Early Gastric Cancer: Tx

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Early gastric cancer (EGC)

- ***being confined to the mucosa or the submucosa, regardless of the presence or absence of regional lymph node metastasis.***

EMR indication of EGC

- differentiated-type adenocarcinoma ***without ulcerative findings***
- the depth of invasion is clinically diagnosed as T1a and the diameter is ***≦2 cm***.
- ***Curative resection:*** resected en-bloc, with tumor size ≦2 cm, adenocarcinoma of differentiated type, pT1a, horizontal/ vertical margins negative, and without lymphatic or vascular involvements.

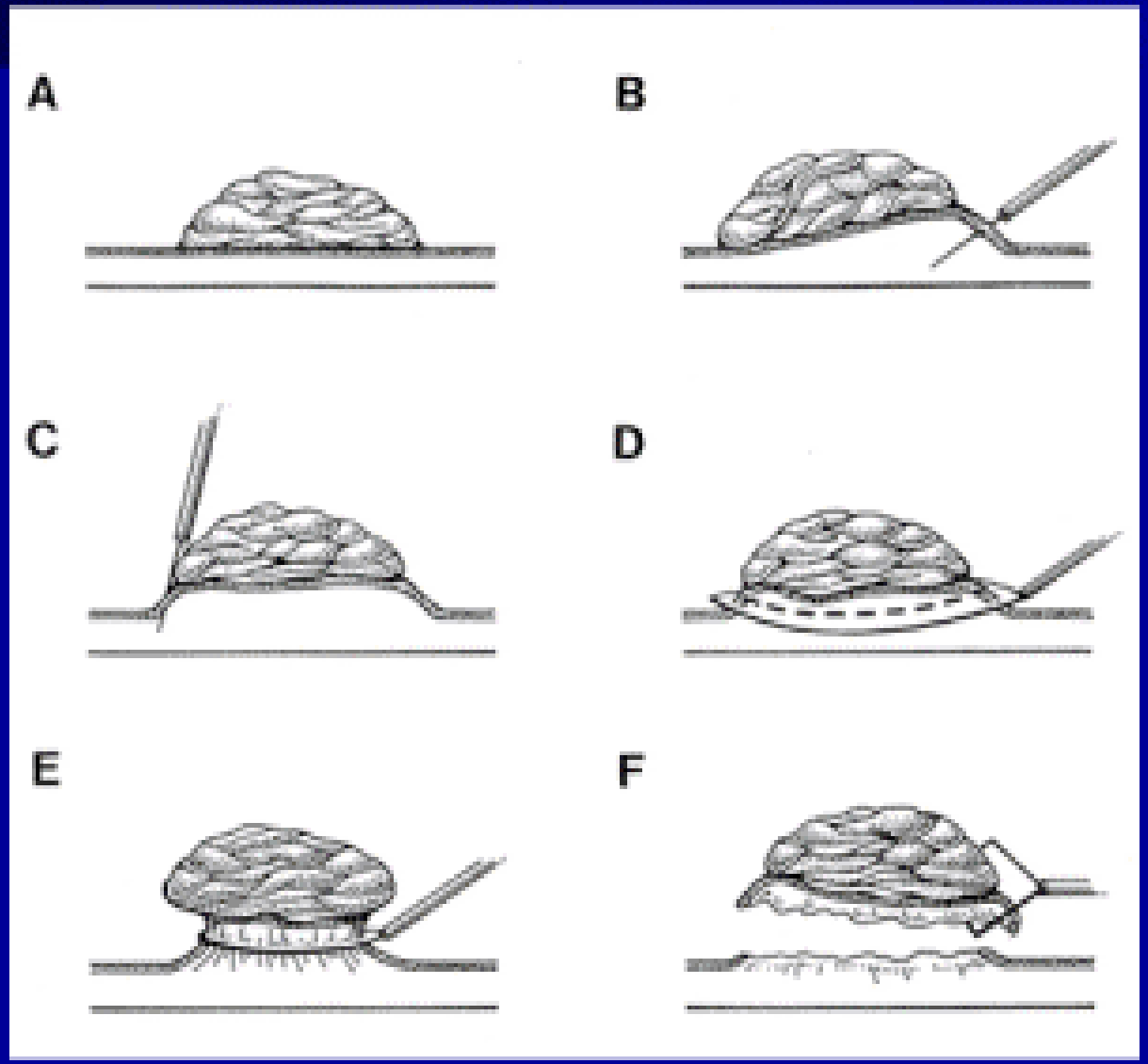
EMR is Diagnostic and Therapeutic

- Resection preferred over ablation
  - Histological specimen
    - Margin of resection
    - Degree of differentiation
    - Lymphovascular Invasion
- Techniques
  - Lift and cut
  - Injection assisted
  - Suction cap assisted
  - IT Knife strip resection

