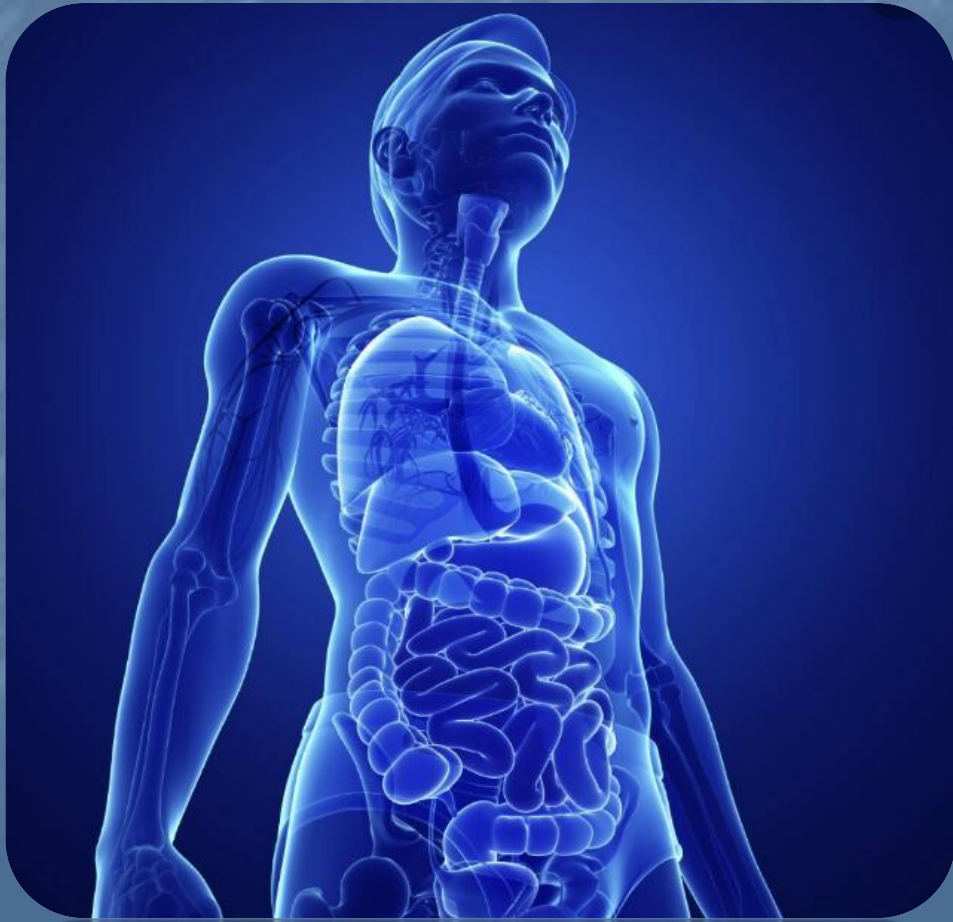


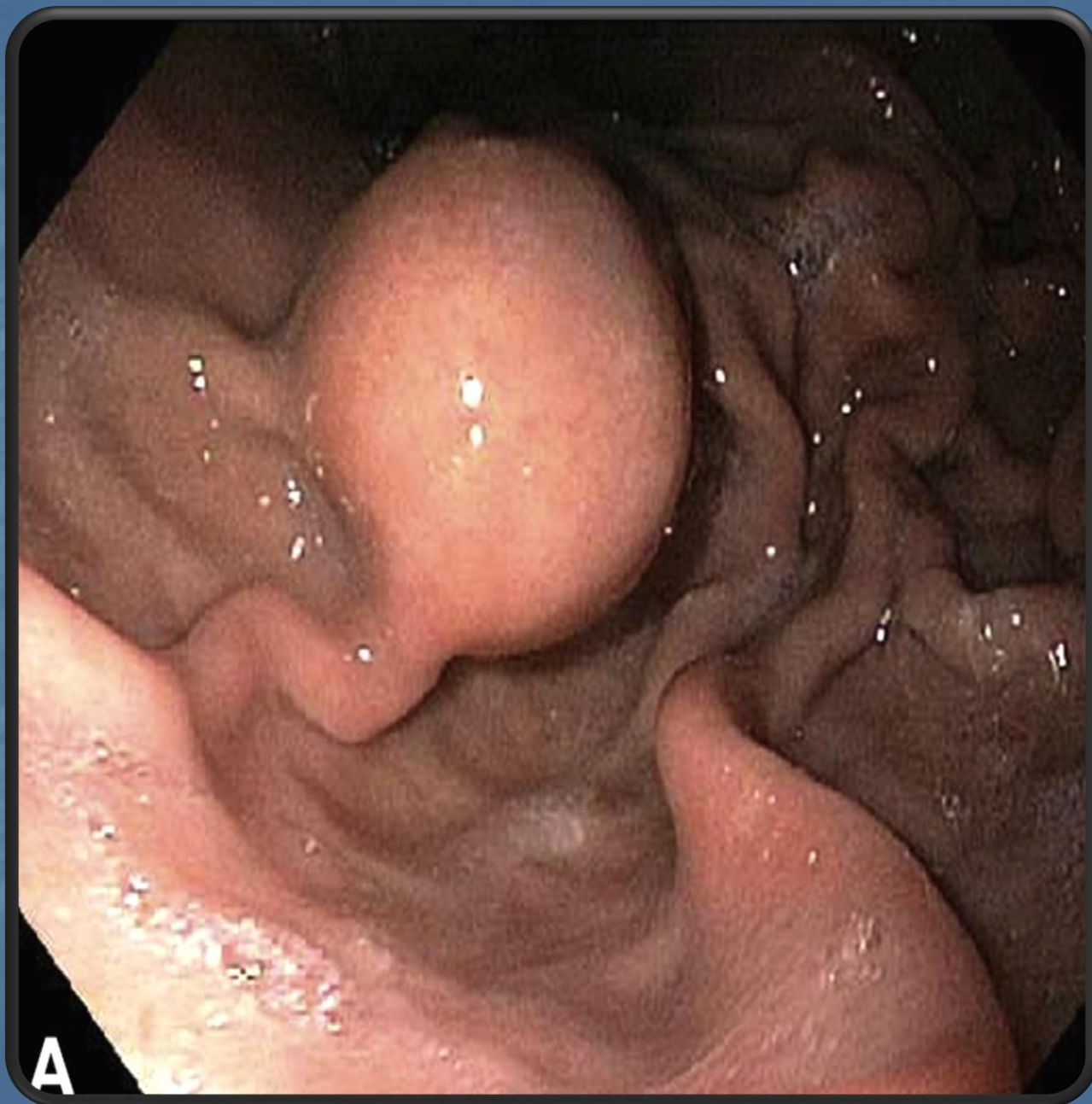
The role of endoscopy in subepithelial lesions of the GI tract



