Principles of Endoscopic Mucosal Resection EMR

Dr.med.Essam Bedewy

Professor A. of Tropical medicine, Hepatology and GI Endoscopy

Definition:

- Endoscopic mucosal resection (EMR) is a technique used for the staging and treatment of superficial neoplasms of the gastrointestinal (GI) tract. This technique was first developed in Japan for the treatment of early gastric cancer and has since spread in use throughout the world for various indications, including dysplastic Barrett mucosa and sessile colonic neoplasms.

The utility of EMR rests in its ability to do the following:

- Provide accurate histologic staging of superficial GI neoplasms
- Provide a minimally invasive technique for removal of superficial malignancies

EMR Modalities:

1-injection-assisted,

2-cap-assisted

3-ligation-assisted techniques.

All have the basic principles of

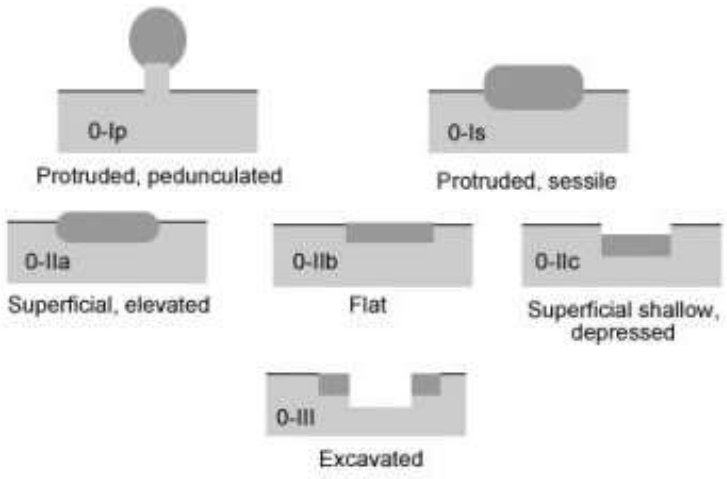
- Identification and demarcation of the lesion.

- Sub mucosal lifting of the lesion, and endoscopic snare resection.

Endoscopic and ultrasonographic characterization of lesions:

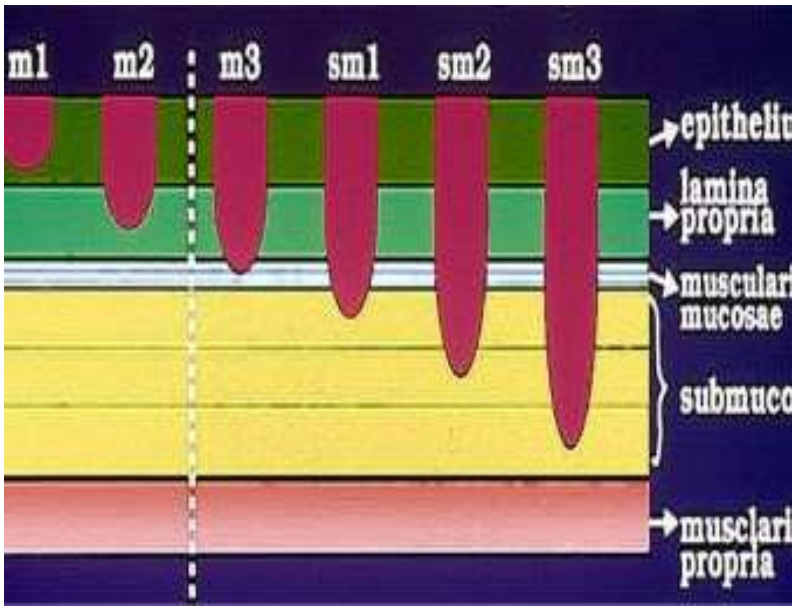
Several classification systems for the staging of early GI cancers that may aid in the prediction of lymph node metastases have been developed. Much of this work has been pioneered by the Japanese Society of Gastrointestinal Endoscopists (JSGE), working from large databases of early gastric cancer resections, classified lesions according to their endoscopic features and the implied risk of mural invasion. The subsequent Paris classification, developed in 2002 at an international consensus meeting, echoed the structure of the JSGE system

Paris classification of superficial GIT neoplasms



In the Vienna classification, lesions are divided into two broad categories, noninvasive (low-grade dysplasia, high-grade dysplasia [HGD]) and invasive (intra-mucosal cancer, cancer that infiltrates the sub mucosa)

High-frequency (≥20 MHz) EUS produces an image of the mucosal wall comprising nine separate layers differentiated by their echogenicity. By carefully examining the depth of lesion penetration into the mucosal and sub mucosal layers, one may determine the risk of lymph node metastases with greater precision. The mucosal layer is divided into upper, middle, and lower layers: m1 (epithelium), m2 (lamina propria), and m3 (muscularis mucosae). The submucosa is similarly divided into three layers: sm1, sm2, and sm3. The sm1 layer is further divided into sublayers a, b, and c on the basis of the lateral spread within the layer



Early gastric neoplasm by upper GI endoscopy

EUS view

Indications:

EMR is considered definitive treatment of superficial premalignant and well-differentiated to moderately differentiated malignant lesions of the GI tract in the absence of lymph node or distant metastases (T1mN0M0).

