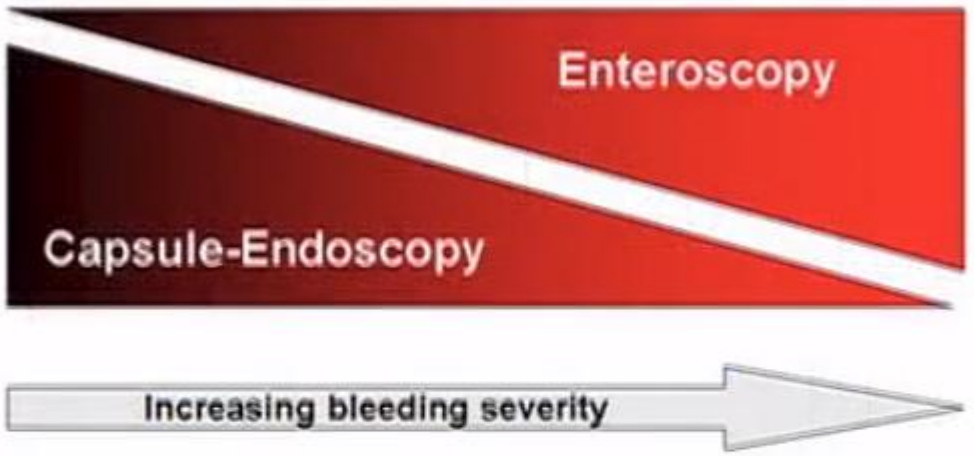


Retrieval of foreing body



Tattooing

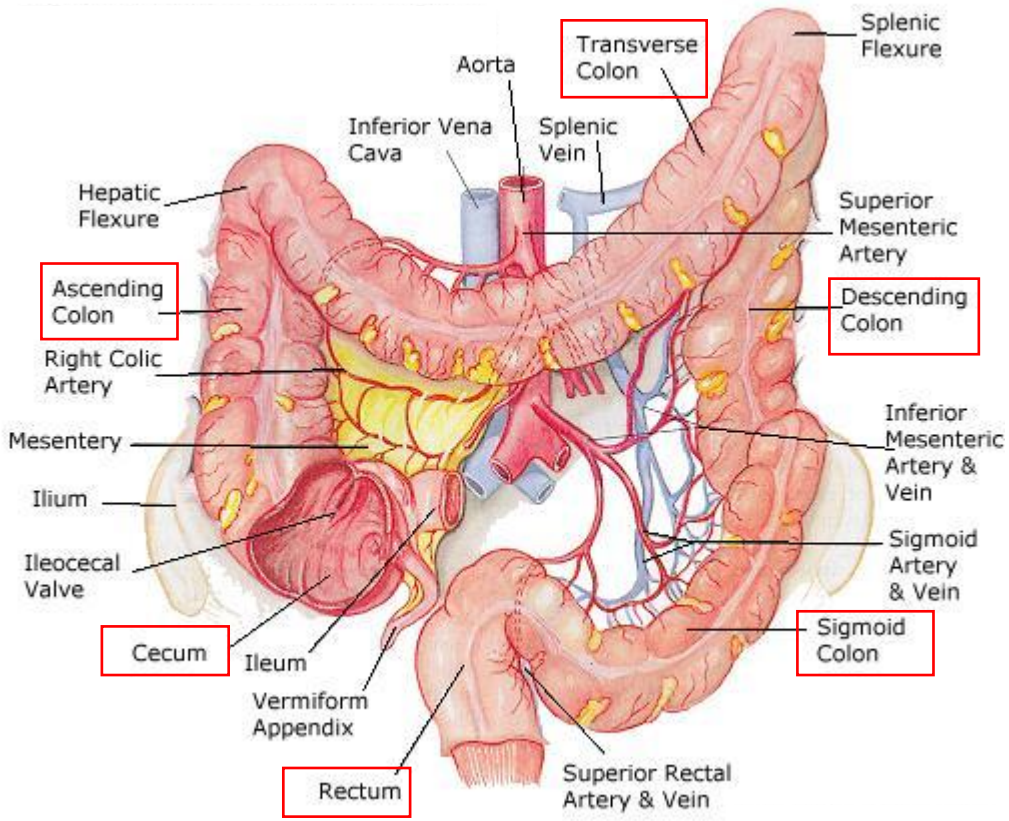
Capsule Endoscopy and obscure GI bleeding



Non-controlable bleeding: **Angiography, Surgery**

Persistent anemia or high suspicioun of tumor: **CT, MRT**

The large bowel



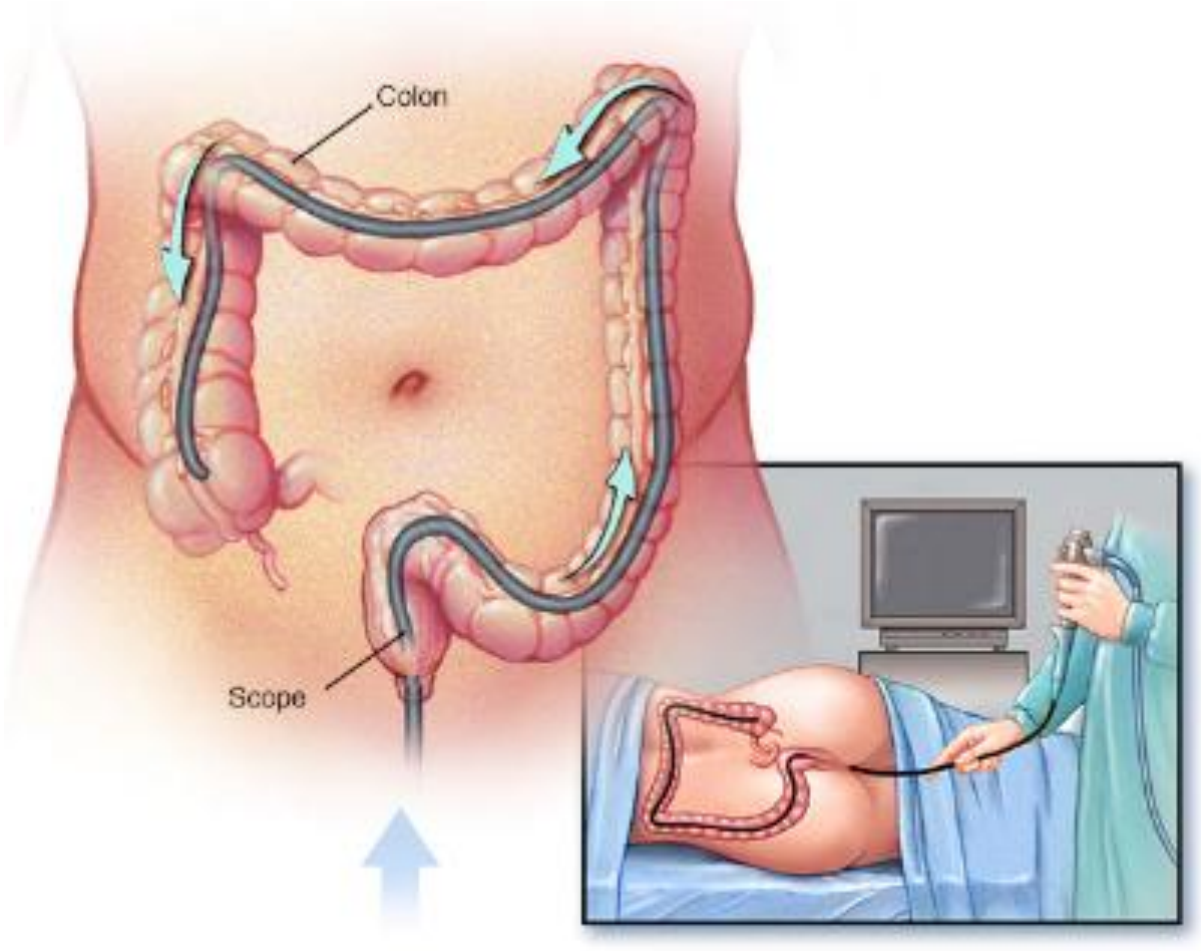
Lower Endoscopy

Colonoscopy is the method of choice for many clinical indications and for cancer surveillance
examinations and follow-up.

Endoscopy is also particularly useful in the postoperative patient, either to inspect in close-up (and biopsy if necessary) any deformity at the anastomosis or to avoid the difficulties of achieving adequate distension in patients with a stoma.

High-yield indications	Low-yield indications
Anemia/bleeding/occult blood loss	Constipation
Persistent diarrhea	Flatulence
Inflammatory disease assessment	Altered bowel habit
Genetic cancer risk	Pain
Abnormality on imaging	
Therapy	

Colonoscopy



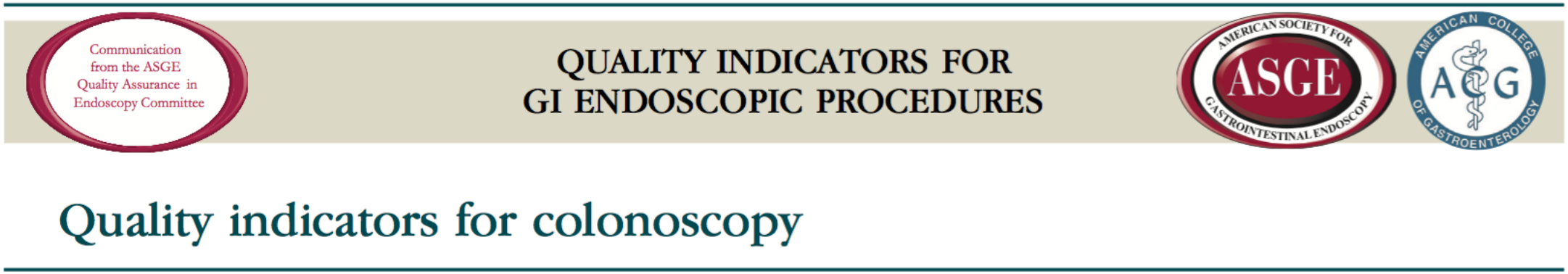
https://www.youtube.com/watch?v=6kg5wZQfADQ

Curr Gastroenterol Rep (2015) 17: 10
DOI 10.1007/s11894-015-0432-6

GI ONCOLOGY (R BRESALIER, SECTION EDITOR)

Quality Measures for Colonoscopy: Where Should We Be in 2015?

John I. Allen



Colonoscopy

Limitations of colonoscopy

- ***Incomplete examination*** can be due to inadequate bowel preparation, uncontrollable looping, inadequate hand-skills, or an obstructing lesion.
- ***Gross errors in colonoscopic localization and "blind spots" are possible*** even for expert endoscopists. Blind areas, with the possibility of missing very large lesions, occur especially in the cecum, around acute bends and in the rectal ampulla

Complications of colonoscopy

- ***Perforations*** are usually caused by inexperienced users and the use of excessive force when pushing in or pulling out. In a pathologically fixed, severely ulcerated, or necrotic colon, however, forces that would be safe in a normal colon may be hazardous.
- ***Hypotensive episodes.*** Hypotensive episodes, even cardiac or respiratory arrest, can be provoked by the combination of oversedation and the intense vagal stimulus of forceful or prolonged colonoscopy
- ***Infection.*** Prophylactic antibiotics are rarely indicated before colonoscopy, then only for well-defined groups such as severely immunocompromised patients, and possibly those with ascites or on peritoneal dialysis. However, Gram-negative septicemia can result from instrumentation (especially in neonates or the elderly) and unexplained post-procedure pyrexia or collapse should be investigated with blood cultures and managed appropriately.

World Journal of Gastroenterology

Submit a Manuscript: http://www.f6publishing.com
World J Gastroenterol 2018 July 14; 24(26): 2833-2843
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ISSN 1007-9327 (print) ISSN 2219-2840 (online)

MINIREVIEWS

Bowel preparation quality scales for colonoscopy

David Kastenberg, Gerald Bertiger, Stuart Brogadir

Bowel preparation

Adequate bowel preparation is essential for successful colonoscopy CRC screening. However, up to one-quarter of colonoscopies are associated with inadequate bowel preparation, which may result in reduced polyp and adenoma detection rates, unsuccessful screens, and an increased likelihood of repeat procedure.

The use of validated bowel preparation quality scales with stringent but simple scoring criteria would help clarify clinical trial data as well as the performance of colonoscopy in clinical practice related to quality measurements.

An informed team member should be available to talk to the patient at the time of booking to explain the procedure, including the importance of successful bowel preparation, although printed instructions and explanations will be sufficient for most patients. Minutes spent in explanation and motivation may prevent a prolonged, unpleasant, and inaccurate examination due to bad preparation.

The majority of patients find that the worst part of colonoscopy is the bowel preparation and that the anticipation of the procedure (including fear of indignity, a painful experience, or the possible findings) is much worse than the reality of the colonoscopy itself.

Colonoscopy

Normal findings of colonoscopy should be familiarized in order to better understand the pathological findings of colonoscopy.

The colon segments can be divided into six:

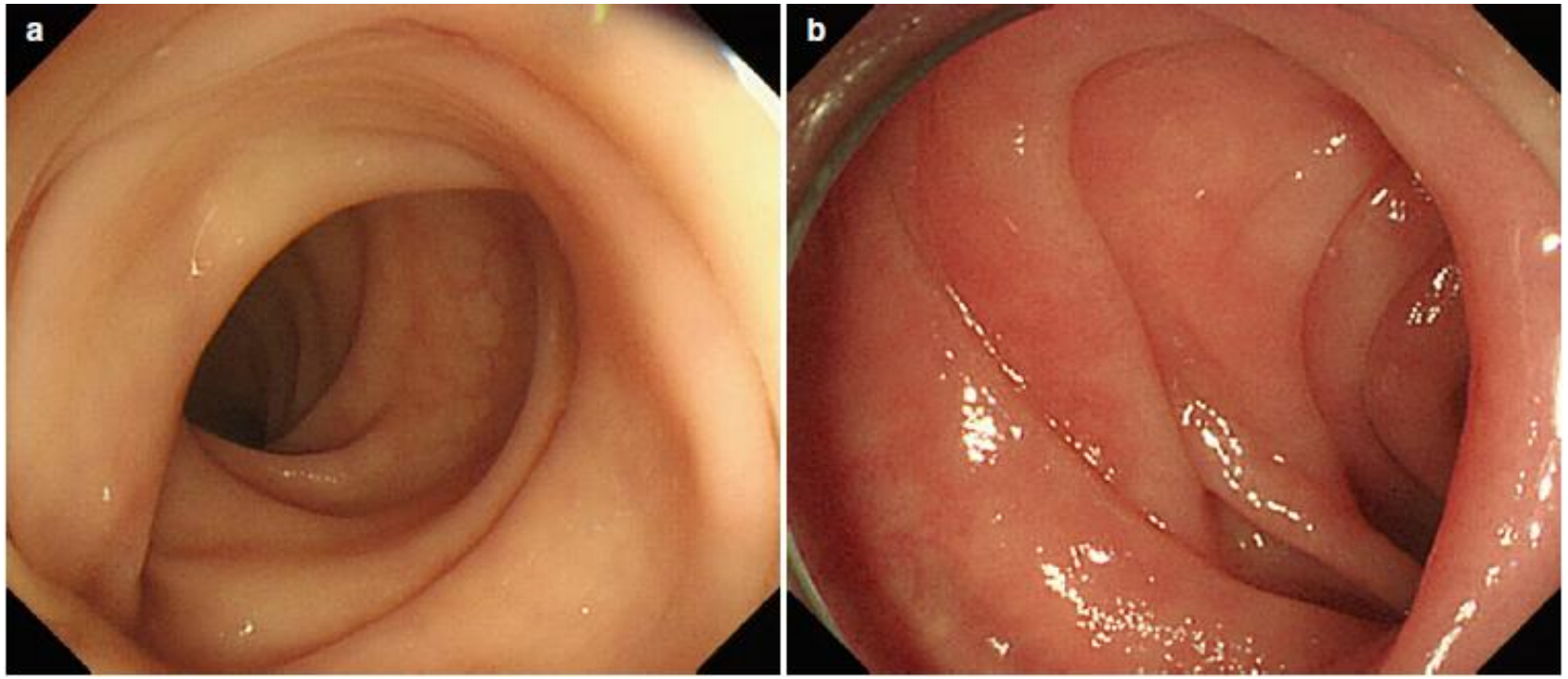
- Rectum
- Sigmoid colon
- Descending colon,
- Transverse colon,
- Ascending colon
- Cecum, where the ileocecal valve and appendiceal orifice serve as important landmarks.

Appreciation of the endoscopic differences between regions is important, particularly when dealing with colonic neoplasms, where accurate localization is essential

In the colon, diagnosis and therapy of neoplasms assume a prominent role. Although adenomatous polyps are the most frequent neoplastic lesions, a variety of other polyps may masquerade endoscopically.

Sigmoid Colon

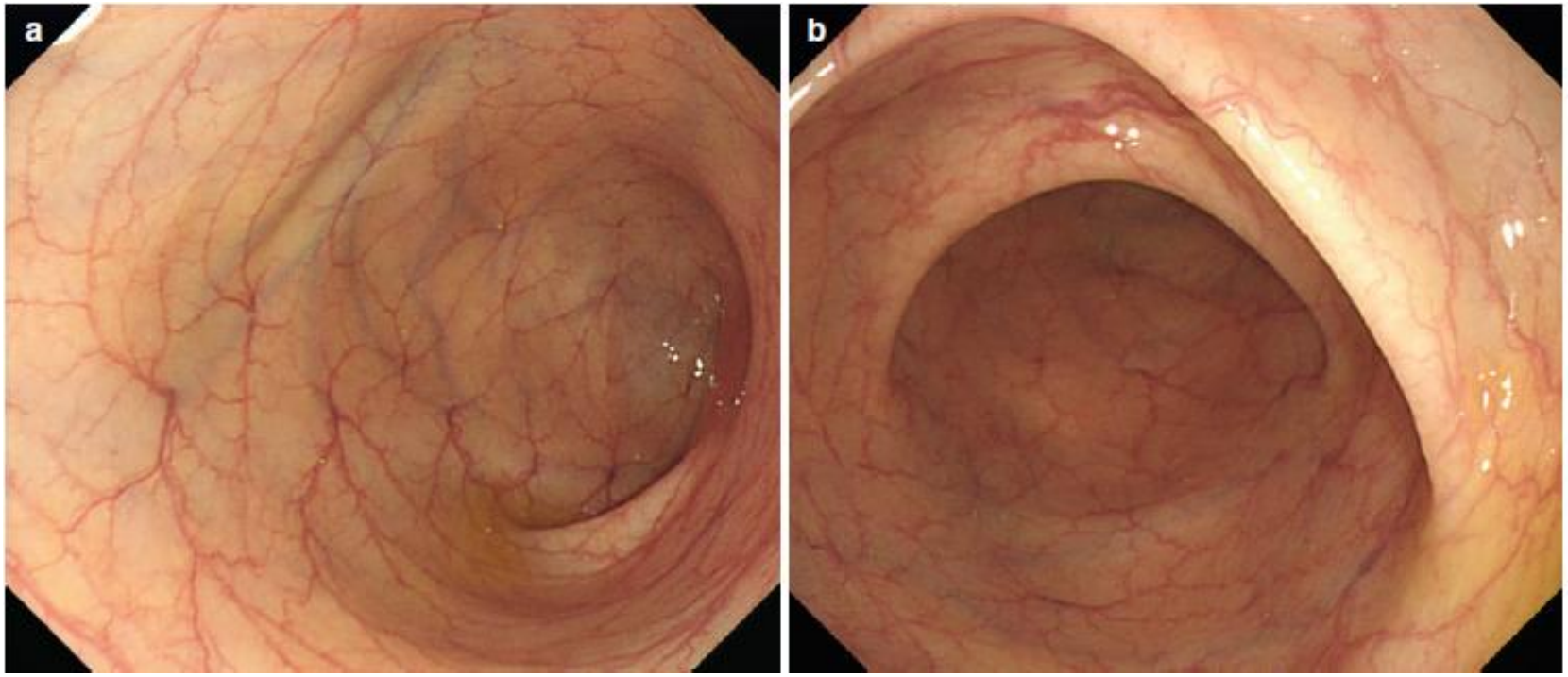
The sigmoid colon is located in the lower left abdomen between the rectum and the descending colon. It forms a loop that average 40 cm long. The lumen is round or oval shaped



Normal colonoscopy findings of sigmoid colon. The sigmoid colon is very movable and elastic and forms loops easily during colonoscopy insertion. (**a**) Lumen of sigmoid colon. (**b**) Series of curves in sigmoid colon.

Descending Colon

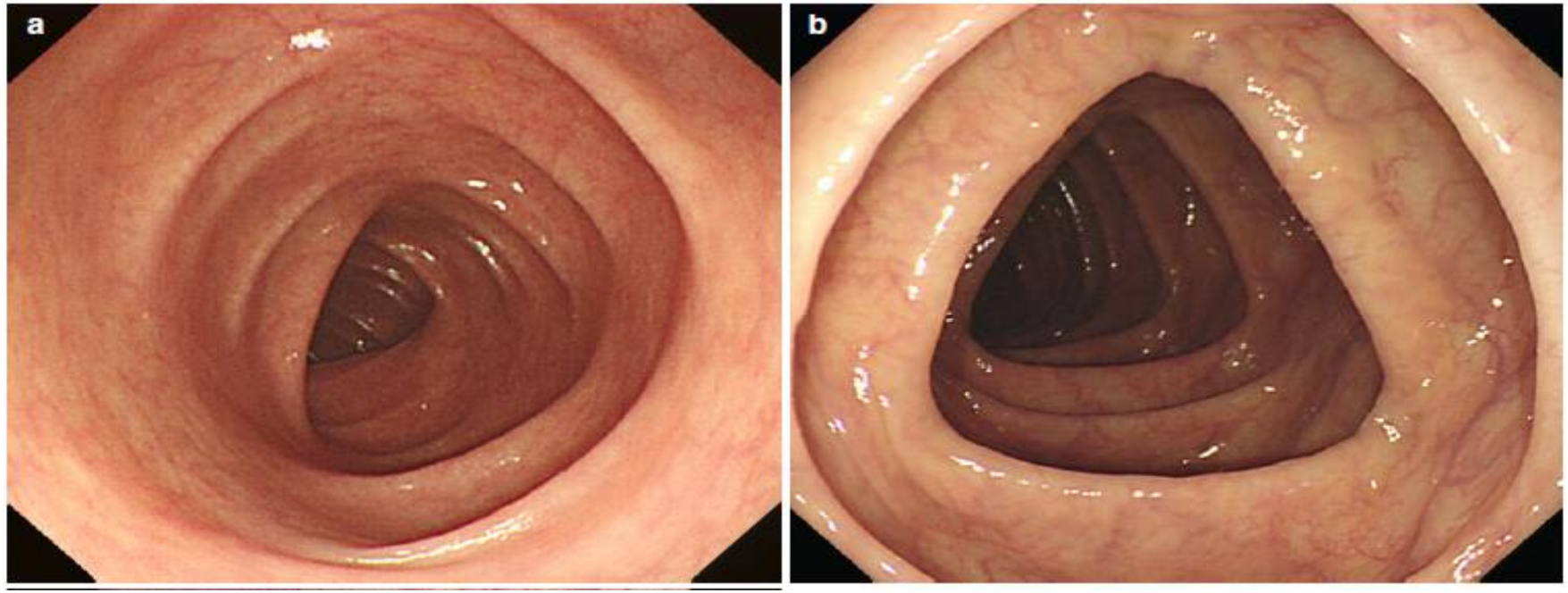
The descending colon runs relatively straight along the left flank from the sigmoid-descending junction to the splenic flexure. It is fixed on dorsally its posterior side to the abdominal wall, and ventrally it is covered by the peritoneum lining the abdominal cavity



Normal colonoscopy findings of descending colon. (**a**) Triangular-shaped descending colon. (**b**) Lumen of descending colon. The lumen of descending colon is not as round as in the sigmoid colon

Transverse Colon

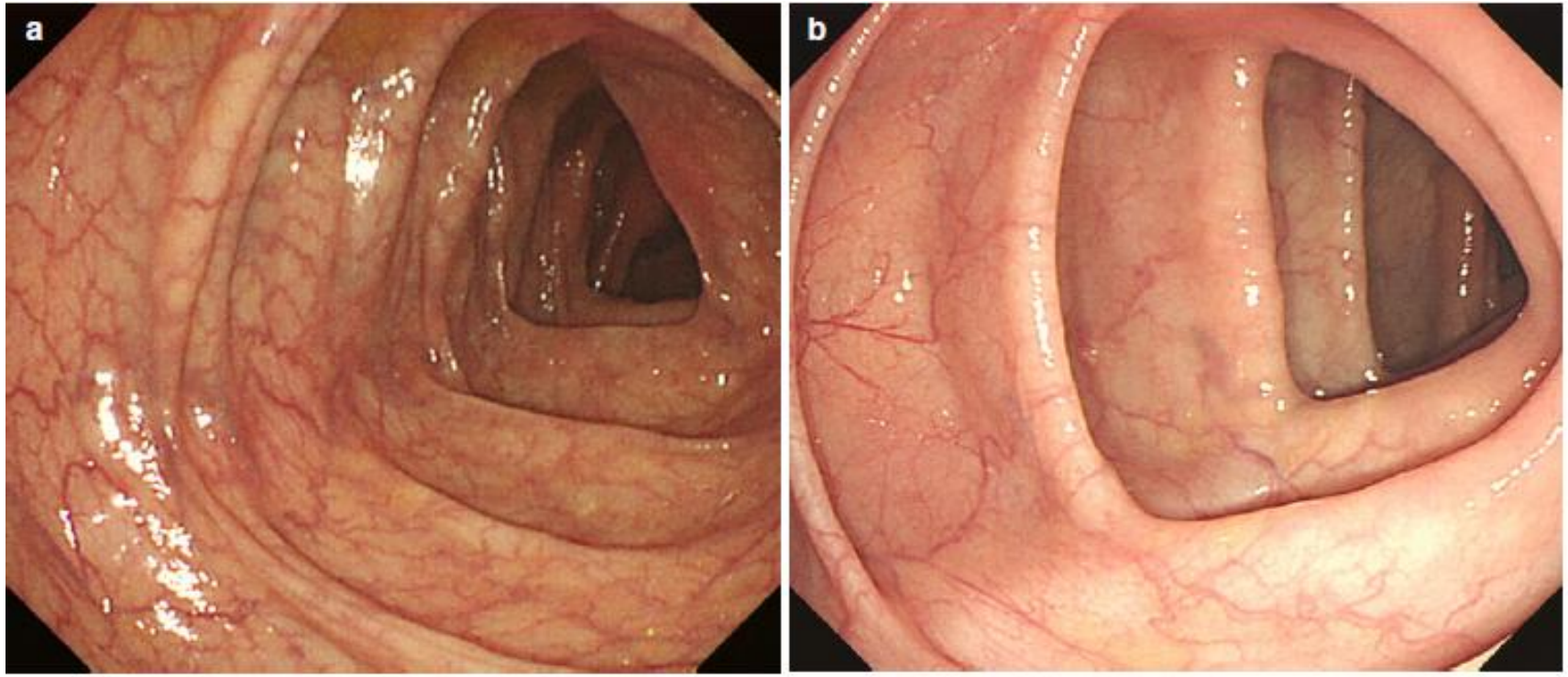
The transverse colon runs across the upper part of abdomen and is the longest and most movable part of the colon. It passes with a downward convexity from the descending colon to the hepatic flexure. The transverse colon is entirely intraperitoneal and is supplied by its own mesocolon The length of the transverse colon is thus highly variable from 30 to 50 cm.