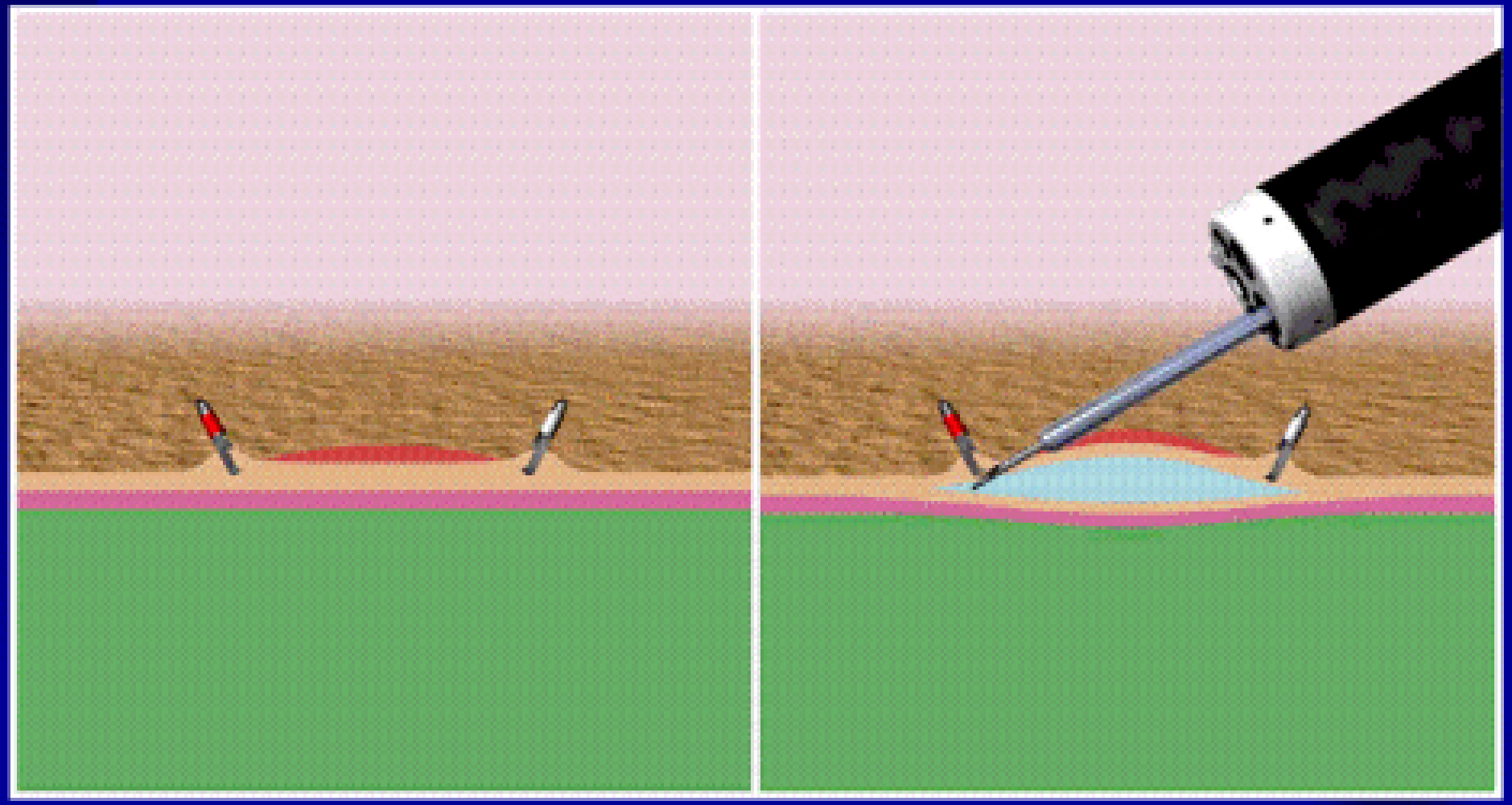
Lift and Cut



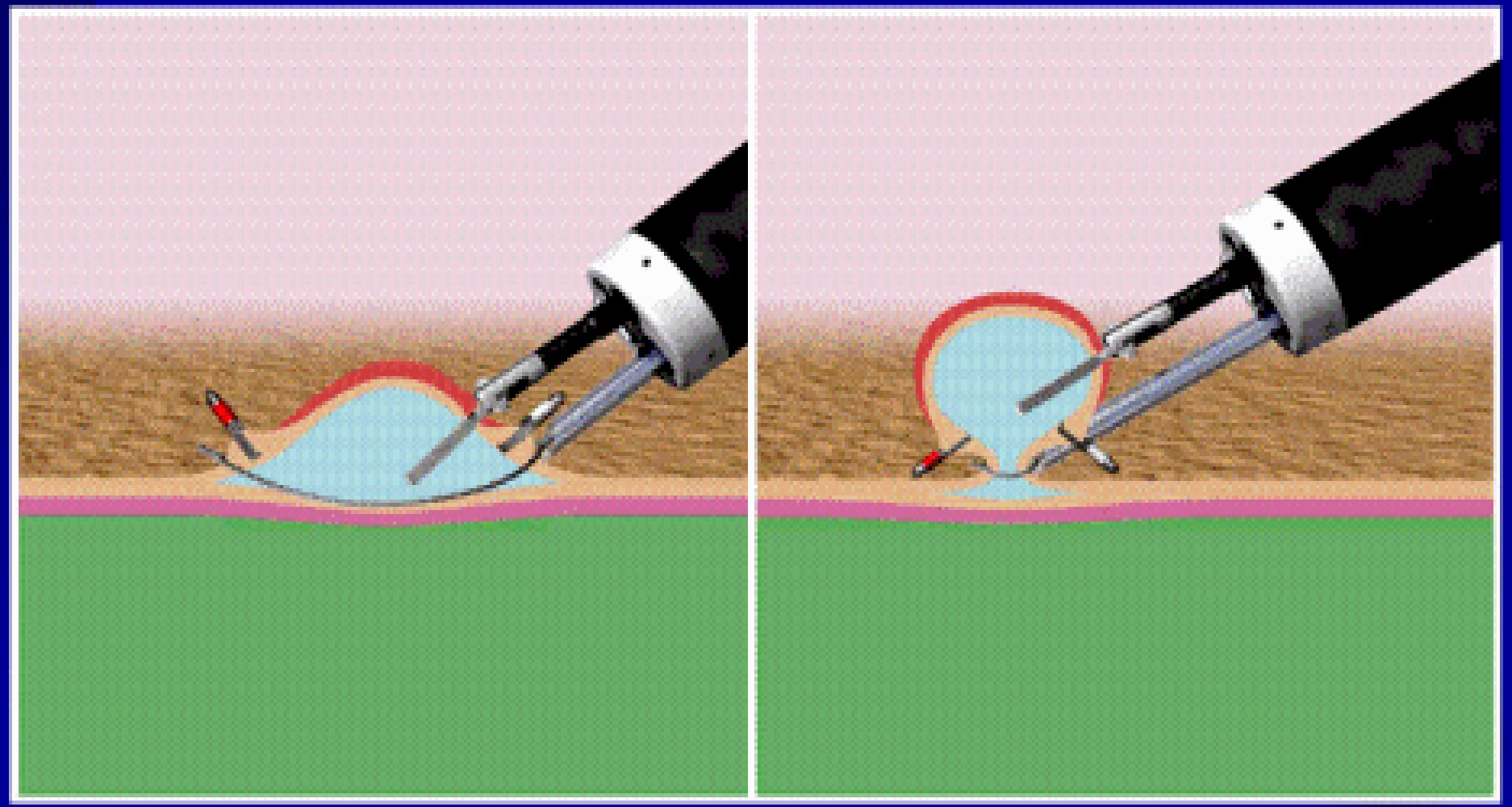
Injection-Assisted

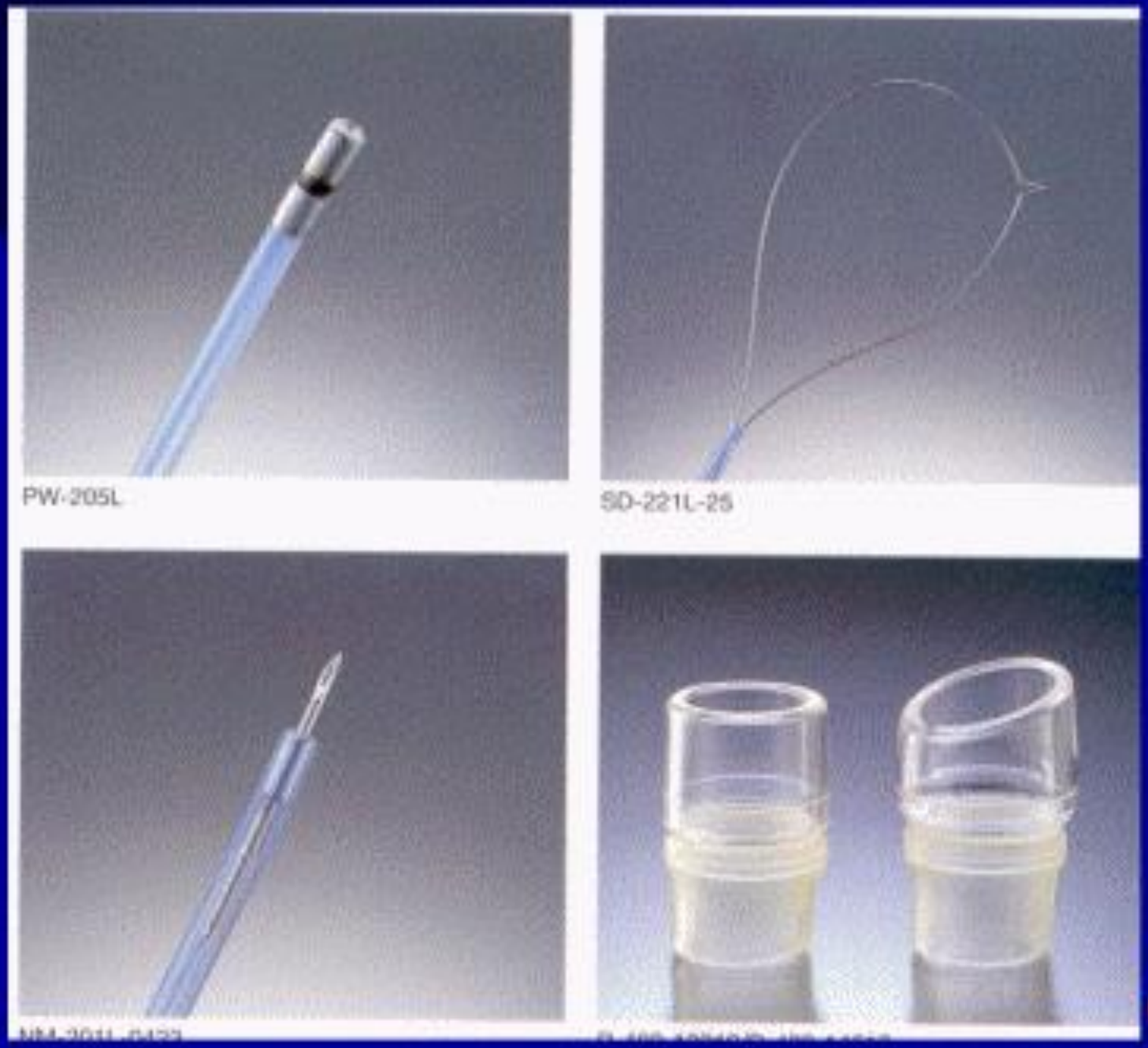


Four-Point Clip Assisted

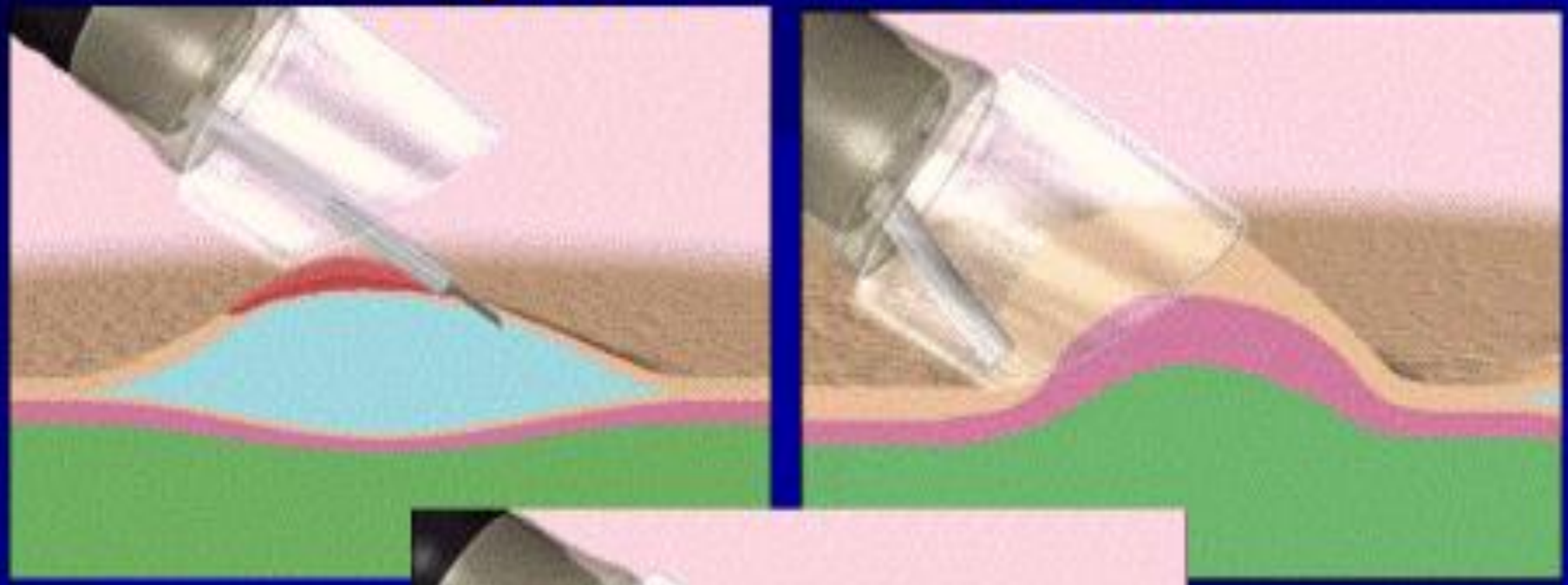


Four-Point Clip Assisted



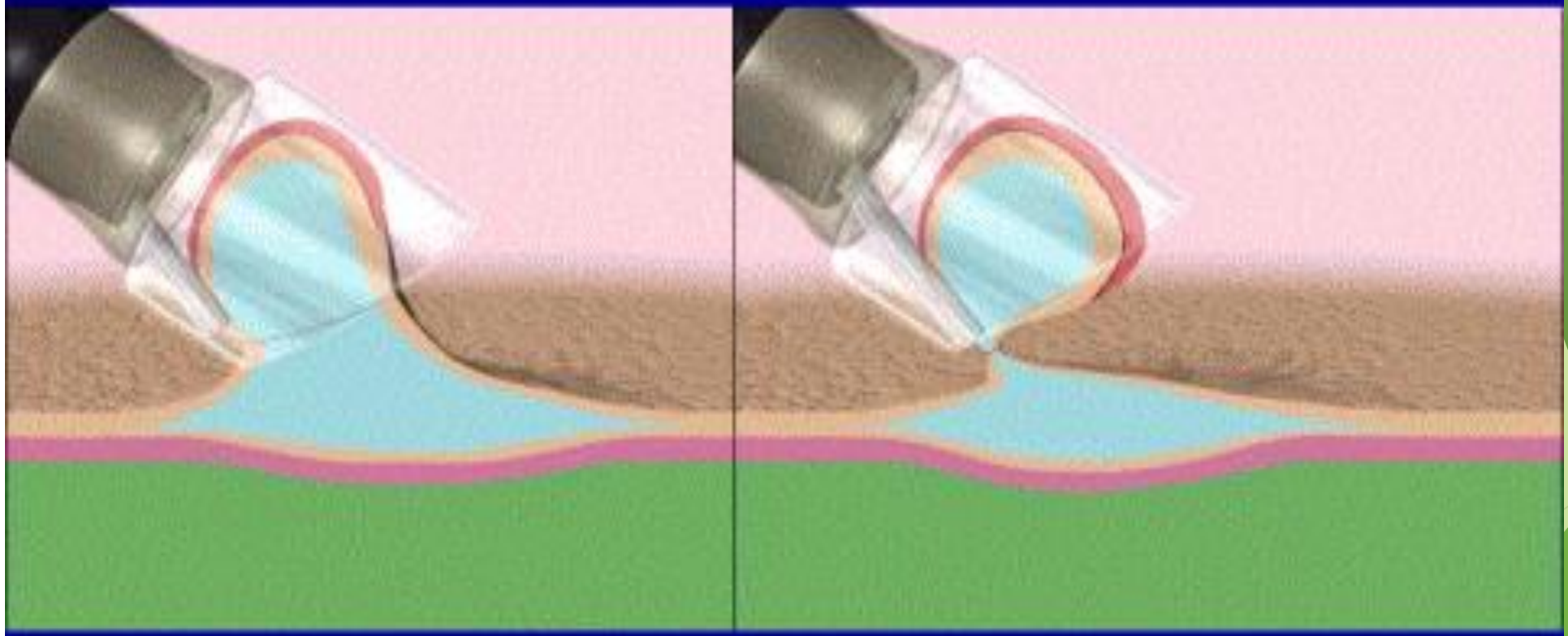

PW-205L
SD-221L-25

Cap-Assisted EMR





Cap-Assisted EMR




Large Soft Cap
Devon®

ESD of Early Gastric Cancer (EGC)

- Since the early 1990s.
- The principle behind indications for ESD is EGC which has negligible risk of lymph node metastasis and is suitable for en bloc resection.

Absolute indication for EMR/ESD and expanded indications for ESD

Invasion depth / Tissue-type	Intramucosal cancer				Minute Submucosal Cancer	
	UL (−)		UL (+)		≦SM1	SM1<
	≦20 mm	20 mm <	≦30 mm	30 mm <	≦30 mm	Any size
Well differentiated adenocarcinoma (WDA)						
Poorly differentiated adenocarcinomas (PDAs)						

Absolute indication for EMR/ESD

Expanded indications for ESD

Possible expansion for ESD

"out of indications" for EMR/ESD

Criteria for expansion of local treatment

Criteria	Intramucosal cancer	Intramucosal cancer	Minute submucosal penetration (SM1)	Undifferentiated intramucosal cancer
	Differentiated adenocarcinoma	Differentiated adenocarcinoma	Differentiated adenocarcinoma	
	No lymphovascular invasion	No lymphovascular invasion	No lymphovascular invasion	No lymphovascular invasion
	Irrespective of ulcer findings	Without ulcer findings		Without ulcer findings
	Tumor less than 3 cm in size	Irrespective of tumor size	Tumor less than 3 cm in size	Tumor less than 3 cm in size
Incidence	1/1230 (0 %)	0/929 (0 %)	0/145 (0 %)	0/141 (0 %)
95 % CI	0–0.3 %	0–0.4 %	0–2.5 %	0–2.6 %

Submucosal Invasion Features: Overall accuracy of 62%-78%

- Irregular or nodular surface protrusion or depression
- Deep Ulcer with marked Marginal Elevation
- Fusion of converging folds
- Abrupt Cutting or clubbing of converging folds

- A prospective confirmatory study by the Japan Clinical Oncology Group (JCOG0607)2 examining curative ESD for clinically mucosal GC revealed ***an excellent 5-year survival rate of 97.0%.***
- Endoscopic resection of mucosal GC can ***preserve the organ.***
- Detection of early GC is important to improve prognosis and preserve the organ.

- *Study:* **The 5-year cancer-specific survival rates of EGC limited to the mucosa or the submucosa were 99 % and 96 %, respectively.**
- Allowable risks of lymph node metastases for ESD of EGCs which are limited to the mucosa or the submucosa are ***less than 1 % and 4 %, respectively***.
- *Study:* ***The 5-year overall survival of the expanded criteria group (n = 625) was 93.4 % and there was no significant difference with guideline criteria group (n = 635, 92.4 %)***

Long-Term Follow-Up Data

- Japanese study from the National Cancer Center Hospital, involving a total of 1,955 EGC patients enrolled from January 1999 to December 2005, showed that ***there were no significant differences in the overall 5-year survival rates of the curative resection group, as defined by the expanded criteria, and the non-curative resection group after additional surgery.***

- ***ESD using the expanded criteria can show excellent long-term outcomes.***

Curative Resection

en-bloc resection, negative horizontal margin, negative vertical margin, no lymphovascular infiltration

Only positive horizontal margin (HM1) differentiated-type carcinoma

-Carry a very low risk of harboring lymph node metastasis, and consider:

- ***repeated ESD,***
- ***endoscopic coagulation using LASER or APC***
- ***close observation expecting a burn effect of the initial ESD***

Consider

- ***All patients with gastric cancer should undergo H pylori testing and eradication therapy if test results are positive, but this is especially important for patients with EGC who are undergoing endoscopic resection, as H pylori eradication decreases the risk of developing metachronous gastric cancers.***

Some disadvantages of ESD

- Significant training requirements
- prolonged procedure time
- need for specialized equipment
- need for an assistant during the entire procedure
- Significantly higher complication rates.

ESD Limitations

-Bleeding ≤ 10%

- Managed frequently during case with coagulation forceps

-Perforation 2% – 10%

- Increases with prior endoscopic therapy including tattoo!
- Managed without surgery in most cases

-Costs

- Equipment and time
- Diversion of surgical revenues within institutions

Limitations of ESD

- ***A case:***
- a slightly elevated, centrally depressed lesion about 15 mm in diameter with a very small ulceration in the center (type IIa + IIc) and
- Biopsies: HGD.
- After Resection: submucosal infiltration depth of greater than 500 μm.
- Then :gastrectomy.
- The postoperative stage was pT1 (sm3), pN0 (0/58), cM0, L0, V0, G2 (UICC stage Ia).

After Three Months

- US: new mass in the liver
- Biopsy: rapidly growing metastasis of the gastric adenocarcinoma.
- ***the risk of affected lymph nodes in early gastric cancer***
- ***the consequent risk of metastasis, which increases with greater depth of infiltration into the submucosa.***

The presence of micrometastasis

- Even after curative surgical resection for EGC, ***the recurrence rate is about 1.7–3.4 %,*** which could be the result of micrometastasis.
- Cai and colleagues: ***tumor size***, ***macroscopic type***, ***accompanying ulcers***, ***and depth of invasion*** are strongly associated with micrometastasis in lymph nodes.
- tumors with suspected submucosal invasion, large size, accompanying ulcers, and undifferentiated histology may have a risk of recurrence owing to micrometastasis, which may indicate ***the inappropriateness of EMR or ESD***.

Distal attachments: (A) straight soft transparent hood and (B) cone-shaped ST hood.