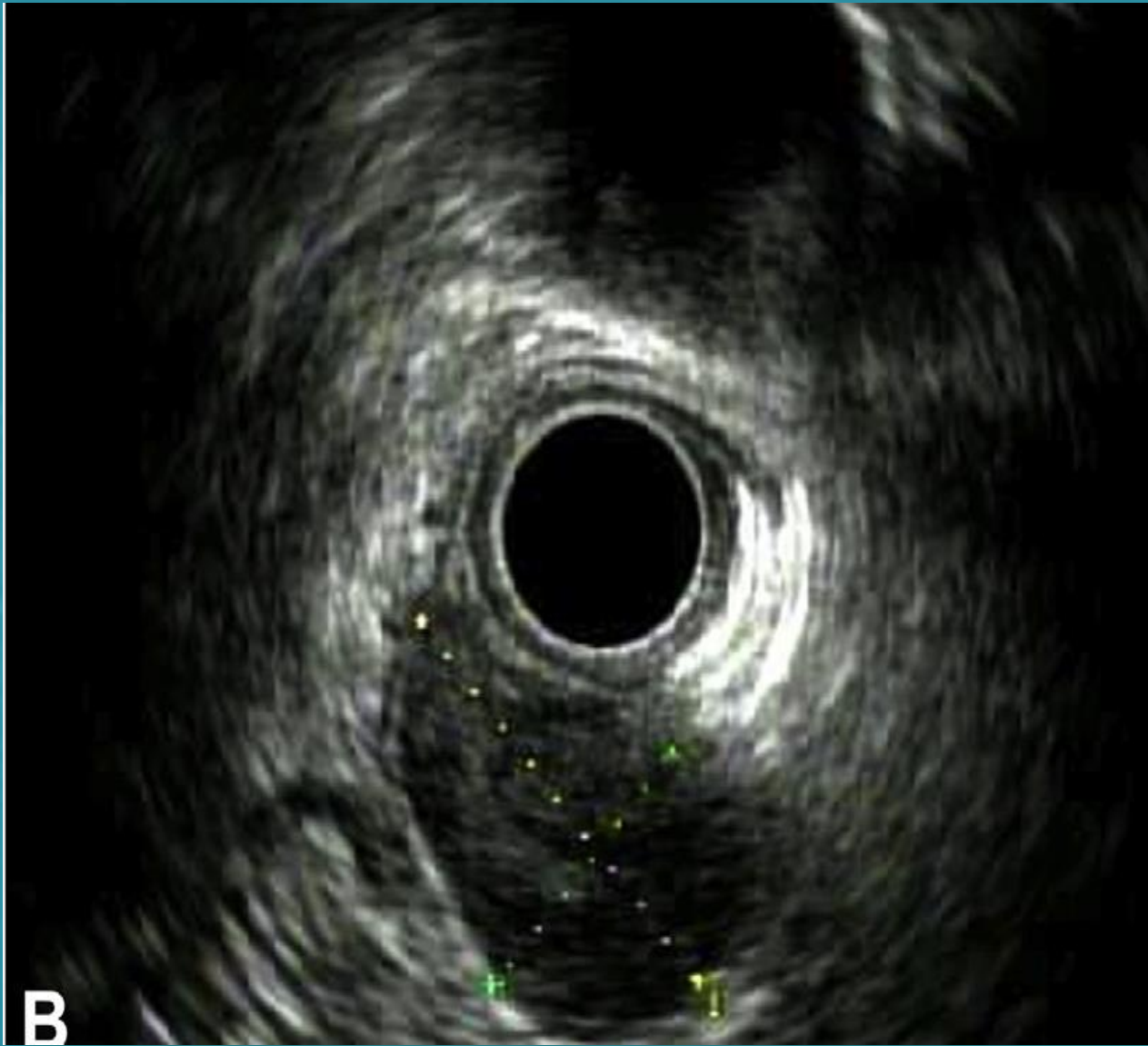
Dr. Yaser Goumaa
18/10/2018

subepithelial lesions (SELs)

- ✓ *Tumors that originate from the muscularis mucosa, submucosa, or muscularis propria.*
- ✓ *The term **subepithelial lesion is preferred** to the term submucosal tumor.*
- ✓ *Most commonly in **the stomach**.*
- ✓ *Rounded protuberances with **normal overlying mucosa**.*
- ✓ *The majority **are small** (<2 cm in diameter) and **found incidentally**.*
- ✓ ***present with** bleeding, obstruction, or metastases.*



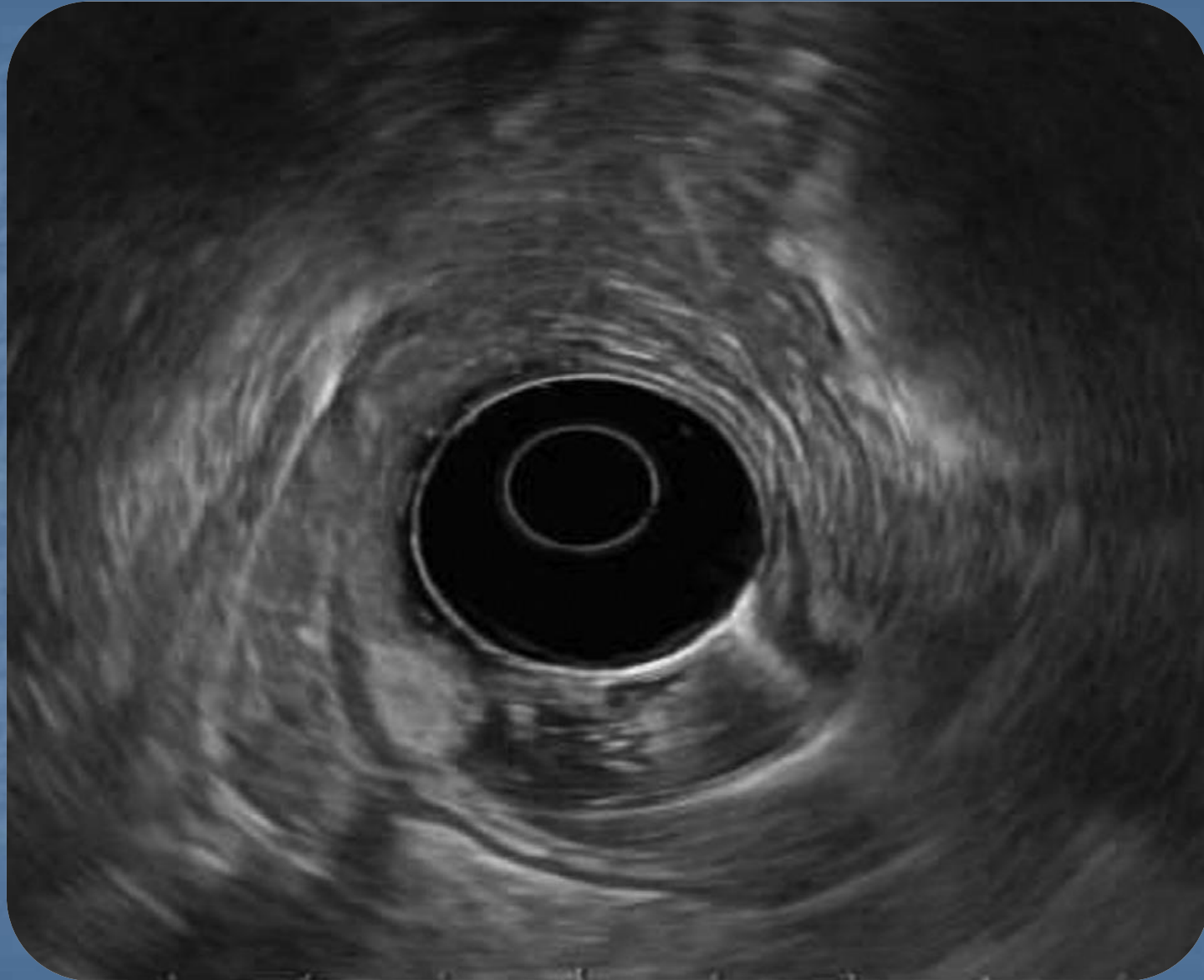
A, Subepithelial gastric lesion seen on standard EGD



***B, EUS image revealing
GI stromal tumor,
deriving from the fourth
layer of the gastric wall***

Characteristics of subepithelial mass lesions at endoscopy and EUS

Subepithelial lesion Benign	Endoscopic appearance	EUS layer	EUS appearance
GI stromal tumor—low risk	No specific characteristics, lack ulcerations	4th (rarely 2nd or 3rd)	Hypoechoic, majority <3-5 cm, smooth margins, round, homogeneous, rare malignant GI stromal tumors were reported with size <3 cm
Leiomyoma	No specific characteristics	2nd, 3rd, or 4th	Hypoechoic, well-circumscribed
Lipoma	Yellow hue, pillow sign (high specificity, low sensitivity), usually isolated	3rd	Intensely hyperechoic, homogeneous, smooth margins, may be polypoid
Varices	Bluish tinge, tortuous, easily compressible	3rd	Anechoic, serpiginous, Doppler positive



EUS image of a gastric lipoma

Subepithelial lesion Benign	Endoscopic appearanc	EUS layer	EUS appearance
Neural origin schwannoma,neuroma , neurofibroma	No specific characteristics	3rd or 4th	Hypoechoic
Granular cell tumor	No specific characteristics, majority small(<4 cm) and solitary	2nd or 3rd	Hypoechoic, heterogeneous echotexture
Inflammatory fibroid polyp	Smooth, usually solitary, sessile polyp with ulceration of the overlying mucosa, 2-5 cm	3rd or 4th	Hypo- to hyperechoic, indistinct margin, homogeneous appearance
Duplication cyst	Smooth and regular appearance, slightly translucent,compressible	Any or extramural	Anechoic, 3-5 layer wall, round or oval, absent Doppler signal

Subepithelial lesion Benign	Endoscopic appearance	EUS layer	EUS appearance
Lymphangioma	Cyst-like bulging mass, easily compressed, more common in intestine	3rd	Anechoic with internal septa
Pancreatic rest	90% have umbilicated surface corresponding to a draining duct, >90% located in the antrum	2nd, 3rd, 4th	Hypoechoic or mixed echogenicity (heterogeneous Z acinous tissue, anechoic Z ductal structures), indistinct margin, anechoic cystic or tubular structures within the lesions can be seen in 1/3 of cases
Brunner's gland hyperplasia	Duodenal bulb, usually single	2nd and 3rd	Hyperechoic, anechoic area due to duct, smooth margin

(SEs) Malignant (potential)	Endoscopic appearance	EUS layer	EUS appearance
GI stromal tumor—low risk	Presence of ulcerations	4th (rarely 2nd or 3rd)	Hypoechoic, >3 cm, irregular extraluminal margins, cystic spaces, heterogeneous, echogenic foci
GI neuroendocrine neoplasm	No specific characteristics, may be yellowish in appearance; gastric carcinoid tumors often multiple. Types I and II usually are benign, and type III usually is malignant. Rectal and duodenal usually solitary.	2nd or 3rd	Mildly hypoechoic or isoechoic, homogeneous, oval or round, smooth margin
Lymphoma	No specific characteristics	2nd, 3rd, or 4th	Hypoechoic
Metastasis	No specific characteristics	Any or all	Hypoechoic, heterogeneous mass
Glomus tumor	No specific characteristics, mostly seen in the antrum	3rd and 4th	Hypo- or hyperechogenicity. More than half have internal hyperechoic spots that corresponded to calcifications. Doppler EUS shows a prominent vascular signal consistent with the hypervascular nature of the tumor.