Normal colonoscopy findings of transverse colon. The lumen of the transverse colon has a triangular shape. (**a**) Typical findings of lumen of transverse colon. (**b**) Triangular lumen of transverse colon.

Ascending Colon

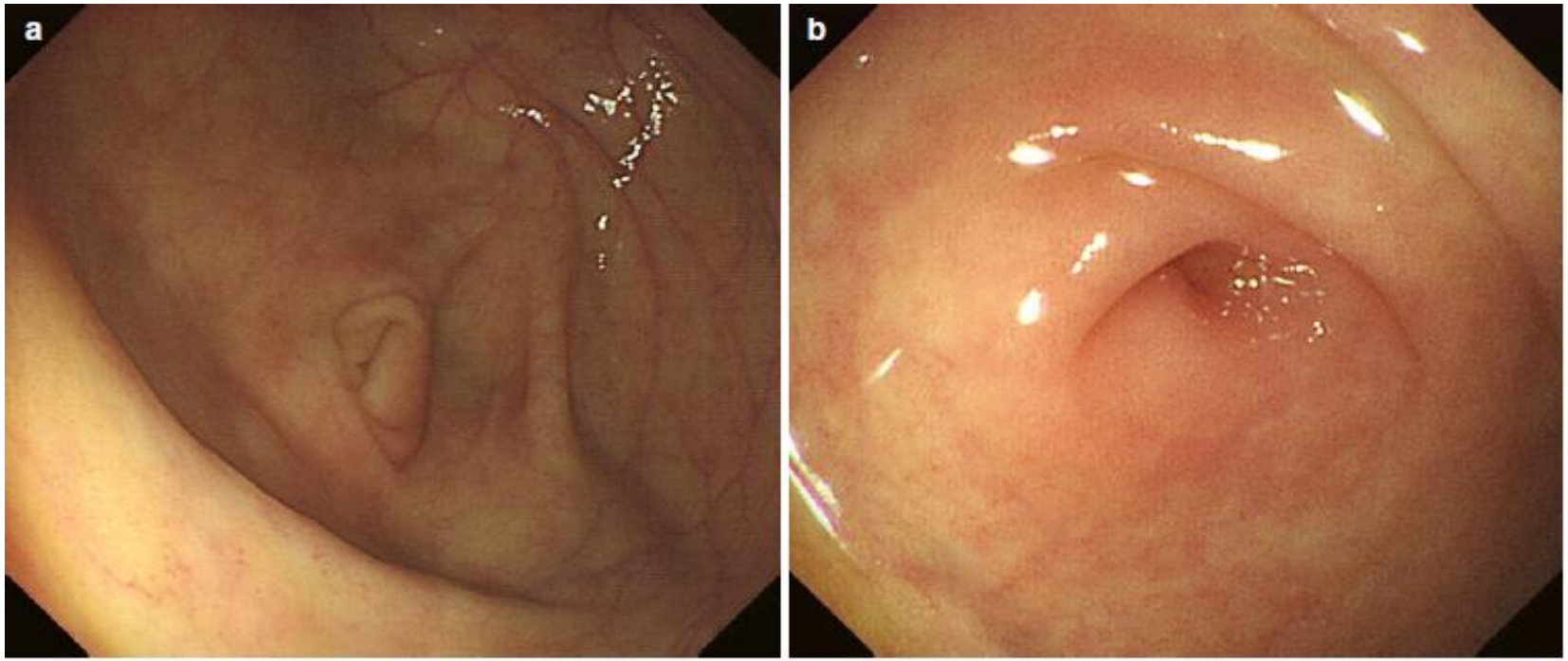
The ascending colon passes downward from the hepatic flexure to the cecum. Similar to the descending colon, the ascending colon is fixed to the dorsal abdominal wall and running relatively straight. The average length of the ascending colon is approximately 15–20 cm



Normal colonoscopy findings of ascending colon. The ascending colon has a wide lumen and runs in a straight line. (**a**) Straight running of ascending colon. (**b**) Thicker haustration of ascending colon.

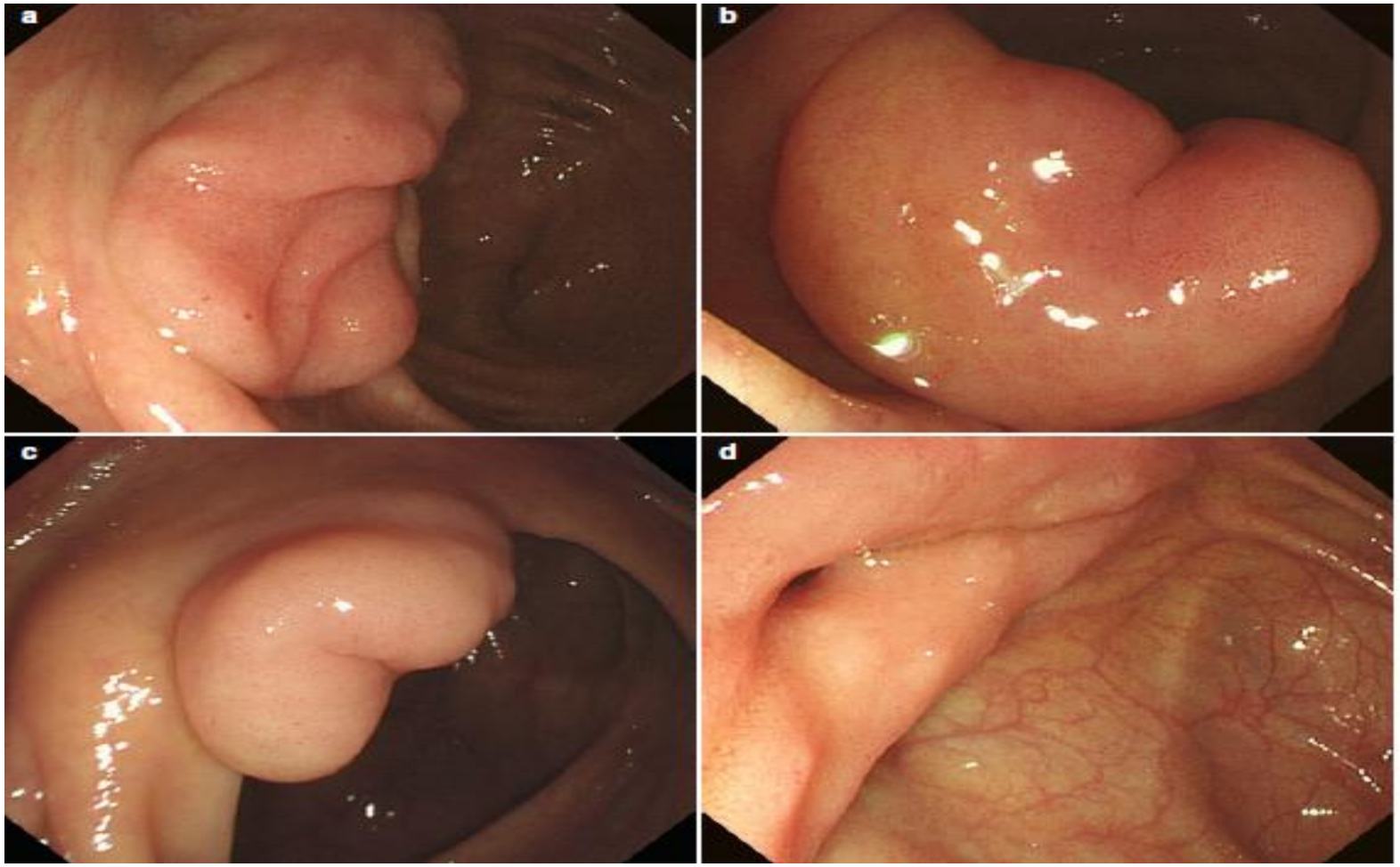
Cecum

The cecum or caecum is a pouch, usually peritoneal, that is considered to be the end of the colon. Cecum is separated from the ileum by the ileocecal valve The three taenia coli converge in a triangular-shaped formation. This is where the appendix is connected to the cecum through appendiceal orifice.



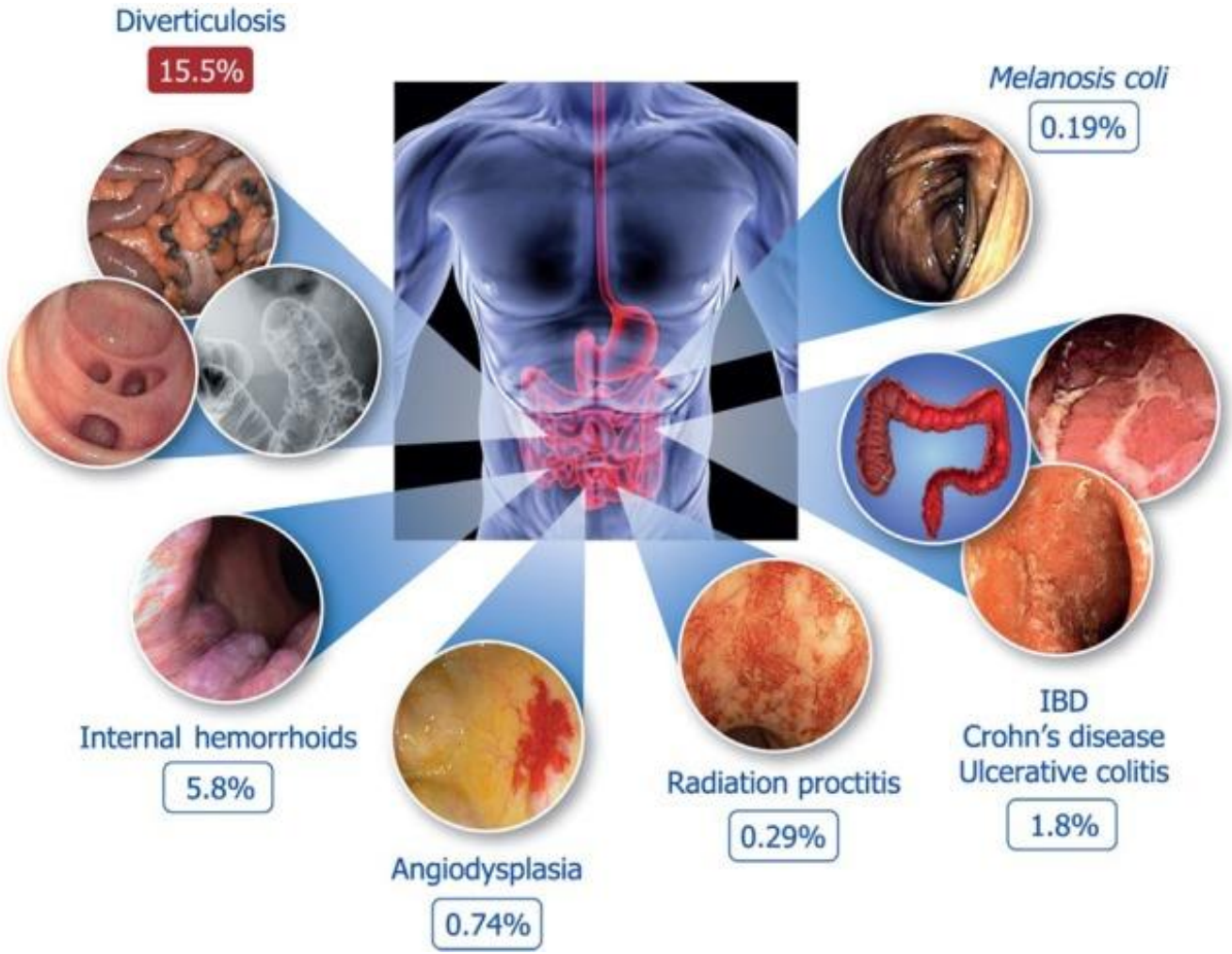
Normal colonoscopy findings of cecum. (**a**) Three taenia coli convergence. (**b**) Semilunar-like round appendiceal orifice.

Ileocecal valve



Variable findings of ileocecal valve. (**a**) A yellowish protruding ileocecal valve. (**b**) Mass-like ileocecal valve. (**c**) Polyp-like ileocecal valve. (**d**) Labial from of ileocecal valve

NON-NEOPLASTIC FINDINGS AT COLONOSCOPY AFTER POSITIVE FAECAL OCCULT BLOOD TESTING

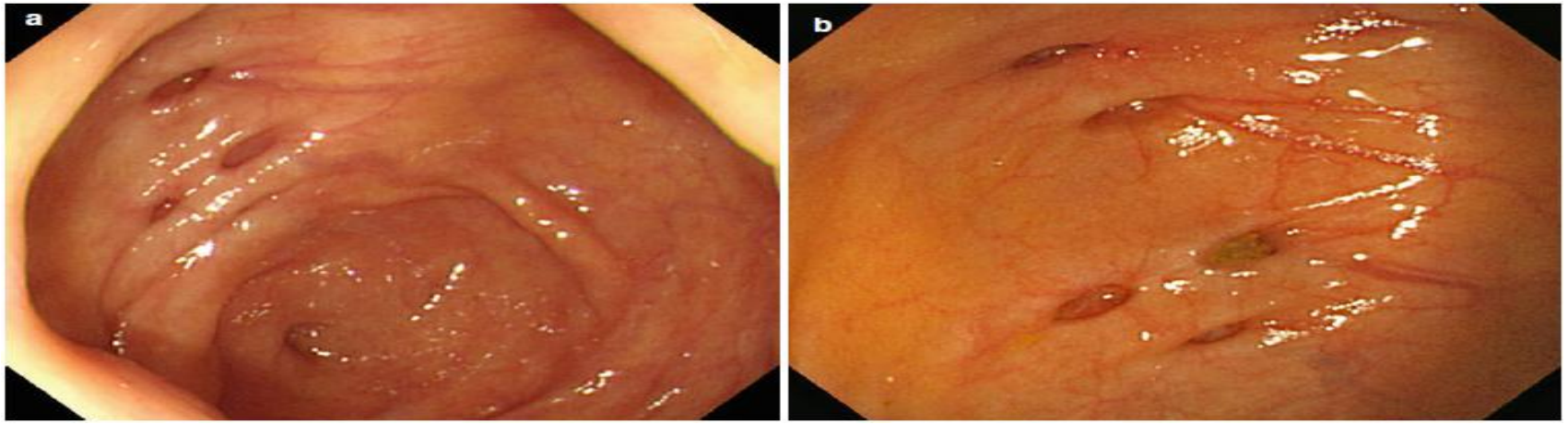


Bevan R, J Med Screen 2014; 21: 89–94.

Diverticular Disease

Colonic diverticulum is an outpouching from the colonic lumen due to herniation of mucosa and submucosa layer because of muscle weakness at sites of vascular penetration, vasa recta supplying mucosa. In Western population, about 90 % of diverticula develop in sigmoid colon, whereas, in Asian, right sided involvement of diverticula is more prominent

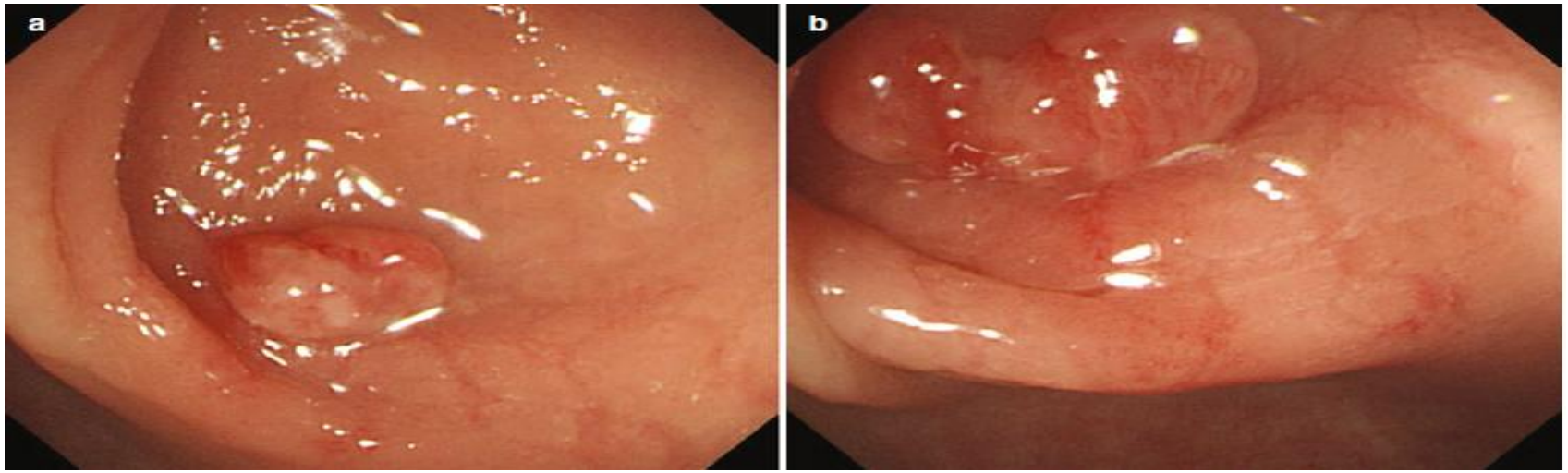
Colon diverticulosis, whose prevalence rises with age, indicates multiple diverticula in the colon without complications.



Colon diverticula. (**a)** Multiple diverticula are noted in the cecum. **(b)** Multiple diverticula in sigmoid colon

Diverticular Disease

Occasionally, diverticulum can be inverted into the lumen, it is called “inverted diverticulum.”



Inverted diverticulum. (a) Inverted diverticulum resembling polyp is seen. (b) The mucosa of the inverted diverticulum shows engorgement and edema.

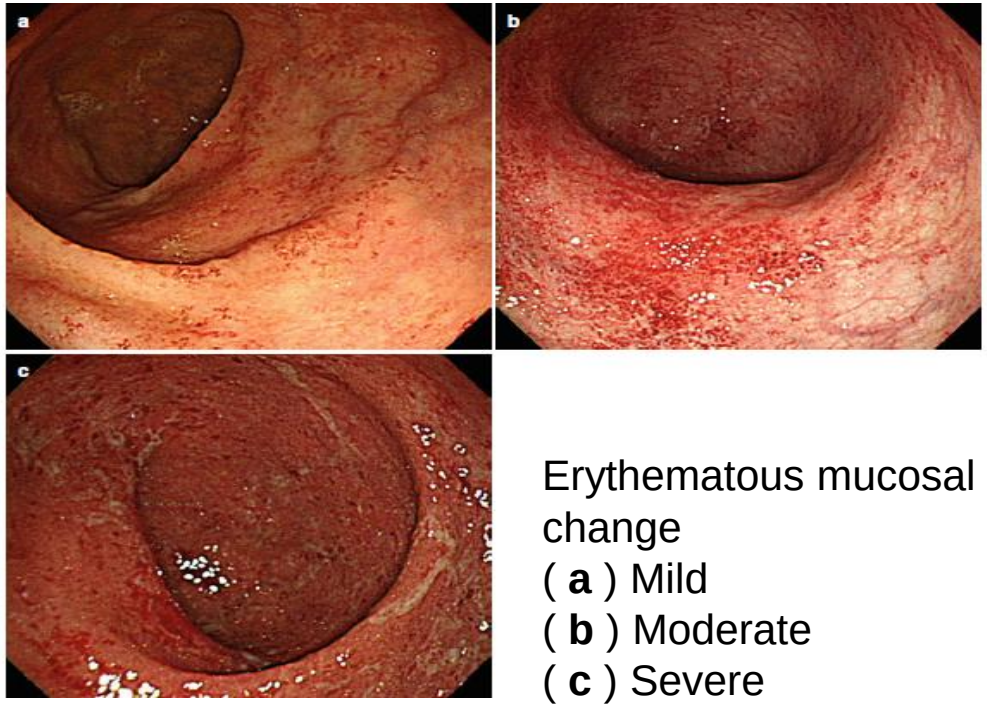
Inflammatory bowel diseases: Ulcerative colitis

Ulcerative colitis (UC) is a chronic inflammatory bowel disease of colon involving mucosal and submucosal layers. The pathogenesis of UC is still unclear and there are no curative medical treatments for UC. After diagnosed usually in young age, disease activity of UC tends to wax and wane. The typical feature of UC is chronic history of bloody diarrhea, mucoid stool, urgency, and tenesmus.

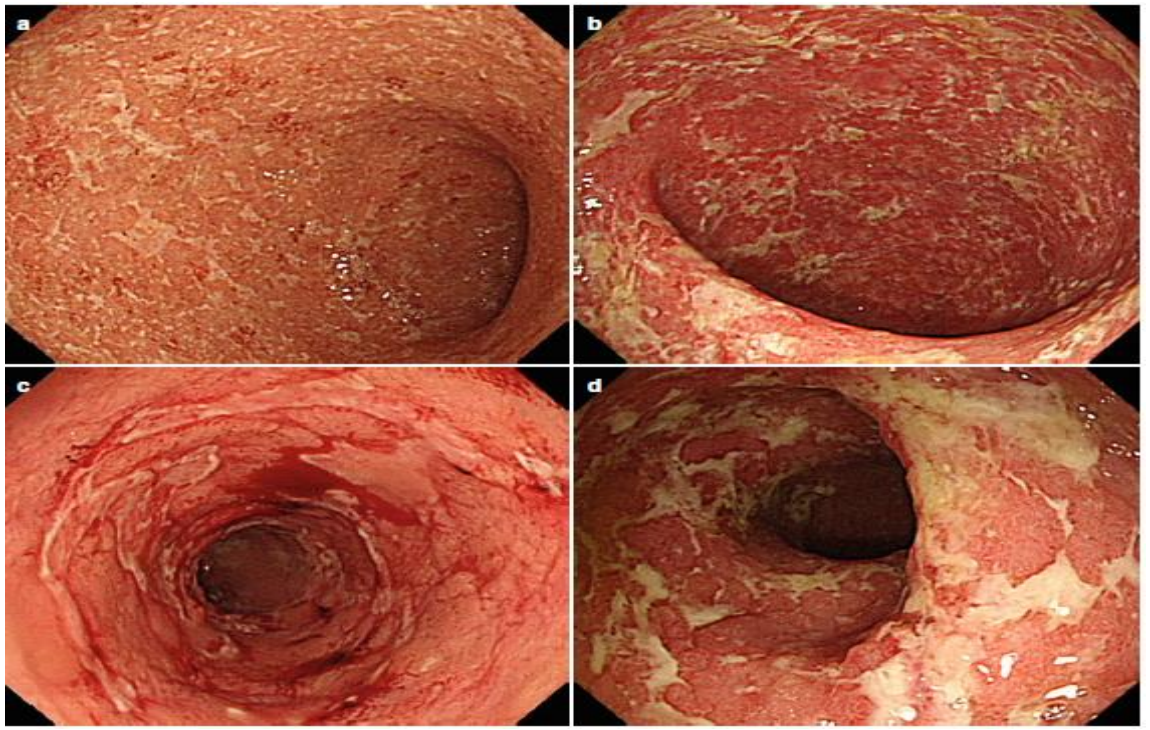
The typical endoscopic feature of UC is continuous inflammation without skip area and the involvement of rectum in nearly all cases. The extent of UC can be classified as proctitis (inflammation involving up to 15 cm from anal verge), left-sided colitis (inflammation involving up to splenic flexure), and extensive colitis (inflammation involving more proximal area to splenic flexure). When the whole colonic mucosa from cecum to rectum is inflamed, it is called “pancolitis”.