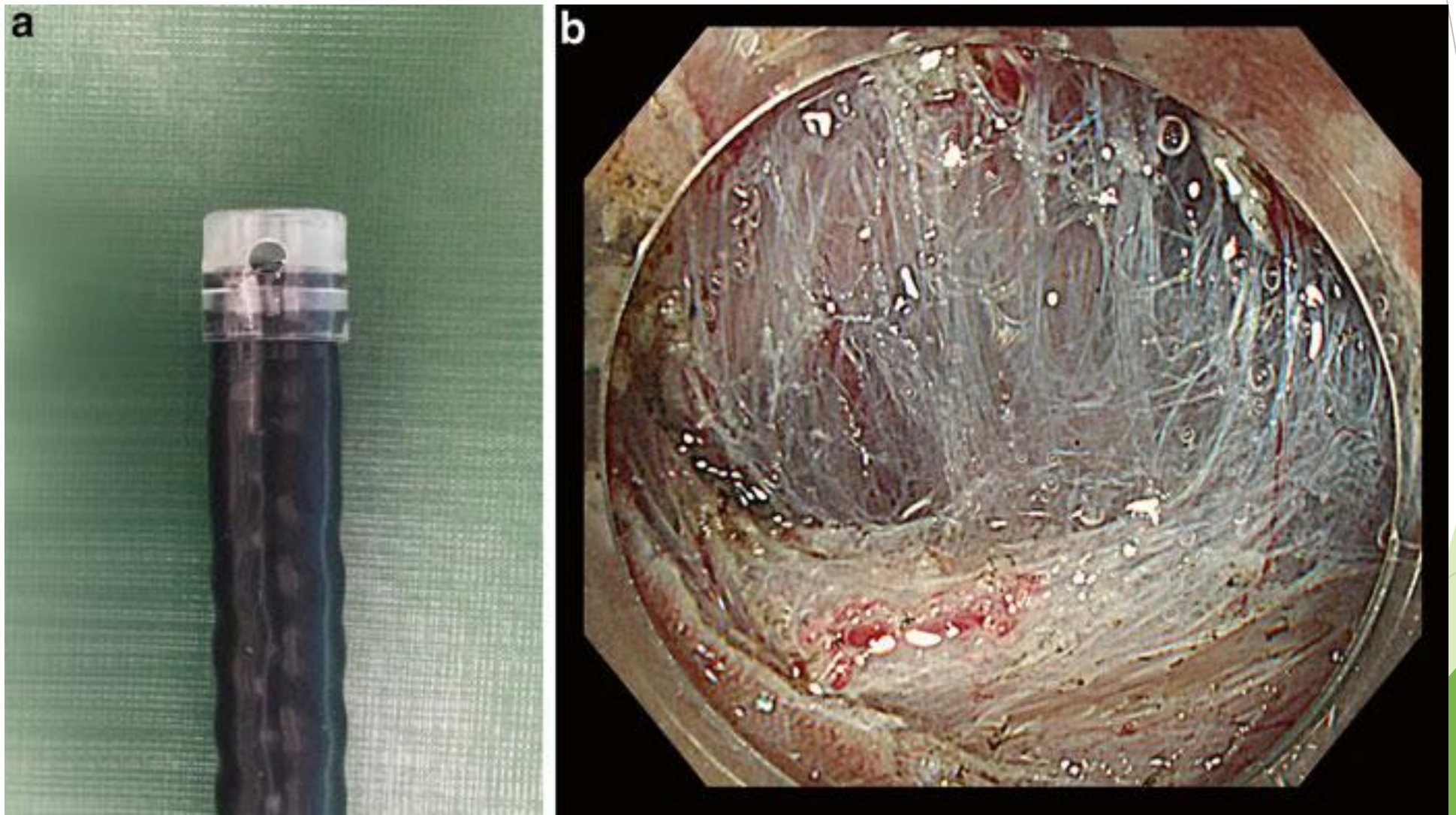
A



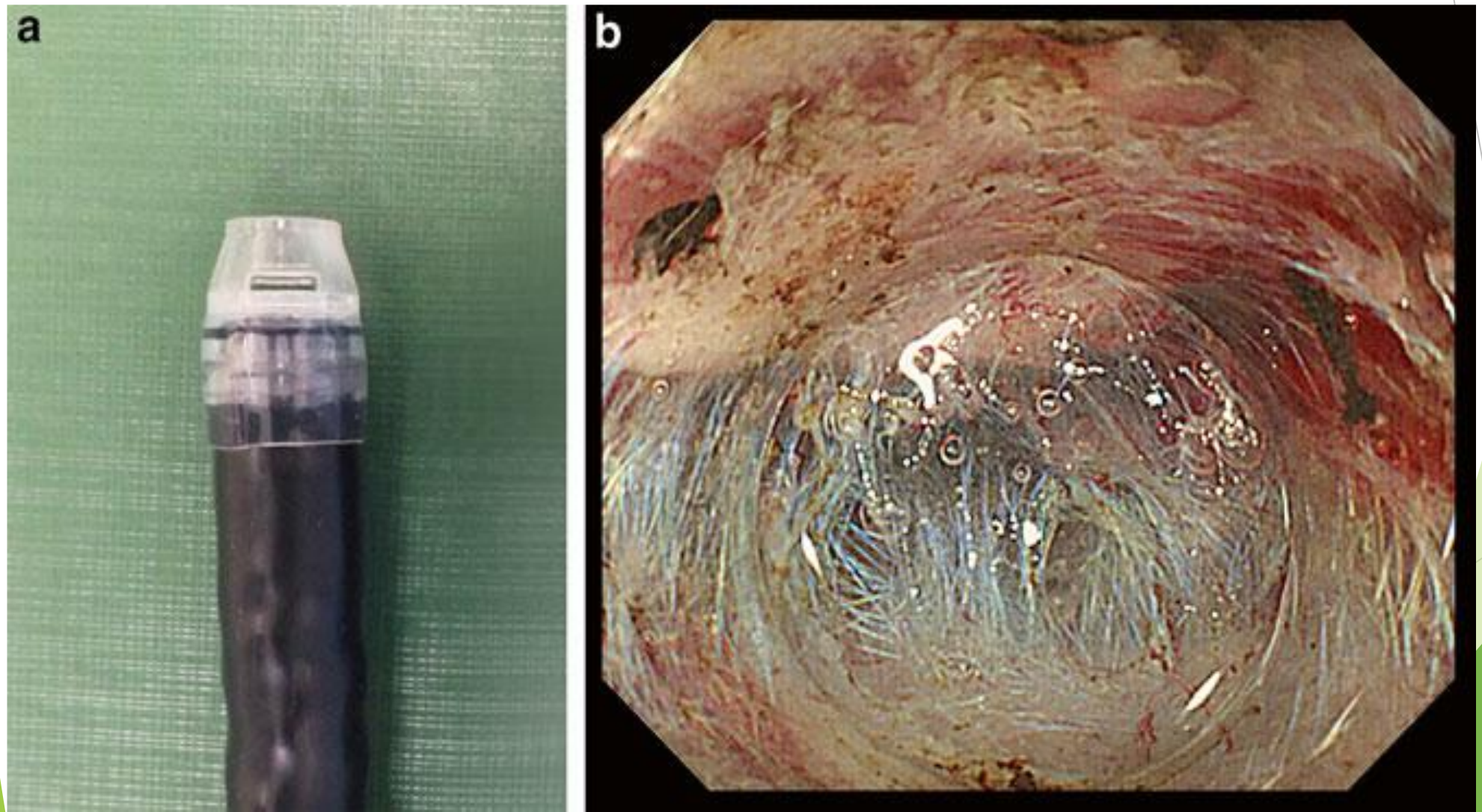
B



A straight soft distal attachment (Olympus Medical Systems, Tokyo, Japan)



A short ST hood (small-caliber tip hood) (Fujifilm, Tokyo, Japan)



Electrosurgical knives for ESD. (A) Dual Knife, (B) Flush Knife, (C) Hybrid Knife, (D) Hook Knife, (E) Safe Knife V, (F) IT Knife-nano, (G) SB (stag beetle) Knife Jr., and (H) Cluch Cutter (short type).



A



B



C



D



E



F



G



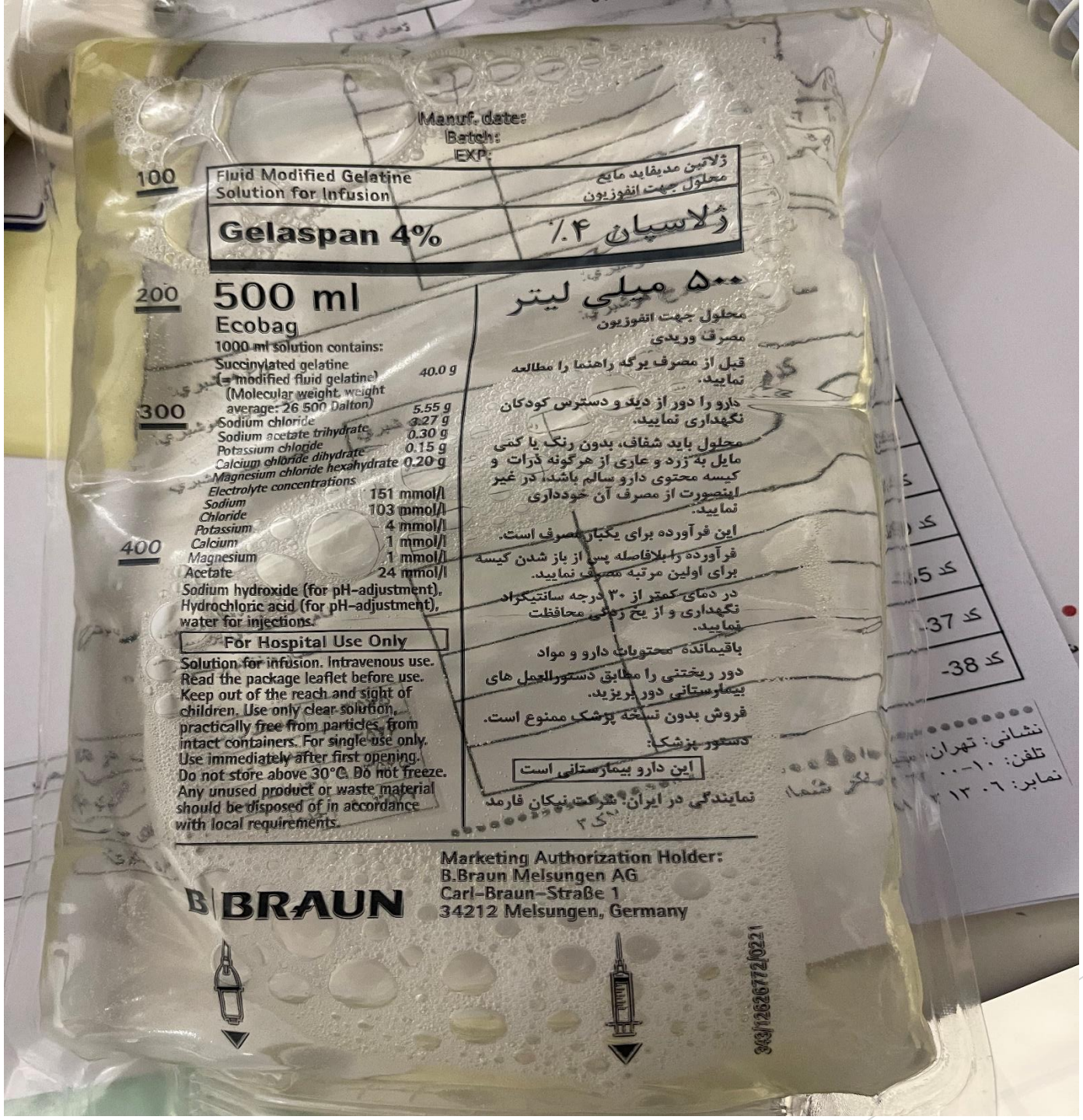
H

Hemostatic forceps. (A) Monopolar hemostatic forceps (Pentax), (B) Hemostat-Y (Bipolar hemostatic forceps, Pentax), and (C) Coagrasper (Olympus).



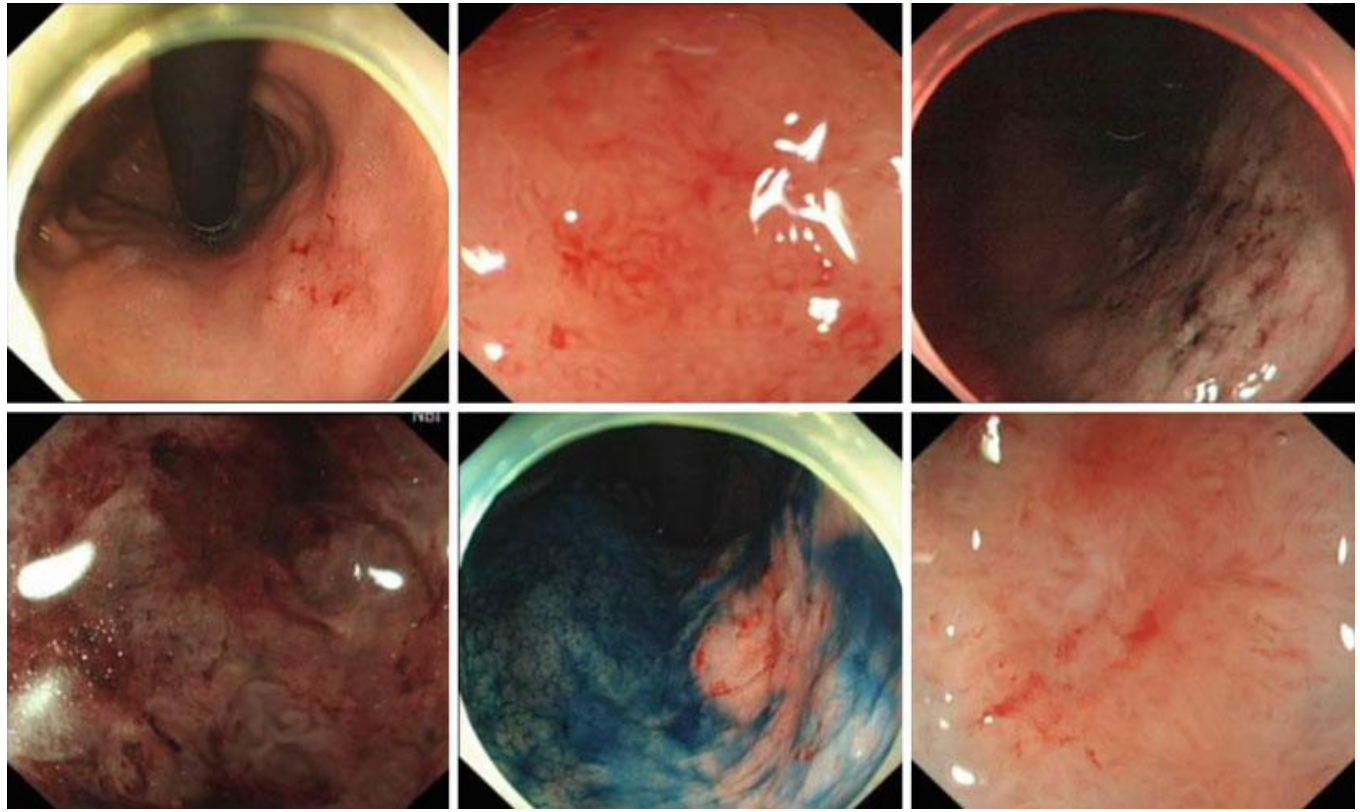
Injection Solutions

- Normal saline
- Glyceol solution (consisted of 10 % glycerin, 5 % fructose, and 0.9 % sodium chloride)
- A sodium hyaluronate solution at a concentration of 0.4 % (MucoUp, Seikagaku Kougyo Co., Tokyo, Japan; derived from rooster comb)
- It is mandatory to use CO 2 insufflation for ESD procedure.