Ulcerated gastric GIST

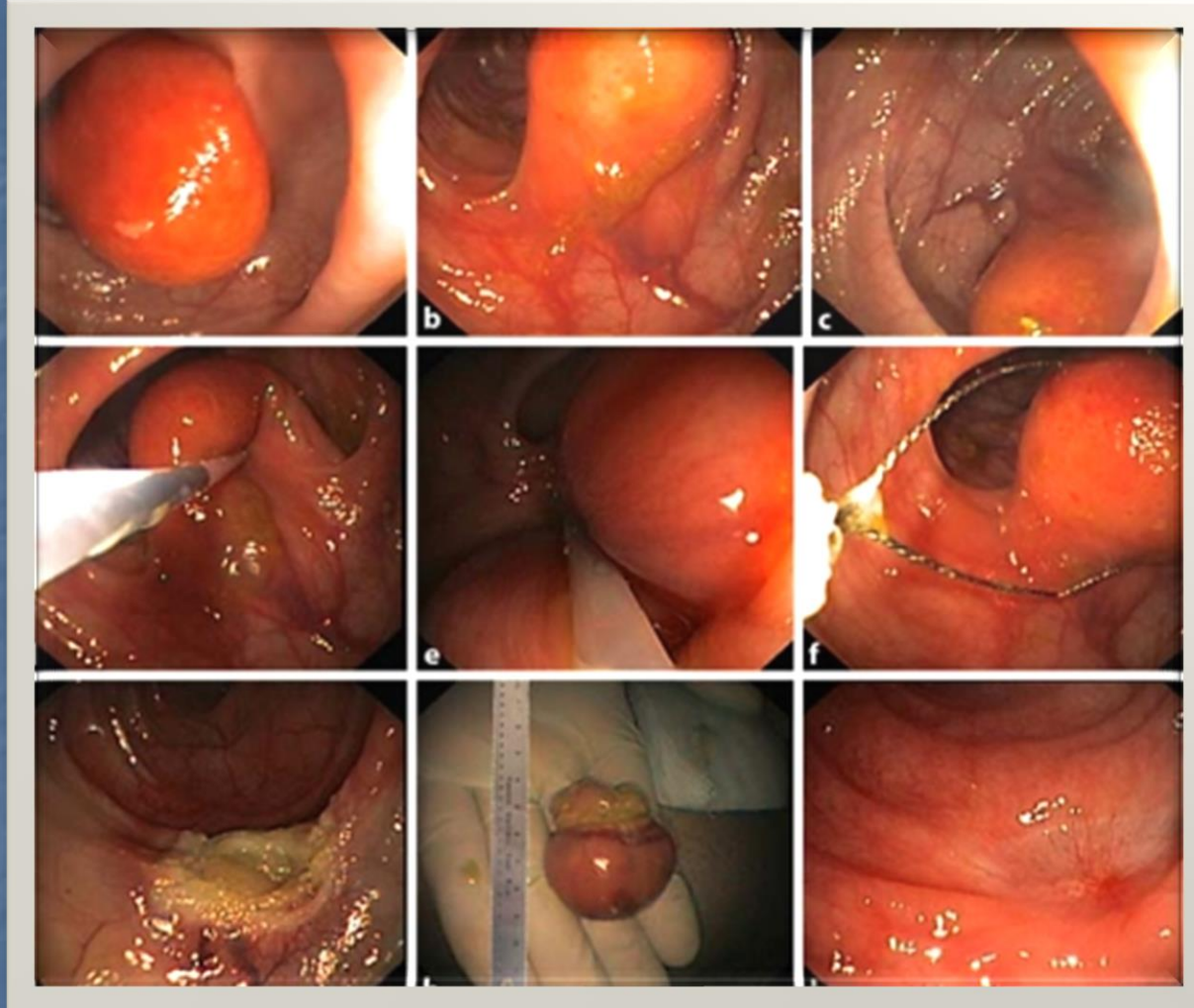
Gastric GI stromal tumors
proposed guidelines for assessing the malignant potential

Tumor size	Mitotic rate	Predicted biologic behavior
≤2cm	≤5 mitoses/50 HPF >5 mitoses/50 HPF	Metastasis rate or tumor-related mortality: 0 metastasis rate or tumor-related mortality: <4%
>2 cm ≤5 cm	>5 mitoses/50 HPF	Metastasis rate or tumor-related mortality: 16%
>2 cm ≤10 cm	≤5mitoses/50 HPF	Metastasis rate or tumor-related mortality: <4%
>5 cm ≤10 cm	>5 mitoses/50 HPF	Metastasis rate or tumor-related mortality: 55%
>10 cm	≤5mitoses/50 HPF	Metastasis rate or tumor-related mortality: 12%
>10 cm	>5 mitoses/50 HPF	Metastasis rate or tumor-related mortality: 86%

Small-intestine GI stromal tumors

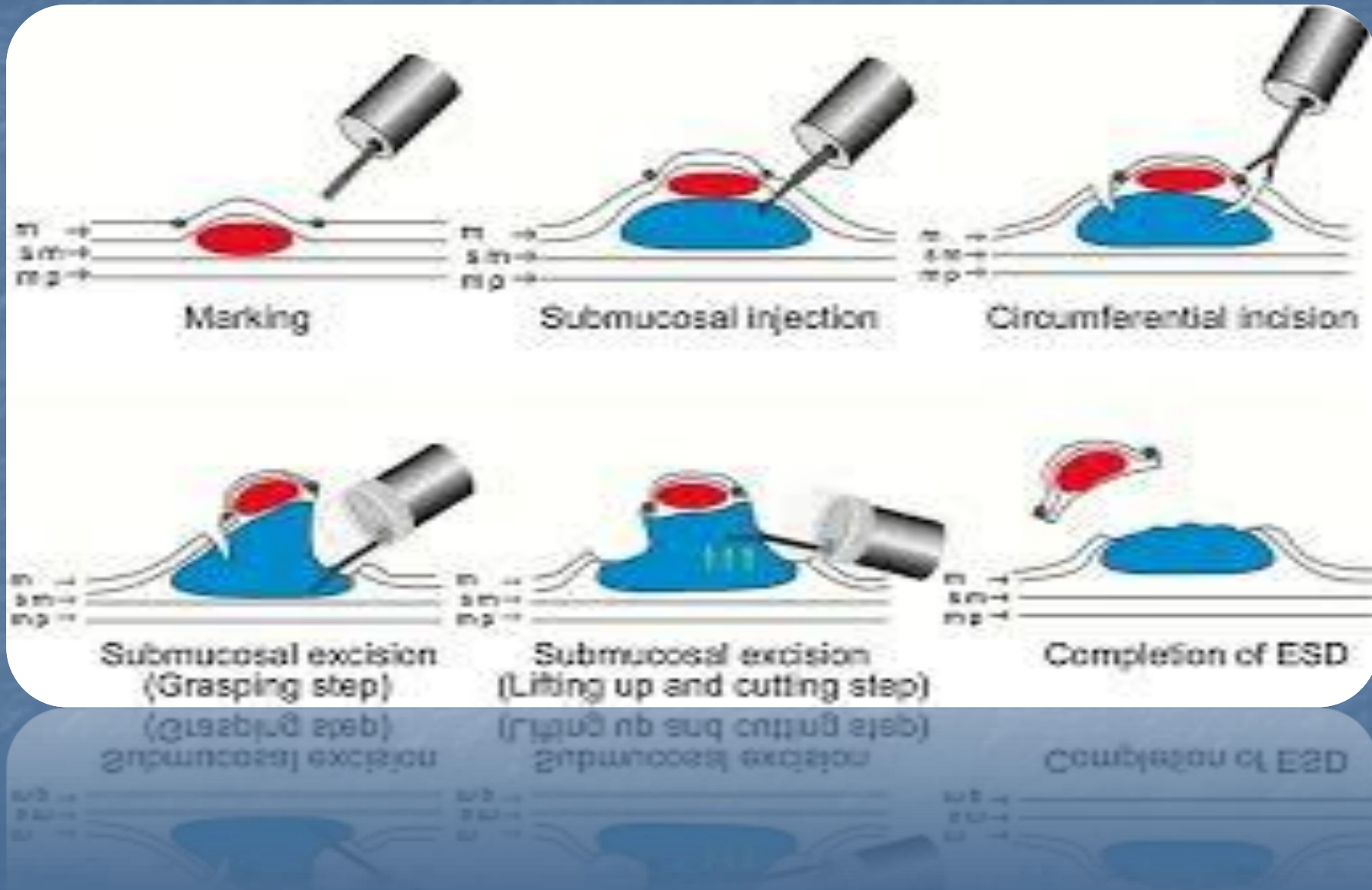
proposed guidelines for assessing the malignant potential