Rarely, inflammation of terminal ileum in patients with pancolitis can be observed, and it is called “backwash ileitis”

Ulcerative colitis



Erythematous mucosal change
(**a**) Mild
(**b**) Moderate
(**c**) Severe



(**a** , **b**) Small superficial ulcers
(**c** , **d**) Larger and deeper ulcers

Ulcerative colitis

The endoscopic Mayo Score *(Mayo endoscopic subscore)* evaluates ulcerative colitis stage, based only on endoscopy.

Mayo Score endoscopic: decoding and example images

Inflammatory bowel diseases: Crohn's Disease

Crohn's disease (CD) is a chronic inflammatory disease of gastrointestinal tract which can involve whole gut from mouth to anus.

Similar with UC, the etiopathogenesis of CD is still unclear and there are no curative medical treatments for CD.

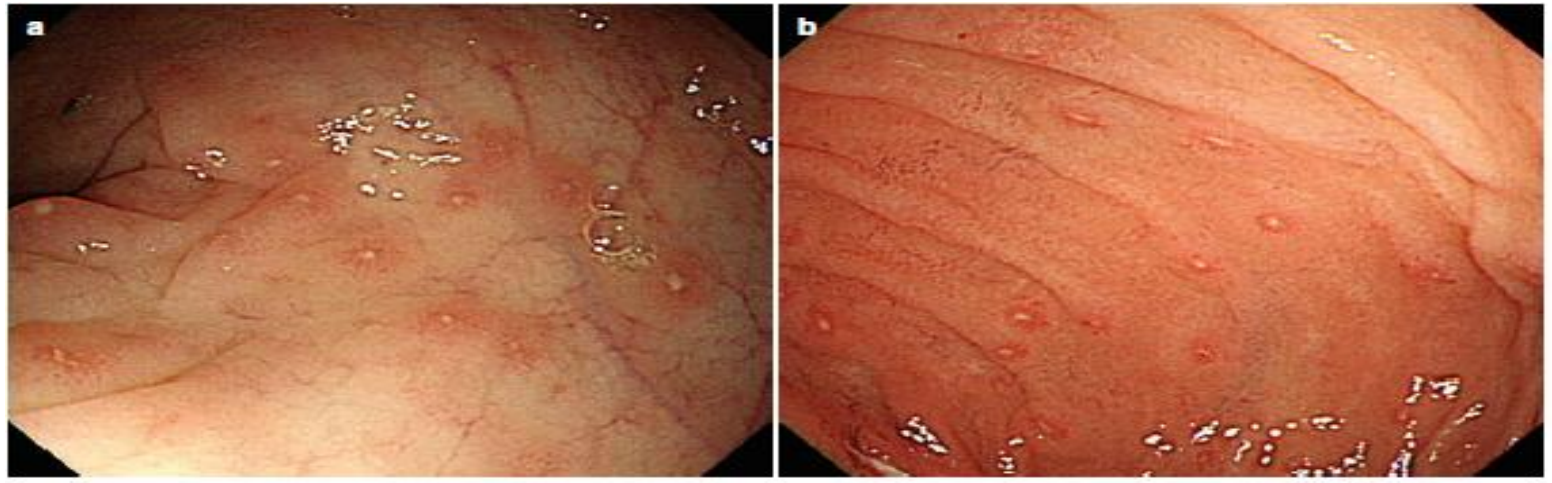
Its usual clinical manifestation is chronic abdominal pain, weight loss, and diarrhea developing in young adolescents. Interestingly, perianal abscess and fistula can develop before, at, or after the diagnosis of CD.

The disease activity of CD tends to change over time, but bowel damage accumulates. In contrast to UC, transmural inflammation is characteristic of CD, and complications such as stricture or penetration of bowel walls commonly develop with long duration of illness. Further, lesions in CD are distributed in skipped pattern with normal intervening mucosa. Usually, the lesions are eccentric rather than concentric.

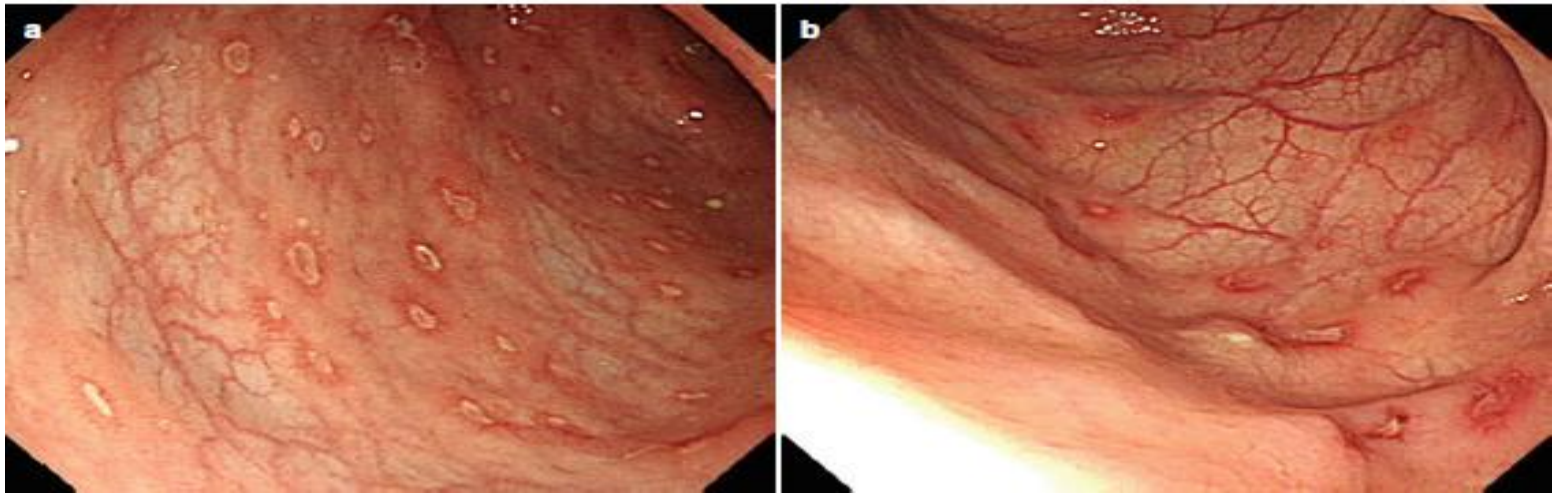
The most commonly involved area is ileocecal areas, but inflammation can be observed throughout the colon.

The early lesions of CD are tiny punctuate hyperemia with edema. They are considered to be the preceding lesions of aphthous erosions/ulcerations.

Crohn's Disease

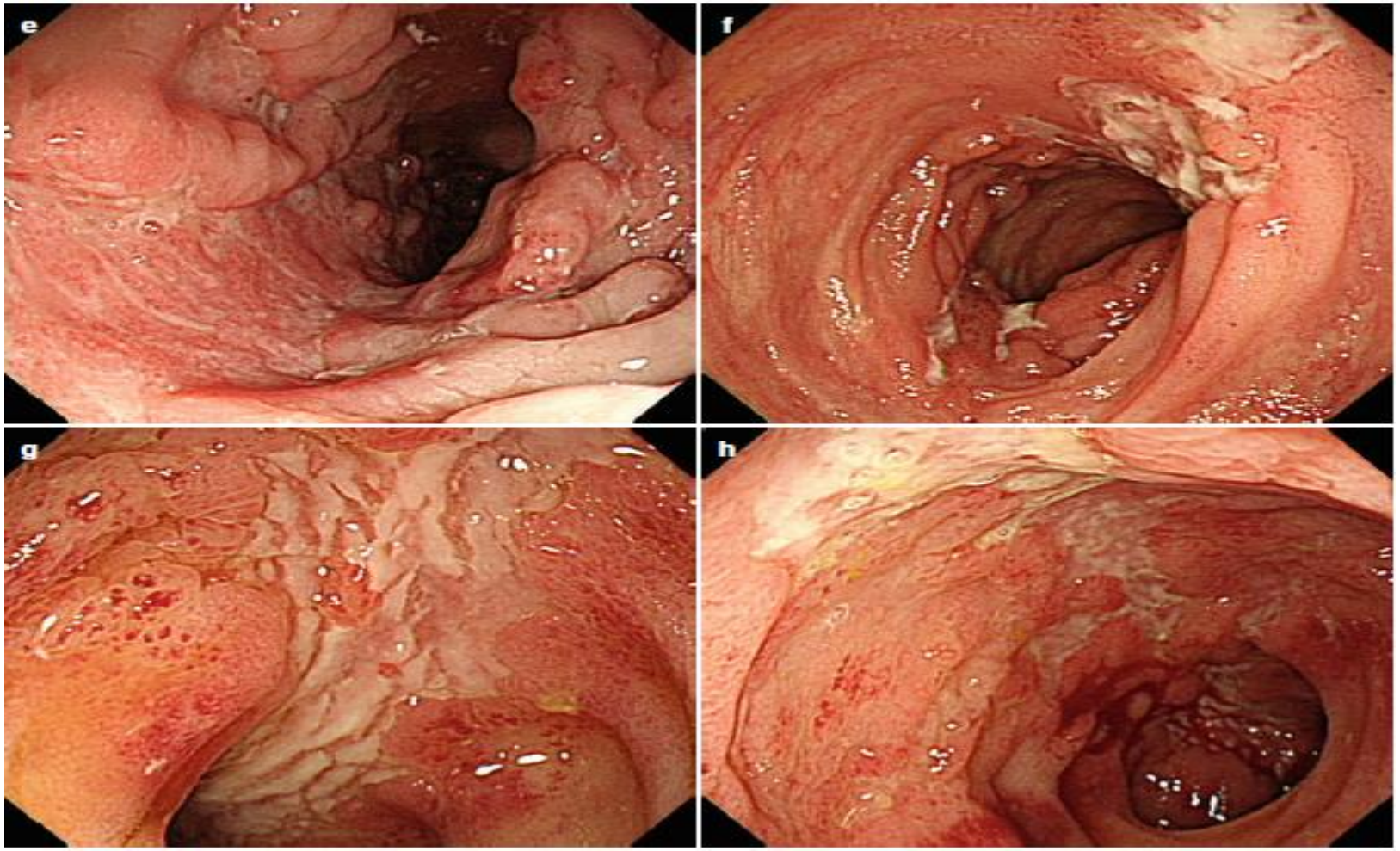


Aphthous erosions. (**a**) Rectum (**b**) Terminal ileum



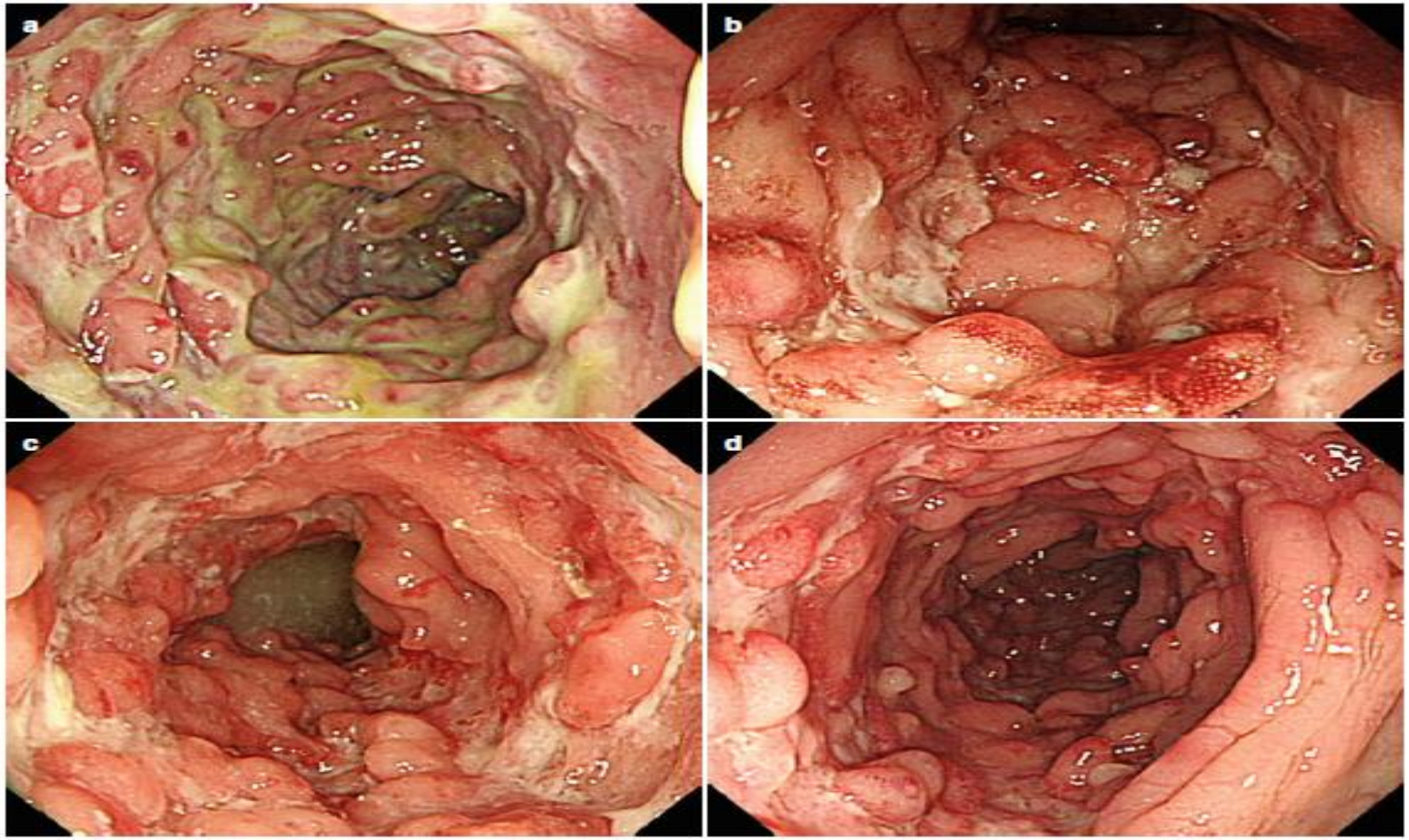
Aphthous ulcerations. (**a**) Multiple aphthous ulcerations in colon. (**b)** Aphthous ulcerations of colon arranged in longitudinal fashion ulcerations.

Crohn's Disease



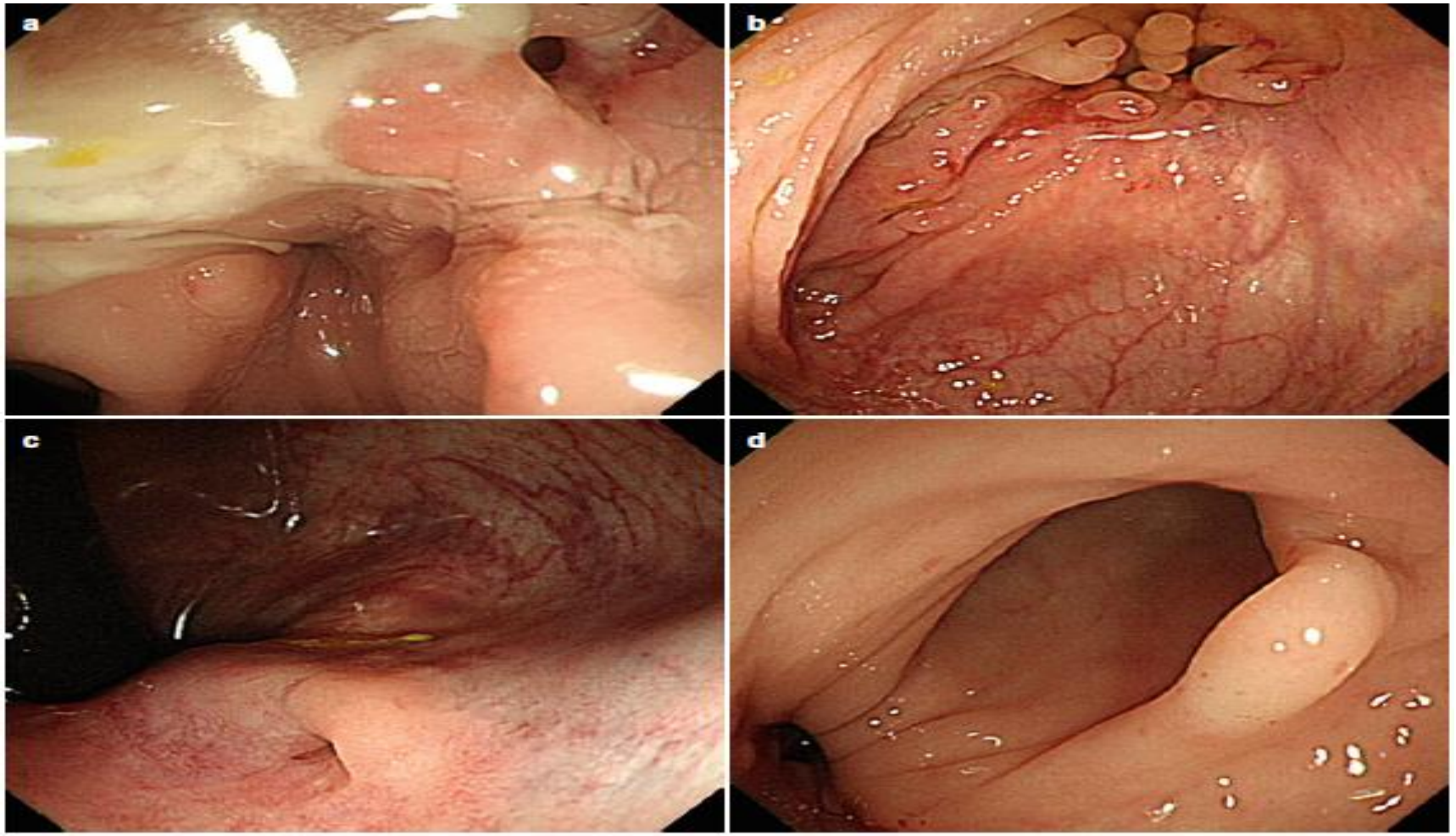
Longitudinal ulcers.
(e) Colonic ulcer. with surrounding mucosa around ulcers showing nodular appearance with hyperemia.
(f – h) Terminal ileum longitudinal ulcers

Crohn's Disease



Cobblestone appearance.
(a, b) Longitudinal and transverse ulcers make cobblestone-like mucosa.
(c,d) Cobblestone appearance showing normal or only hyperemic nodular intervening mucosa

Crohn's Disease



Fistula of CD.
(**a**) In the *upper right side* of the figure, fistula opening with converging folds is observed.
(**b**) Opening of fistula is not evident, but multiple pseudopolyps with converging folds suggest the opening of fistula.
(**c**) On the retroflexion of colonoscope, internal opening of perianal fistula is suspected.
(**d**) On the *left lower side* of the figure, fistula opening is observed. Deformity of colonic lumen is accompanied.

Endoscopic Differential Diagnosis UC vs. CD in colon

		UC	CD
Distribution of lesions	Continuity	Continuous	Not continuous
	Symmetricity	Symmetric	Not symmetric
	Rectal involvement	Nearly always	Commonly not
Mucosal inflammation	Vascularity	Blurred	Not blurred
	Hyperemia	Usually present	Rare or not severe
	Granularity	Common	Rare
	Friability	Common	Rare
	Bleeding	Common	Rare
	Mucosa around ulcers	Inflamed	Commonly normal
Ulcers	Aphthous ulcer	Not common	Common
	Longitudinal ulcer	Not common	Common
	Serpiginous ulcer	Not common	Common
	Large ulcer (>1 cm)	Not common	Common
Others	Cobblestone appearance	Not common	Common
	Stricture	Not common	Common

Ischemic Colitis

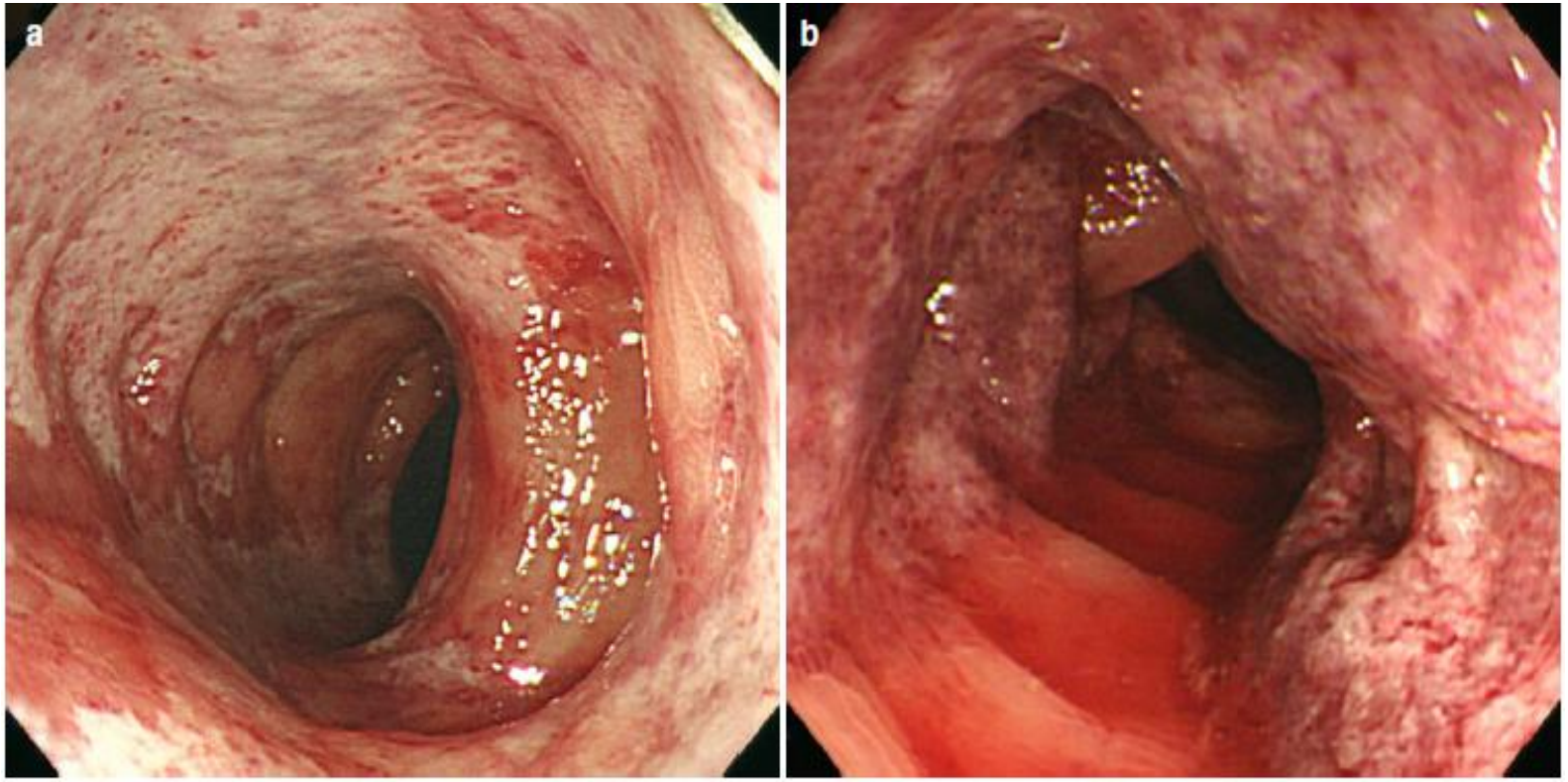
The typical presentations of ischemic colitis are a sudden, cramping natured, left lower abdominal pain with an urgent desire to defecate and passage of bright red or bloody diarrhea within 24 h. Other manifestations include fever, necrosis, perforation, peritonitis, and septic shock.

The main characteristics of ischemic colitis are segmental disease, rectal sparing, and rapid spontaneous resolution of disease.

The most commonly affected sites are the splenic flexure, descending colon, and sigmoid colon which are called as the "watershed" area.