Manuf. date:
Batch:
EXP:
100
Fluid Modified Gelatine
Solution for Infusion
ژلاتین مدیفاید مایع
محلول جهت انفوزیون
Gelaspan 4%
ژلاسپان ۴٪
200
500 ml
Ecobag
۵۰۰ میلی لیتر
محلول جهت انفوزیون
مصرف وریدی
1000 ml solution contains:
Succinylated gelatine (= modified fluid gelatine) 40.0 g
(Molecular weight, weight average: 26 500 Dalton)
300
Sodium chloride 5.55 g
Sodium acetate trihydrate 3.27 g
Potassium chloride 0.30 g
Calcium chloride dihydrate 0.15 g
Magnesium chloride hexahydrate 0.20 g
Electrolyte concentrations
Sodium 151 mmol/l
Chloride 103 mmol/l
Potassium 4 mmol/l
400
Calcium 1 mmol/l
Magnesium 1 mmol/l
Acetate 24 mmol/l
Sodium hydroxide (for pH-adjustment), Hydrochloric acid (for pH-adjustment), water for injections.
For Hospital Use Only
Solution for infusion. Intravenous use. Read the package leaflet before use. Keep out of the reach and sight of children. Use only clear solution, practically free from particles, from intact containers. For single use only. Use immediately after first opening. Do not store above 30°C. Do not freeze. Any unused product or waste material should be disposed of in accordance with local requirements.
قبل از مصرف برگه راهنما را مطالعه نمایید.
دارو را دور از دید و دسترس کودکان نگهداری نمایید.
محلول باید شفاف، بدون رنگ یا کمی مایل به زرد و عاری از هرگونه ذرات و کیسه محتوی دارو سالم باشد، در غیر اینصورت از مصرف آن خودداری نمایید.
این فرآورده برای یکبار مصرف است.
فرآورده را بلافاصله پس از باز شدن کیسه برای اولین مرتبه مصرف نمایید.
در دمای کمتر از ۳۰ درجه سانتیگراد نگهداری و از یخ زدگی محافظت نمایید.
باقیمانده محتویات دارو و مواد دور ریختنی را مطابق دستورالعمل های بیمارستانی دور بریزید.
فروش بدون نسخه پزشک ممنوع است.
دستور پزشک:
این دارو بیمارستانی است
نمایندگی در ایران: شرکت نیکان فارمد
Marketing Authorization Holder:
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Carl-Braun-Straße 1
34212 Melsungen, Germany
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343/12267/2021

	Mode	Tool	Effect	Watts	Duration	Interval
Marking	SOFT COAG	Tip Knife	4-5	20-50		
Mucosal incision	DRY CUT	IT Nano/Tip	3	80		
	ENDO CUT	Tip Knife	3		1-3	1
		IT-2 Knife	3		2-3	1
	ENDO CUT	IT Knife	2		2	2
	ENDO CUT	Dual, Hook	3		2	2
	SPRAY COAG (esophagus)	Dual, Hook	2	60		
Submucosal dissection	DRY CUT	Hybrid/Tip	2	50		
	ENDO CUT	Hybrid/Tip	3		2	1
	ENDO CUT	Dual, Hook	3		2	2
	FORCED COAG	Hybrid/Tip	2	35-50		
	SPRAY COAG	Hook	2	60		
	SPRAY COAG	Hybrid/Tip	1	35-50		
	SWIFT COAG	IT Knife	4/5	100		
	SWIFT COAG	ITnano/Tip	2	40		
Hemostasis	Bipolar soft	Bipolar forceps	4	25		
	FORCED COAG	Hybrid/Tip	2	35-50		
	FORCED COAG	ITnano/Tip	2	40		
	SOFT COAG	Coagrasper	5	80		
	SOFT COAG	forceps	5	40		
	SPRAY COAG	Dual/Hook	2	60		

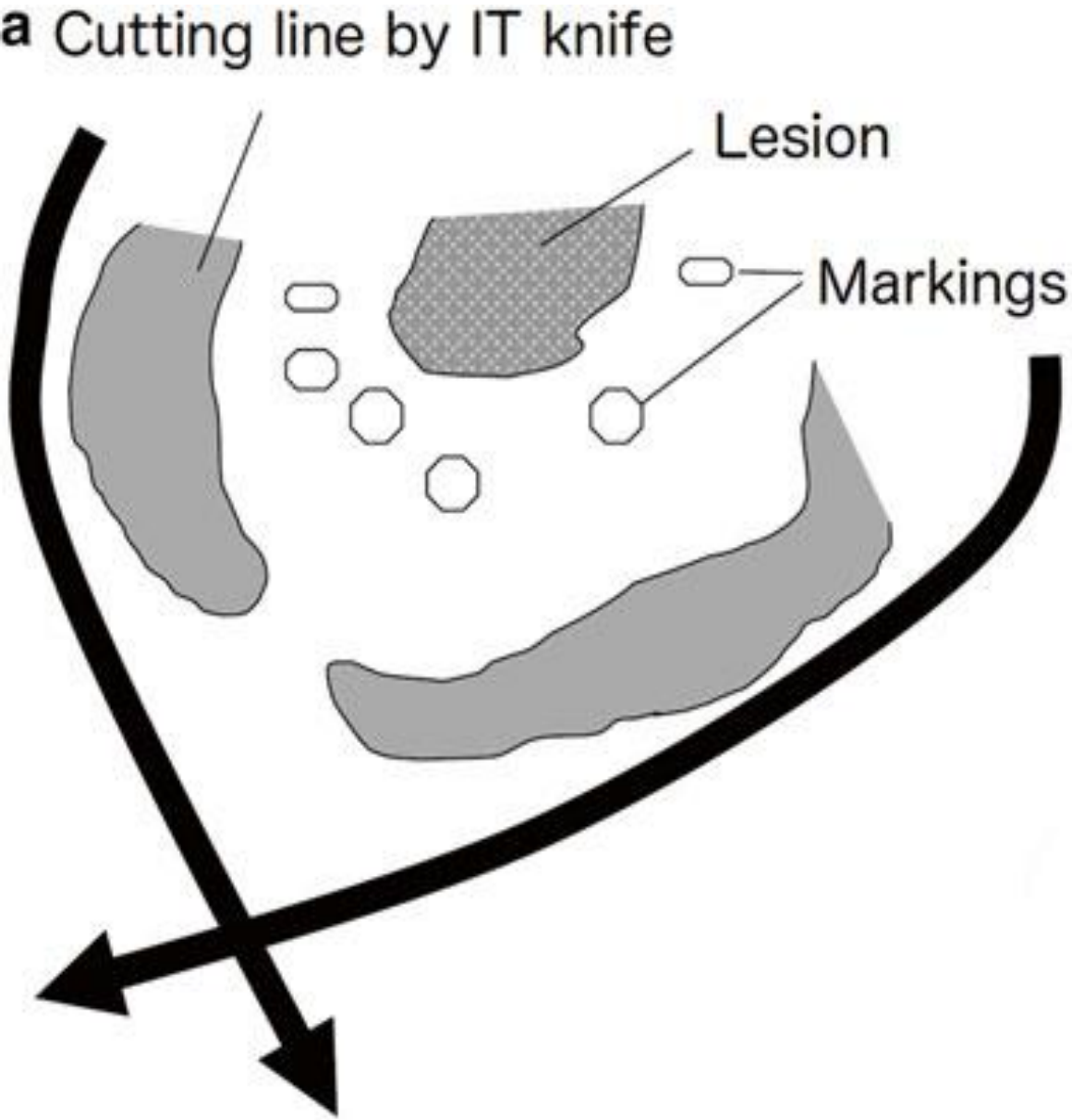
White light and Conventional magnifying endoscopy.
NBI and NBI and magnifying.
Indigo carmine staining and Indigo carmine staining and magnifying

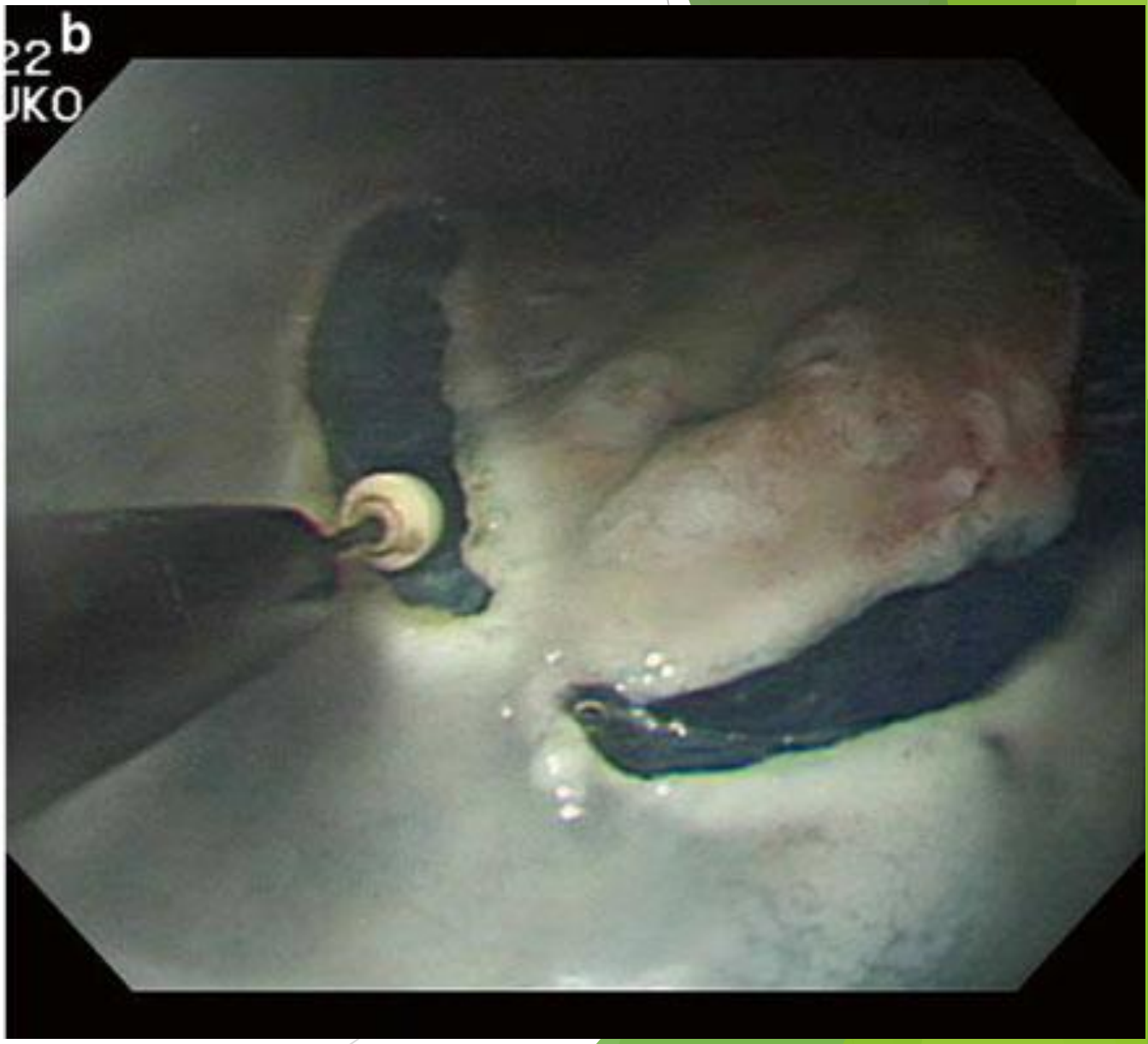


Marking

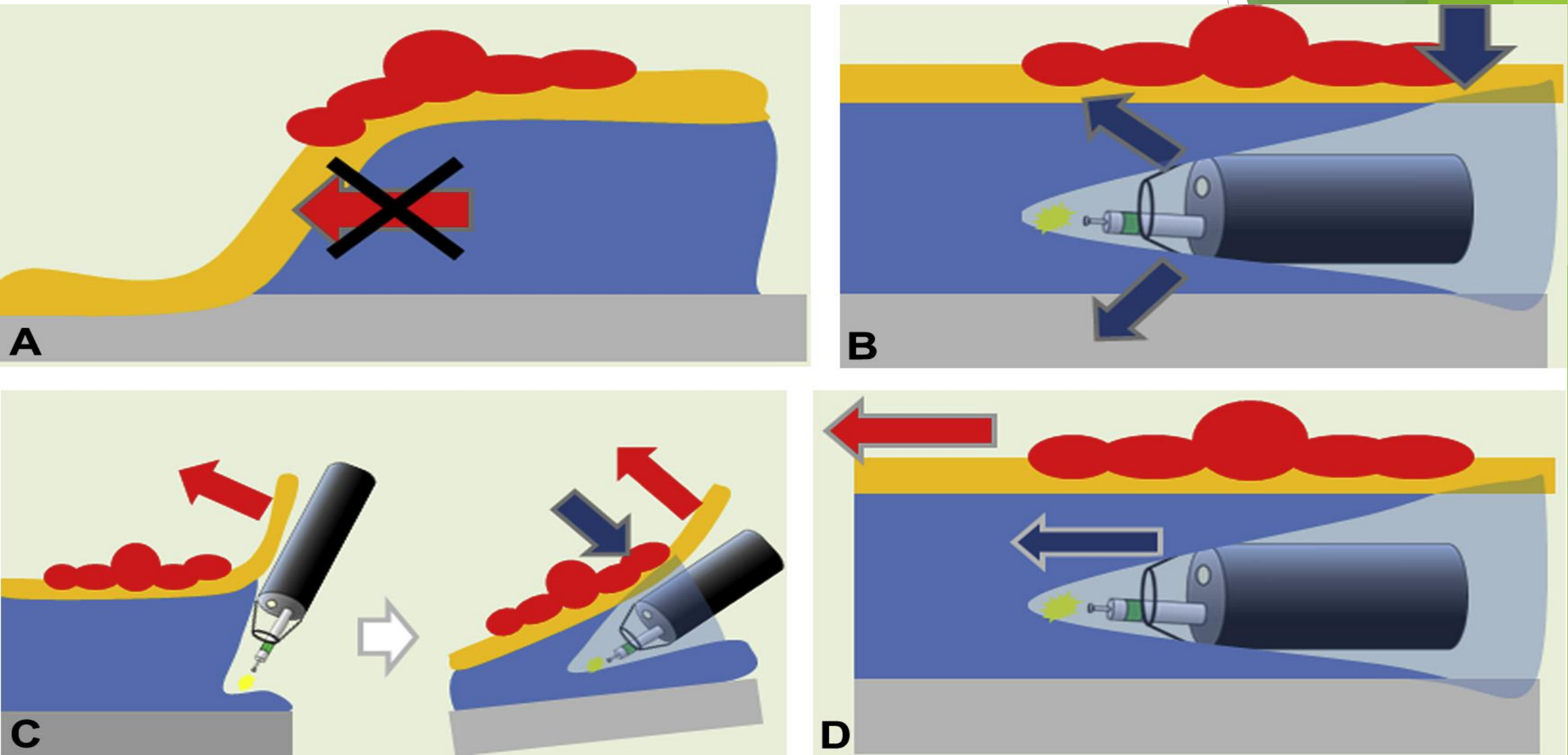
- Marking dots are made by electrocoagulation at 3–5 mm from the outer border of lesions.
- If the border is vague, it could be determined under the guidance of NBI or indigo carmine staining

As a rule, the main movement of the IT knife is cutting by drawing the knife anteriorly from the interior