It also plays an integral role in the staging algorithm of early GI cancers by providing a larger resection specimen than standard forceps biopsy, allowing accurate T staging and establishing the presence of lympho-vascular involvement and hence may alter the patient managing plan.

Esophagus:

- Squamous cell carcinoma of esophagus

Previous criteria from the JSGE include a lesion size less than 2 cm and involvement of less than one third of the esophageal circumference. Disease-specific survival rates after EMR are as high as 95%, with a low rate of complications.

- Barrett esophagus with dysplasia and early adenocarcinoma

The indications for EMR of Barrett esophagus (BE) with dysplasia (BE-D) and early adenocarcinoma (EAC) in BE are evolving. Interest in EMR as an adjunct or alternative to ablative therapies for BE with or without dysplasia or intramucosal carcinoma is growing. Accurate pathologic staging, the potential for cure, and a favorable safety profile are reported advantages of EMR in this setting.

As with squamous neoplasms, accepted indications include well-differentiated to moderately differentiated lesions limited to the mucosal layer that are 2 cm or less in size. Investigations have demonstrated the efficacy of EMR applied to the treatment of larger lesions, as well as the complete eradication of BE with favorable results.

Early gastric cancer

- As an established alternative to surgery, guidelines for the use of EMR in the treatment of early gastric cancer have been published by the JSGE. Criteria for treatment include well-differentiated to moderately differentiated intestinal type adenocarcinomas or papillary carcinomas of the following types
- Type I to 0-IIa lesions measuring less than 2 cm
- Type 0-IIb to type 0-IIc without ulceration less than 1 cm
- Expansion of these criteria has been proposed to include the following:
- Lesions that are well-differentiated and up to 3 cm without ulceration or ulcer scar
- Mucosal lesions less than 2 cm with ulcer or ulcer scar
- sm1 lesions less than 2 cm without ulcer or ulcer scar
- Poorly differentiated cancer less than 1 cm

Duodenum

- EMR has been used in the treatment and staging of ampullary and periampullary adenomas, EACs, and ampullary sub mucosal lesions. Additional applications include non-ampullary adenomas, neuroendocrine tumors, and submucosal lesions.

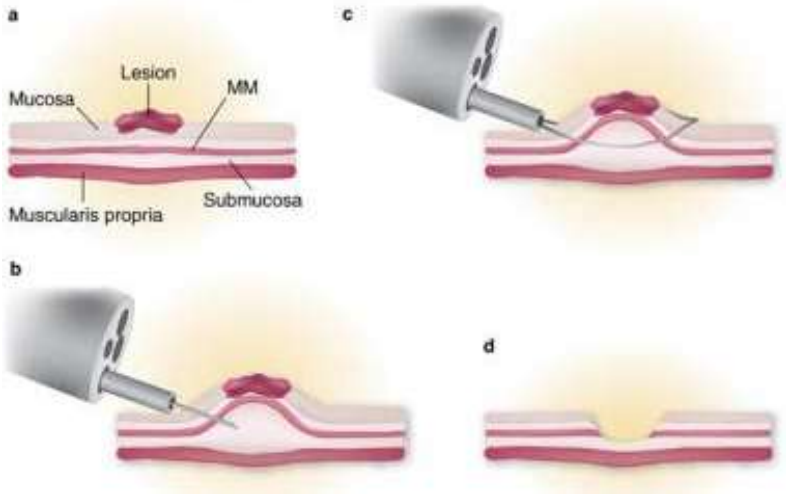
Colon

- EMR is commonly used for the resection of laterally spreading benign lesions or EAC of the colon. The "lift-and-cut" technique is most commonly used, as opposed to cap-assisted or ligation-assisted EMR . Appropriate indications include the following
- Well-differentiated or moderately differentiated tumors confined to the mucosa
- Type 0-IIa lesions smaller than 2 cm
- Type 0-IIb lesions smaller than 1 cm
- Type 0-IIc lesions smaller than 1 cm
- Additional indications also include those patients who refuse surgical intervention or in whom significant comorbidities are prohibitive. Successful removal of larger lesions has been well documented but is associated with higher recurrence rates, highlighting the need for intensive surveillance after EMR

Contraindications:

- Include the presence of or a high index of suspicion for lymph node or distant metastases.
- The non-lifting sign, defined as the failure of a lesion to elevate above the surrounding mucosa after sub mucosal injection underneath the lesion, has been established as a highly accurate and specific predictor of sub-mucosal invasion by colonic lesions.
- The presence of coagulopathy is a relative contraindication, in view of the risk of bleeding. Any contraindication that applies to standard endoscopy (eg, severe cardiopulmonary comorbidities) is also applicable to EMR.

Technique: injection assisted



Injection assisted technique

Is it EMR???????