Endoscopic appearances:

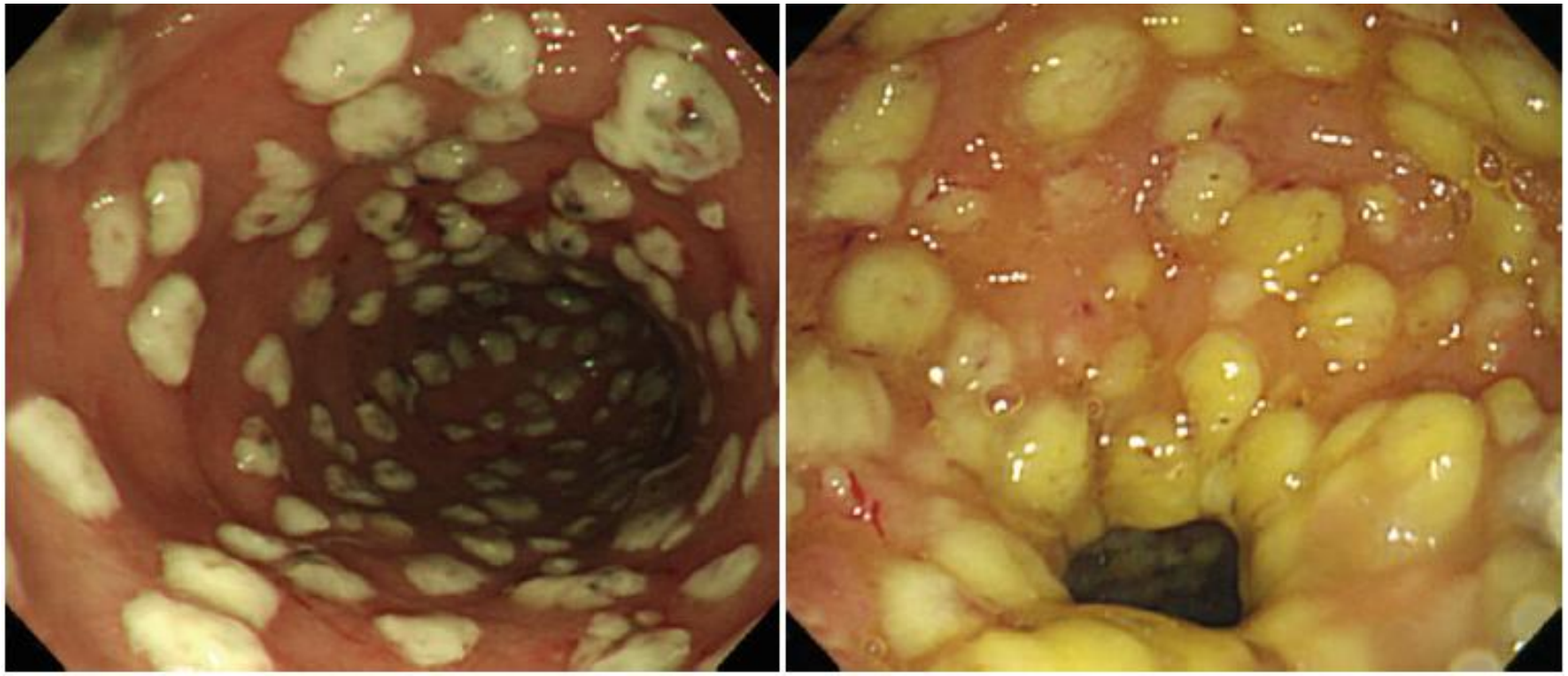
- edematous and friable mucosa[b]
- segmental erythema[b]
- scattered erosions[a]
- longitudinal ulcerations
- petechial hemorrhages
- purple hemorrhagic nodules.



Clostridium difficile colitis

Clostridium difficile infection (CDI) accounts for 15–25 % of all cases of antibiotics-associated colitis. The clinical manifestations of CDI vary from mild diarrhea to life-threatening severe colitis, toxic megacolon, bowel perforation, and septic shock.

When inflammatory pseudomembrane caused by infection with toxin-producing strains of C. difficile covers the underlying intestinal mucosa, it is called **pseudomembranous colitis**. Classic endoscopic findings are characterized by the presence of multiple round-shaped yellow-gray-white plaques 2–5 mm in diameter with adjacent normal mucosa in the rectum. In some areas they can combine to cover large part of the mucosal surface



COLORECTAL LESIONS

Non neoplastic lesions

- -Juvenile polyps
- -Hamartomatous polyps
- -Inflammatory polyps
- -Lymphoid polyps

They have not generally been thought of as precursors of cancer

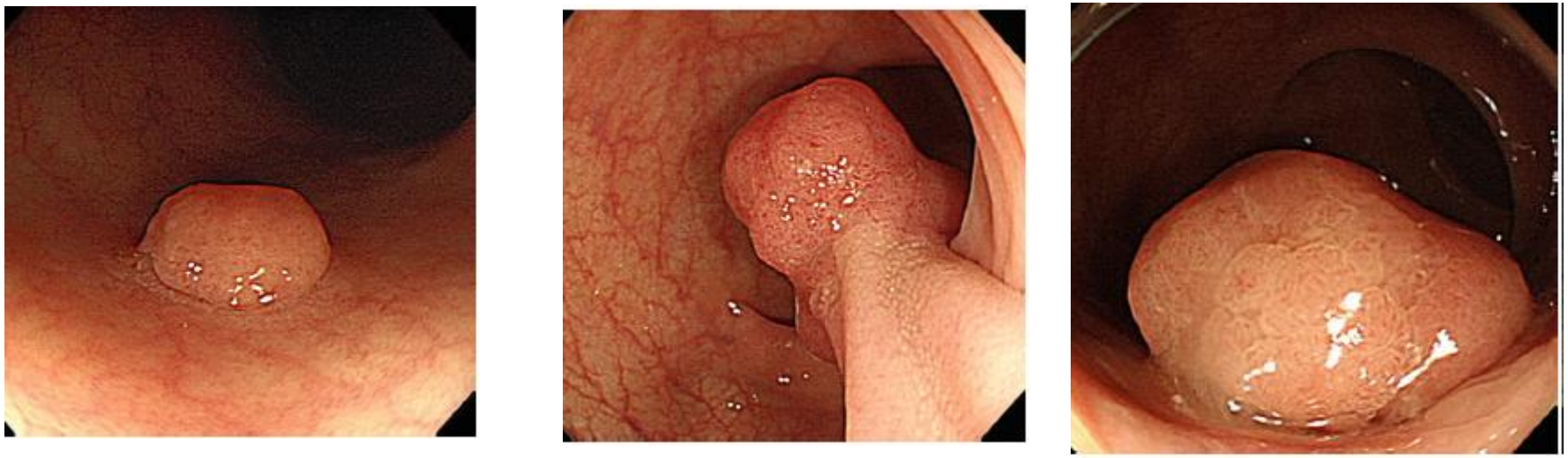
Neoplastic lesions

Pre-cancerous lesions
- Conventional adenomas
- Serrated types

Cancerous lesions
- Superficial cancer
- Invasive cancer

Adenomatous Polyp

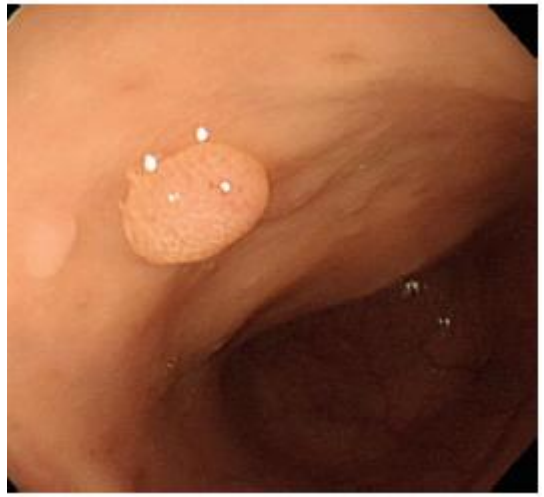
Adenomatous polyp is the most common colorectal polyp. In general, small adenomatous polyps are round and sessile with no lobulation. As the size increases, some may have a
stalk and show redness and/or lobulation.
Adenomatous polyps are classified into tubular, tubulo-villous, and villous adenoma. They can be further divided into low- vs. high-grade dysplasia



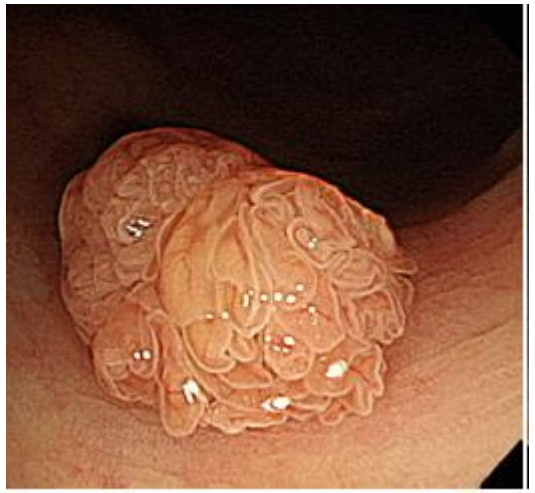
Subtypes of adenomatous polyps.

Serrated Polyp

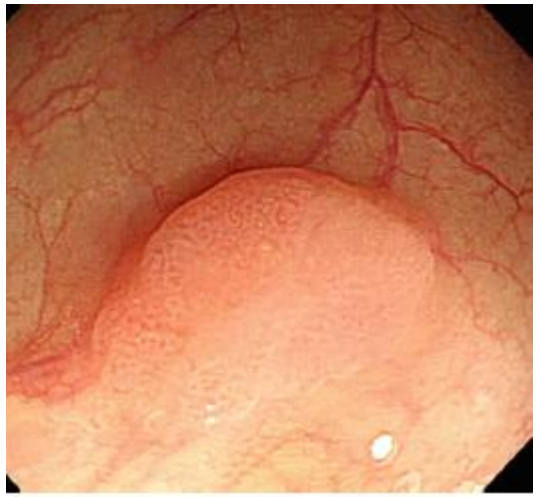
Serrated polyps of the colorectum are defined histologically by serrated features of the crypt epithelium.
Serrated polyps are subcategorized into hyperplastic polyp, sessile serrated adenoma/polyp, and traditional serrated adenoma based on their histological characteristics



hyperplastic polyp (no cancer)

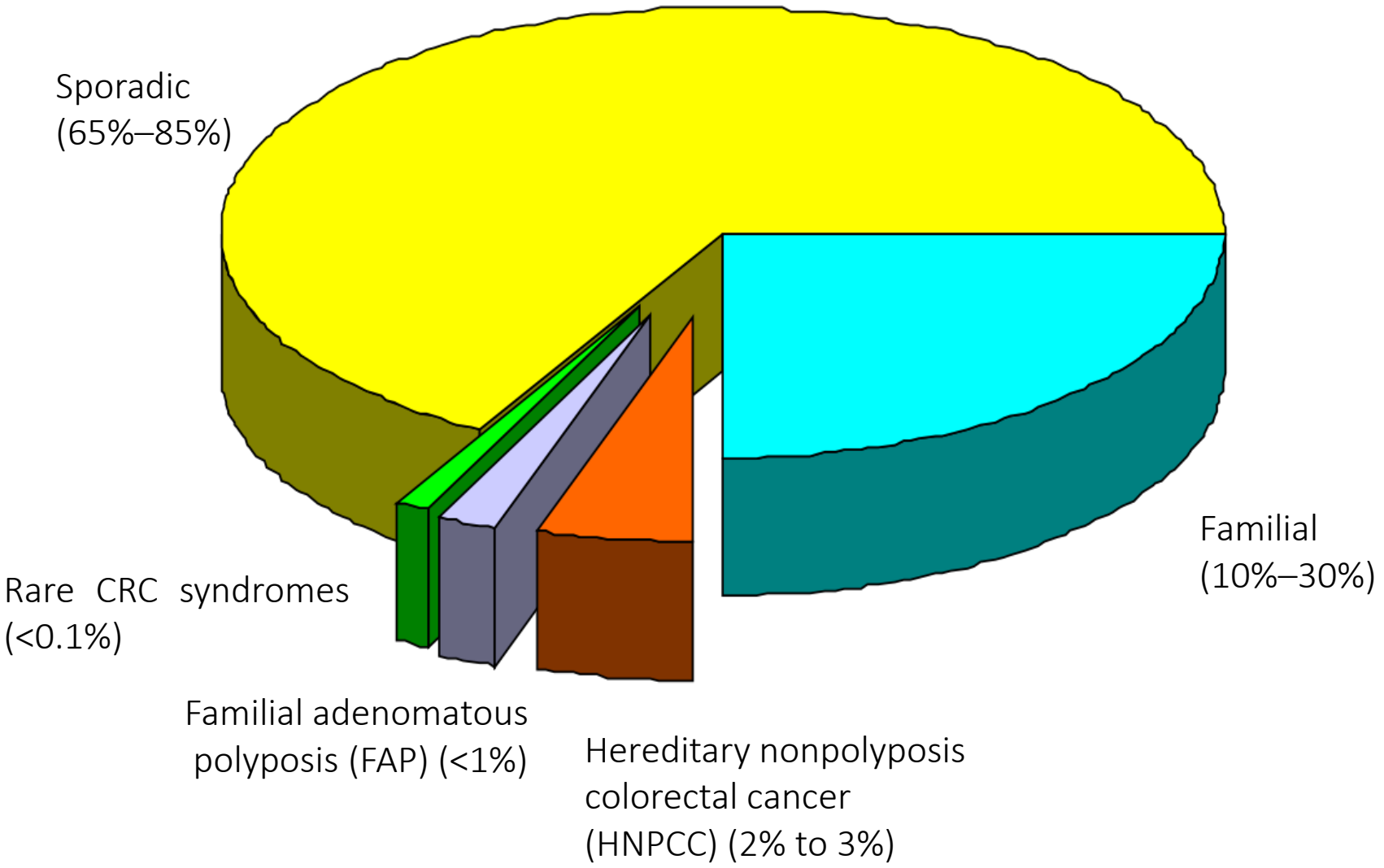


Traditional serrated adenoma.



Sessile serrated adenoma/ polyp

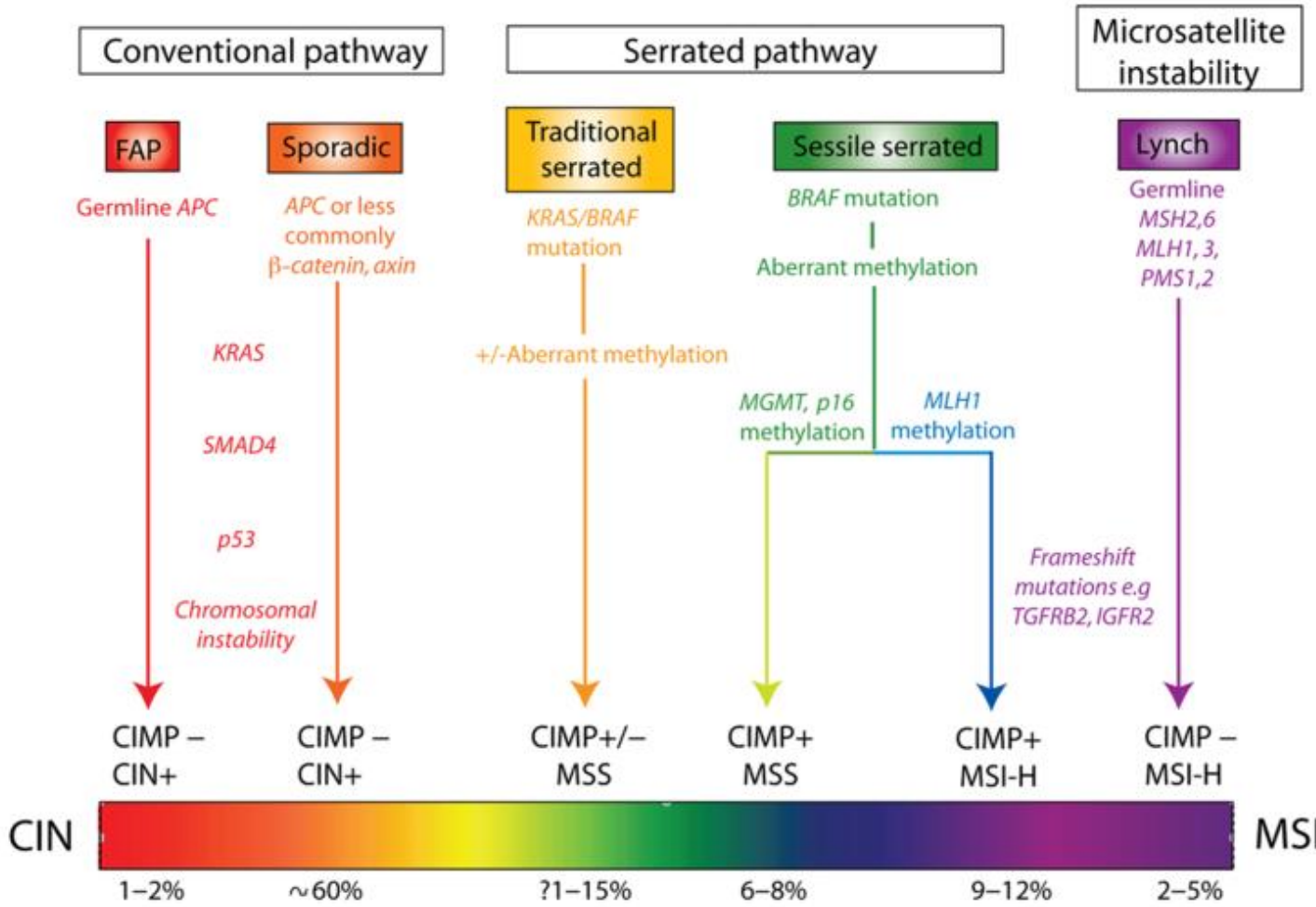
Neoplastic lesions



Randall W. Burt et al Gastroenterology 2000

Neoplastic lesions

Neoplastic lesions progress by the sequential accumulation of genetic mutations by three different pathway



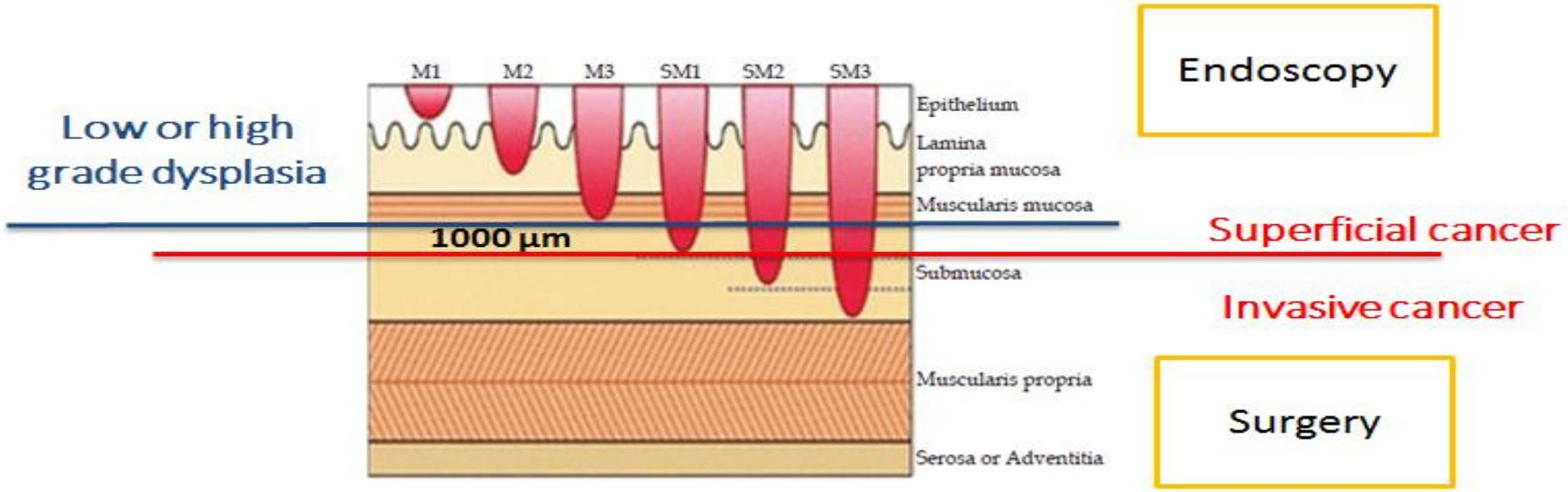
East JE, et al. Gut 2017;0:1–16.

Endoscopic resection of colon cancer

ESGE recommends that:

- An en bloc R0 resection of a superficial lesion with histology no more advanced than well-differentiated adenocarcinoma (G1/G2), sm1 (≤1 mm submucosal invasion) with no lymphovascular invasion is considered curative (strong recommendation, moderate quality evidence).

Endoscopic submucosal dissection: European Society of Gastrointestinal Endoscopy (ESGE) Guideline

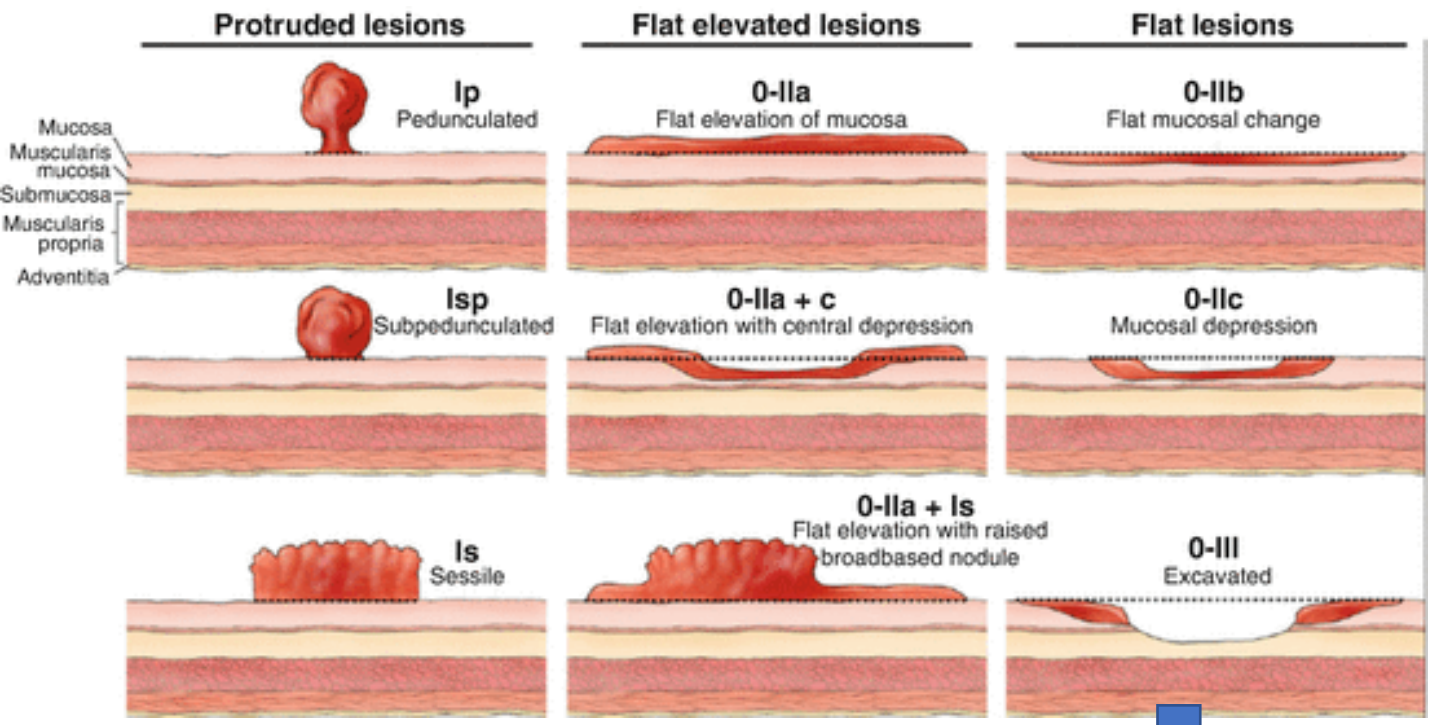


Rex D.K. Gastrointestinal Endoscopy 2017

Endoscopic assessment of neoplastic lesions

- MORPHOLOGY
- Pit pattern or surface microarchitecture
- Vascular pattern

Morphology: Paris Classification

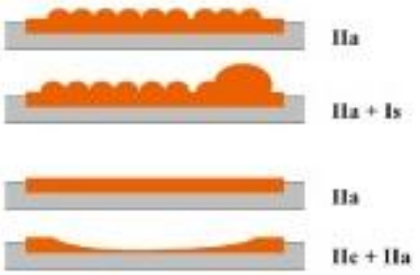


Morphological classification assessing the risk of submucosal invasion and the risk of lymphnode metastases, provides an 'endoscopic staging'

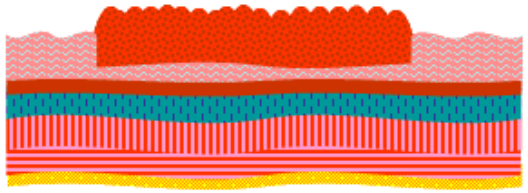
The prevalence of high grade dysplasia and cancer in IIc lesions can reach 50%

Flat lesions with horizontal growth pattern extending ≥ 10 mm are designated as Lateral Spreading Tumors (LST)

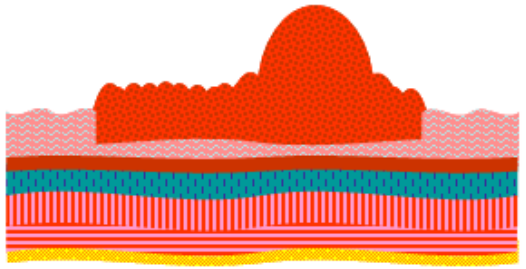
Subtypes of LST	Classification of type 0
LST granular (LST-G)	
Homogenous type	0-IIa
Nodular mixed type	0-IIa, 0-Is + IIa, 0-IIa + Is
LST non-granular (LST-NG)	
Flat elevated	0-IIa
Pseudo-depressed type	0-IIa + IIc, 0-IIc + IIa