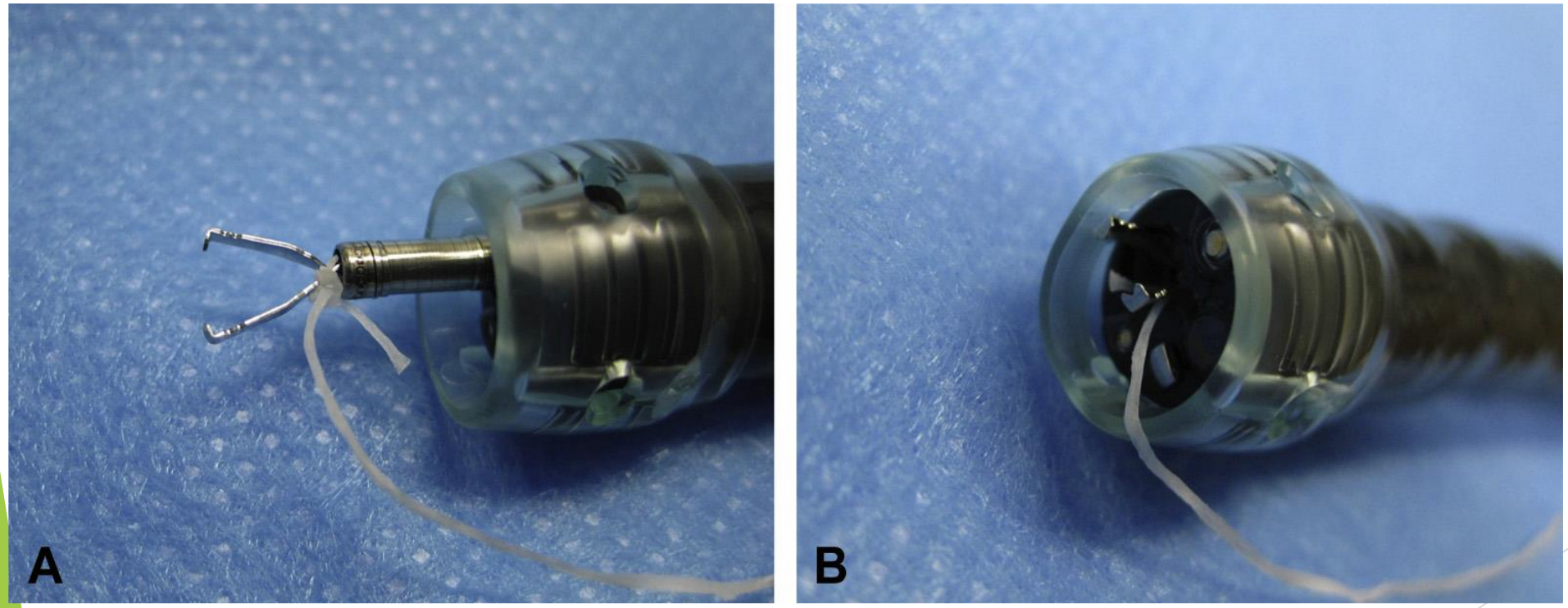
pocket-creation method in gastric ESD



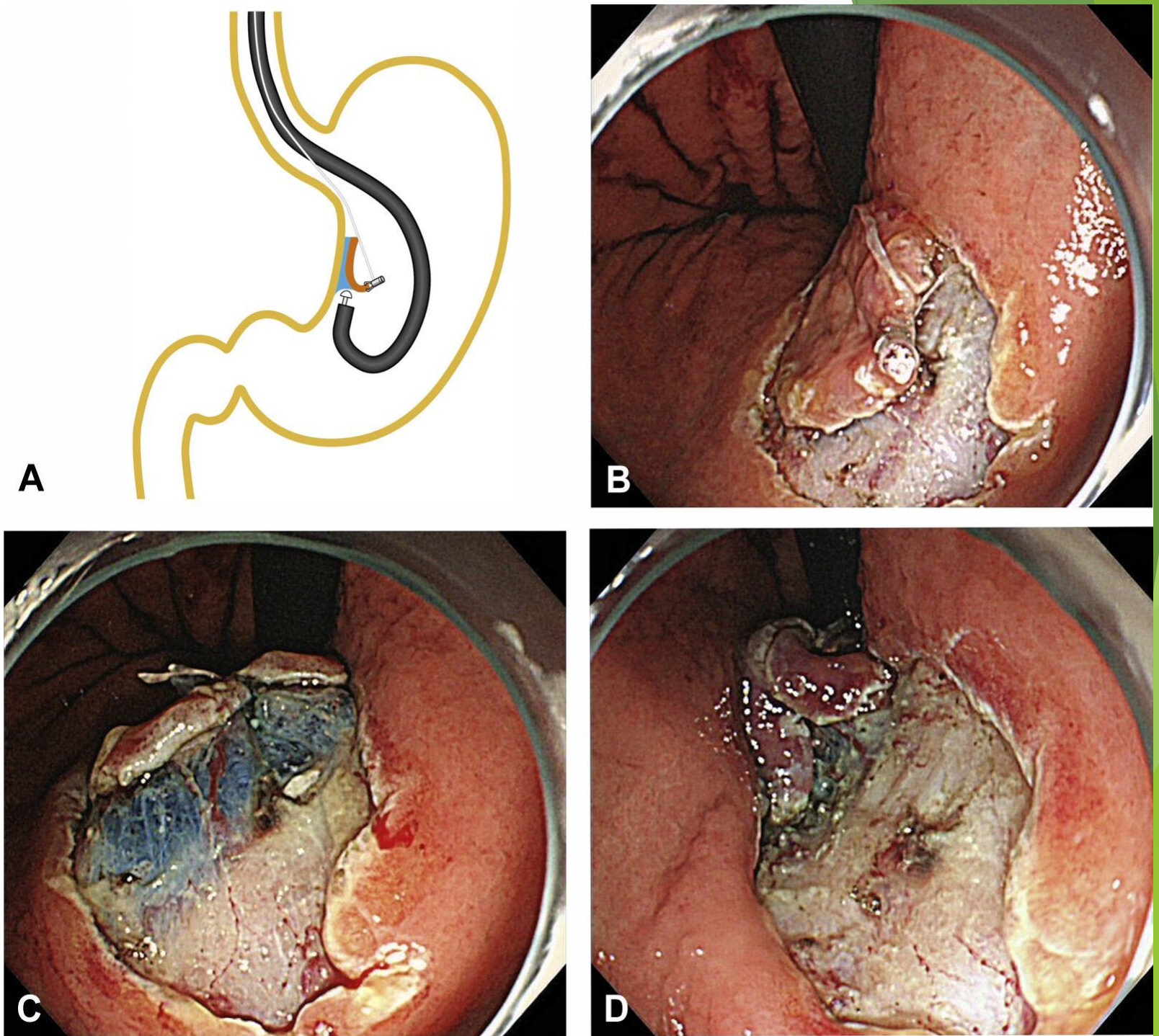
Advantage of PCM for Gastric ESD

- (1) clear visualization of the submucosal Layer
- (2) good traction by stretching the submucosal Tissue
- (3) adjusting the approach angle to the muscularis,
- (4) synchronizing the endoscope and the pocket, which lessens the effect of respiratory movement.

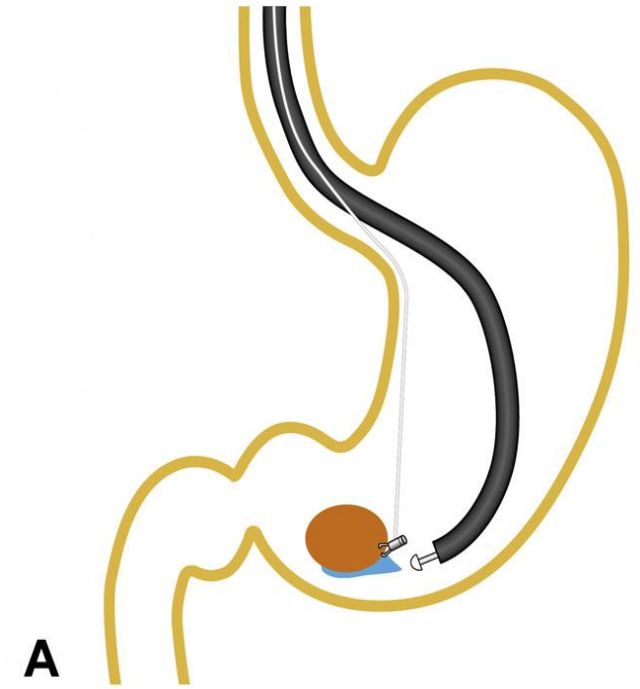
Preparation of the DFC(dental floss and a hemoclip)

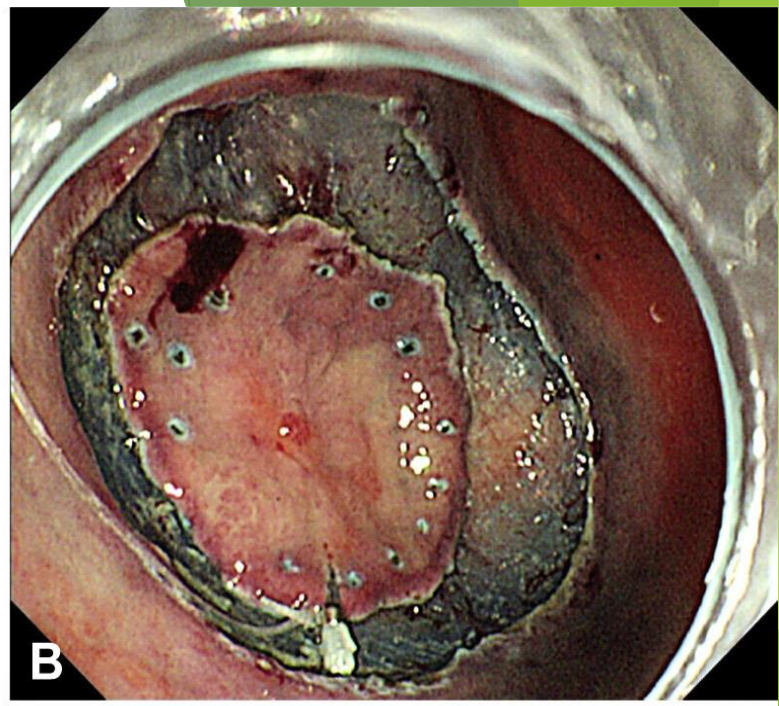


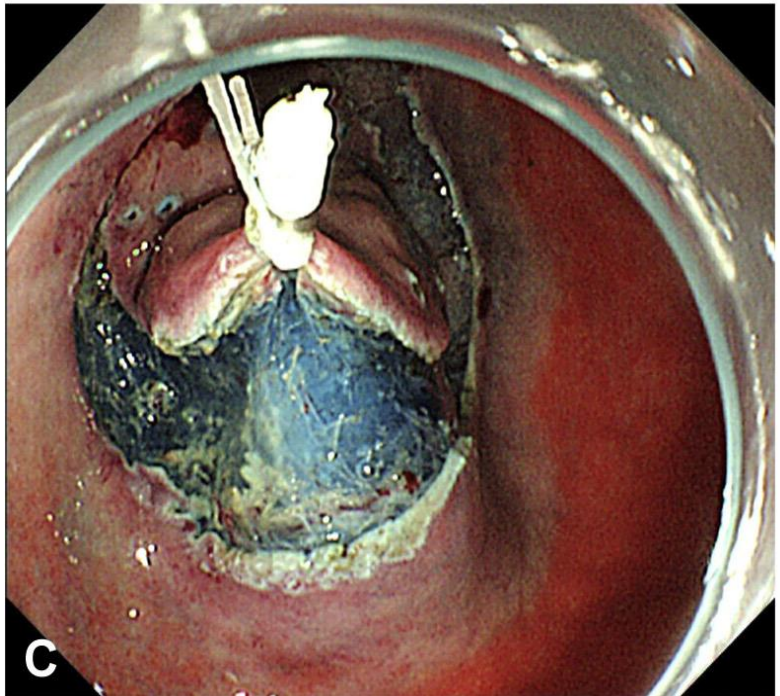
ESD with DFC an approach from the retroflex endoscopic position

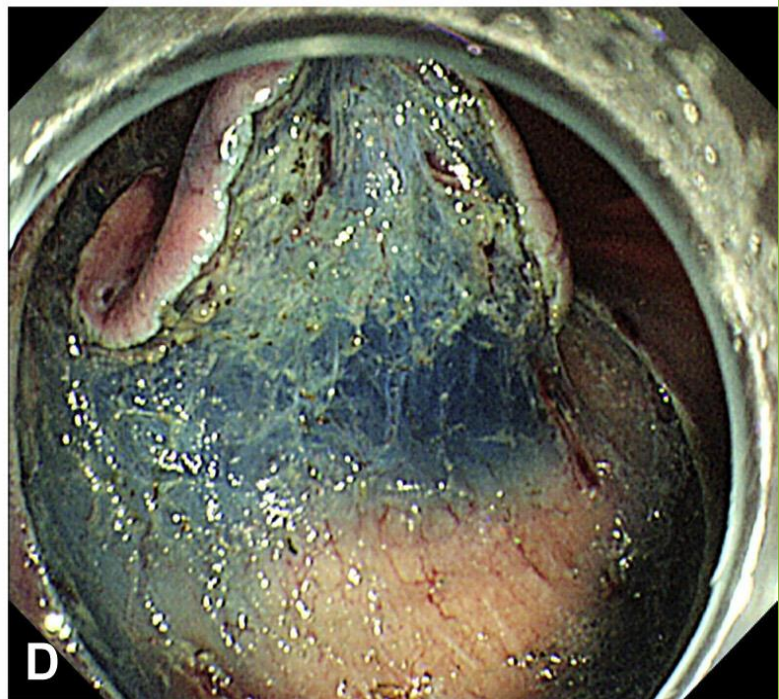


ESD with DFC, involving an approach from the straight endoscopic position









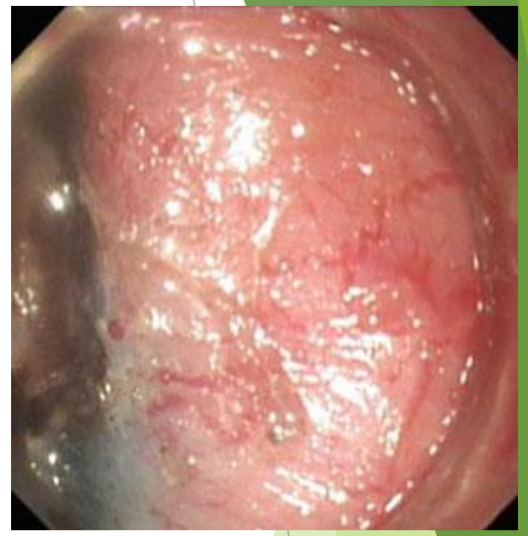
ESD for Cardia (GEJ) Lesions

- A ***difficult and risky location*** for ESD due to its narrow lumen, sharp angle and very rich small Vessels
- ***A small initial incision is often made with a hook knife at the antral side*** under direct view for insertion of the tip of the IT knife into the submucosal layer.
- Then a circumferential mucosal incision is made from the anal side of the lesion using the IT knife, with retroflex manipulation of the scope.
- The ceramic ball prevents perforation of the muscle layer.
- Submucosal dissection is then continued from the oral side of the lesion. The solution can be injected into the submucosa during dissection to raise the submucosal layer