Tumor size	Mitotic rate	Predicted biologic behavior
≤ 2 cm	≤ 5 mitoses/50 HPF > 5 mitoses/50 HPF	Metastasis rate or tumor-related mortality: 0
> 2 cm ≤ 5 cm	> 5 mitoses/50 HPF	Metastasis rate or tumor-related mortality: 2%
> 2 cm ≤ 10 cm	≤ 5 mitoses/50 HPF	Metastasis rate or tumor-related mortality: 73%
> 5 cm ≤ 10 cm	> 5 mitoses/50 HPF	Metastasis rate or tumor-related mortality: 25%
> 10 cm	≤ 5 mitoses/50 HPF	Metastasis rate or tumor-related mortality: 85%
> 10 cm	> 5 mitoses/50 HPF	Metastasis rate or tumor-related mortality: 50%-90%



Endoscopic-resection-of-colonic-lipoma

ESD



DIAGNOSIS AND MANAGEMENT

tissue sampling is not required: *lipomas, duplication cysts, and ectopic pancreas.*

tissue sampling or removal is recommended to diagnose: *hypoechoic and heterogeneous lesions from the submucosal and muscularis propria layers such as GI stromal tumors, leiomyomas, and carcinoid tumors. Immunohistochemical staining is mandatory to further characterize these lesions*

Various techniques to facilitate the diagnosis : *standard biopsy, jumbo biopsy, unroofing techniques, bite-on-bite biopsy, endoscopic ligation, FNA, FNB, endoscopic submucosal resection (ESMR), endoscopic submucosal dissection (ESD), submucosal tunneling with endoscopic resection (STER), and surgery.*

Standard biopsy

Open biopsy forceps

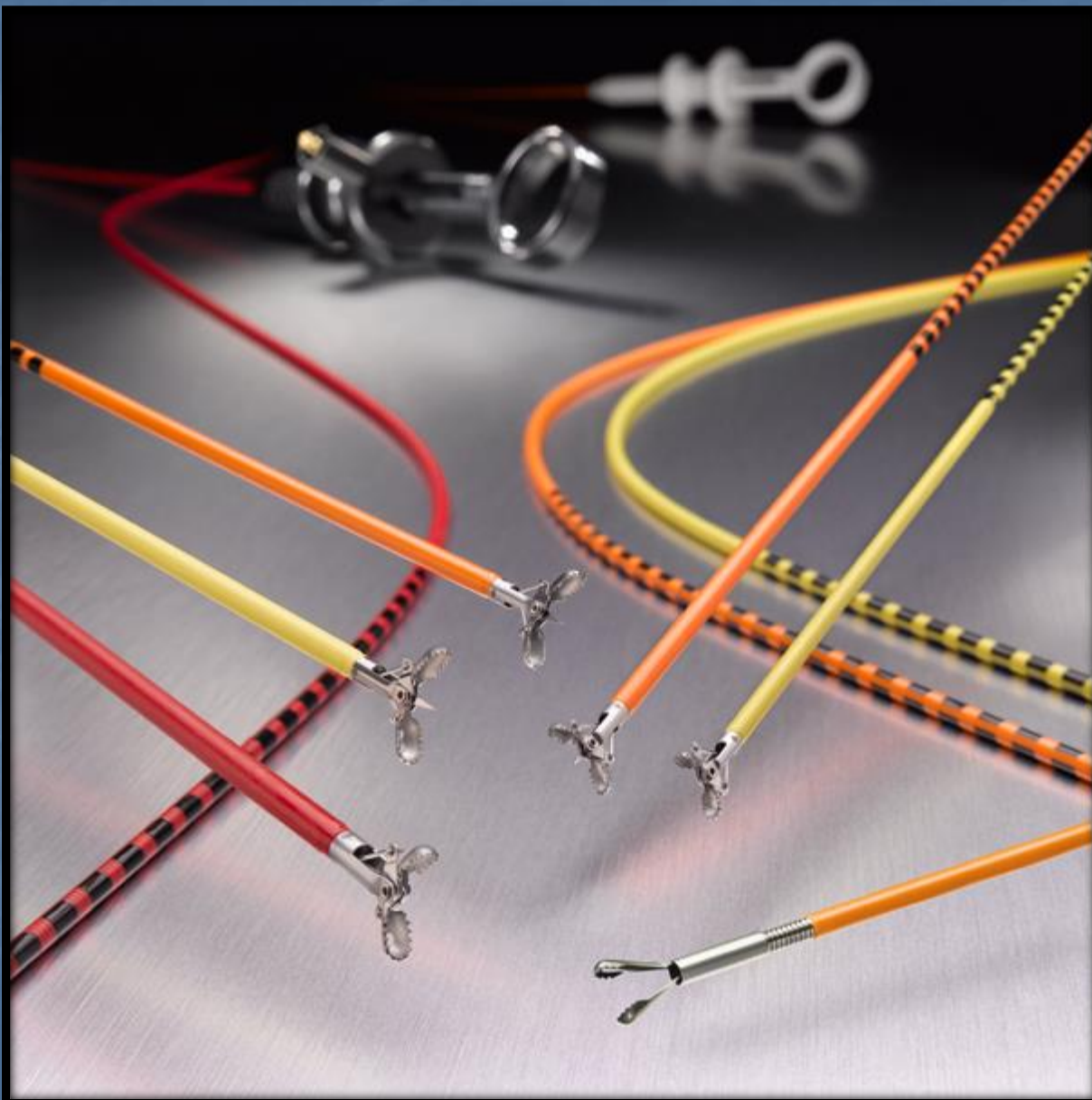
closed biopsy forceps a soft or firm lesion.

standard biopsy forceps (jaw volume 5-6 mm³) alone rarely are sufficient for diagnosing

Tunnel or bite-on-bite biopsies involve using a biopsy forceps to obtain 2 to 8 deeper biopsy specimens.

Jumbo biopsy and unroofing techniques

- *Jumbo biopsy forceps (jaw volume 12-13 mm³)*
- *significant **bleeding** was seen in 35.7% of patients after jumbo forceps biopsy*
- *Bite-on-bite jumbo biopsy of SELs with on-site touch preparation cytology evaluation has been reported to obtain a definitive diagnosis in 82% (18 of 22) of SELs.*
- *Jumbo forceps biopsy of ulcerated GI stromal tumors can have a high diagnostic yield and can be considered if there has been no recent bleeding from the lesion.*



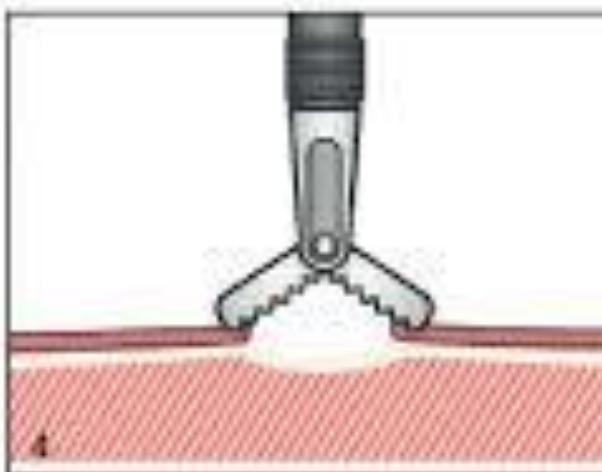
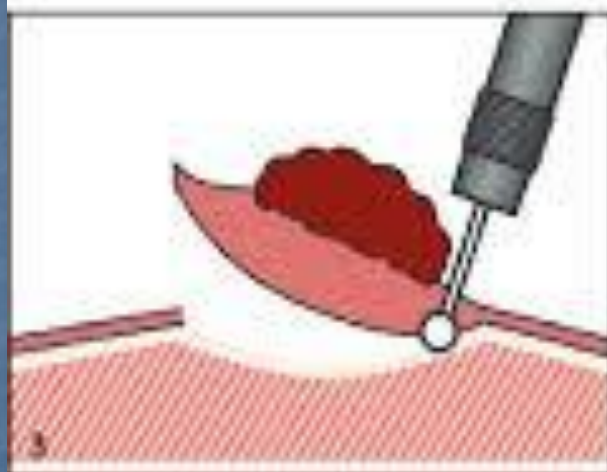
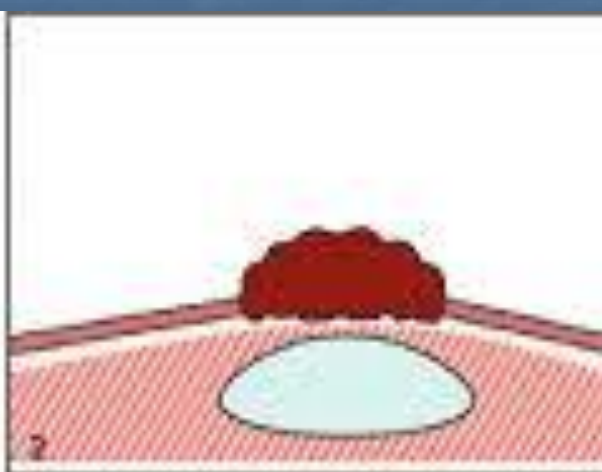
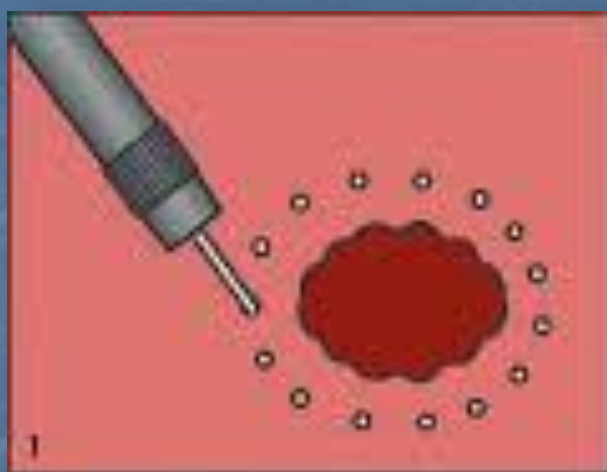
Jumbo biopsy