Proportion of sm cancer lesions > 20 mm



Granular type H 0%



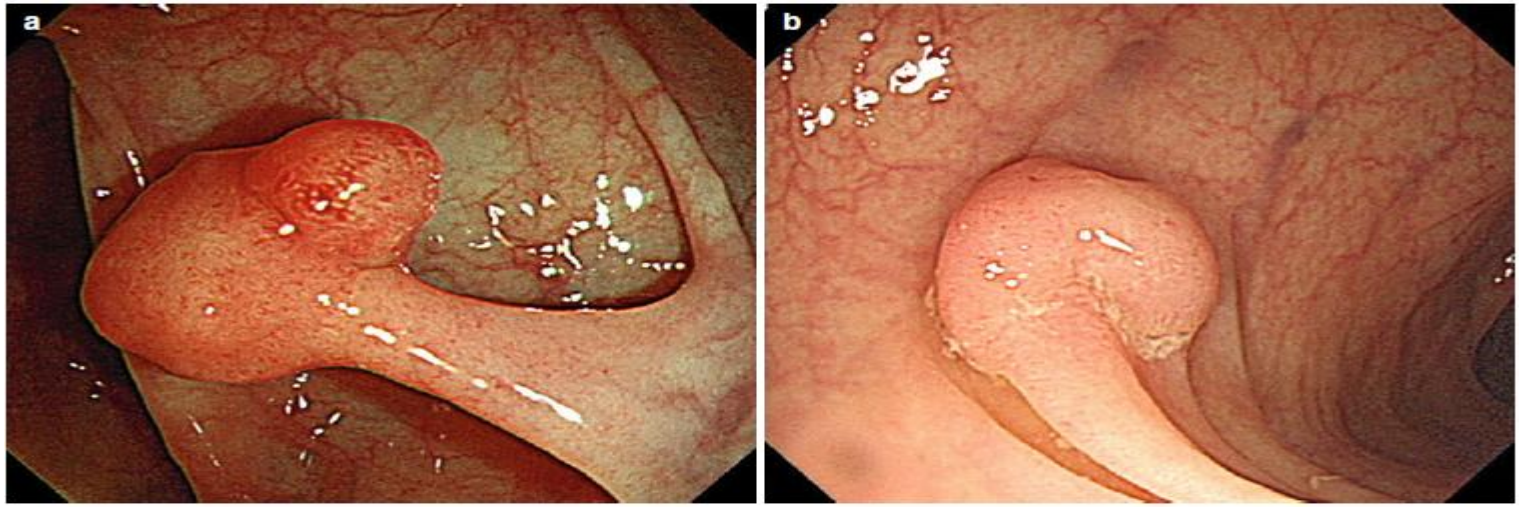
Granular type M 45%

Non- Granular type F 60%

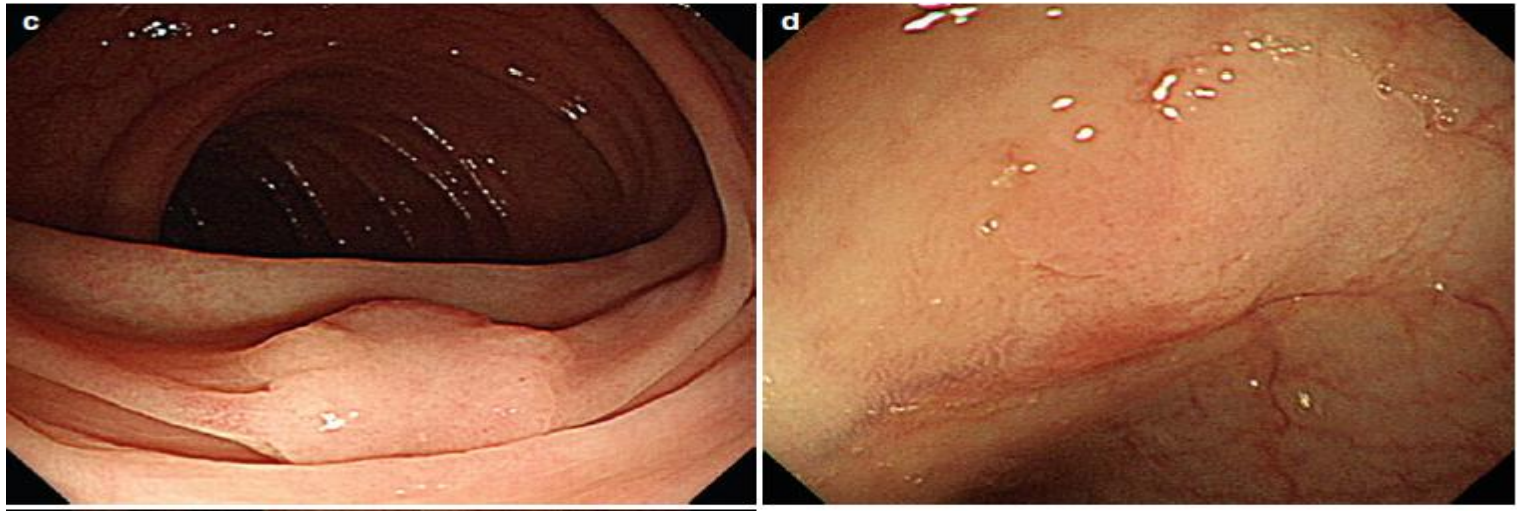
Non-Granular type PD 90%

Horiuchi Y et al *Dig Endosc* 2013

Colorectal Polyps



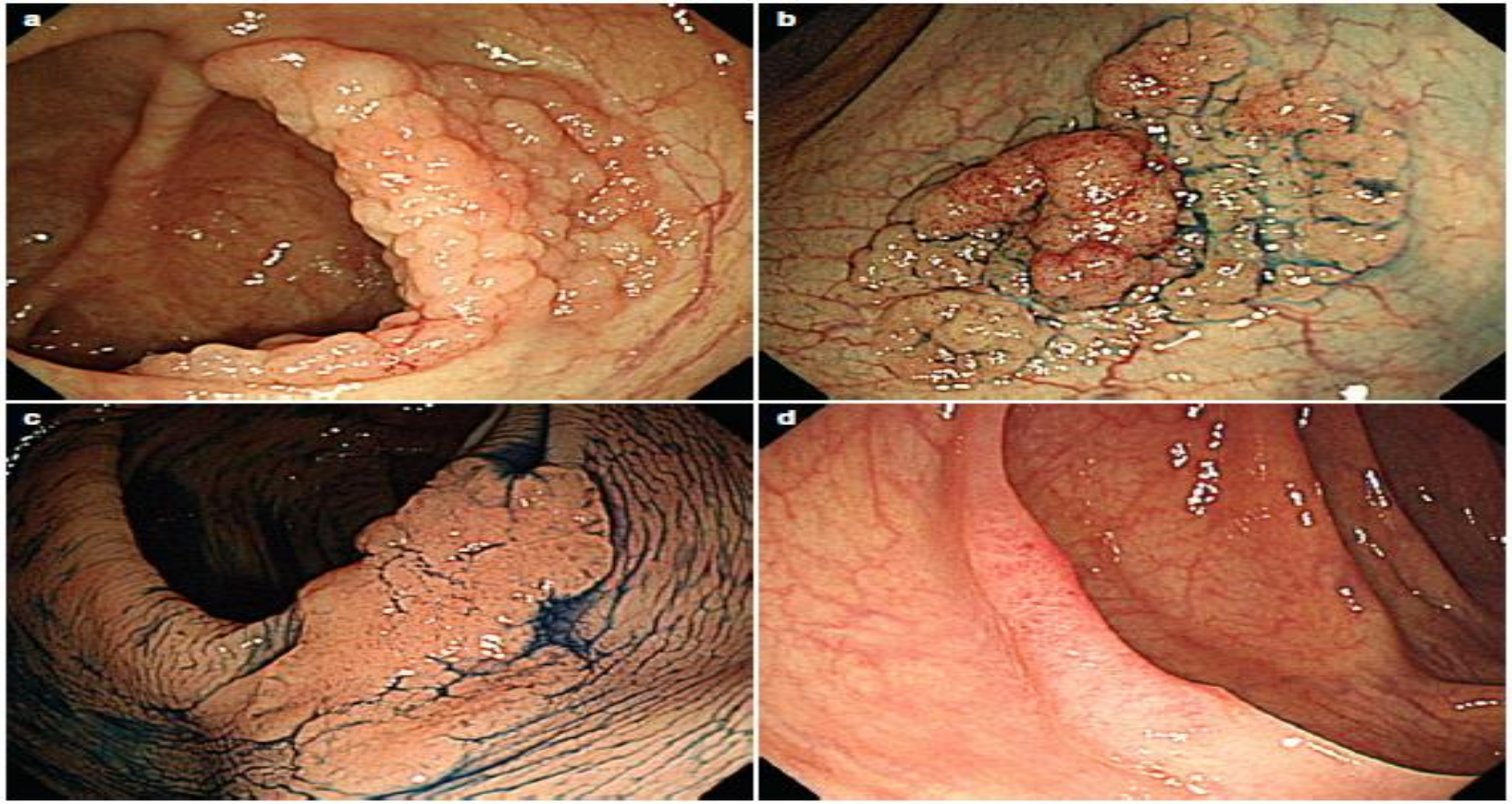
Morphologic classification of colorectal polyps. (a) Ip polyp. (b) Is polyp



Morphologic classification of colorectal polyps. (c) IIa polyp. (d) IIb polyp.

Colorectal Polyps

Laterally spreading tumor (LST) refers to the nonpolypoid tumor of 10–20 mm or more in its diameter, which shows lateral growth rather than traditional polypoid upward growth. LST is subclassified into granular and nongranular type



Subtypes of LST. (a) Homogenous-type granular LST, (b) nodular mixed-type granular LST, (c) elevated-type nongranular LST,(d) pseudodepressed-type nongranular LST

Endoscopic assessment of neoplastic lesions

- Morphology
- PIT PATTERN OR SURFACE MICROARCHITECTURE
- Vascular pattern

Colorectal Polyps

Kudo classification

I		Round pit (normal pit)	
II		Asteroid pit	
III_S		Tubular of round pit that is smaller than the normal pit (type I)	
III_L		Tubular of round pit that is larger than the normal pit (type I)	
IV		Dendritic or gyrus-like pit	
V_I		Irregular arrangement and sizes of III_L, III_S, IV type pit pattern	
V_N		Loss or decrease of pits with an amorphous structure	

Normal mucosa

Type II pit pattern is specific for hyperplasia. Also, superficial type serrated adenoma and SSA/P show this pit like pattern.

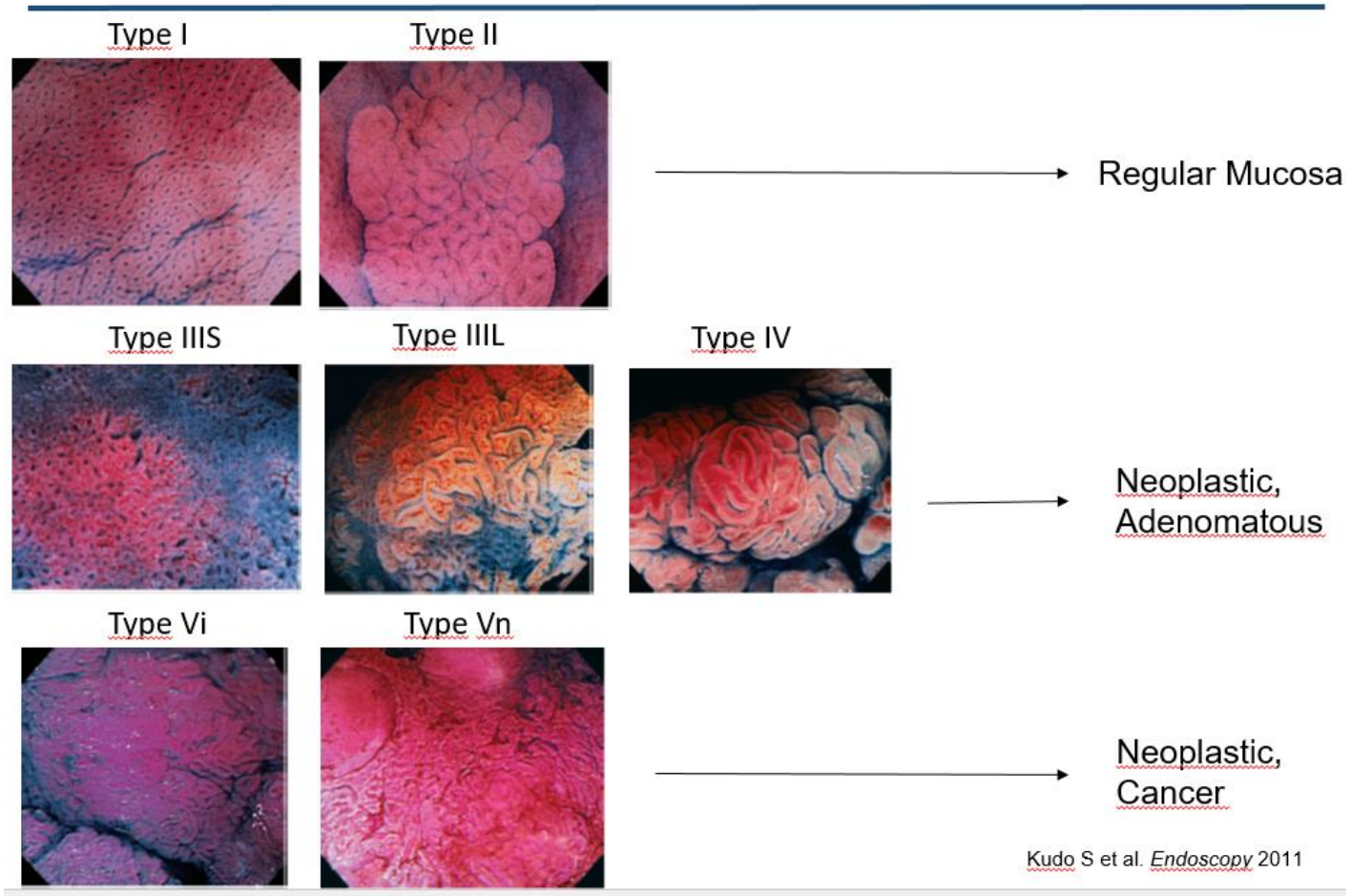
Regular pattern → intramucosal lesion

Irregular pattern
→ mucosal-submucosal deep invasion

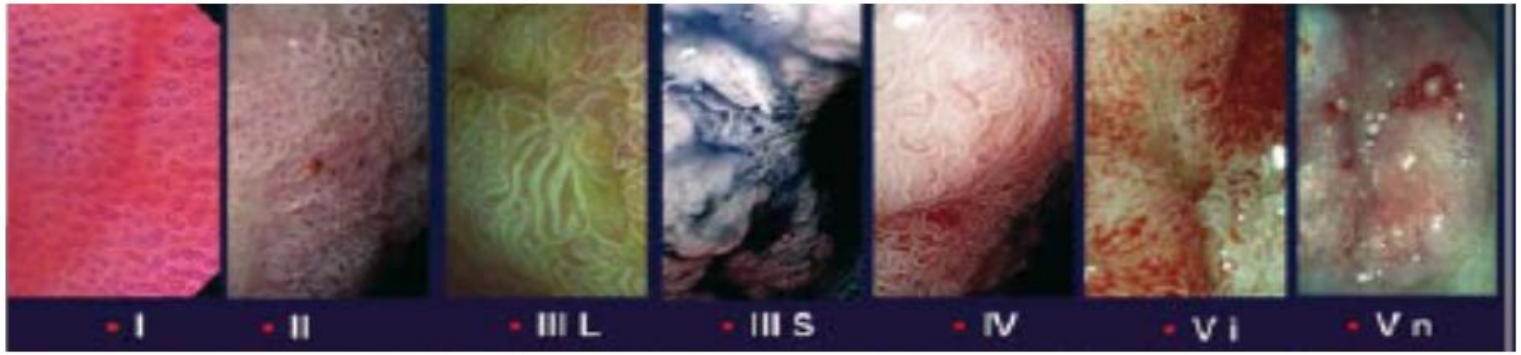
Nonstructure pattern
→ Submucosal deep invasion

Kudo’s pit pattern

The frequency of malignant transformation correlates with the progressive shift of the surface pit pattern from the category IIIL to VN



Kudo's pit pattern

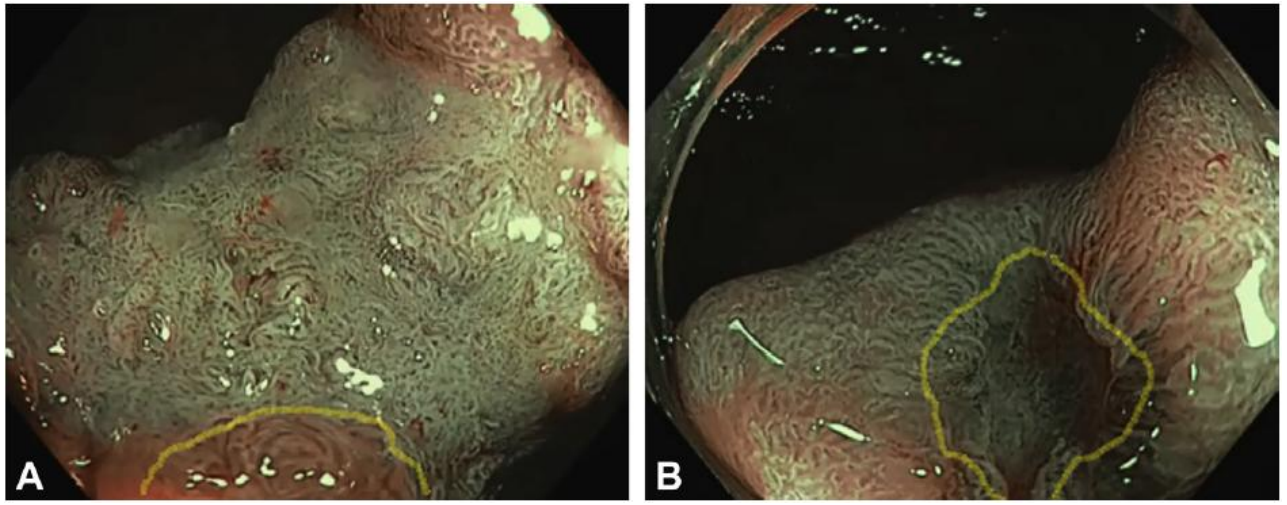


	Frequency	Low Grade	High Grade	Invasive
IIIL	71.2%	94.7%	5.3%	0,0%
IV	20.4%	75.5%	21.8%	2,8%
IIIS	0.9%	76.7%	20.5%	2,7%
Vi	6.0%	23.5%	42.8%	33,7%
Vn	1.5%	0.0%	8.5%	91,5%

Kudo S et al Endoscopy 2011

Nice Classification

	Type 1	Type 2	Type 3
Color	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
Vessels	None, or isolated lacy vessels may be present coursing across the lesion	Brown vessels surrounding white structures†	Has area(s) of disrupted or missing vessels
Surface pattern	Dark or white spots of uniform size, or homogeneous absence of pattern	Oval, tubular or branched white structures† surrounded by brown vessels	Amorphous or absent surface pattern
Most likely pathology	Hyperplastic & sessile serrated polyp (SSP)‡	Adenoma§	Deep submucosal invasive cancer



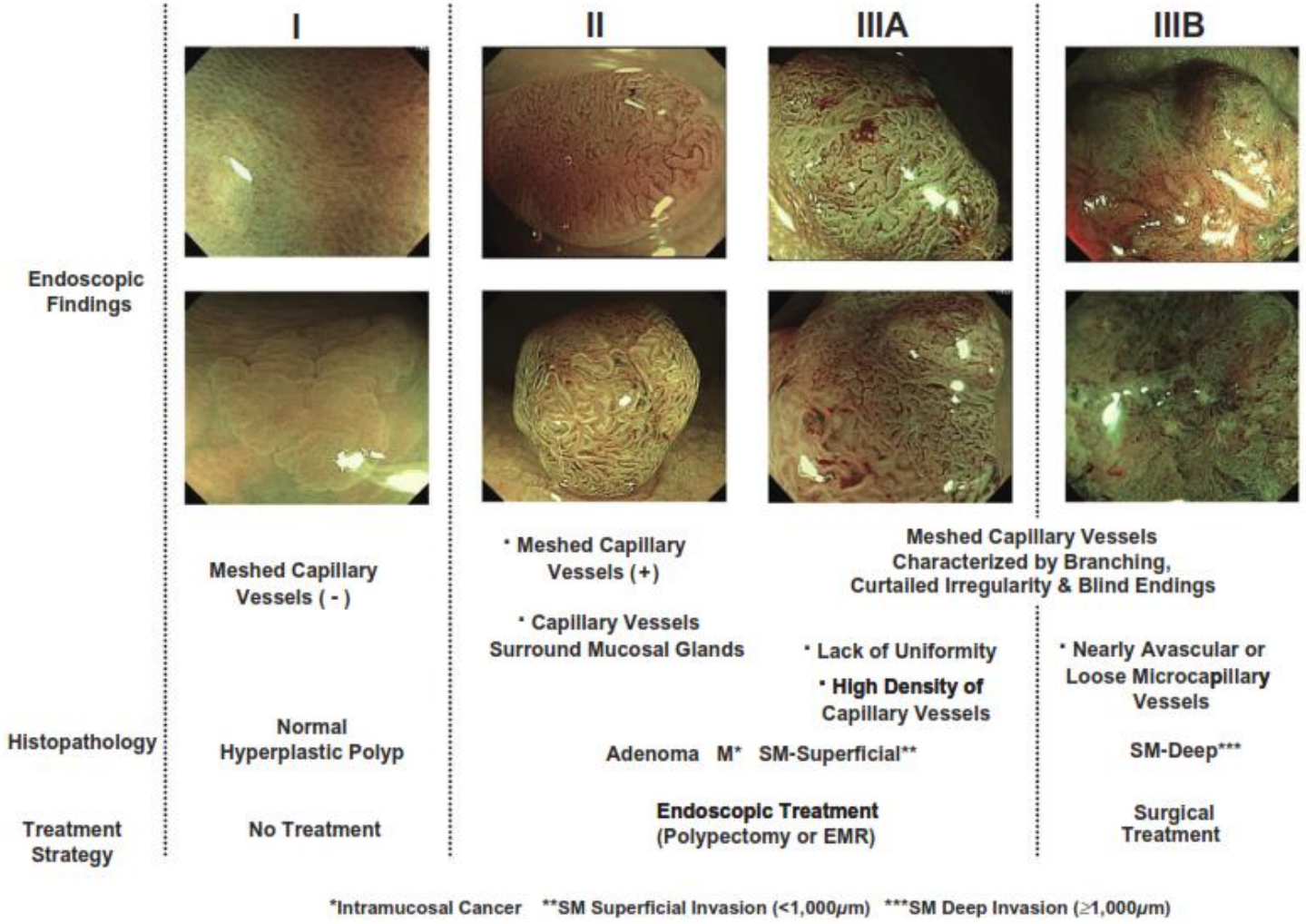
Rex DK et al. *Gastrointest Endosc* 2017

Endoscopic assessment of neoplastic lesions

- Morphology
- Pit pattern or surface microarchitecture
- VASCULAR PATTERN

Sano’s capillary pattern classification

The capillaries in neoplastic lesions become elongated with larger diameters as the number and density of microcapillary vessels increase in the process of changing from premalignant to malignant lesions.