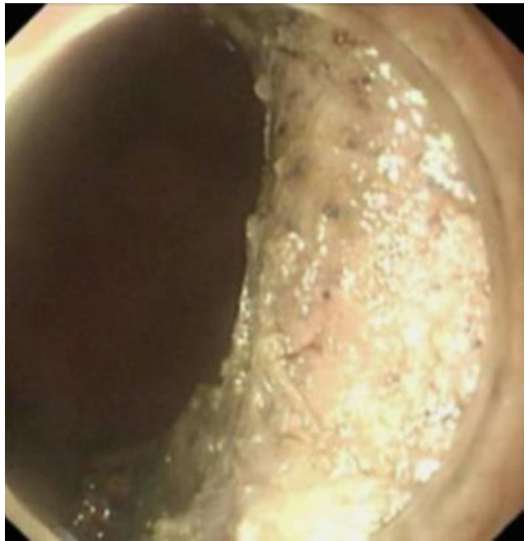
ESD procedure for a lesion at the Cardia

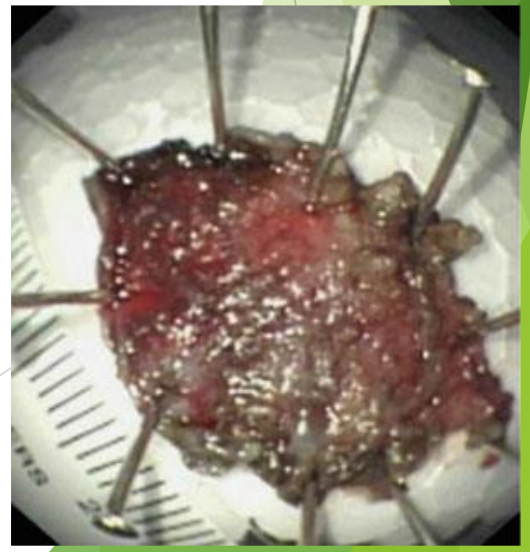




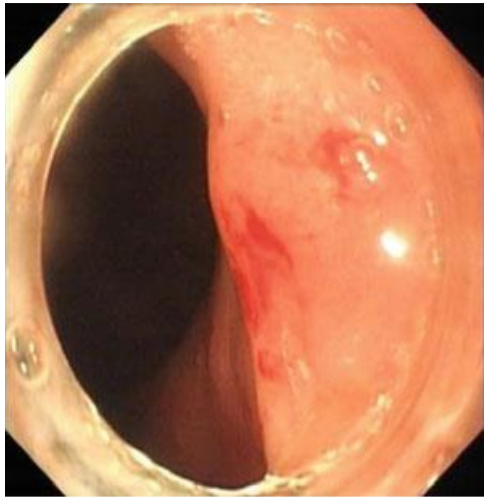
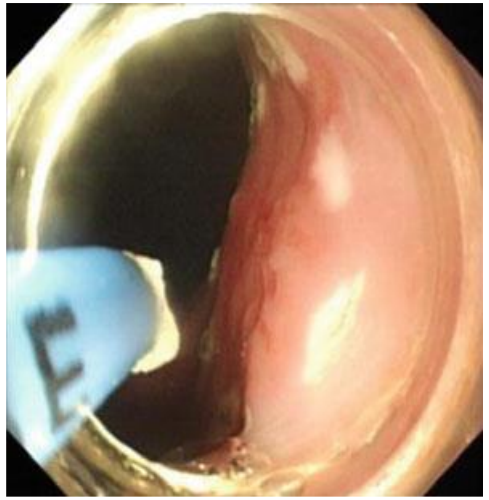
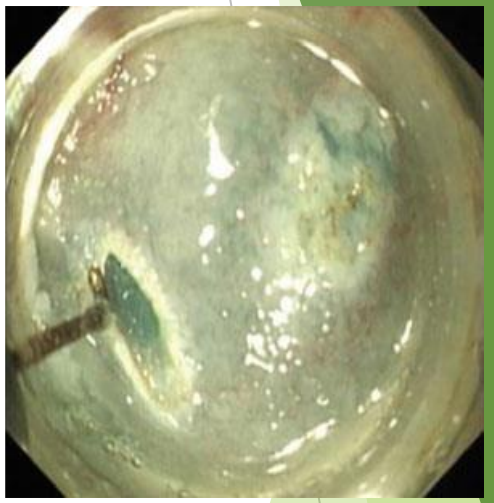
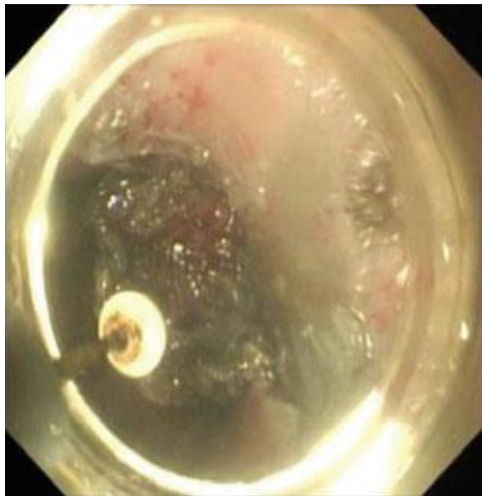
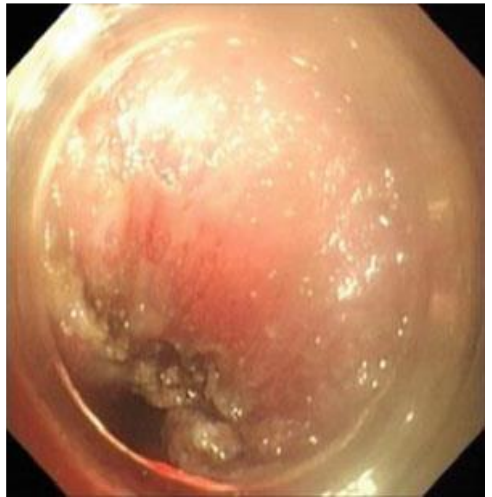








ESD procedure for a lesion at the Cardia

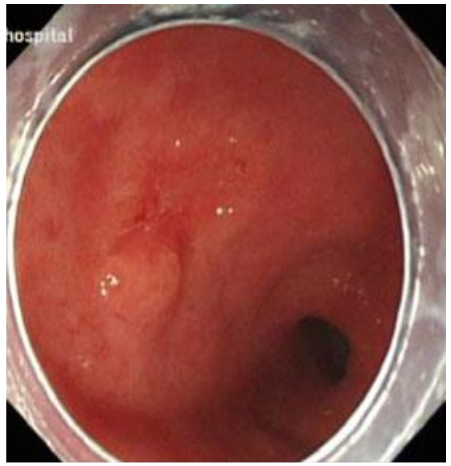







ESD for Antral Lesions

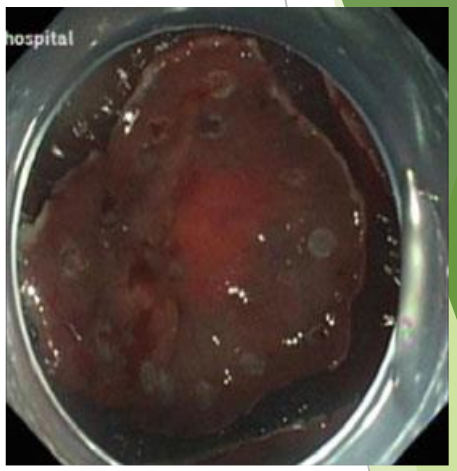
- Easy location for ESD due to its thick wall, large space, hence with more operating space.
- Posterior wall of the antrum more difficult than the anterior wall, and the lesser curvature side more difficult than the greater curvature because of gravitational effect of fluid cushion.
- Changing body position is sometimes necessary for separating lesions from the liquid.
- Submucosal vascular bed at the antrum is also rich, so it is particularly important to prevent and stop bleeding quickly

- Lesions located in the pyloric area are difficult to resect; ESD is technically diffi cult and should be carried out by experienced endoscopist.
- If the pre-pyloric tumor extended to the pyloric channel, ESD using scope retrofl exion is often then attempted within the duodenum to evaluate tumor extension and resect the lesion from the pyloric area to the duodenal bulb(difficult in bulb deformity or duodenal ulcer).

ESD for a lesion at the gastric antrum





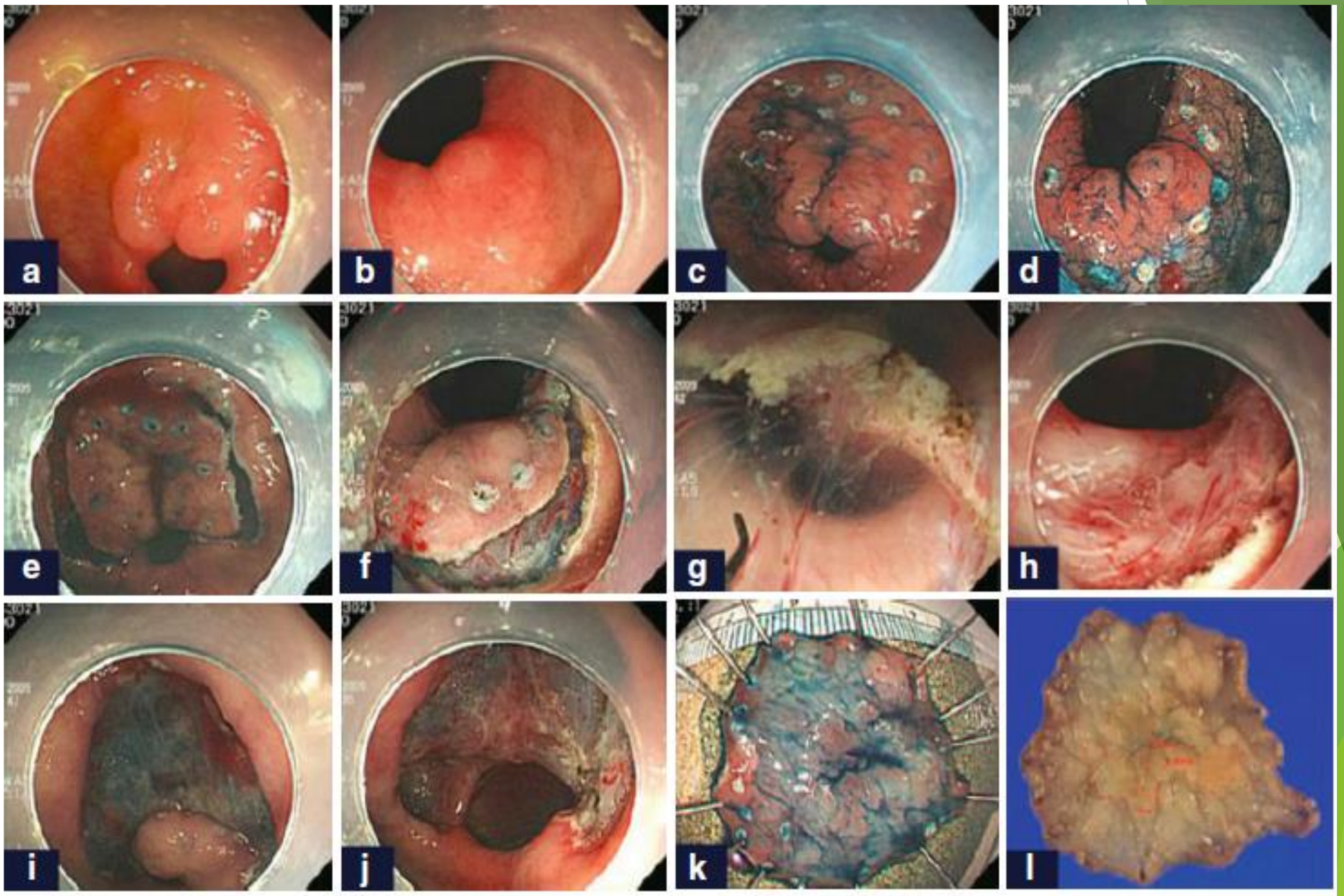








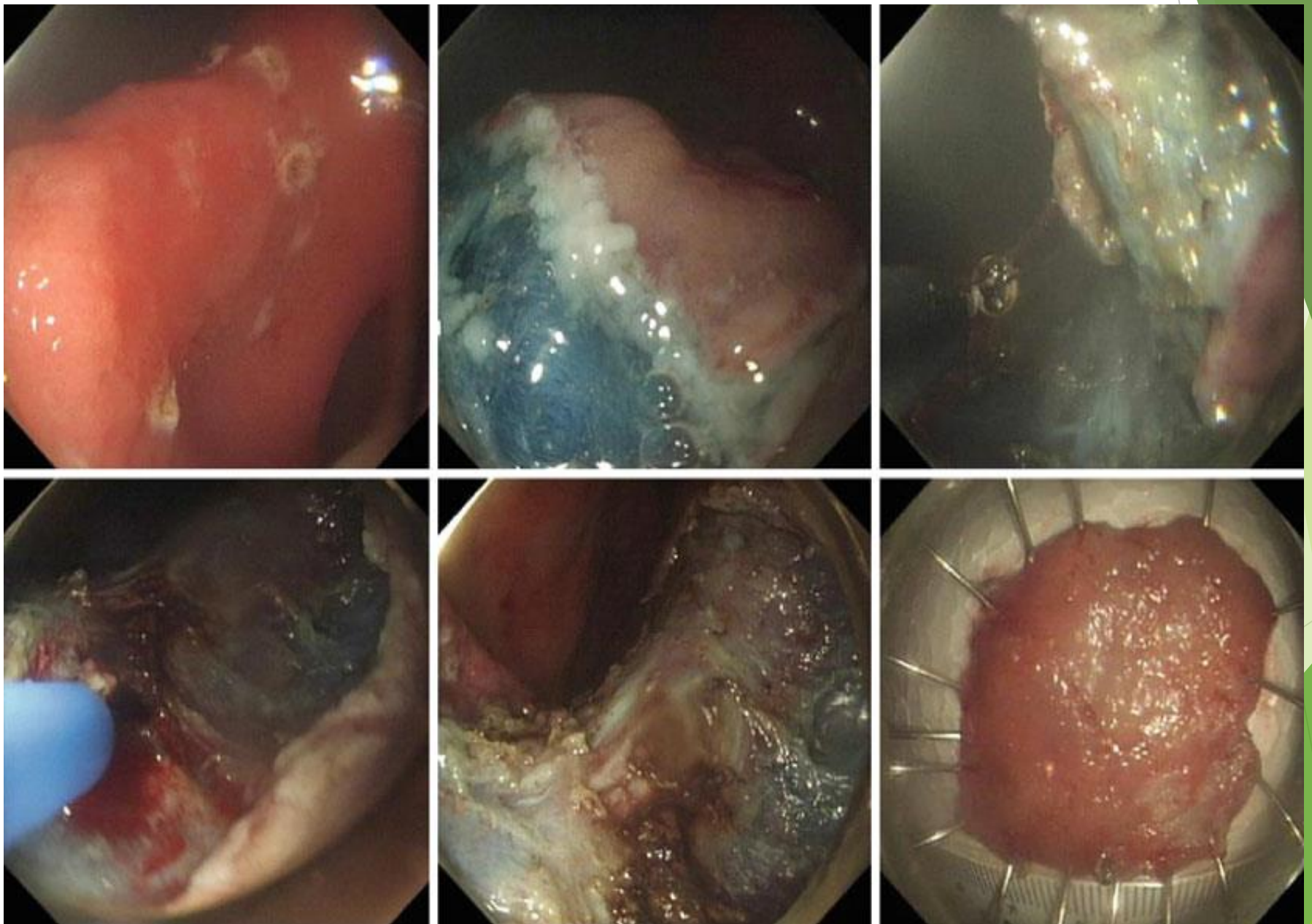
ESD using retroflexion in the duodenum.