***Direct biopsy of the gastric
submucosal mass using
jumbo forceps***

Unroofing of a SEL

- *removes the overlying mucosa and possibly permits partial resection of the lesion, thereby improving access to the deeper layers.*
- *performed with a needle-knife, snare, cap, or banding device*
- *increase the diagnostic yield when compared with that of forceps biopsies.*



The single-incision needle-knife (SINK)

- *In this technique, the mucosa overlying the lesion was resected by using a **snare**, and once the lesion was exposed the upper half of the lesion was grasped and resected.*
- *This procedure had a diagnostic yield of **94%** in a series of 16 patients.*
- ***Minor hemorrhage** was seen, but hemostasis was achieved in all cases with argon plasma coagulation*
- ***no perforations** were reported.*
- *A potential disadvantage of the jumbo biopsy and partial resection techniques is development of **perilesional fibrosis**.*

EUS-FNA

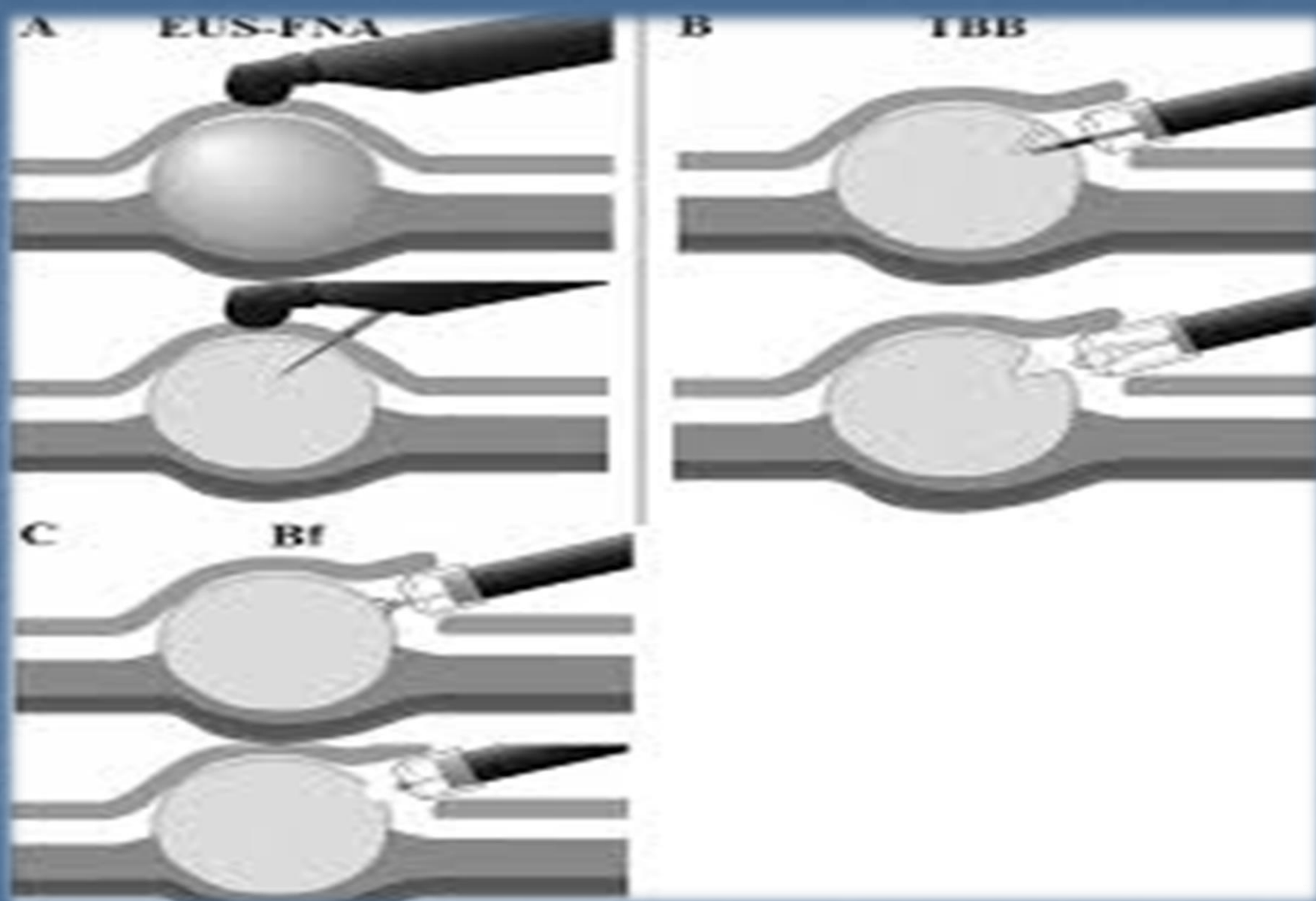
- ✓ *The most used method for obtaining tissue from SELs arising from the submucosal or muscularis propria layer.*
- ✓ *The diagnostic accuracy ranges widely from 46% to 93% in the evaluation of GIST.*
- ✓ *Several factors that may impact the diagnostic.*
- ✓ *Some of the factors to consider while performing FNA for SELs for maximizing tissue acquisition for immunohistochemical staining*

Needle

- *Various EUS-FNA needles (19G, 22G, 25G) may be used.*
- *Small core biopsy can be obtained with a 22G or 25G needle.*
- *Larger needles (19G) may acquire more tissue.*

EUS-FNA family_beauty shot





Stylet and suction

- *Initial lesion puncture with a stylet may prevent contamination or clogging of the needle.*
- *The additional utility of suction or slow stylet withdrawal to improve sampling during FNA of SELs is also unknown.*
- *Accuracy of FNA in SELs has been shown to increase gradually with a plateau reached after the fourth pass.*
- *Using the up-down knob on the endoscope or the elevator to move the needle in a fan-like fashion may help sample multiple areas within the lesion.*

