

Endoscopic Mucosal Resection and Endoscopic Submucosal Dissection for the Safe and Effective Removal of Precancerous and Potentially Cancerous Lesions from the Gastrointestinal Tract

With advances in endoscopic equipment and techniques, endoscopic mucosal resection (EMR) and endoscopic submucosal dissection (ESD) have become established treatments for the safe and effective removal of mucosal lesions of the esophagus, stomach, duodenum and colon. The effective resection of these lesions allows for the endoscopic cure and/or definitive staging of gastrointestinal neoplastic lesions in these respective organs. Many large-volume medical centers, such as Penn State Health Milton S. Hershey Medical Center, routinely perform EMR and ESD. In doing so, they have changed the management of these lesions throughout the gastrointestinal tract by allowing effective resection without the need for major surgery.

Indications for EMR and ESD include:

- Mucosal lesions of the esophagus (precancerous or potentially cancerous), including nodules or masses within Barrett's esophagus and short segment Barrett's esophagus with dysplasia
- Gastric mucosal lesions
- Duodenal lesions, including ampullary lesions requiring ERCP-assisted ampullectomy
- Adenomatous colon and rectal lesions which are not amenable to safe or complete removal during a screening colonoscopy
- Limited gastric and rectal carcinoid tumors
- In highly selected cases, submucosal tumors may be removed by EMR, ESD or full-thickness resection device with good results

Effectiveness of EMR and ESD procedures

These procedures are highly effective and typically result in endoscopic cure in amenable and properly staged lesions. Cure can be expected in a high percentage of cancerous lesions in the upper gastrointestinal tract, which have a stage of T1a or less (cancerous tissue does not invade through the muscularis mucosa). It has recently been proposed that the criteria for endoscopic curative treatment of colon and rectal lesions be expanded to include lesions with limited submucosal invasion without certain high-risk features. * However, any cancer with more advanced or high-risk features should be managed in a multidisciplinary fashion in conjunction with surgical and medical specialists, radiologists and pathologists, as done at the Milton S. Hershey Medical Center. More advanced lesions should be staged and considered for surgery.

Techniques used

A variety of techniques are used in EMR for complete removal of lesions depending on the nature of the tumor and its location. At Hershey Medical Center, specialists typically use an injection of an EMR cocktail (such as hydroxy propyl methylcellulose with dilute epinephrine and methylene blue) to separate the lesions from the important muscularis propria. This provides better visualization and prevents entrapment or damage to the muscularis propria by separating it from the resection plane and any thermal or mechanical injury which could occur. ESD is a more aggressive technique using the most advanced tools to perform a dissection through the submucosal dissection plane and removing an entire lesion en block. This allows a thorough resection of larger flat lesions with more definitive histological assessments and lesion removal. However, this method is more technically demanding and time consuming with a slightly increased rate of complications. At Hershey Medical Center, we consider ESD in select cases that require en block or a deeper resection.

Risks and benefits

The benefits of EMR and ESD outweigh the risks when performed in a high-volume center with an appropriate team that includes skilled interventional endoscopists who have the correct equipment and procedure volume. However, complications can occur and should be explained to the patient when considering these options. Complications include bleeding, which occurs in 5 to 7% of cases. Sixty-five percent of these bleeding episodes will occur within 24 hours of EMR. At Hershey Medical Center, we may keep patients for that period of time for observation. Perforation has been known to occur in approximately 1% of EMR procedures and approximately 2 to 5% of cases for ESD. The estimated rates of lesion recurrence after EMR is 1 to 11%, and often less with ESD. In order to prevent incomplete EMR and ESD, it is important for referring physicians to know that previous failed attempts at lesion removal using electrocautery or injection of tattoo adjacent to the lesion will increase the technical difficulty of EMR and increase the risk of incomplete lesion removal and complications. If a lesion is identified during a screening procedure and is considered inappropriate for complete removal, it is best to leave the lesion alone, mark it 3 to 4 cm distal to the lesion, consider biopsy of the periphery (if histological confirmation is required or cancer should be ruled out), and then refer for EMR or ESD.

Follow-up treatment

In order to ensure abnormal tissue has not been left behind, patients will be brought back in six months after resection for a repeat colonoscopy and possible resection of any residual abnormal tissue. At that point, the patient will typically be referred back to their referral physician to reenter a routine surveillance program. Referral physicians should feel free to call the Division of Gastroenterology and Hepatology at 717-531-8741 for discussion. They also can

make a referral for this procedure by completing the [Interventional Endoscopy Request Form](#) or by calling the interventional endoscopy care coordinator at 717-531-4877 or 717-531-1470. Be sure to include the original procedure report and pathology report from the outside institution with this form.

References

1. [Endoscopic mucosal resection outcomes and prediction of submucosal cancer from advanced colonic mucosal neoplasia](#). Gastroenterology 2011 Jun;140(7):1909-18. doi: 10.1053/j.gastro.2011.02.062.
2. [Endoscopic Removal of Colorectal Lesions: Recommendations by the US Multi-Society Task Force on Colorectal Cancer](#) GASTROINTESTINAL ENDOSCOPY Volume 91, No. 3 : 2020
3. [Clip Closure Prevents Bleeding After Endoscopic Resection of Large Colon Polyps in a Randomized Trial](#) Gastroenterology 2019 Oct;157(4):977-984.e3.

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