

ADVANCES IN ENDOSCOPY

Current Developments in Diagnostic and Therapeutic Endoscopy

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Endoscopic Mucosal Resection

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G&H What is endoscopic mucosal resection?

JW Endoscopic mucosal resection (EMR) refers to removal of a growth on the lining of the intestinal tract, usually aided by an injection of fluid into the tissues of the submucosa underneath the tumor (Figures 1 and 2). More recently, the term EMR has come to be associated with a technique in which a cap or a hood is attached to the endoscope. Tissue is suctioned into this hood, and then cut off using a snare attached to the hood (Figures 3 and 4).

G&H Why was this technique developed? What problems does it address?

JW The mucosal surface is quite thin. By injecting fluid underneath, the mucosa is raised away from the deeper tissue. The submucosa becomes very thick from the fluid injection, and the increased distance from the mucosa to the outer wall of the intestinal tract protects the deeper layers from injury when the lesion is removed by applying heat to sever the tissue from the surface of the gut.

In the upper intestinal tract, the term EMR refers to the resection of tumor tissue usually employing a hood and a snare, but does not necessarily mean that a submucosal fluid injection is employed. In the lower intestinal tract, a hood is rarely used to remove lesions. In the context of the colon, EMR is understood to describe a freehand (no hood used) snare resection of a lesion using a submucosal injection of fluid and a snare. Submucosal injection polypectomy is a more appropriate name for the technique being performed in the colon.

G&H Are there other methods for EMR?

JW Dr. Soehendra, of Germany, has pioneered the use of a technique that is ordinarily used for banding esophageal

varices. In the esophagus, this technique uses a hood on the tip of the endoscope into which the tumor is suctioned but without a previous injection of saline. A rubber band from a variceal banding device is placed on the lesion and its surrounding mucosa. A standard snare resection technique is then used to shave off the captured tissue below the rubber band. Dr. Soehendra has demonstrated that this type of EMR in the esophagus, without a previous injection of fluid, is safe and effective.

G&H What are the risks associated with EMR?

JW One of the major risks is penetrating too deeply into the mucosa and making a hole in the wall of the intestinal tract. Bleeding is also a possibility. However, in general, if the patient selection is adequate, that is, a tumor has been clearly identified and investigations with endoscopic ultrasound or other imaging techniques have shown that it is not fixed to deeper layers of the intestinal wall and there is no metastatic disease outside the wall of the intestinal tract, then EMR is extremely effective and safe. It is possible to remove almost the entire circumferential lining of the esophagus over a several-centimeter segment with EMR devices, and patients undergoing this procedure do very well. In the colon, the ability to lift the polyp by injecting fluid into the submucosal space is a sign that if malignancy is present it is relatively superficial in depth. When a tumor will not lift, it is called the "non-lifting sign."

One of the risks associated with circumferential EMR in the esophagus is stricturing. As the area heals and the mucosa regenerates, the cicatricial tissue may narrow the lumen, causing a stricture that then needs to be dilated. However, the experience thus far shows that strictures are readily treated with dilation procedures.

G&H Are these techniques replacing other approaches?

JW These EMR techniques in the upper intestinal tract are more effective than using a snare alone, and appear to be more effective than other mucosal-destroying devices, such as the argon plasma coagulator.

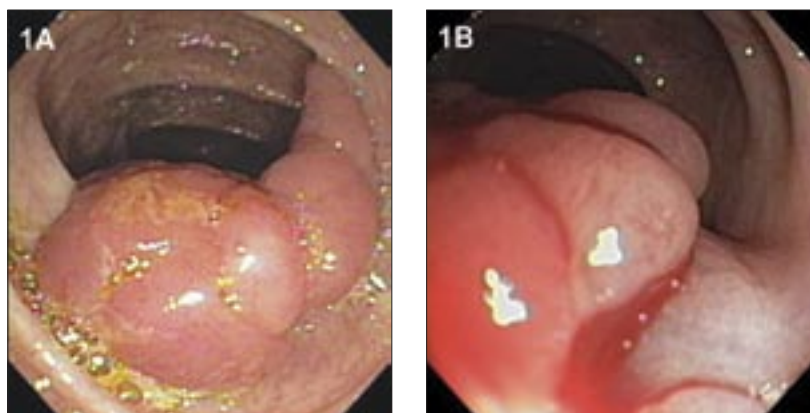


Figure 1. (A) Large sessile polyp in descending colon; (B) The right side of the polyp has been lifted by the submucosal injection of saline.