Core biopsy needles

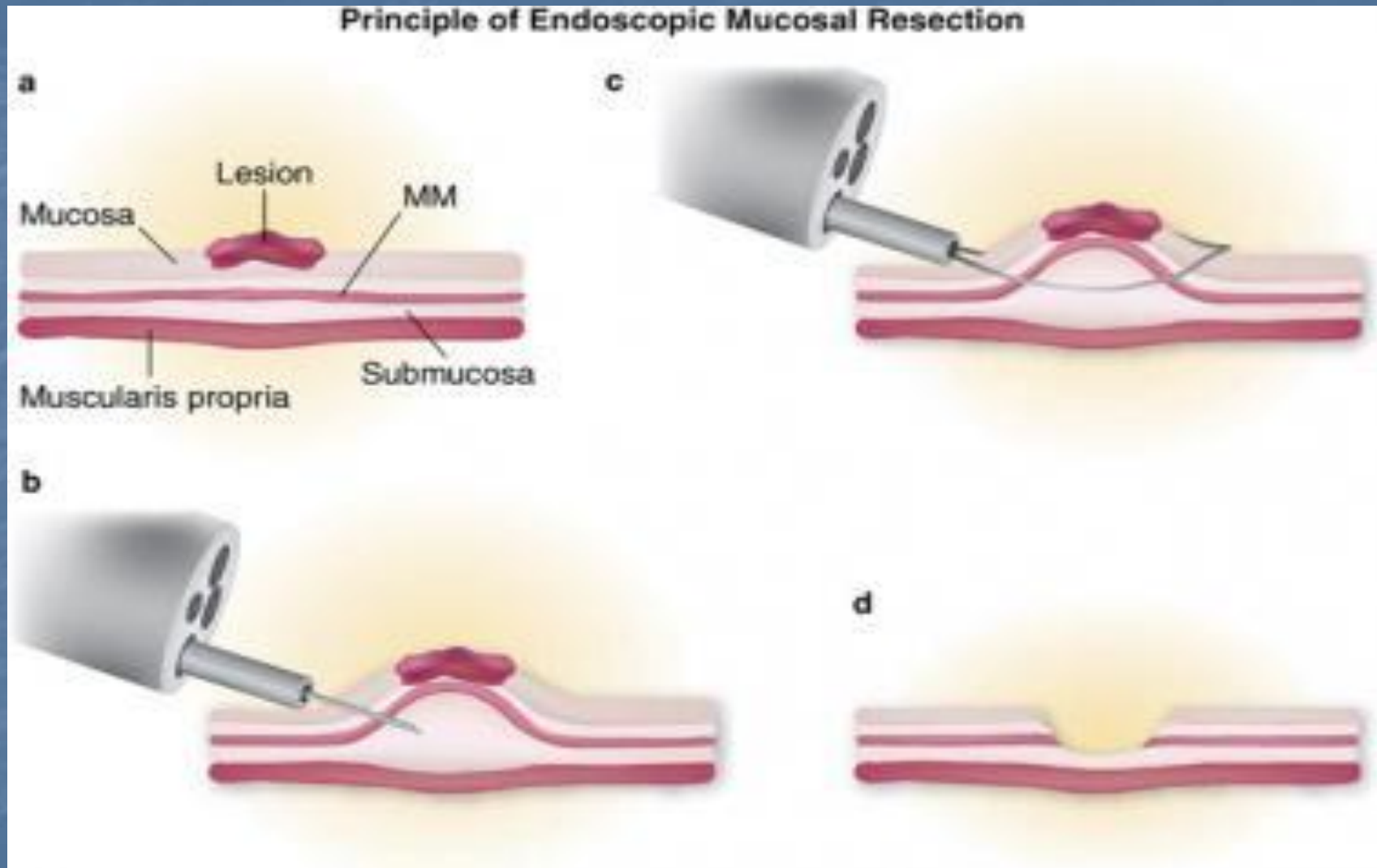
- *New needles specifically designed to acquire core biopsy specimens are available in different gauges (19G, 22G, and 25G).*
- *Kim et al¹³⁰ reported that the yield of FNB by using a 22G core biopsy needle (75%) was significantly greater than the yield of a 22G FNA needle (20%) for the evaluation of SELs.*
- *EUS-FNB can be used as a salvage technique when FNA results in a nondiagnostic or inadequate specimen.*

ENDOSCOPIC RESECTION AND/OR LIGATION AND TUNNELING TECHNIQUES

ESMR

- ✓ *ESMR adapts techniques used for EMR to facilitate removal of lesions up to 20 mm in size that arise from the mucosal and submucosal layers.*
- ✓ *ESMR involves resection with:
a standard snare (with or without a grasping forceps using a double channel endoscope) or by using a transparent cap (ESMR-C) or ligation device (ESMR L)*
- ✓ *ESMR may be complicated by bleeding in up to 9% of cases, usually can be controlled endoscopically.*
- ✓ *ESMR also has a risk of perforation.*
- ✓ *caution should be used when these techniques are used in the duodenum.*

Principle of Endoscopic Mucosal Resection



Standard EMR procedure



Polypectomy: Deyhle et al., Endoscopy, 1973



Strip Biopsy: Tada et al., Gastrointestinal Endosc., 1984



EMR-C: Inoue et al., Gastrointestinal Endosc., 1993



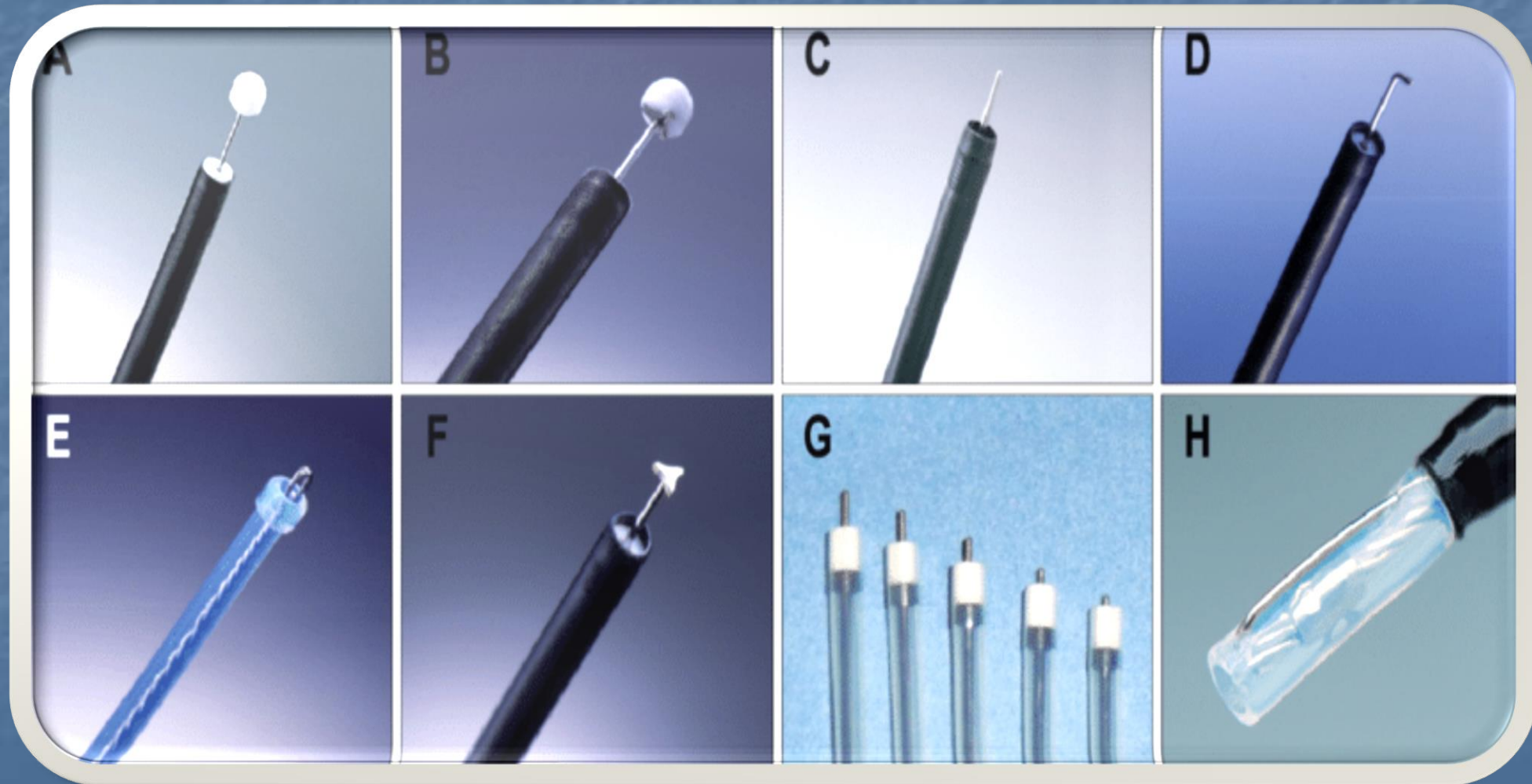
EMR-L: Aikawa et al., Gastrointestinal Endosc., 1997