ESD for Lesions at the Gastric Angle

- Very thin and the clear view of the angle is usually possible after adequate insufflation during gastroscopy.
- close attention to the direction of the knife tip and cut tangentially to the submucosal layer to prevent perforation, especially when the lesion locates at the notch.
- The lesion also can be resected using forward view technique when it is located anteriorly at the lesser curve

ESD for a lesion at the gastric angle using retroflexion.



Example of ESD for a HGD at the gastric angle





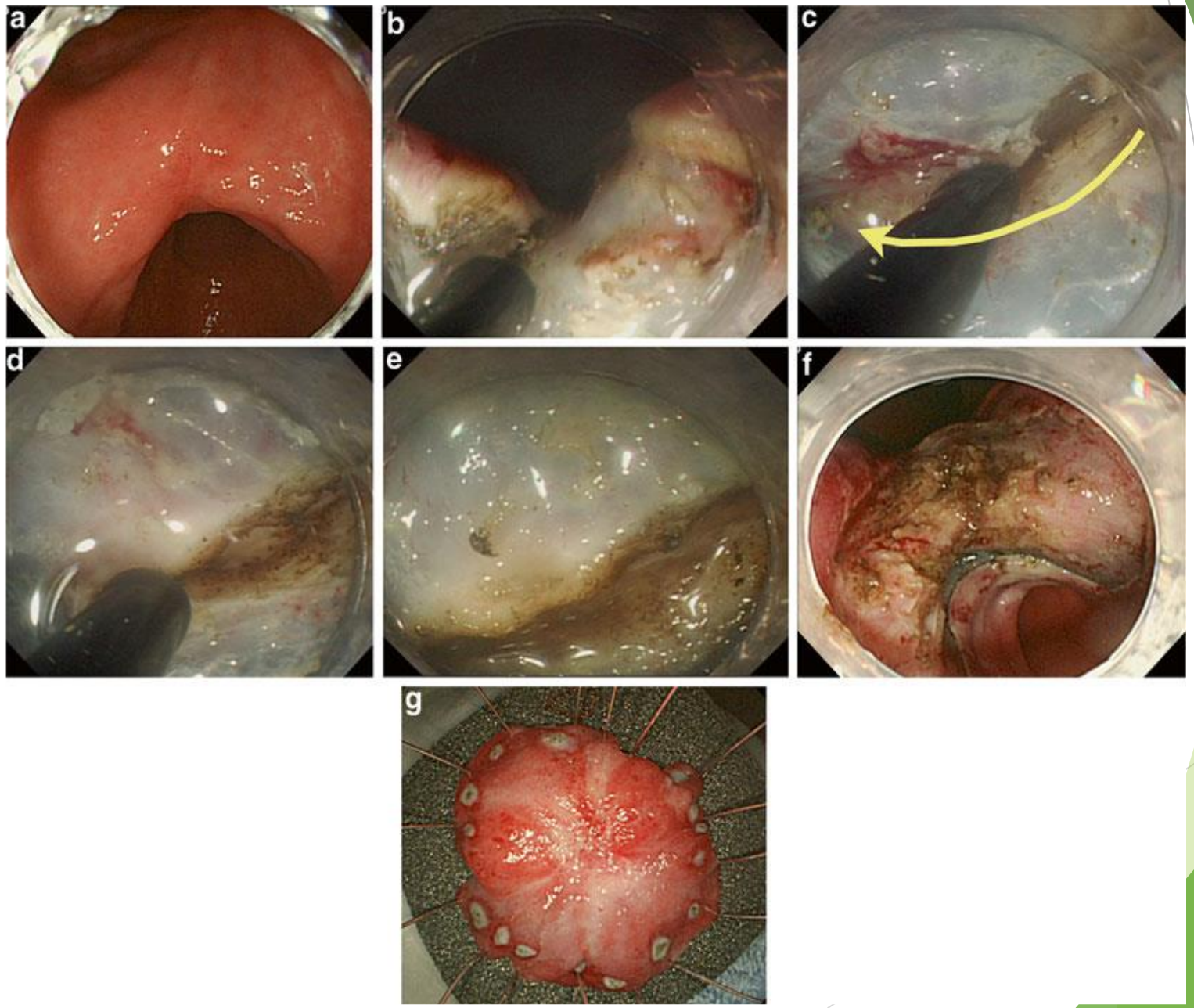








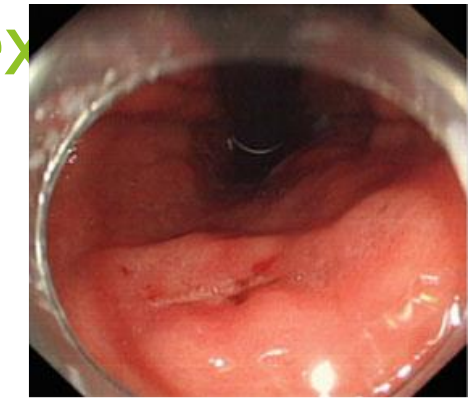
A IIc lesion on a gastric ulcer on the angular incisure of the lesser curvature.

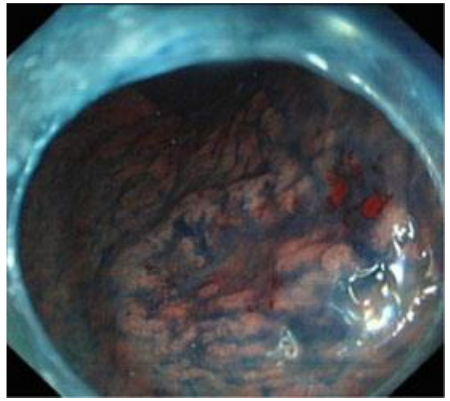


ESD for Lesions at the Gastric Body

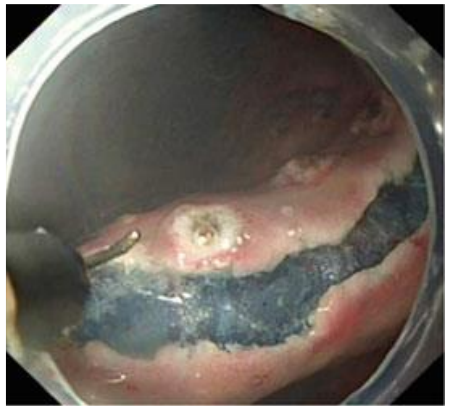
- regarded relatively easy location :large operating space and clear view
- The lesion at the lesser curve and proximal side are technically diffi cult to resect.

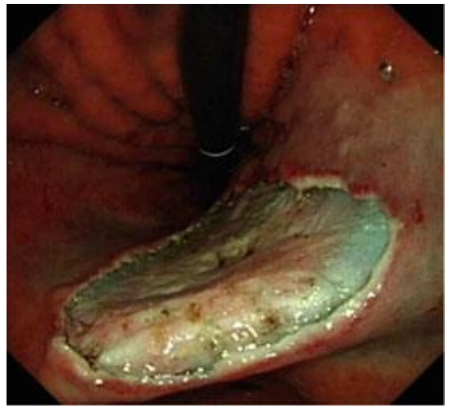
ESD for a lesion at the gastric body using retrofl
ex

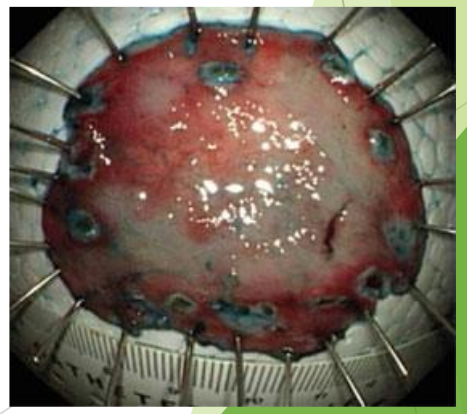




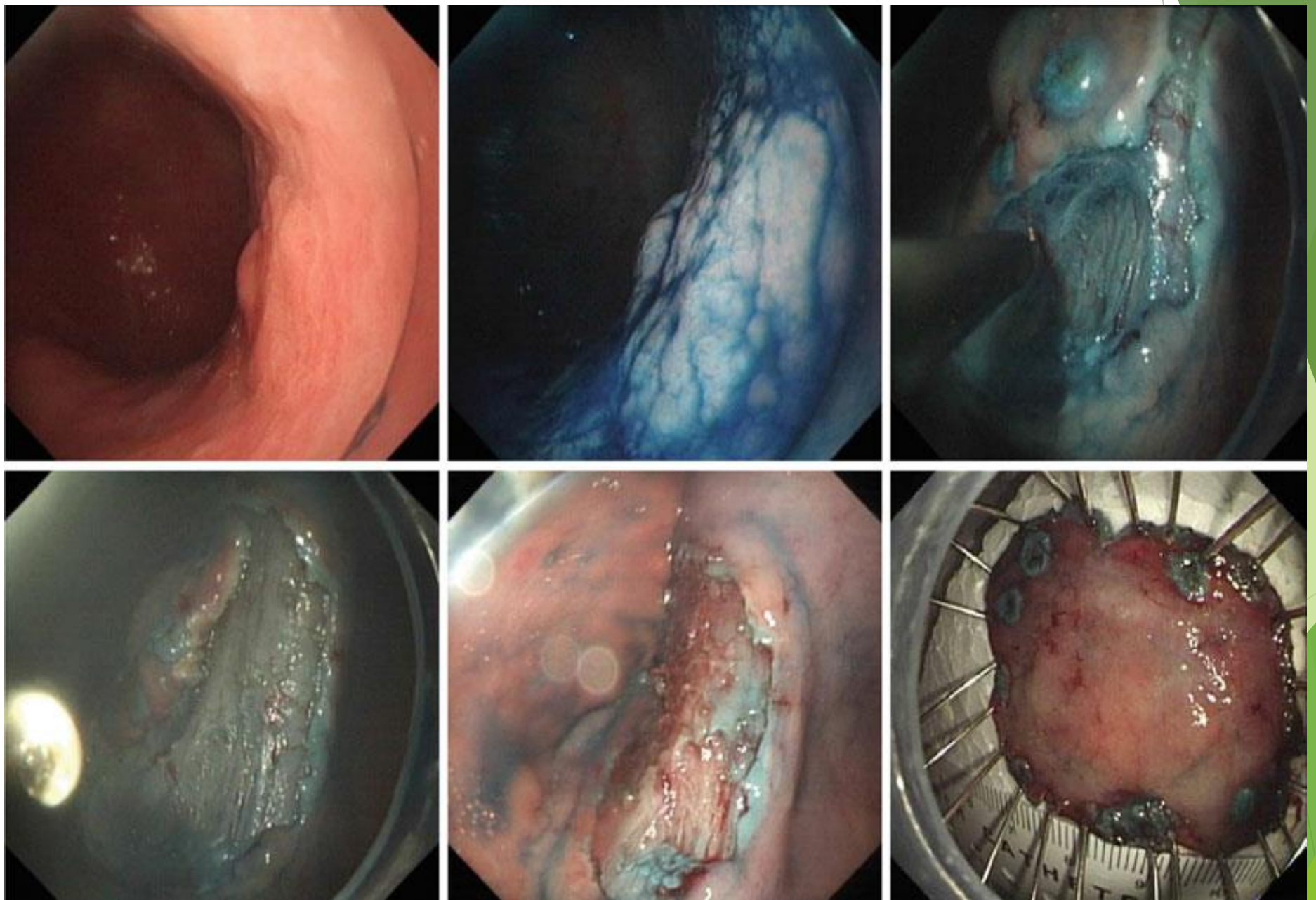




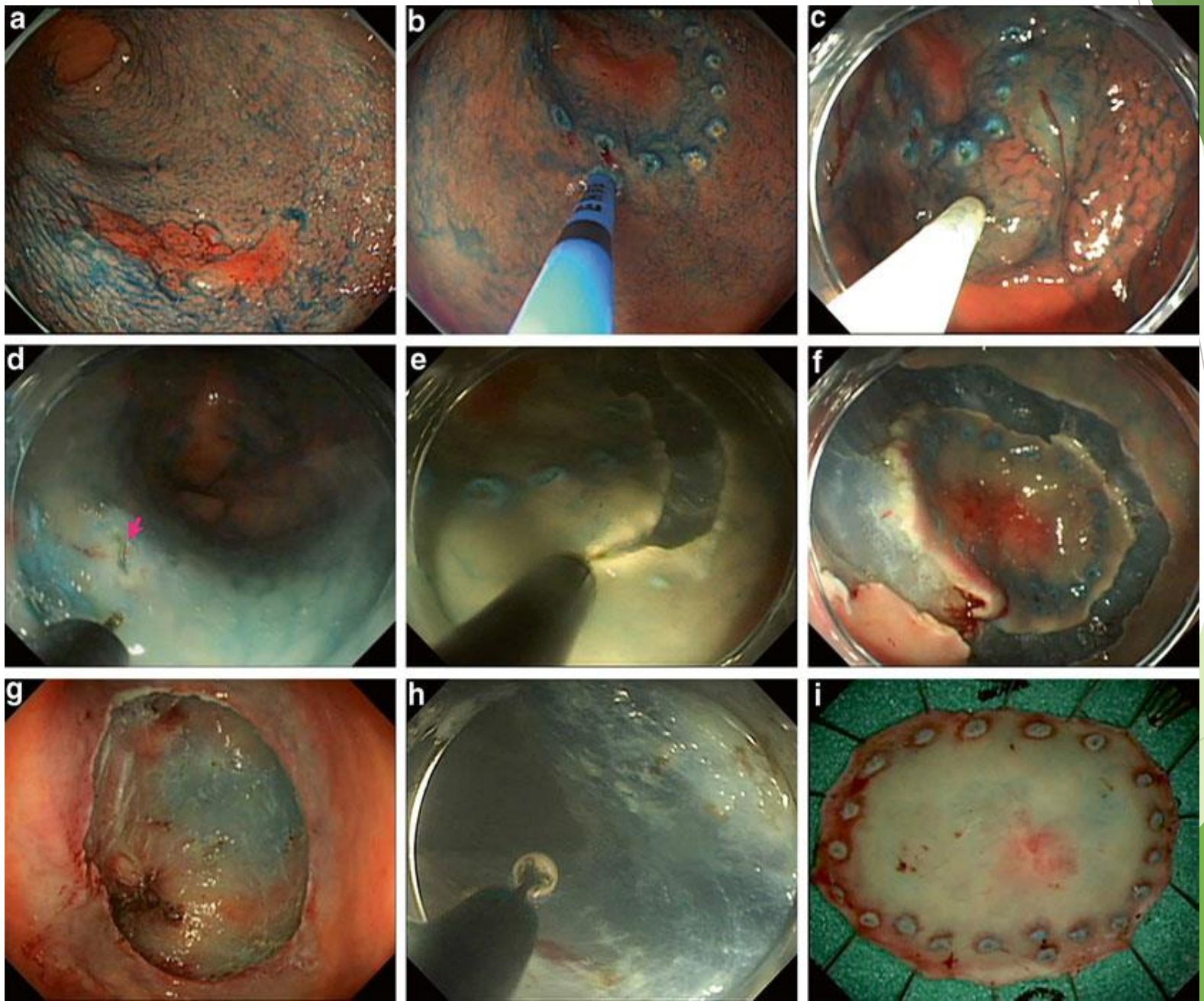




ESD for a lesion at the gastric body under the forward view.