Turaoka et al Digestive Endoscopy 2011

Therapeutic endoscopy

- Treatment of gastrointestinal bleeding
  - Varices ligation, haemostasis techniques: photocoagulation, electrocoagulation, thermocoagulation and injection method
- Esophageal Zenker diverticular resection
- Achalasia management: peroral endoscopic myotomy (POEM), esophageal dilatation
- Mucosectomy:
  - Barrett esophagus
  - Polypectomy: Hot biopsy" forceps to excise polyps of up to 6 mm, snare electrocautery for larger polyps
- Endocopic submucosal dissection (ESD)
- Oddi sphincterotomy (Endoscopic retrograde cholangiopancreatography)
  - choledocholithiasis and papillary stenosis with ascending cholangitis, acute gallstone pancreatitis, decompression of the biliary tree by placement an internal endoprothesis
- Endoscopic baritiatric surgery

World Journal of Gastrointestinal Endoscopy

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ISSN 1948-5190 (online)

REVIEW

Role of endoscopy in acute gastrointestinal bleeding in real clinical practice: An evidence-based review

Guidelines

OPEN ACCESS

Diagnosis and management of acute lower gastrointestinal bleeding: guidelines from the British Society of Gastroenterology

Kathryn Oakland,[1] Georgina Chadwick,[2] James E East,[3] Richard Guy,[4] Adam Humphries,[5] Vipul Jairath,[6,7] Simon McPherson,[8] Magdalena Metzner,[9] A John Morris,[10] Mike F Murphy,[11] Tony Tham,[12] Raman Uberoi,[13] Andrew McCulloch Veitch,[14] James Wheeler,[15] Cuthbert Regan,[16] Jonathan Hoare[17]

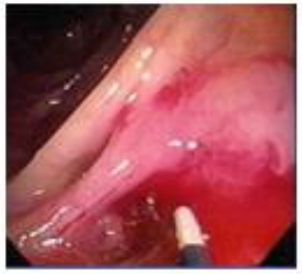
Gastrointestinal bleeding

Endoscopic Treatment

Argon Plasma Coagulation (APC)

Clip apposing

Adrenaline injection

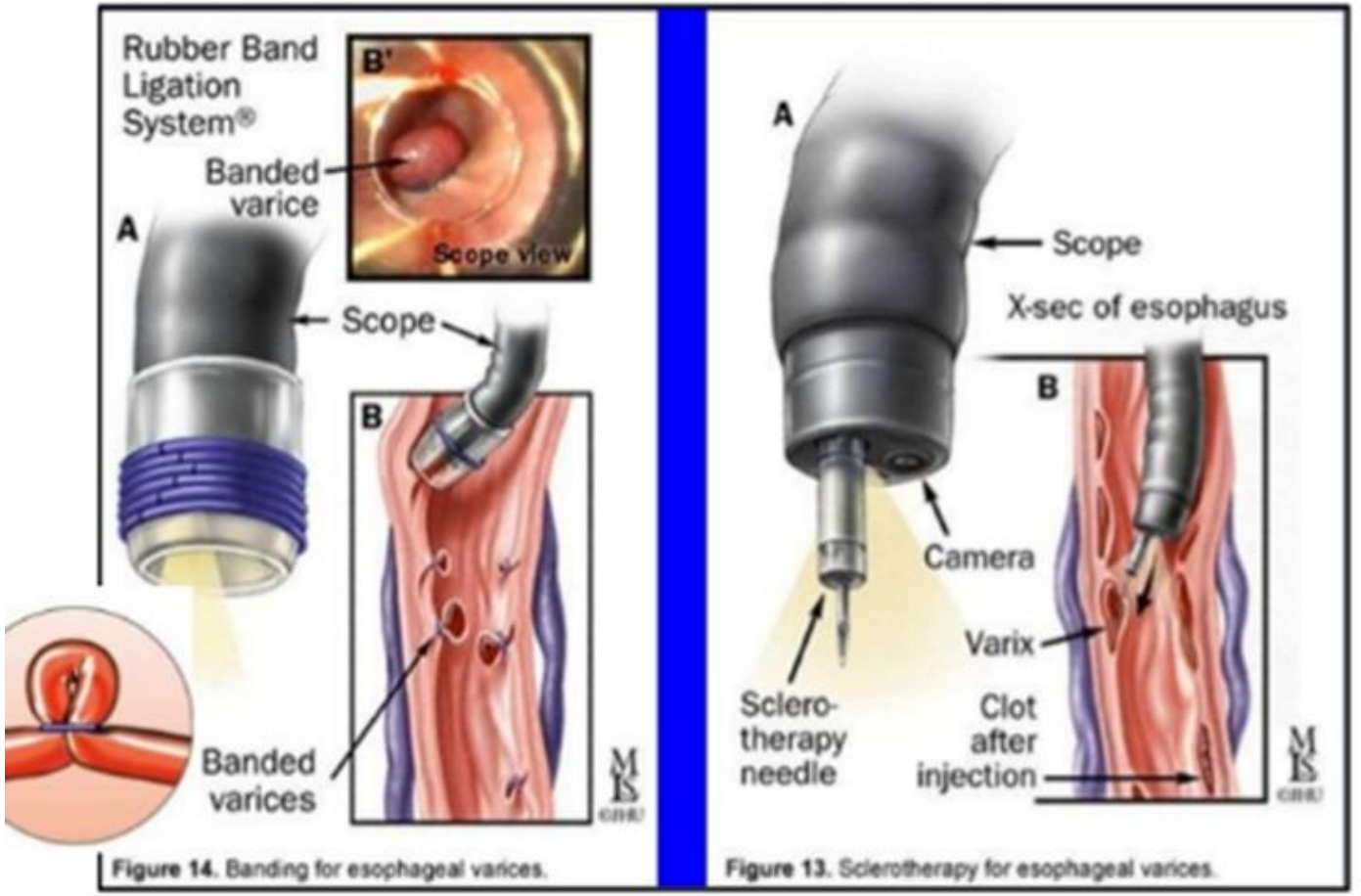


ALONE
OR
IN COMBINATION

https://www.youtube.com/watch?v=59uO-8UVC2A&t=4s

Gastrointestinal bleeding

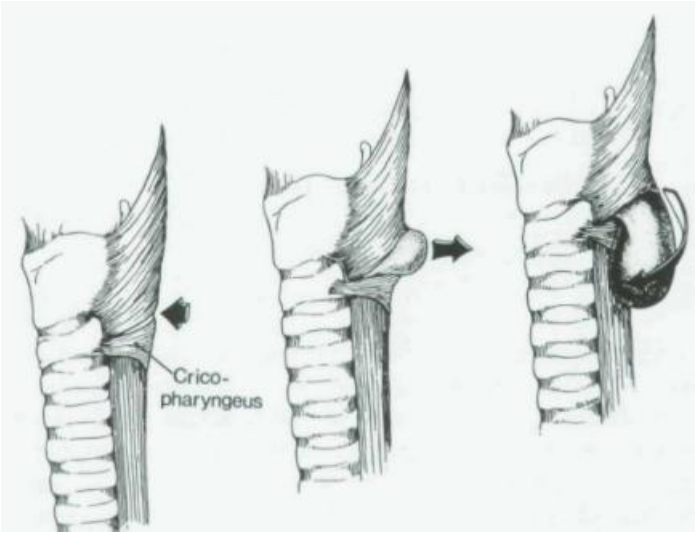
Treatment of bleeding caused by rupture of esophageal varices

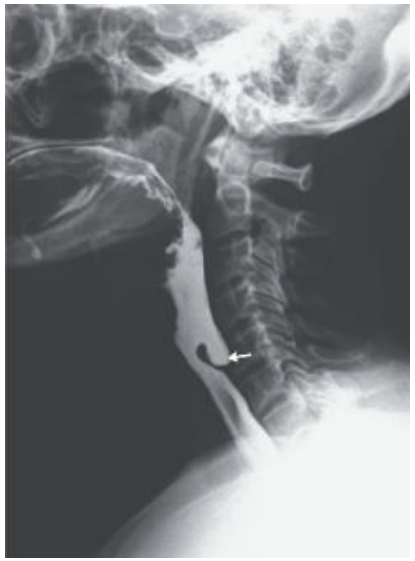


https://www.youtube.com/watch?v=UC3a8QRs2OU

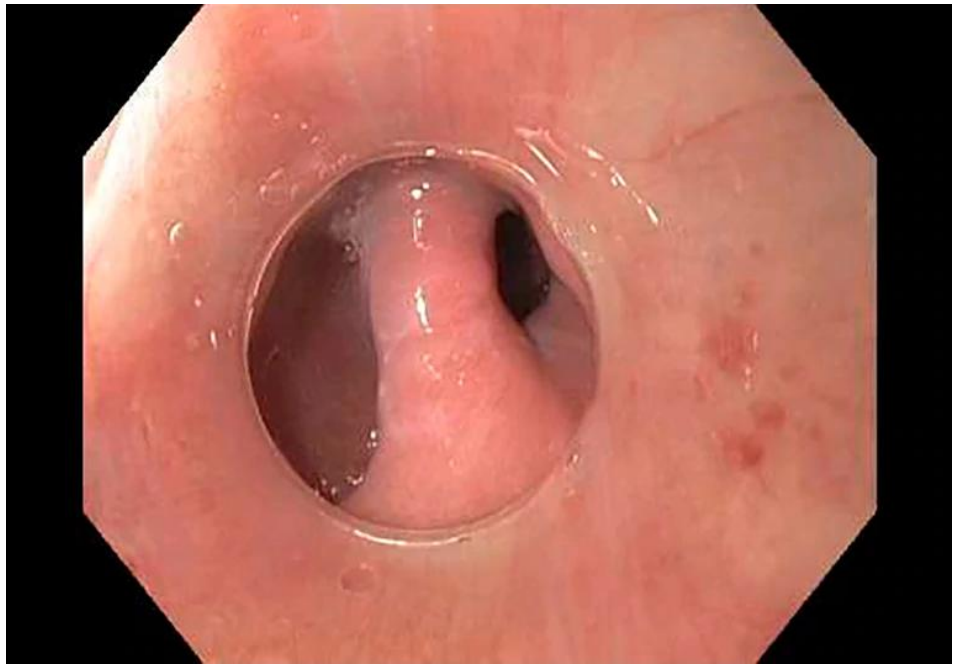
Zenker's Diverticulum

Zenker's diverticulum (ZD) arises from herniation of pharyngeal mucosa on the dorsal wall, immediately proximal to the transition from hypopharynx into oesophagus.

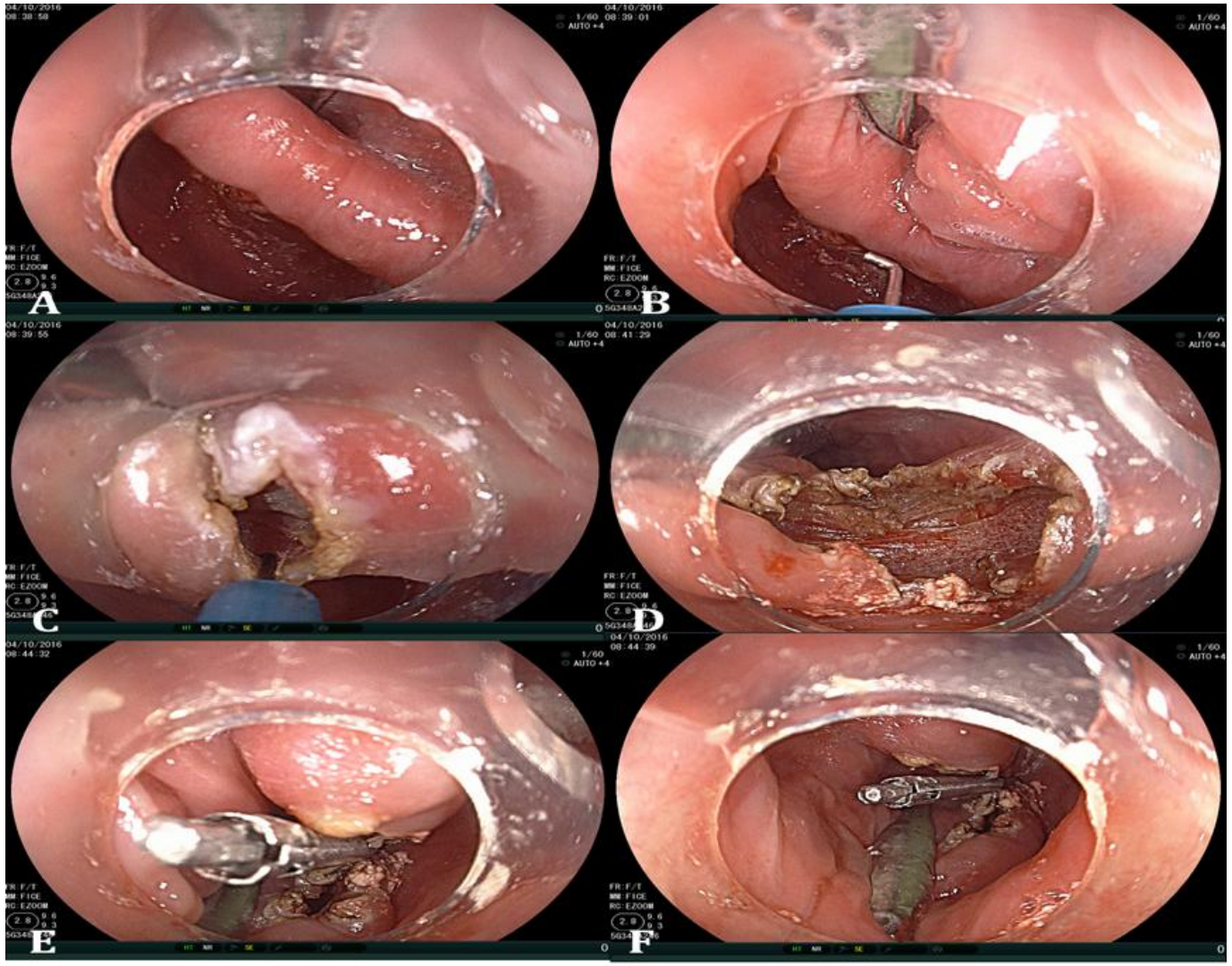




ZD is a false diverticulum of the pulsion type that results from poor upper oesophageal sphincter compliance: impairment of relaxation of CP causes outpouching of the relatively thin posterior hypopharyngeal wall directly above the CP muscle

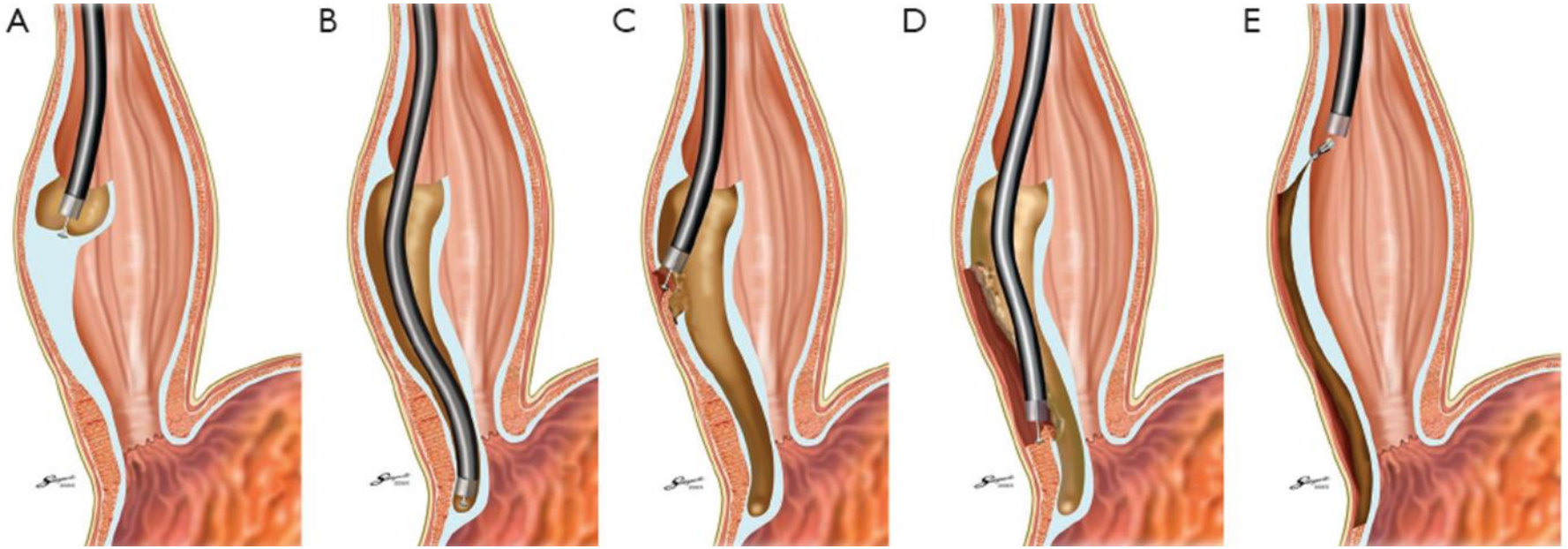


Flexible endoscopic septotomy of Zenker's diverticulum



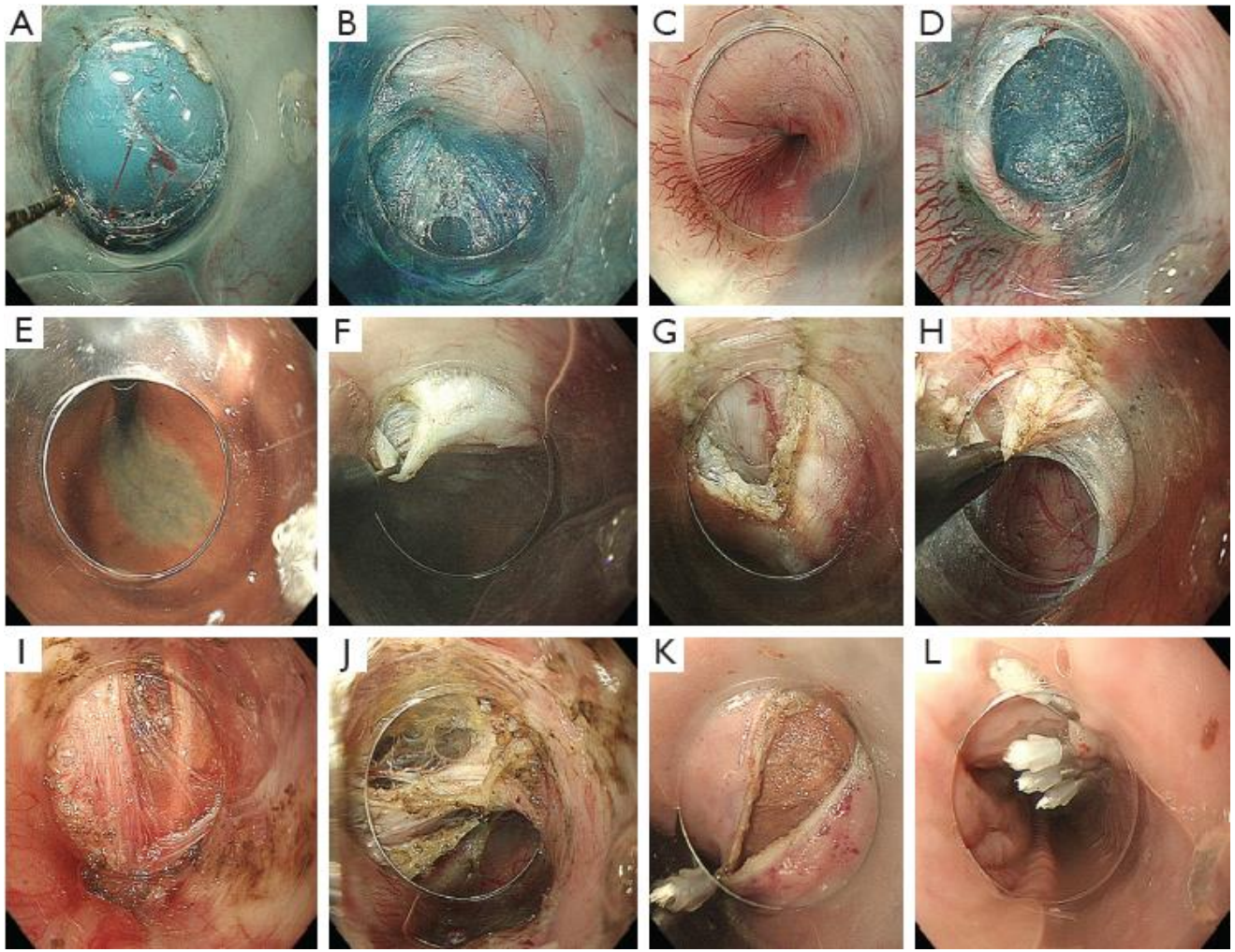
https://www.youtube.com/watch?v=0isx0YvN-jo

POEM (per oral endoscopic myotomy)



https://www.youtube.com/watch?v=svV6OonI2eA

POEM (per oral endoscopic myotomy)



Step of POEM.

- (A) submucosal layer;
- (B) dissection plane just beneath muscle layer;
- (C) palisade vessels;
- (D) gastric site;
- (E) retroflex view showed dye stain;
- (F) initial myotomy site;
- (G) circular muscle was divided exposed longitudinal muscle;
- (H) narrow segment of LES;
- (I) exposed mediastinum due to total myotomy (vagus nerve seen);
- (J) myotomy was end about 2 cm below EGJ;
- (K,L) closure of mucosal inlet. POEM, peroral endoscopic myotomy.

Endoscopic resection of superficial neoplastic lesions

- Polypectomy
- Endoscopic *mucosal* resection (EMR)
- Endoscopic *submucosal* dissection (ESD)

Polypectomy

Resection of small protrutred lesions with snare or cold biopsy forcep with or without submucosal fluid injection

RECOMMENDATION

ESGE recommends against the use of cold biopsy forceps (CBF) excision because of high rates of incomplete resection. In the case of a polyp sized 1–3 mm where cold snare polypectomy is technically difficult or not possible, cold biopsy forceps may be used. (Moderate quality evidence; strong recommendation.)

RECOMMENDATION

ESGE recommends snare polypectomy for sessile polyps 6–9 mm in size. ESGE recommends against the use of biopsy forceps for resection of such polyps because of high rates of incomplete resection. (High quality evidence; strong recommendation.)

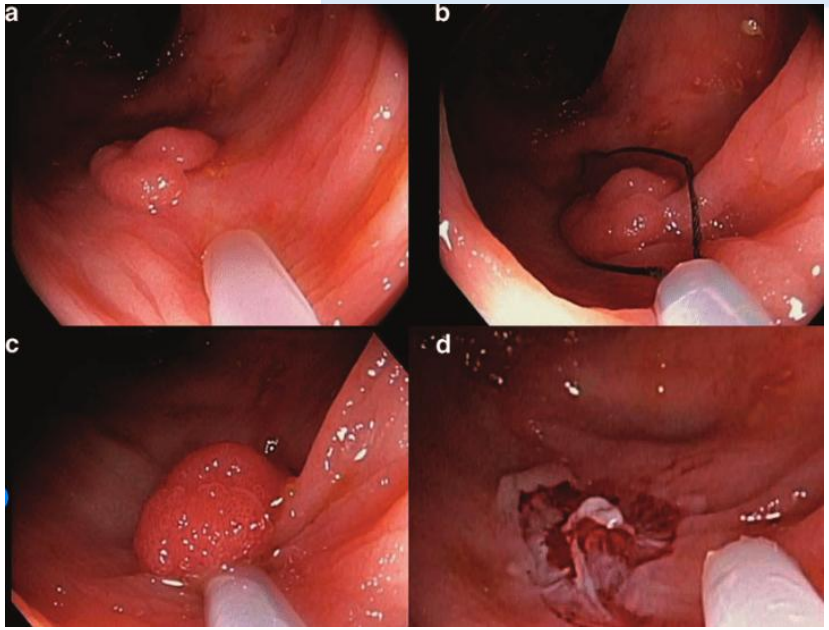
Ferlitsch Monika et al. Endoscopy 2017

Cold snare polypectomy

Resection of small protrutred lesions with snare or cold biopsy forcep with or without submucosal fluid injection.