Saito et al., Gastrointestinal Endosc., 2000

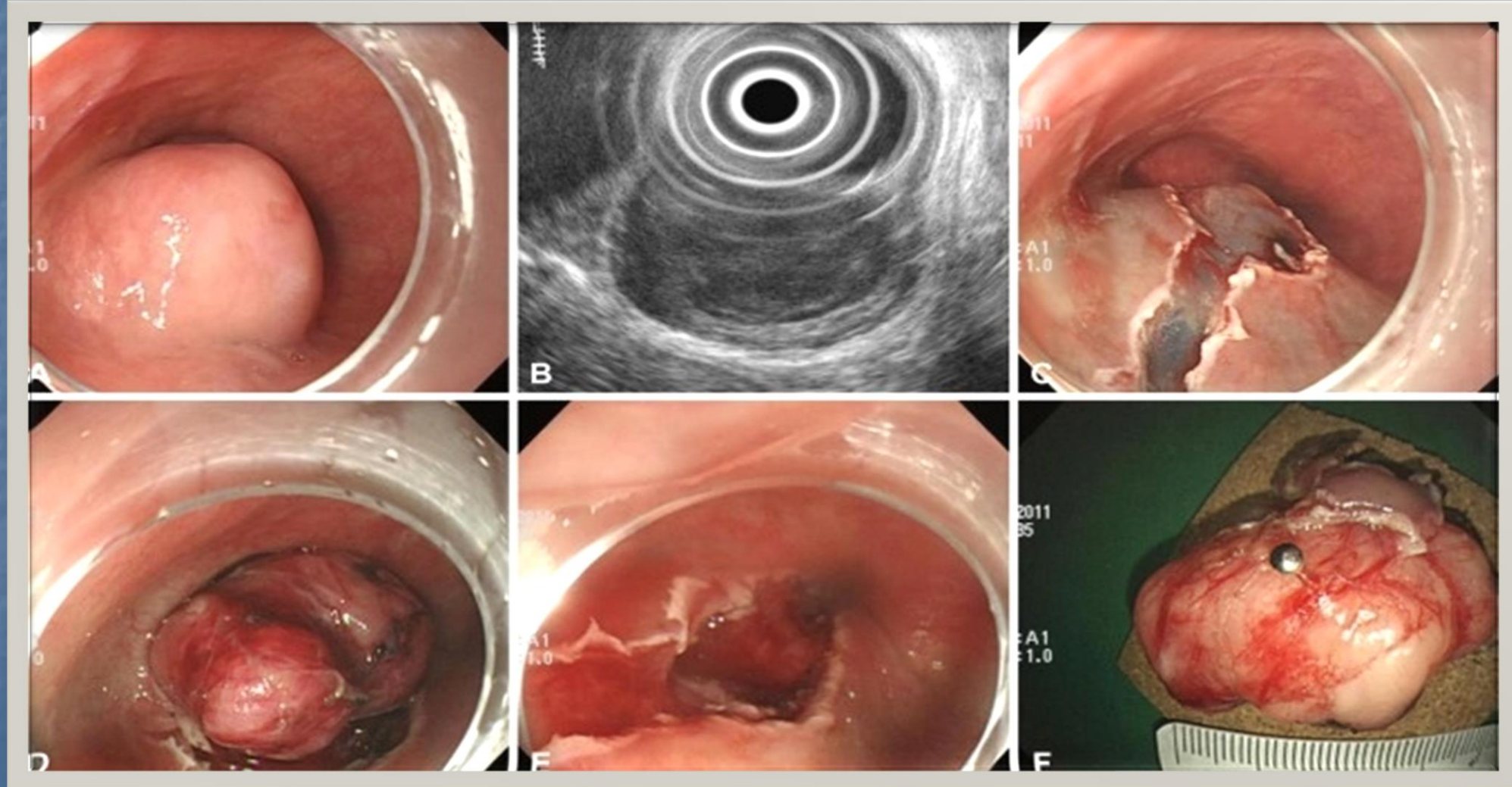
ESD

- ✓ *Endoscopic enucleation, endoscopic submucosal excavation, or endoscopic muscularis dissection.*
- ✓ *Applied for resection of carcinoid tumors, granular cell tumors, and also SELs arising from the muscularis propria.*
- ✓ *Procedure time ranged from 25 to 60 minutes .*
- ✓ *Complete resection was obtained in 92% of lesions.*
- ✓ *Perforation was seen in 14% of cases.*
- ✓ *No local recurrence or distant metastases.*
- ✓ *The mean time required 71 minutes (range 40-105 minutes).*
- ✓ *ESD is technically challenging, time consuming, and has limited application for large tumors (>5 cm) because of a reported perforation rate of up to 19% for larger lesions.*
- ✓ *Additional risks include positive resection margins, bleeding, and tumor spillage.*

Endoscopic-devices-for-ESD-A-IT-knife-KD-610L-Olympus-B-modified-IT-knife-with



Endoscopic-submucosal-dissection-of-an-esophageal-leiomyoma-using-electrosurgical-knife



STER Submucosal tunneling

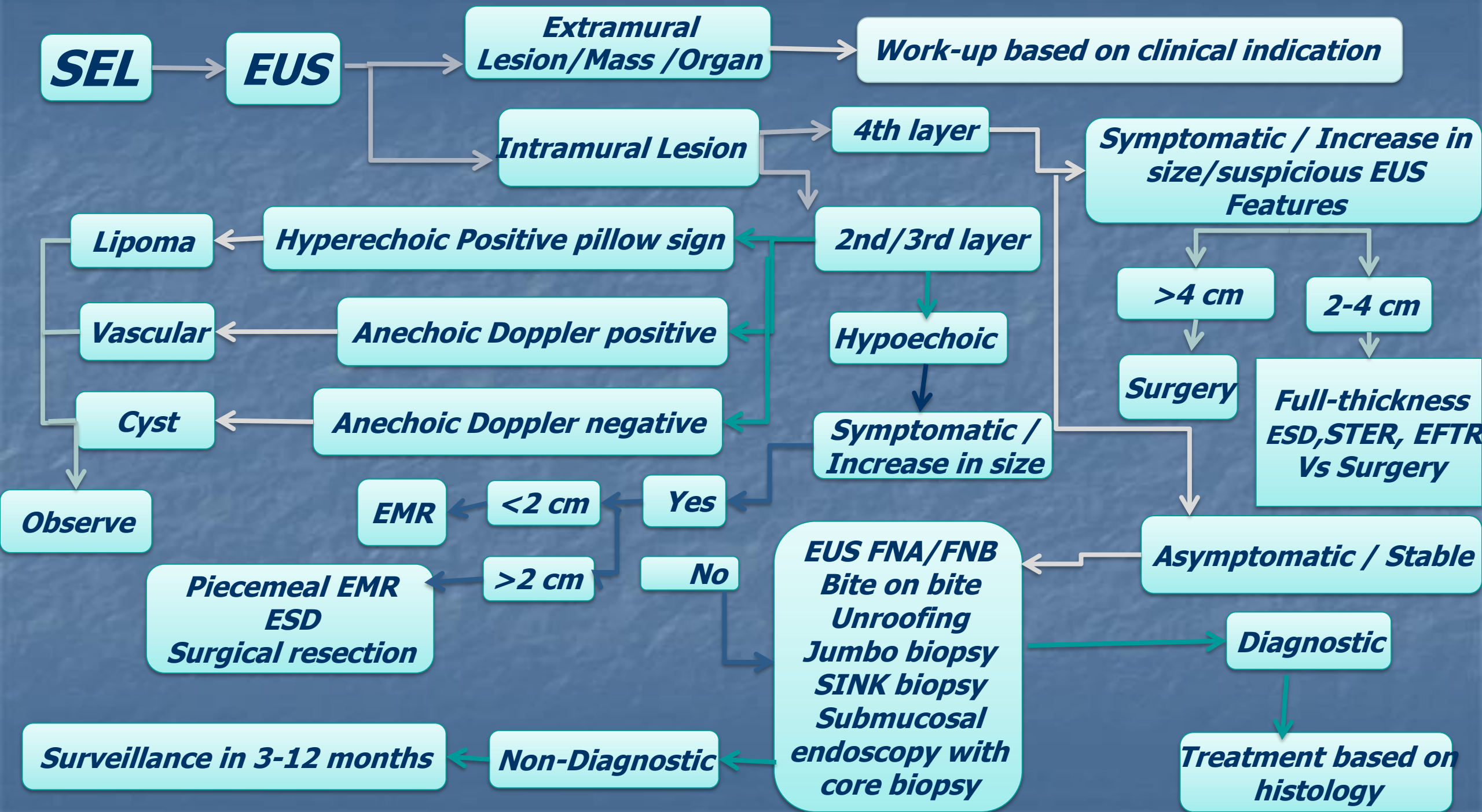
- ✓ *It has been applied for endoscopic resection of SELs arising from the muscularis propria in the esophagus and gastric cardia.*
- ✓ *Submucosal tunneling with endoscopic biopsy of SELs to obtain tissue for histologic assessment .*
- ✓ *The potential advantage of STER over ESD is maintenance of the integrity of the mucosa, which promotes wound healing and reduces risk of peritonitis and mediastinitis.*
- ✓ *The overall rate of adverse events was 9.4%, including pneumothorax in 7.1%, subcutaneous emphysema in 9.4%, and pneumoperitoneum in 4.7%. All adverse events were managed conservatively.*
- ✓ *Incomplete resection, resection of lesions in difficult locations such as the fundus, and resection of larger lesions remain challenges with this method..*