Other EMR Modalities:

- **Cap-assisted EMR**

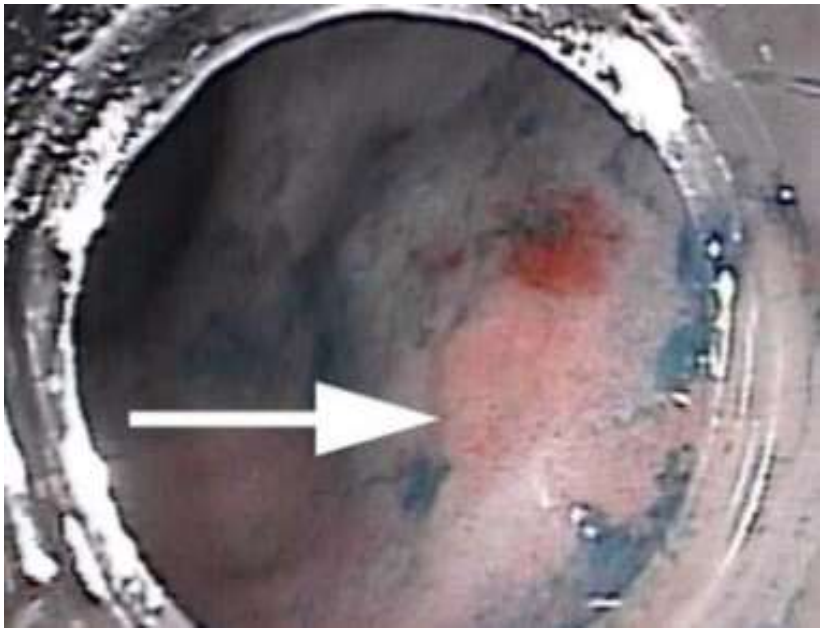
- **Ligation-assisted EMR**

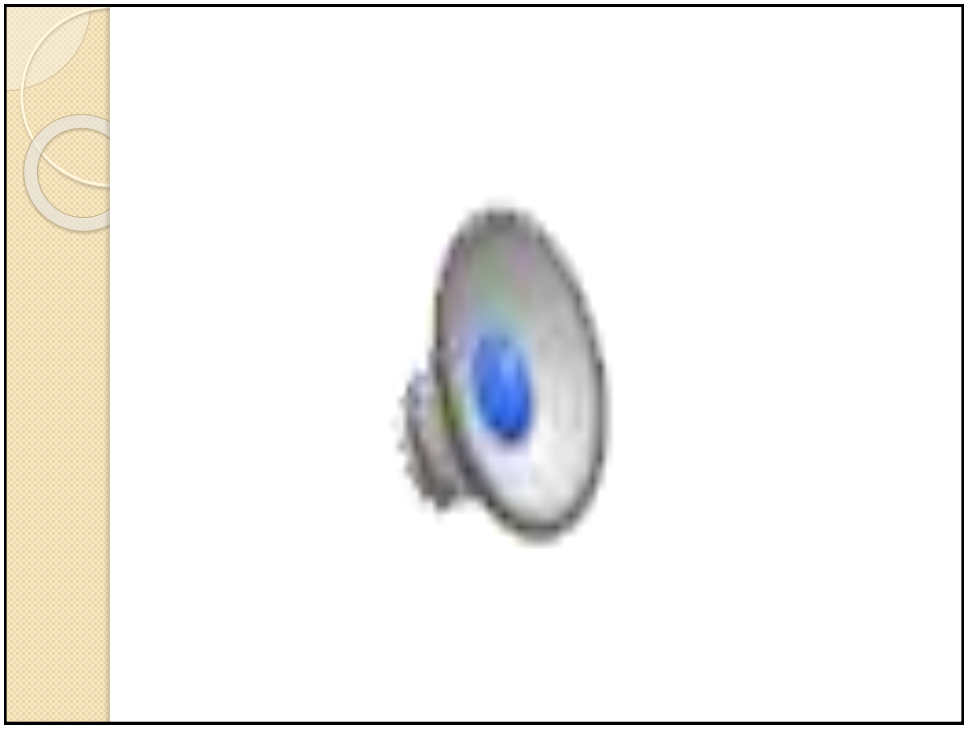
Ligation assisted technique

Complication prevention:

- EMR should be performed by experienced operators in a center of expertise. Appropriate adjuncts to treatment should be readily available in the procedure room. Additionally, interventional radiology and surgical backup should be available in the event of uncontrolled hemorrhage or perforation.

- Before endoscopic mucosal resection (EMR) is initiated, the extent of the target lesion should be clearly established. Once resection has commenced, mucosal landmarks may be obscured. Furthermore, visible abnormalities in early neoplastic lesions are often difficult to ascertain. Saline or water irrigation is often used; spraying of 1% acetylcysteine aids in the dissipation of adherent mucus. A combination of magnification high-definition white-light endoscopy and narrow-band imaging or chromoendoscopy





Thank you