0-IIc type early gastric cancer located at the greater curvature of the antrum.

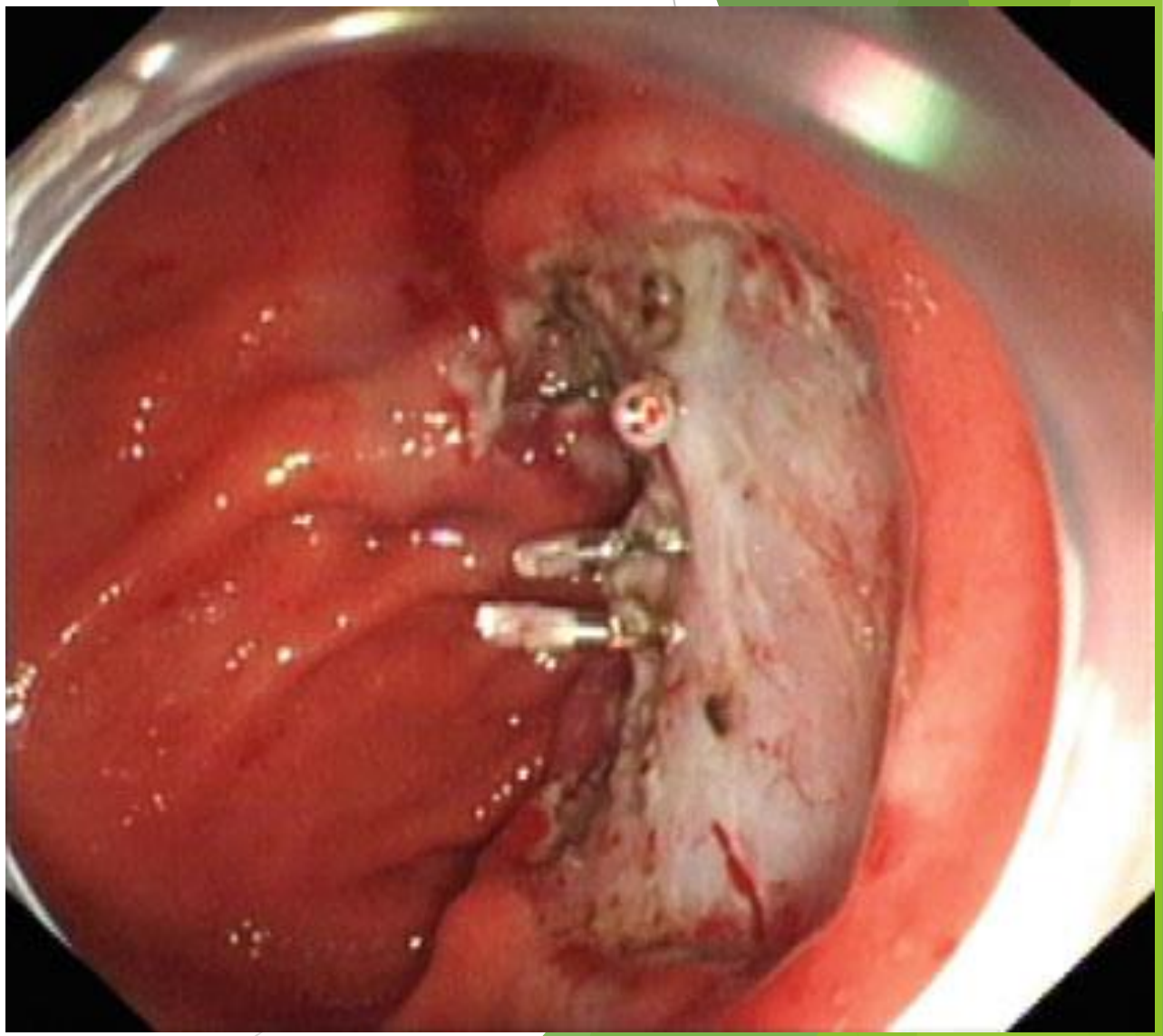


ESD for Lesions with Ulcer Scar

- ESD allows the removal of such lesions because the submucosal layer can be dissected under direct view.
- If the tissue did not lift during or after submucosal injection, the ulcerated tissues can be carefully dissected along the plane of the submucosa using a hook or IT knife
- The key to avoid perforation is to hold the endoscope stably and dissect the lesion along the base of scar using a tangential movement.

ESD for ulcerated gastric lesion using a hook knife.





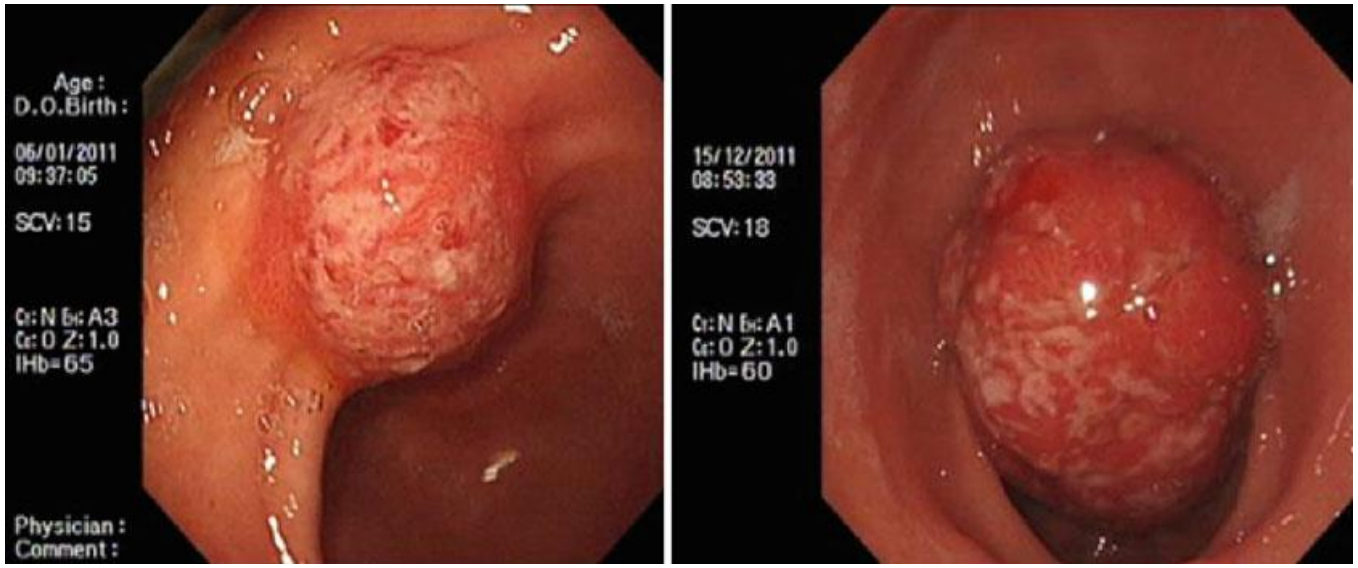
Postoperative Management and Follow-up

- PPI: 8 weeks after ESD.
- Follow up examination is scheduled ***at 1 month*** to evaluate and confi rm complete resection or to carry out additional treatment according to endoscopic assessment or the histology result.
- Patients are followed up and underwent serial endoscopy ***at 3, 6, and 12 monthly and annually thereafter*** to check for wound healing and recurrence.
- Local mucosal recurrence after ESD for tumors fulfilling the indication criteria are treated by further ESD or surgical treatment

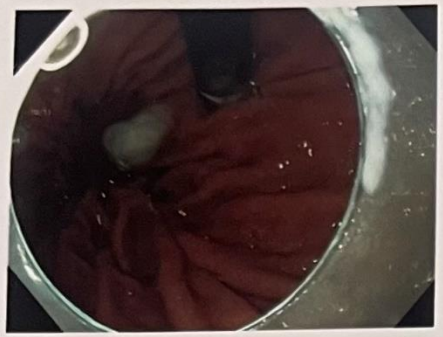
Process of wound healing after ESD



Pyloric obstruction caused by granulation tissue hyperplasia after ESD



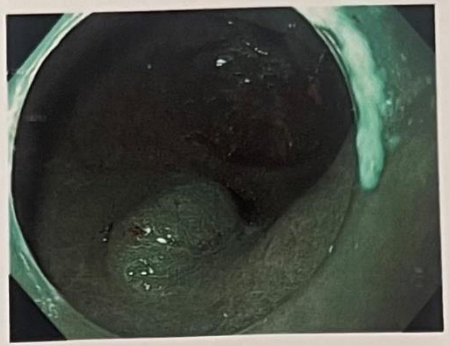
Endoscopy Report



Cardia



Lesser Curvature of Body



Antrum



Antrum



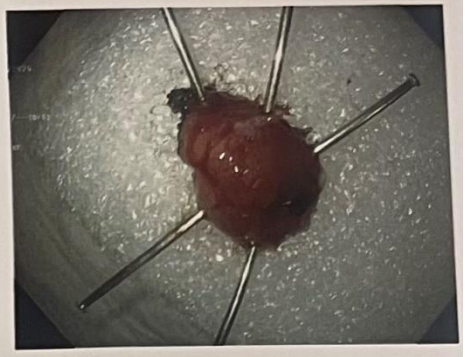
Antrum



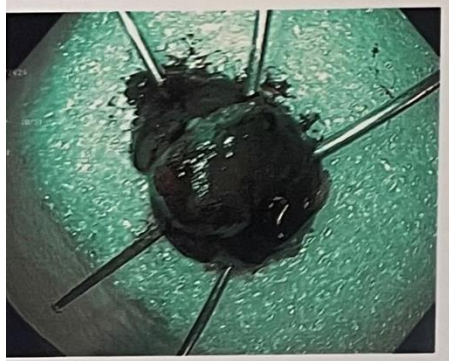
Antrum



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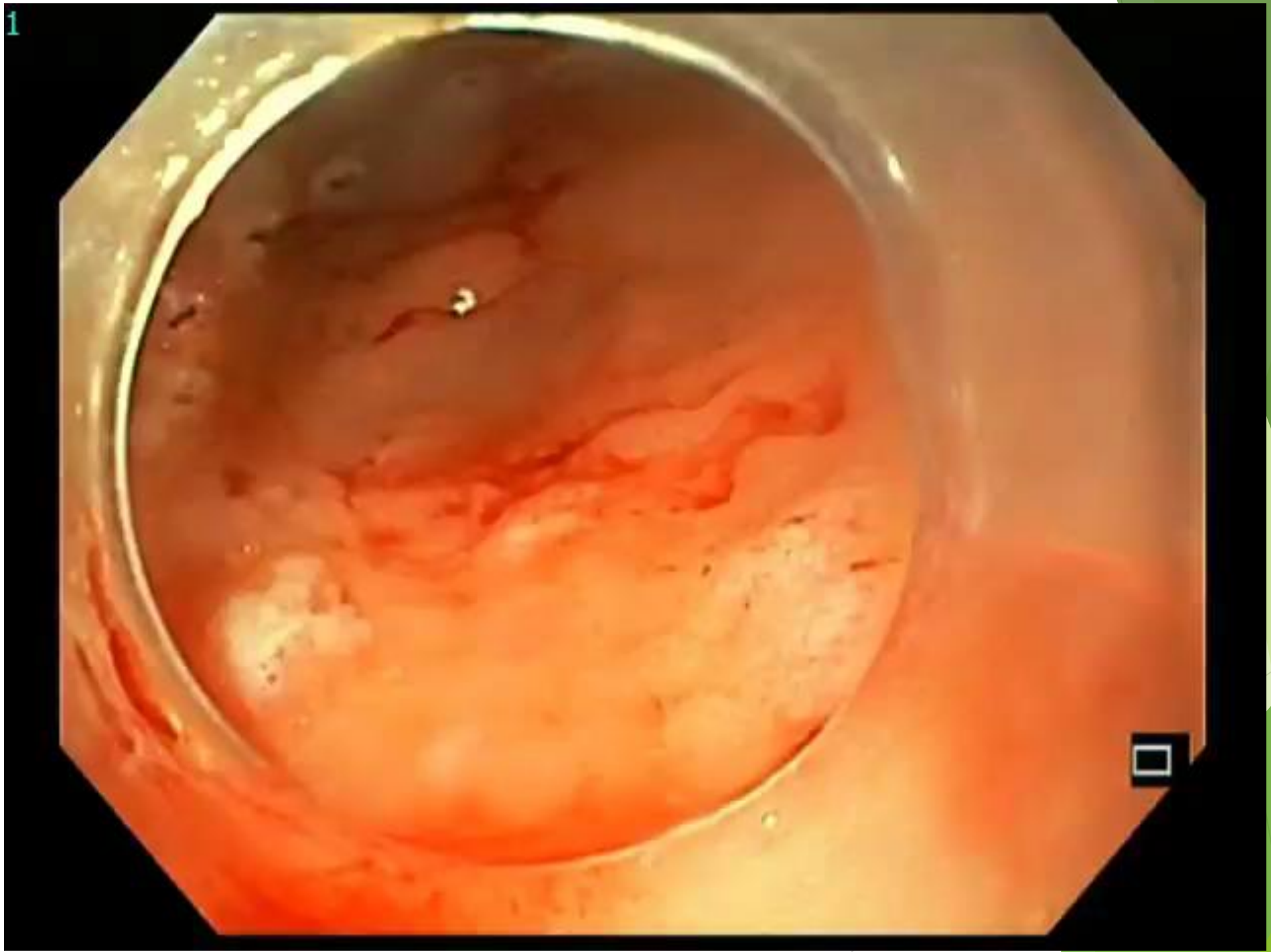
DIAGNOSIS:

A- POLYPOID MASS OF GASTRIC ANTRUM, REMOVED BY ESD:

- *Tubular adenoma with high grade dysplasia (Invasion into the lamina propria cannot be excluded)*
- *The resection margin is unremarkable and free from dysplasia*

B- GASTRIC ANTRUM, SURROUNDING AREA OF MASS, ESD:

- *Moderate chronic gastritis with along with mild mucosal edema*
- *No H. pylori-like bacteria seen in the Giemsa stained sections*
- *Neither intestinal metaplasia nor dysplasia seen*


1