Endoscopic full-thickness resection

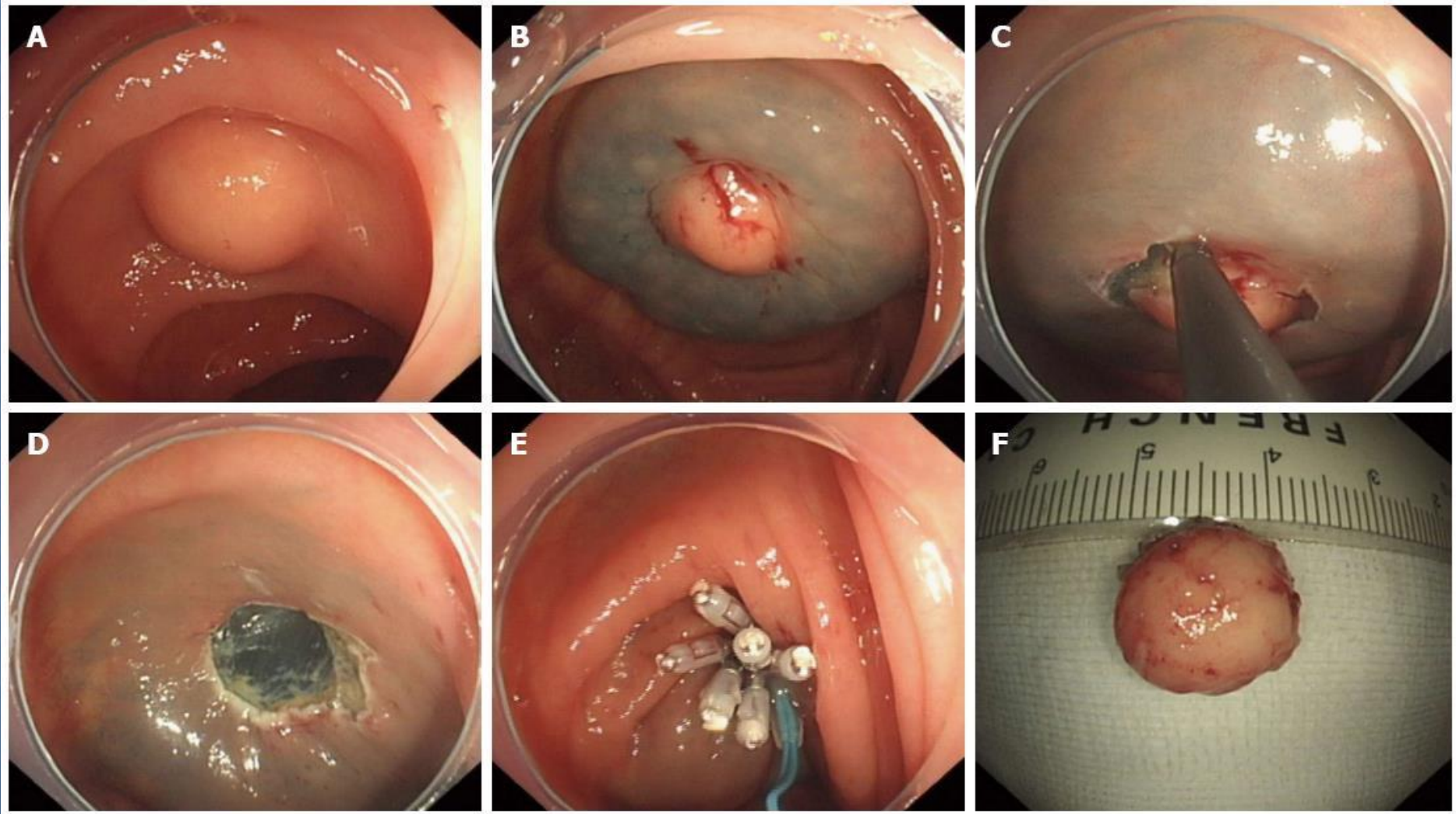
- ✓ *For SELs arising or infiltrating the muscularis propria, especially GI stromal tumors.*
- ✓ *Two different techniques for (EFTR) are:*
 - (1) full-thickness resection followed by endoscopic closure of the defect.*
 - (2) initial creation of a serosa-to-serosa approximation followed by EFTR.*
- ✓ *Hybrid EFTR is a combined endoscopic and laparoscopic*
- ✓ *Endoscopic closure of defects created by these techniques has been performed by using standard clips, over-the-scope clips, endoscopic suturing, and endoloops.*
- ✓ *Complete resection was obtained in 100% of cases.*
- ✓ *The mean tumor size was 2.8 cm (1.2-4.5 cm).*
- ✓ *Thus, the concept of application of an over-the-scope clip over GI SELs in various locations (esophagus, stomach, duodenum, and rectum) followed by snare resection above the clip has been developed.*

MANAGEMENT ALGORITHM

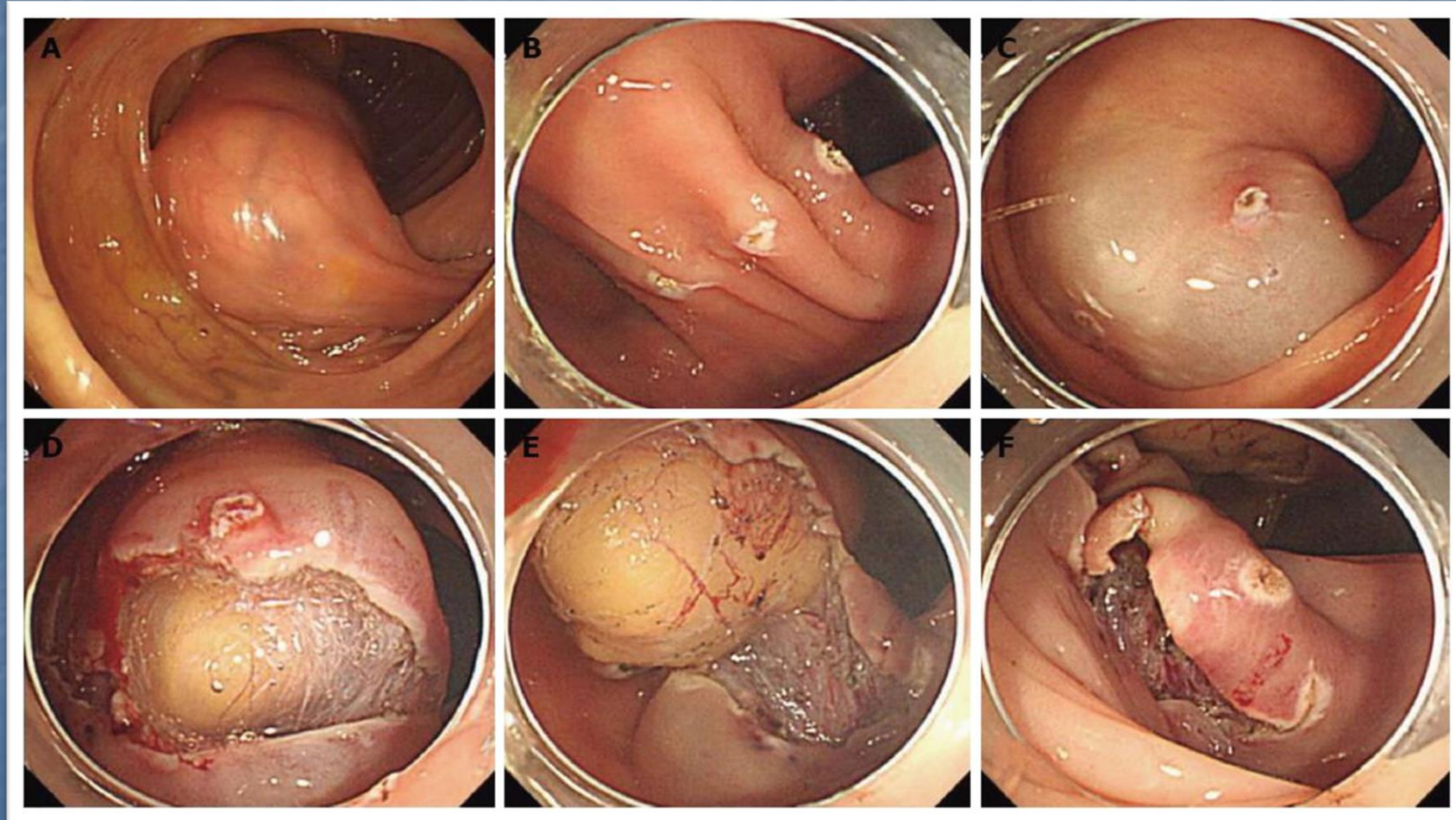
- *The principal indications for **surgery** include SELs that are symptomatic or malignant or those with a risk of metastases such as larger carcinoid tumors in the duodenum or rectum.*
- *The **goals of surgery** are complete resection, avoiding tumor rupture and spillage, intraoperative staging, and lymph node resection when metastasis is suspected.*
- *Asymptomatic benign lesions such as lipomas, vascular lesions, cysts, pancreatic rests, and leiomyomas **do not require any intervention or follow-up.***
- *Lesions with malignant potential should **be resected***
- ***Laparoscopic resection** for malignant lesions remains the standard of care.*



Endoscopic resection of colorectal granular cell tumors



Endoscopic submucosal dissection of a large colonic lipoma



THANK YOU