RECOMMENDATION

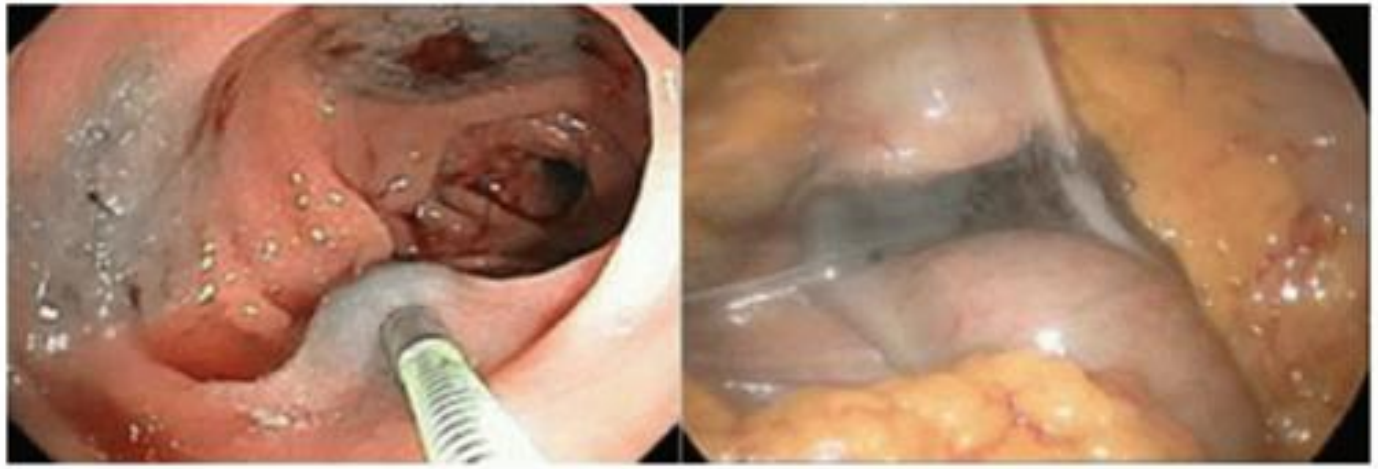
ESGE recommends snare polypectomy for sessile polyps 6–9 mm in size. ESGE recommends against the use of biopsy forceps for resection of such polyps because of high rates of incomplete resection. (High quality evidence; strong recommendation.)



https://www.youtube.com/watch?v=eux6hyKJYt8

Endoscopic Tattooing

Ferlitsch Monika et al. Endoscopy 2017



- Lesions that may need future endoscopic or surgical procedures
- Sterile carbon particle suspension with the formation of a saline bleb
- 2 or 3 separate injections should be performed at this level of 2 – 3 cm distal (anal side) to the lesion. One injection should be in line with the lesion, and one should be on the opposite aspect of the lumen.

https://www.youtube.com/watch?v=s3h_qpnTdQU

Endoscopic Resection of Early Cancer

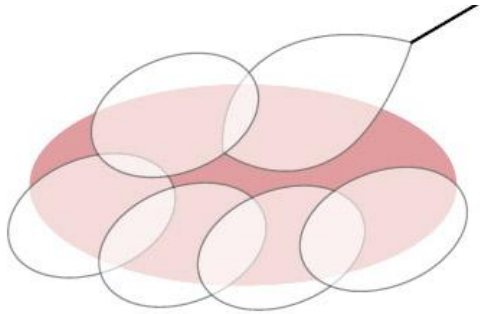
Oncological Radicality ⟶ **R0 resection**

NEGATIVE vertical and horizontal margins

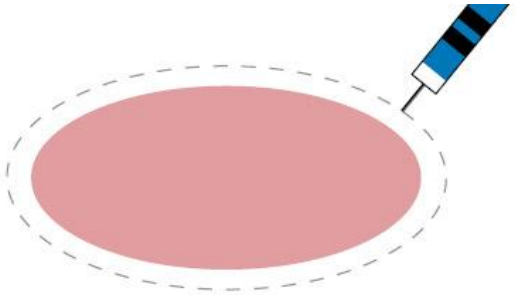
↓

En Bloc Resection

EMR for lesions up to 2 cm (Piecemeal > 2 cm)

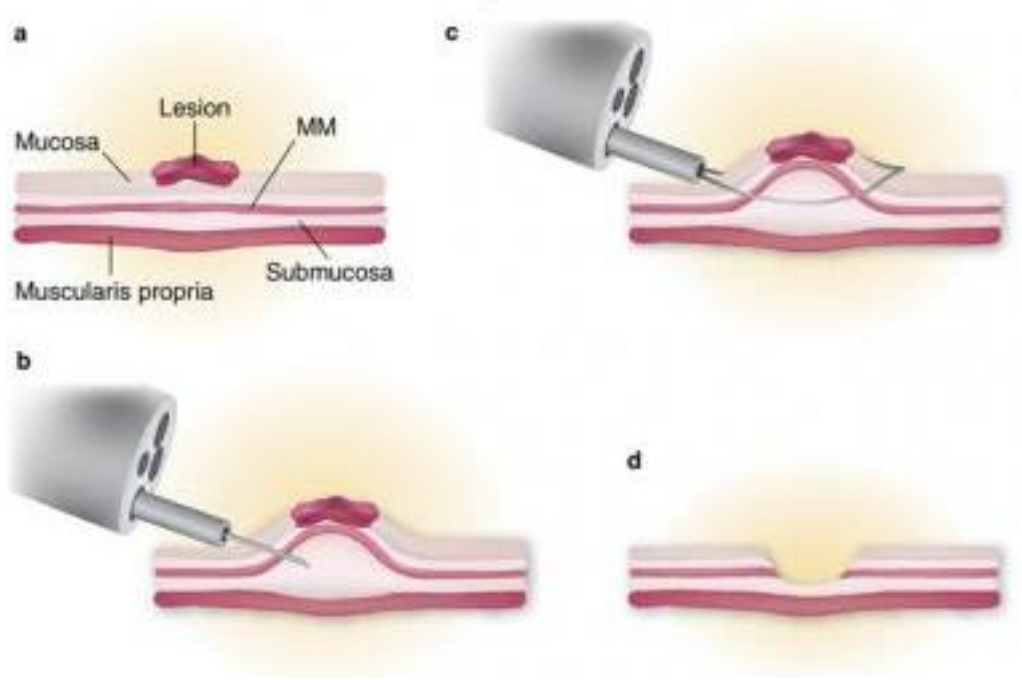


ESD for larger lesions



Endoscopic mucosal resection (EMR)

En bloc or piecemeal snare resection with or without submucosal fluid injection



RECOMMENDATION

ESGE suggests hot snare polypectomy (HSP) (with or without submucosal injection) for removal of sessile polyps 10 – 19 mm in size. In most cases deep thermal injury is a potential risk and thus submucosal injection prior to HSP should be considered. (Low quality evidence; strong recommendation.)

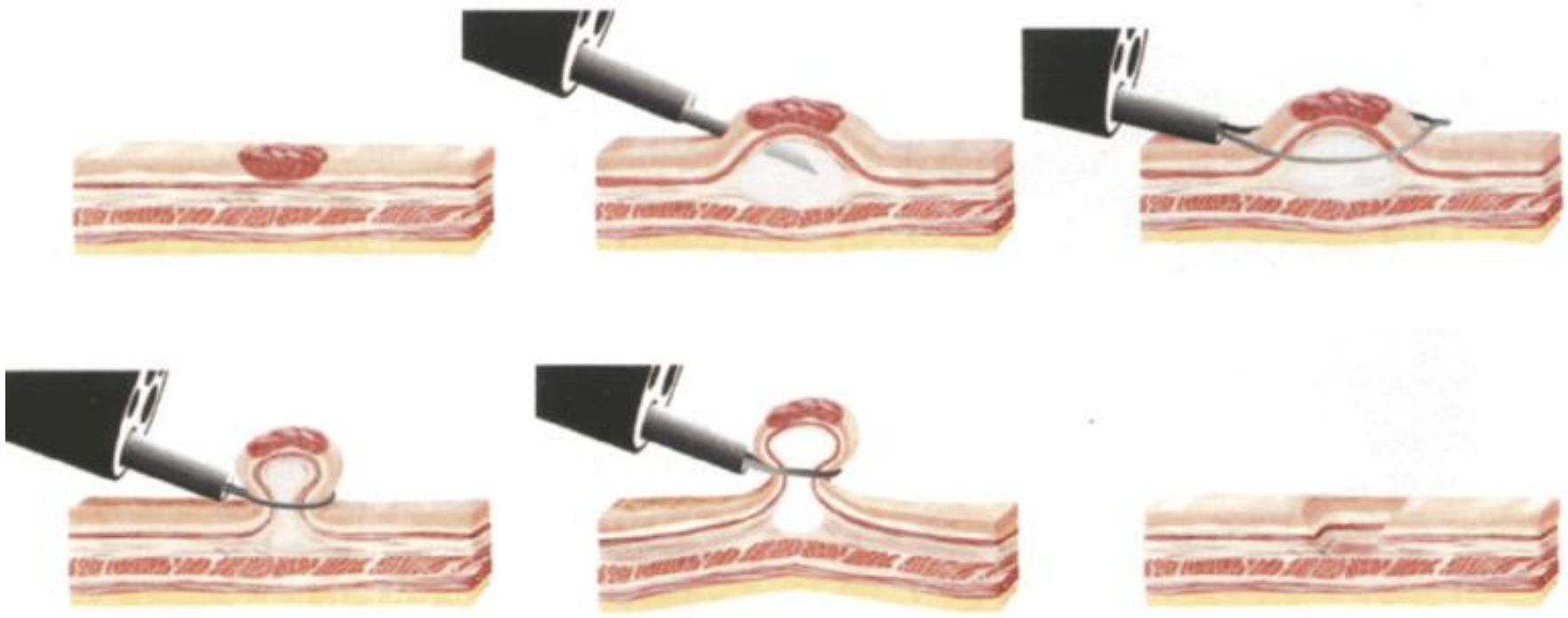
RECOMMENDATION

ESGE recommends HSP for pedunculated polyps. To prevent bleeding, in pedunculated colorectal polyps with head ≥ 20 mm or a stalk ≥ 10 mm in diameter, ESGE recommends pretreatment of the stalk with injection of dilute adrenaline and/or mechanical hemostasis. (Moderate quality evidence; strong recommendation.)

Dehyle P et al. *Endoscopy* 1973

Ferlitsch Monika et al. Endoscopy 2017

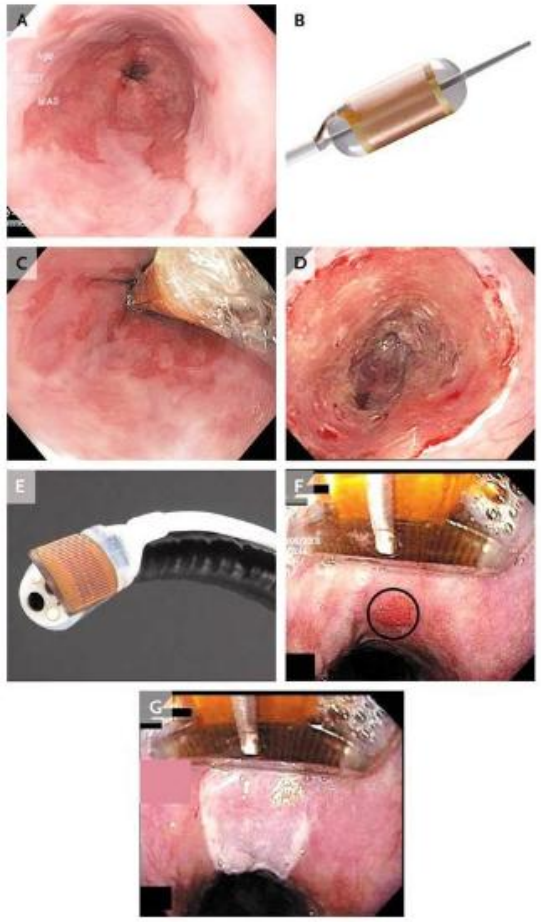
EMR (endoscopic mucosal resection)



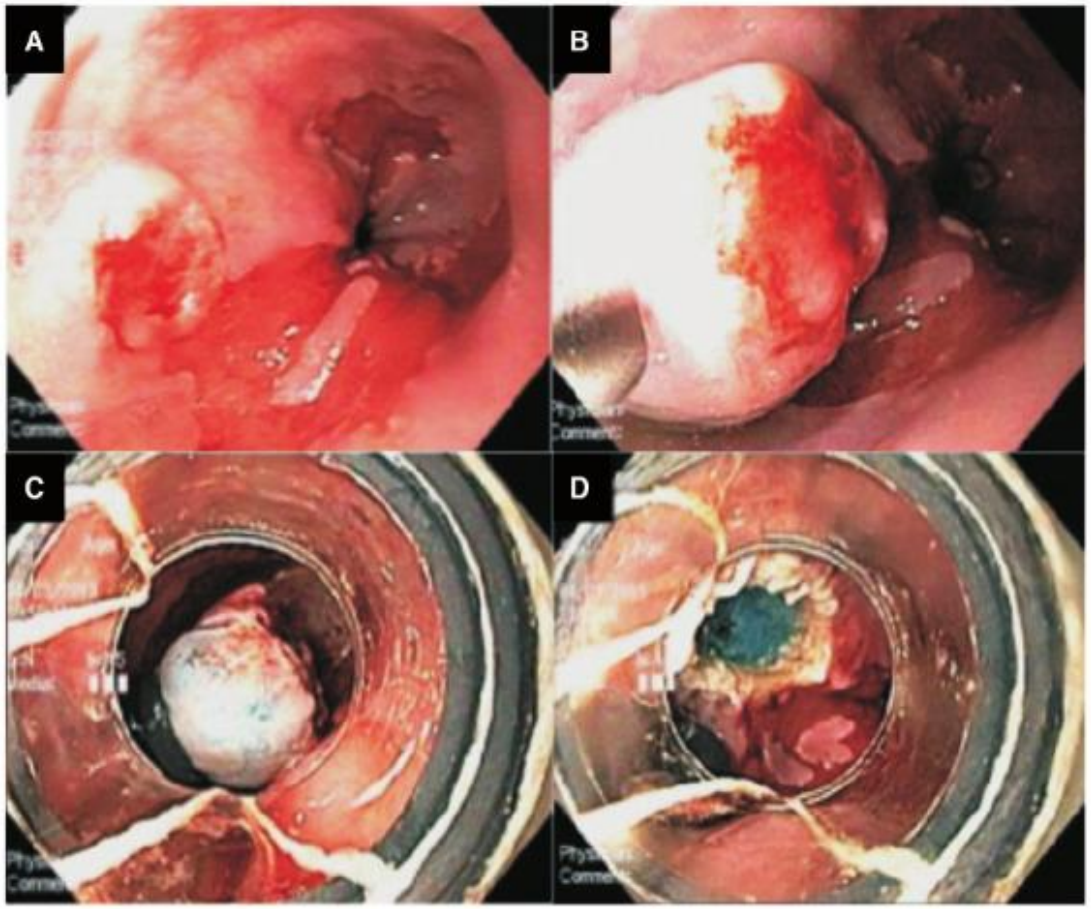
https://www.youtube.com/watch?v=qSkY-iDwO9g

Treatment for Barrett's Esophagus

Radiofrequency Ablation



Endoscopic mucosal resection

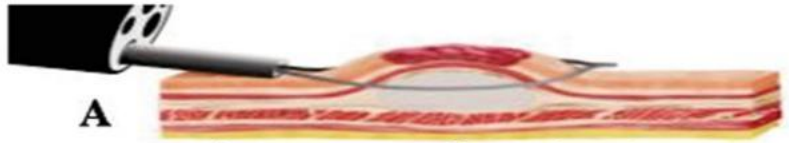


Endoscopic mucosal resection (EMR) for early esophageal adenocarcinoma. (A) A nodular lesion with central depression causing concern about malignancy at the proximal end of Barrett's segment. (B) The lesion lifted well with submucosal injection. (C and D) EMR was successfully performed using band ligation. The pathology showed intramucosal cancer (T1a) without any involvement of the deep and lateral margins.

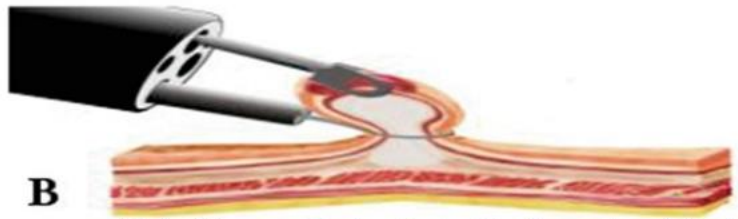
https://www.youtube.com/watch?v=VsbbZ8_nTaE

Endoscopic resection: how to do it?

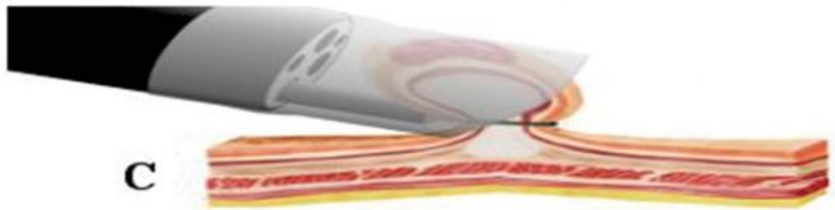
EMR



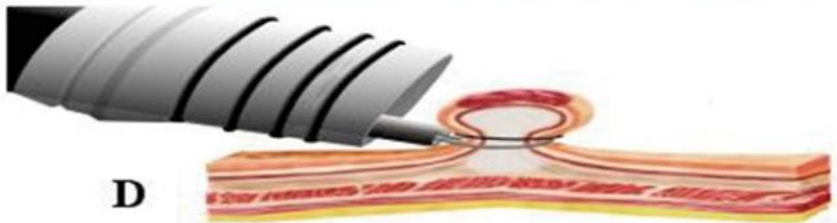
Polypectomy; Deyhle et al., *Endoscopy,* 1973



Strip Biopsy; Tada et al., *Gastroenterol Endosc,* 1984

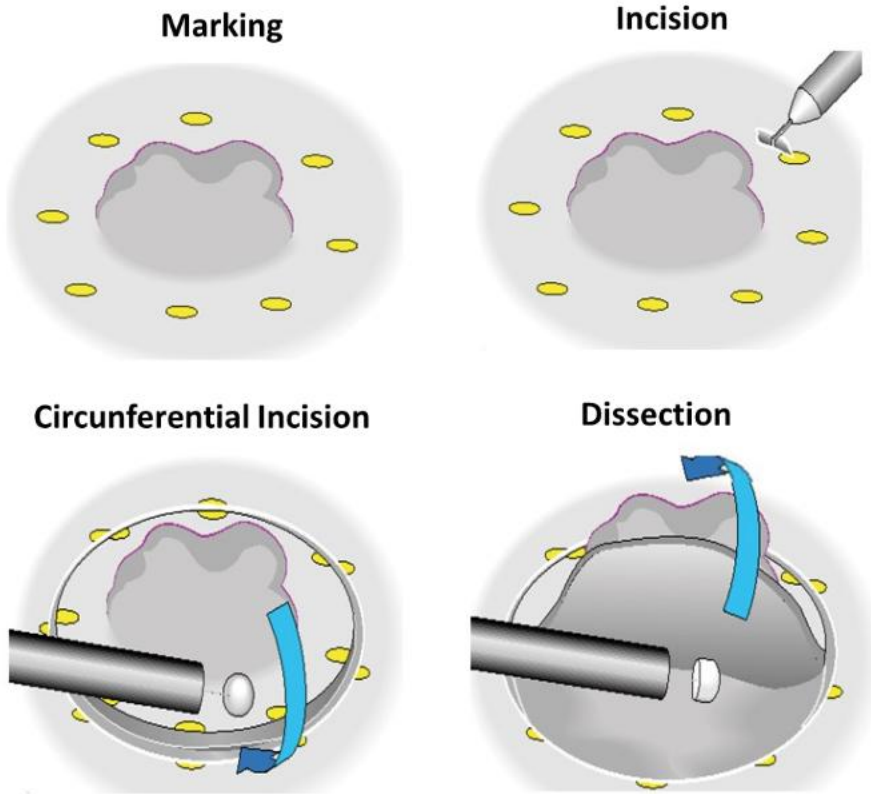


EMR-C; Inoue et al., *Gastrointest Endosc,* 1993



EMR-L; Akiyama et al., *Gastrointest Endosc,* 1997

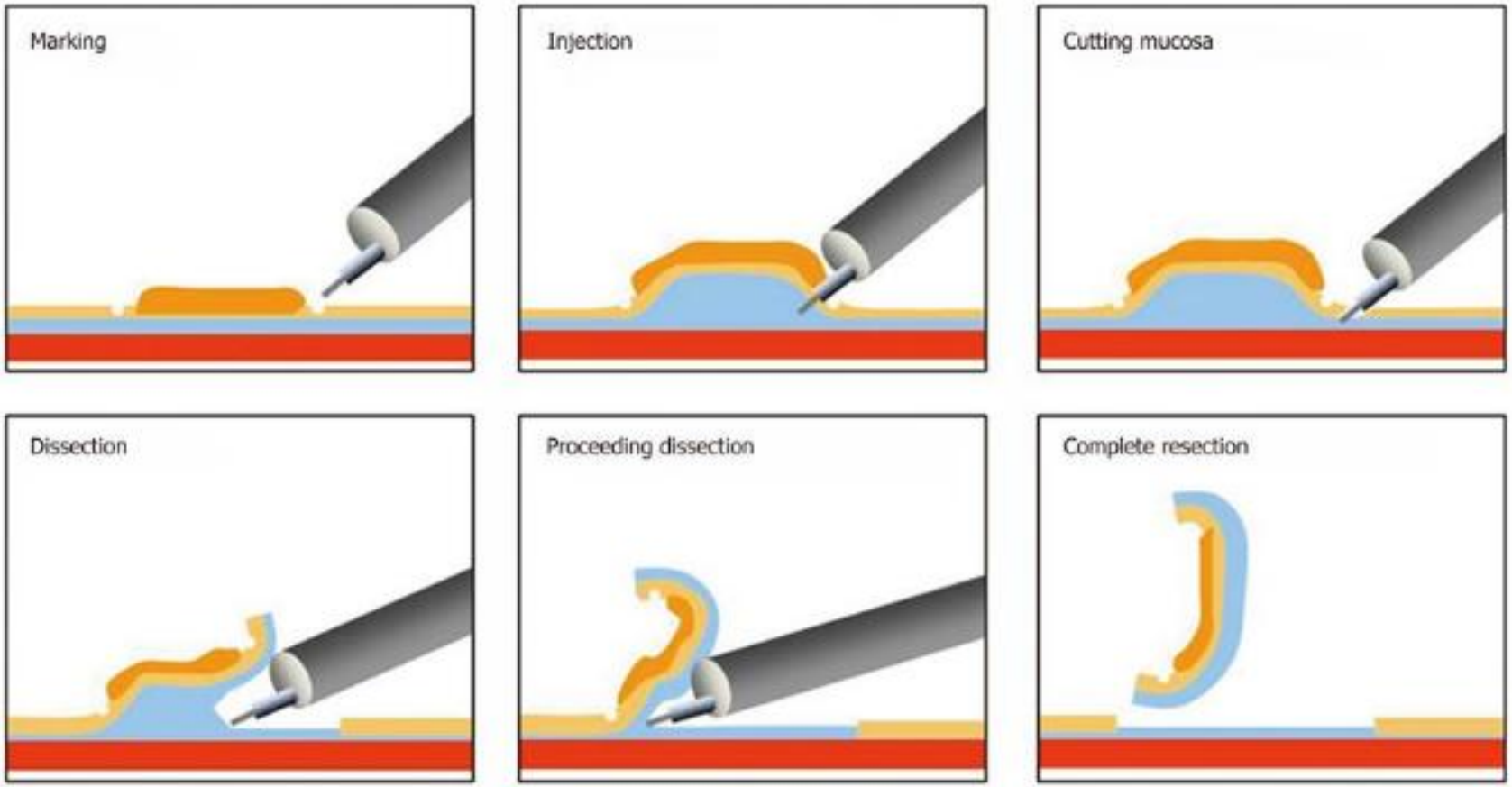
ESD



Soetikno et al, Gastrointest Endosc, 2003
Itaru Saito et al. Clinical Endoscopy, 2014

ESD (endoscopic submucosal dissection)

The gold standard is to achieve en bloc and complete resection of superficial tumors > 20 mm



https://www.youtube.com/watch?v=P3tfr9ytJ9o

ESD (endoscopic submucosal dissection)