Figure 2. Polypectomy site at top of field following complete colonoscopic resection and marking with a surgical marker. The polyp fragments are captured within a Roth retrieval basket.

Figure 3. Flat superficial cancer of cardia seen through the plastic hood attachment. The snare is in place to sever the lesion after it has been suctioned into the hood.

Figure 4. Lesion captured by snare which will transect it.

G&H What other uses are being investigated for EMR?

JW Dr. Yahagi, of Japan, is investigating a variation of EMR with a technique called endoscopic submucosal dissection (ESD) to resect diffuse gastric cancers. With this approach, up to one third of the entire stomach lining can be removed using special injection techniques and an accessory that can dissect the submucosa after infiltration with a fluid solution. This thermal device is an insulated tip knife, which looks like a needle shaft with a ceramic tip on the end. The tip prevents puncturing the deeper layers while the shaft becomes electrically activated. Using cautery through the conductive metal shaft, it is possible to dissect underneath the lining of the mucosa while cauterizing blood vessels to prevent bleeding. The purpose of this technique is to remove large tumors that would ordinarily require surgical resection.

While the Japanese investigators have shown this technique to be extremely effective, most physicians who perform endoscopies, even at major endoscopy centers, are hesitant to use ESD for gastric cancer because it is very difficult and time consuming.

G&H Do the benefits of EMR outweigh the time required to perform the technique?

JW It depends on the setting. With ESD it may be that surgery is quicker, easier, and more readily accepted by the patient. In the esophagus, surgery can be very difficult, and so EMR may be the best approach. Submucosal injection polypectomies are used frequently in the colon for almost any neoplastic lesion. Physicians are accustomed to injecting fluid to elevate a colonic lesion and then remove it with a snare, and the technique is widely accepted. However, not all physicians have embraced the cap-assisted

EMR performed in the esophagus because of the risk of perforation. If circumferential EMR in the esophagus is performed, a stricture will occur with mucosal healing, but this is readily treatable with dilation.

Some doctors use EMR frequently, and these are the individuals most likely to employ this approach. A physician who does not perform EMRs frequently will be understandably hesitant to perform them on an occasional basis.

G&H Is the technique being taught to new doctors?

JW Yes. In the large medical centers where EMR is being used most commonly, doctors are being trained in this technique. Such individuals will be competent in this area, but the training is taking place at only a few centers.

G&H Is endoscopy continuing to change from an imaging modality to a more therapeutic modality?

JW Yes. As endoscopy is being used increasingly for therapeutic purposes, the lines between endoscopy, endoscopic therapy, and surgical therapy are becoming blurred. Endoscopists are removing lesions in the esophagus, stomach, and colon, and are performing gastrotomies.

The most recent development in endoscopy is natural orifice transluminal endoscopic surgery. Here, the abdominal cavity is entered with an endoscope through the natural orifices (the mouth and anus) to perform intraperitoneal surgery by a controlled puncture of the

stomach or colon. Through endoscopic surgery the gallbladder and appendix can be removed and tubal ligations can be performed. At some centers, surgeons and gastroenterologists are working together to develop techniques and new frontiers in the fields of endoscopy and surgery. These explorations will lead to more cooperation between surgeons and endoscopists, and perhaps to increased crossover with endoscopists becoming endoscopic surgeons and surgeons focusing increasingly on endoscopy.

Suggested Reading

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