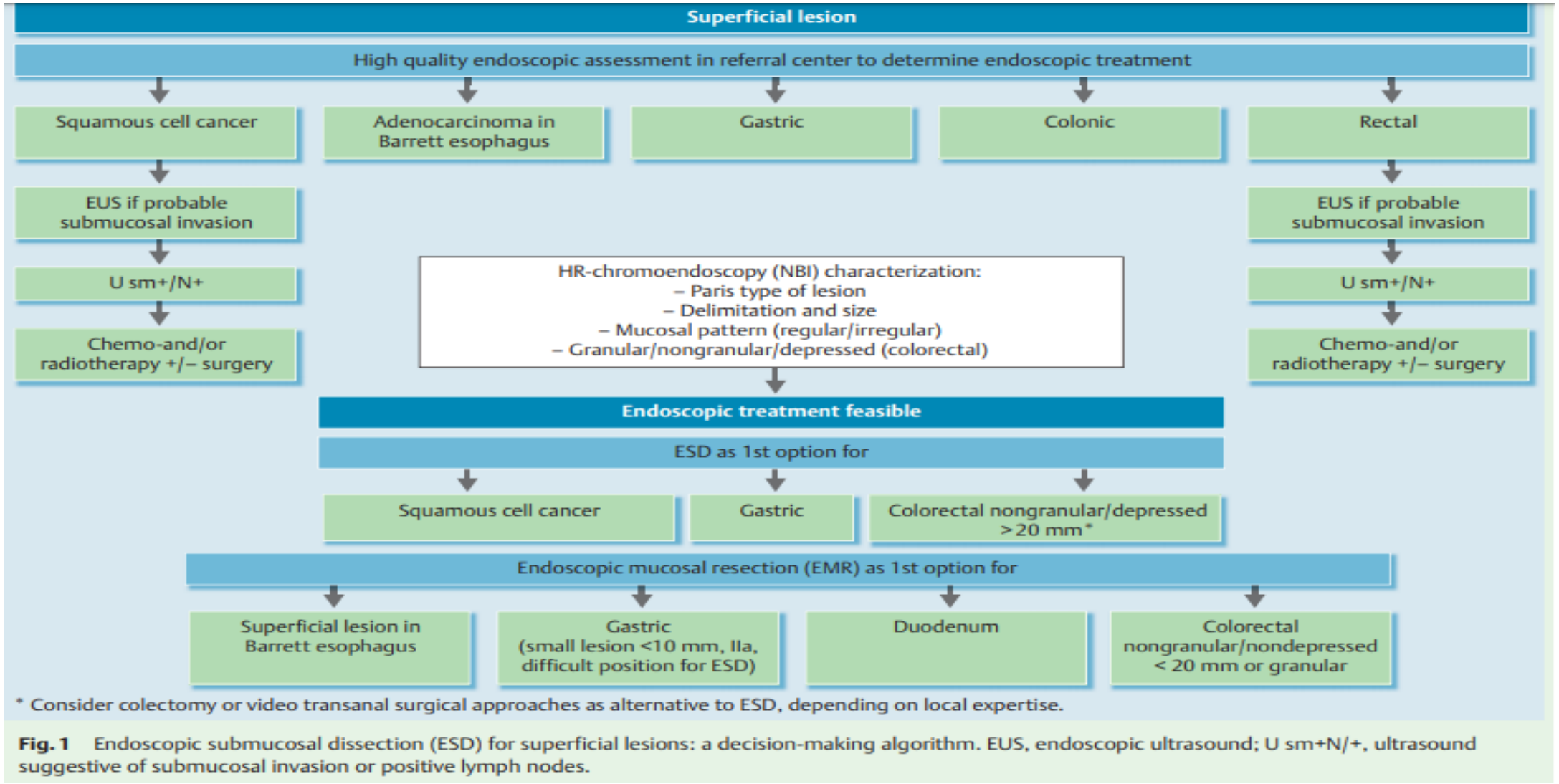
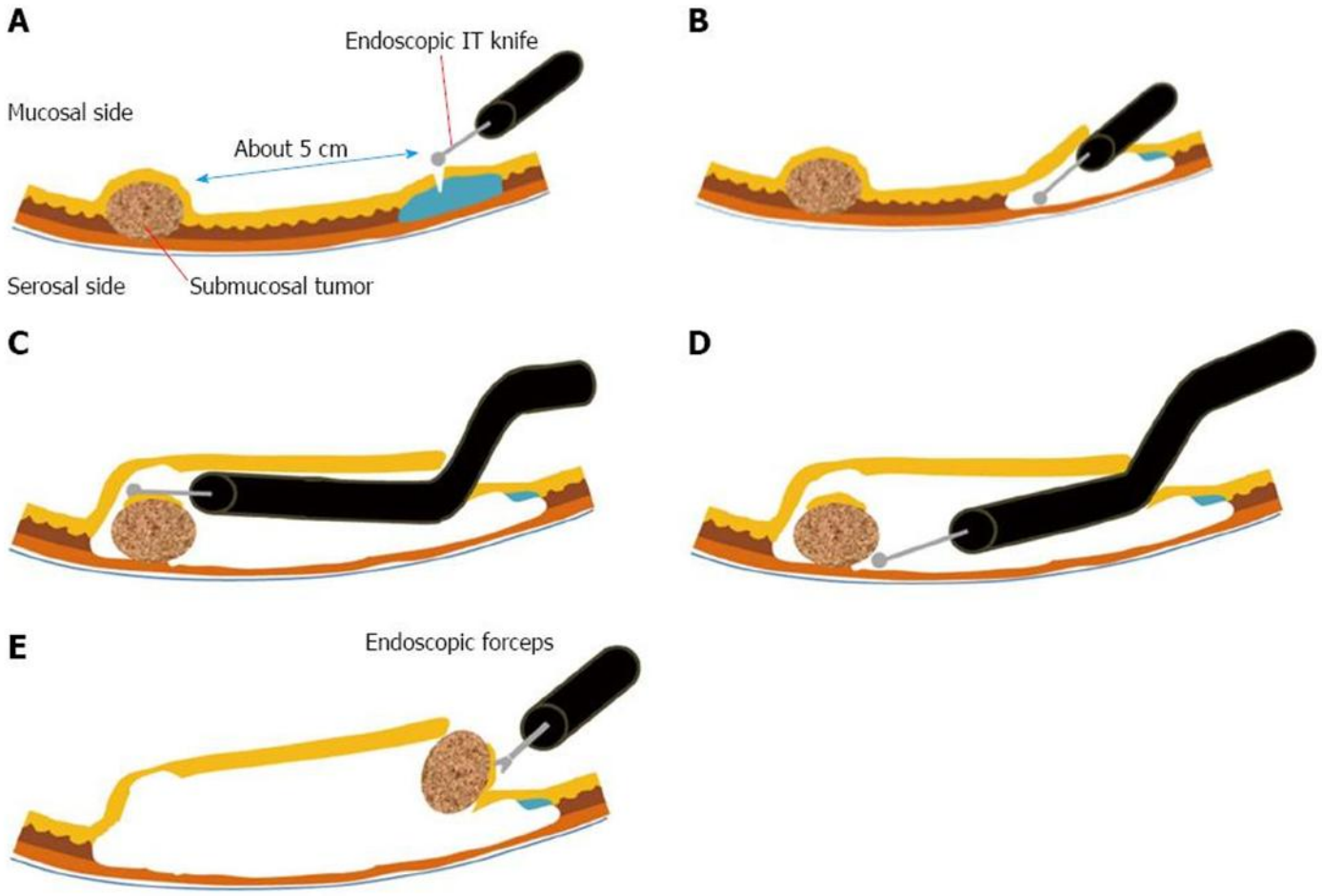


Fig. 1 Endoscopic submucosal dissection (ESD) for superficial lesions: a decision-making algorithm. EUS, endoscopic ultrasound; U sm+N/+, ultrasound suggestive of submucosal invasion or positive lymph nodes.

Endoscopic submucosal dissection: European Society of Gastrointestinal Endoscopy (ESGE) Guideline

Submucosal Tumor Endoscopic Resection



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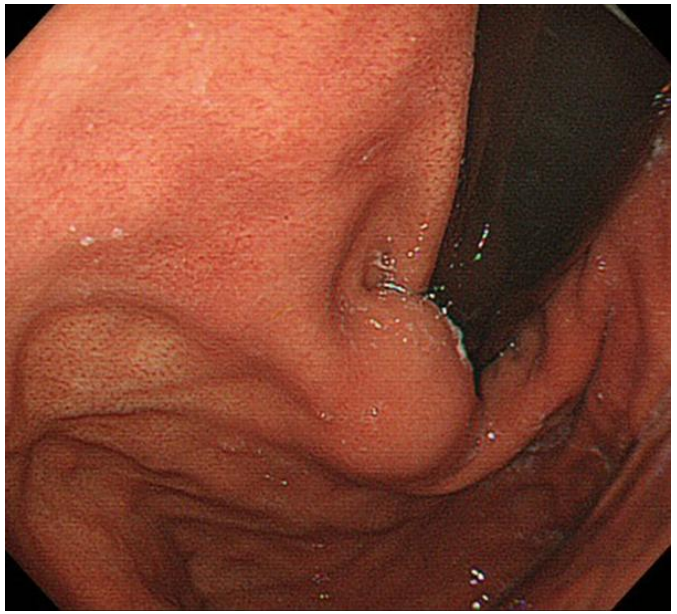
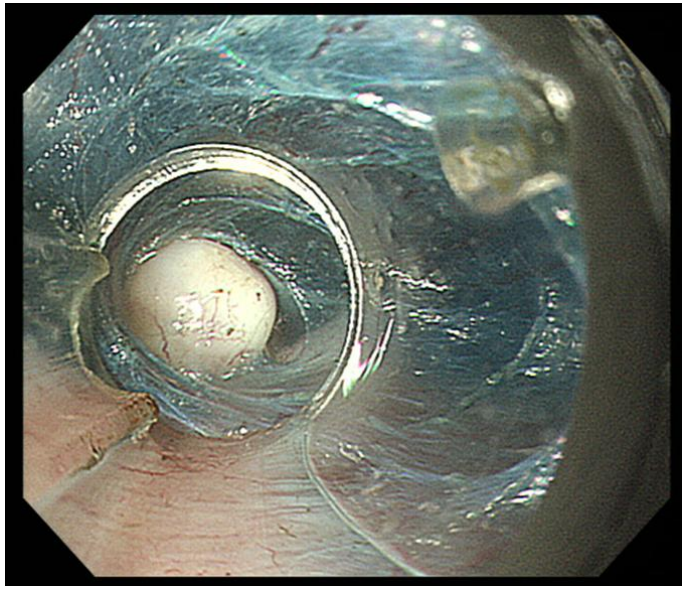
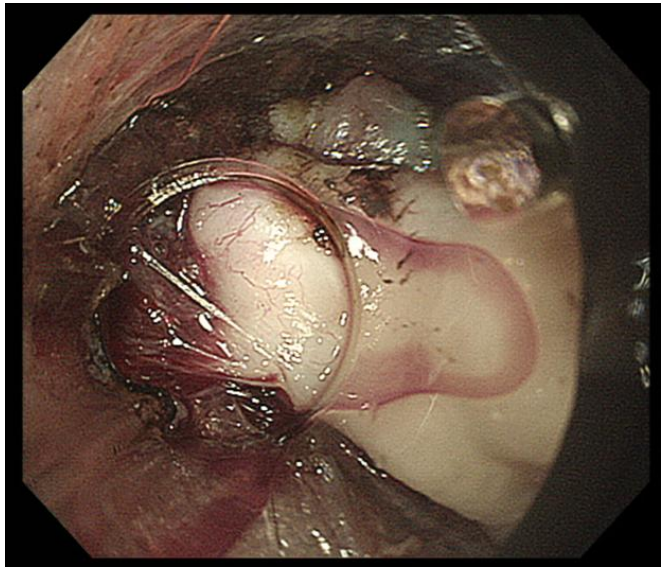
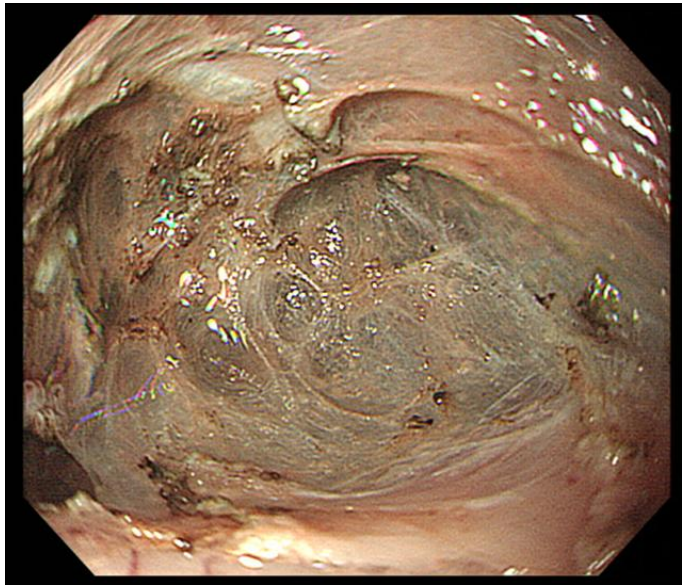
Submucosal Tumor Endoscopic Resection









Bowel obstruction

- Colonoscopy may be required to exclude other causes of obstruction by endoscopic biopsy or brush citology, but it is not required prior to colonic stent placement.
- Oral bowel cleansing is a contraindication in bowel obstruction
- Enema is considered useful to clean bowel distal to the stricture and to facilitate the stent placement procedure
- Naso-gastric tube placement is advisable

Van Hooft JE et al. ESGE clinical guideline. Endoscopy. 2014

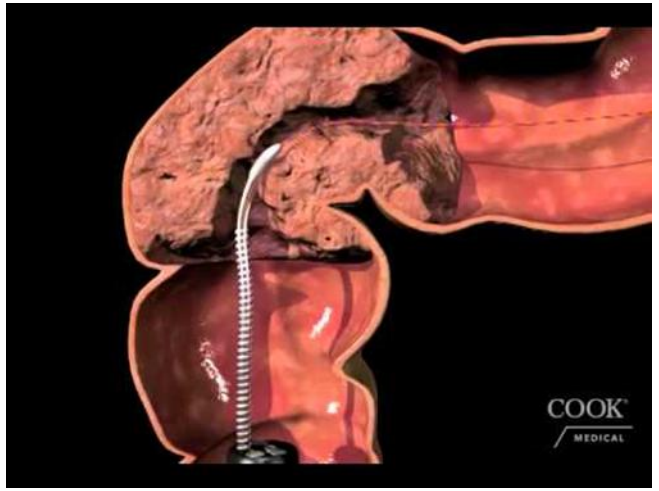
Self Expanding Metal Stent - SEMS

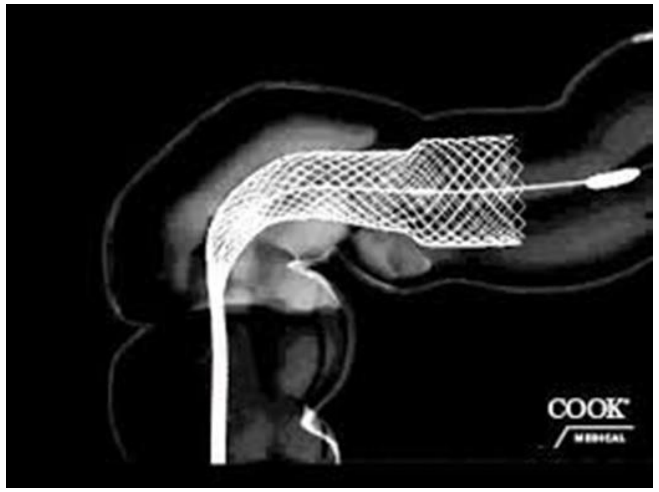
SYSTEM OF DEPLOYMENT : under endoscopic or radiologic control

Through the scope stents (TTS)

- mounted on a small size catheter that can pass through an endoscope with a working channel of at least 3.7 mm.
- the stent is advanced through the working channel of the endoscope, after positioning of a guidewire across the stricture
- deployed under endoscopic and fluoroscopic control

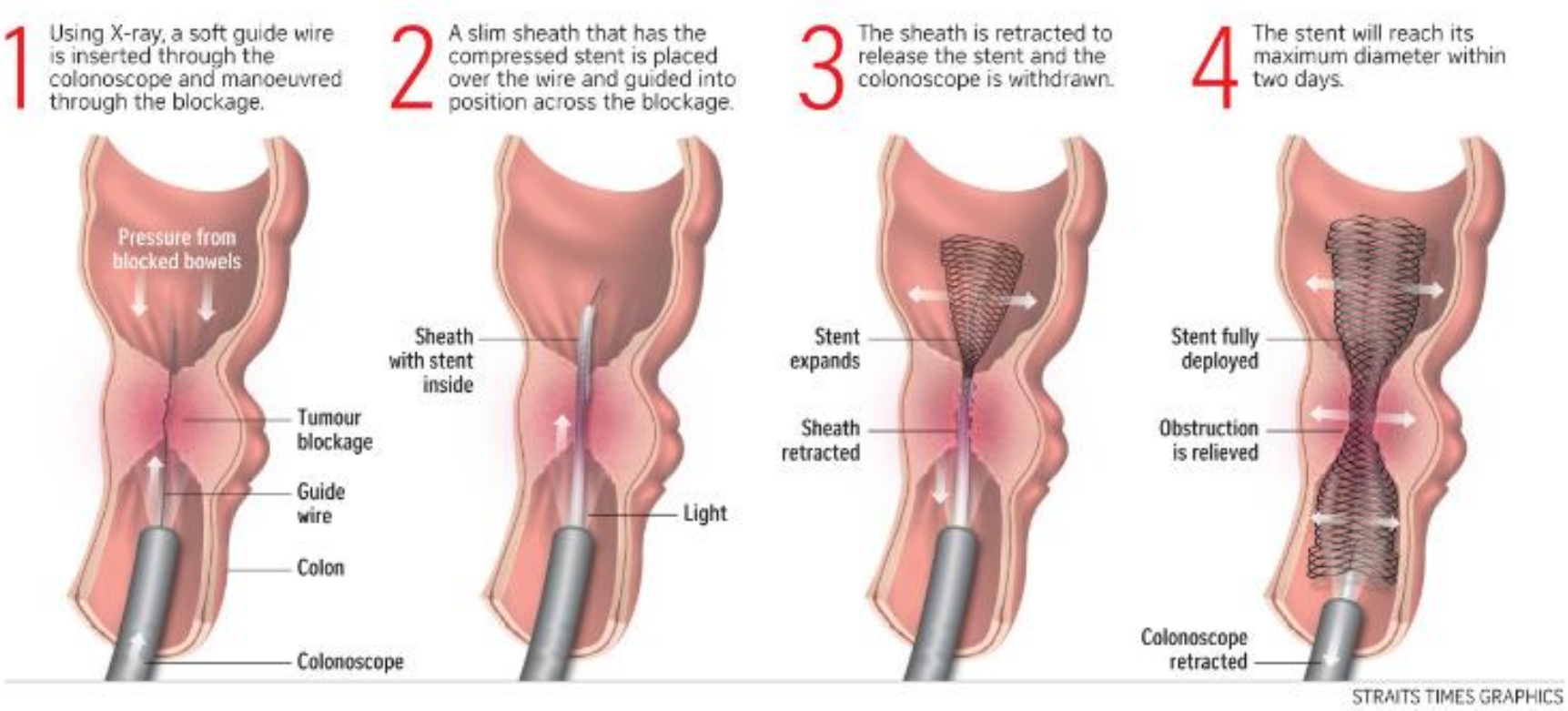
Most of the stents commercially available today use the TTS system for their safety and effectiveness





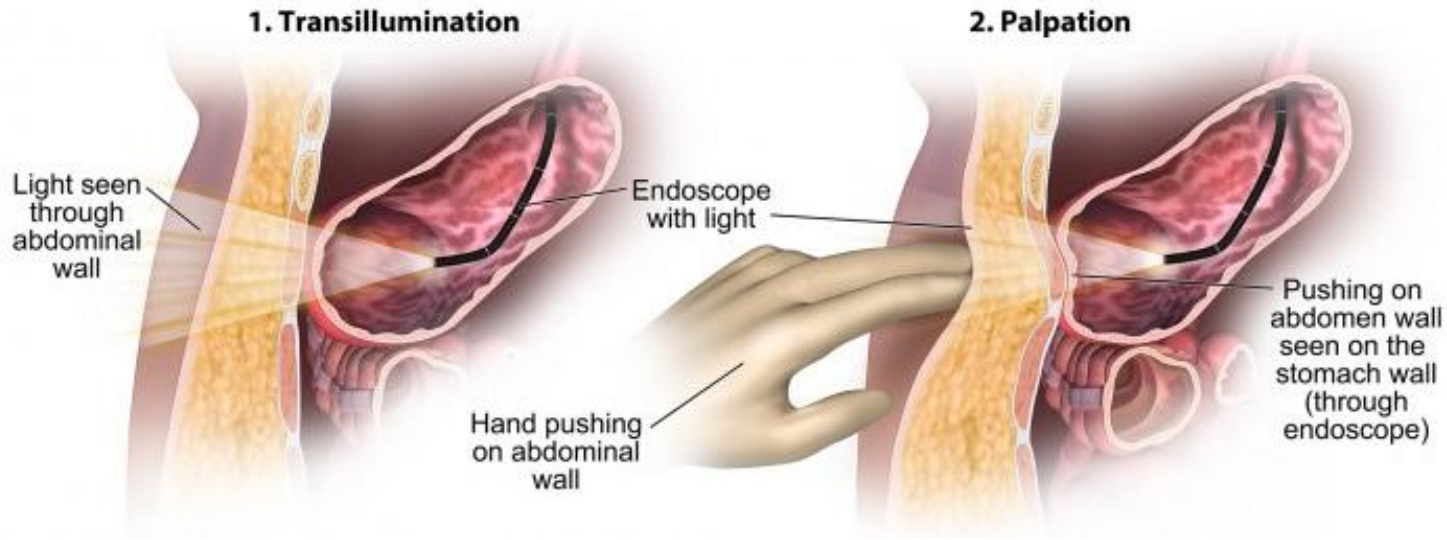
Wan Y et al. Tech Coloproctol. 2016

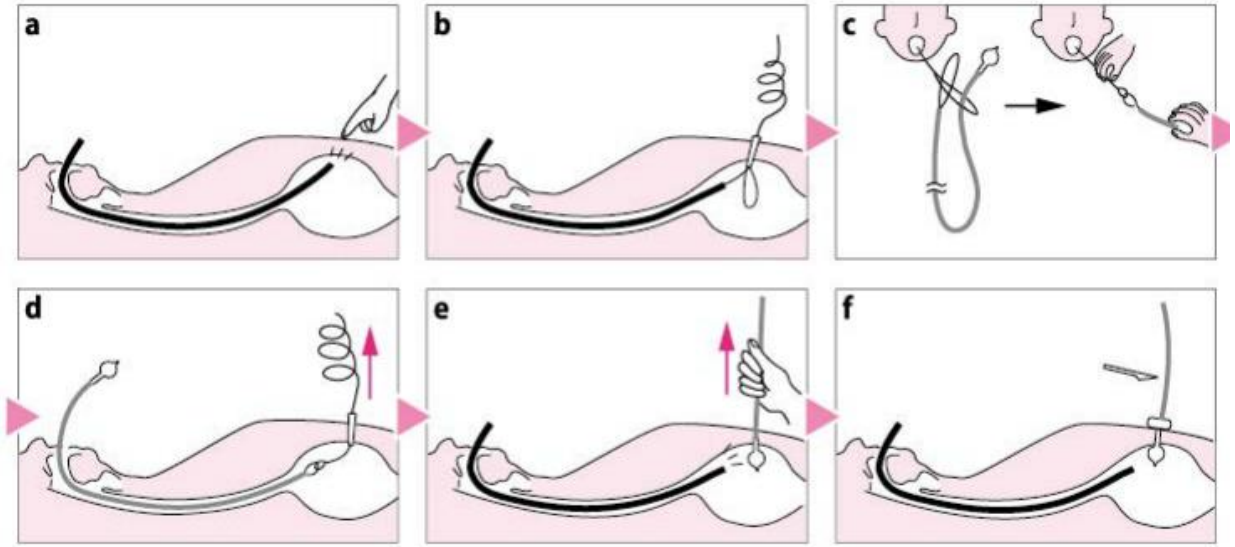
Stent placement



https://www.youtube.com/watch?v=p-9CtX-ukdU

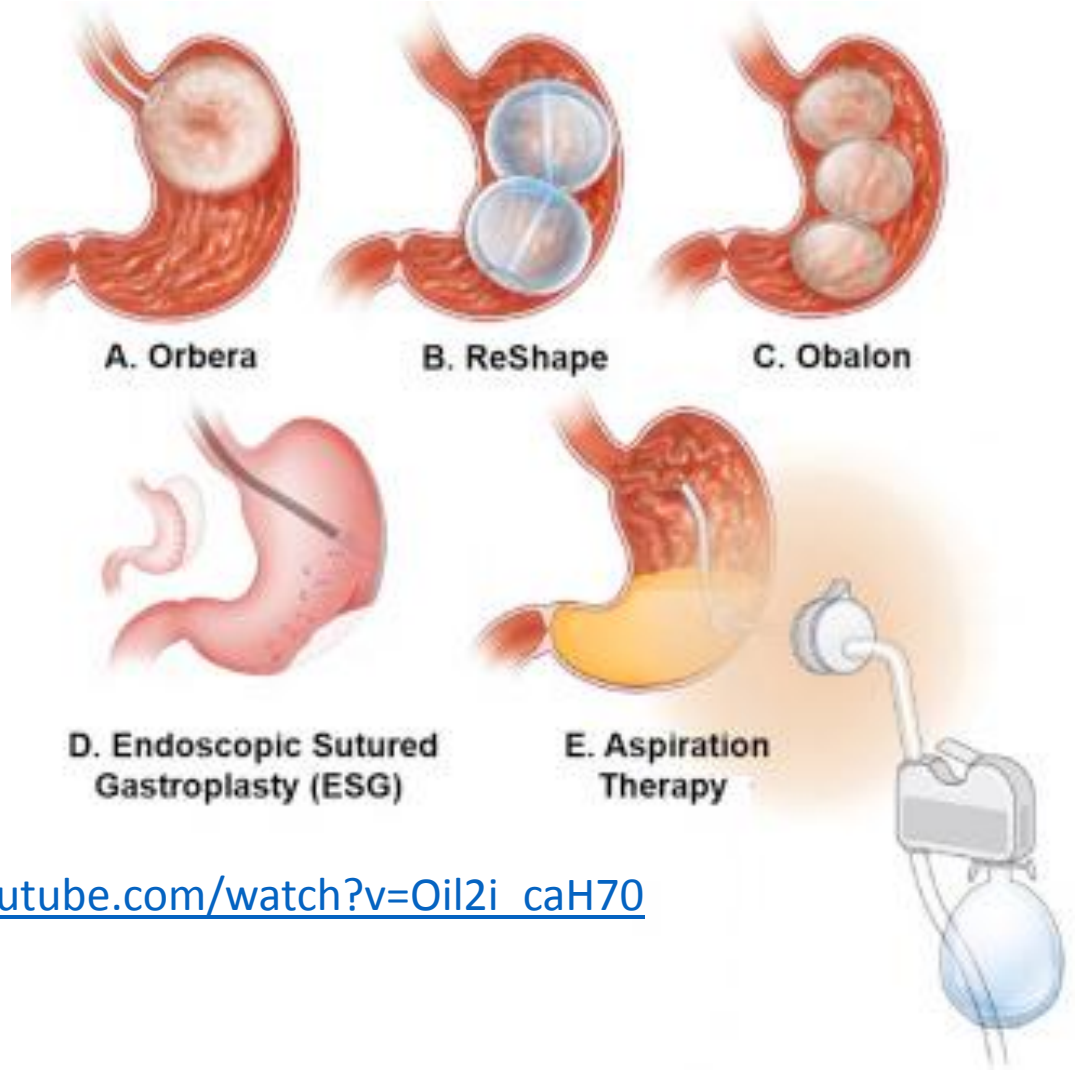
PEG (Percutaneous endoscopic gastrostomy)





https://www.youtube.com/watch?v=HmvFv1jswzg

Bariatric endoscopic treatments



https://www.youtube.com/watch?v=Oil2i_caH70

Review Article

Endoscopic bariatric therapies for treating obesity: a learning curve for gastroenterologists

Vahe Shahnazarian[1], Daryl Ramai[2], Avik Sarkar[3]

Transl Gastroenterol Hepatol 2019;4:16