Endoscopic Resection in the Esophagus

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KEYWORDS

• Esophageal cancer • Endoscopic resection • Endoscopic mucosal resection
• Endoscopic submucosal dissection

KEY POINTS

- Endoscopic resection is commonly used as first-line treatment of most intramucosal esophageal cancers and high-grade dysplasia.
- Endoscopic mucosal resection and endoscopic submucosal dissection are both applicable endoscopic techniques but differ in regard to speed, opportunity for en bloc resection, and skill required.
- There are few studies that directly compare outcomes following endoscopic resection techniques for superficial esophageal cancer.
- Endoscopic resection is superior to esophagectomy for early superficial cancers in terms of complications and length of stay. Oncologic outcomes seem equivalent for early and appropriately staged disease.

INTRODUCTION

The development of esophageal adenocarcinoma is based on an inflammatory pathway that begins with normal squamous mucosa undergoing transformation to intestinal metaplasia or Barrett esophagus (BE). With increasing genetic changes and ongoing inflammation from chronic gastroesophageal reflux disease (GERD), dysplastic changes ensue and progress to cancer. This understanding has led to improved surveillance in this setting and early identification of lesions isolated to the mucosa amenable to curative resection using advanced endoscopic surgical techniques.[1–4]

Advanced endoscopic techniques have supplanted more traditional approaches to many of the benign and malignant conditions of the esophagus and stomach. BE with high-grade dysplasia (HGD) and intramucosal esophageal cancer (IMC) were among the first 2 pathologic conditions to move toward an endoscopic approach with radiofrequency ablation (RFA) and endoscopic resection (ER). These techniques are now considered first-line treatment and standard of care in appropriately selected patients. This article reviews the techniques and variations of endoscopic mucosal resection (EMR) and endoscopic submucosal dissection (ESD). Common complications and their frequency with each technique are discussed. This involves a review of the current literature describing the relative advantages and disadvantages of each technique, and comparing the outcomes between endoscopic techniques and esophagectomy.

PRINCIPLES OF ENDOSCOPIC RESECTION

The principles underlying ER of HGD and IMC are based on experience and knowledge gained from radical resection of these tumors. The idea that esophageal cancer could be treated with anything less than esophagectomy seemed impossible because of the rich and easily accessed esophageal submucosal lymphatic plexus leading to early metastatic nodal spread. Analysis of radical esophagectomy specimens with extensive

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lymphadenectomies demonstrated a progressive risk of nodal metastases based on the depth of the lesion, such that intramucosal tumors (tumors superficial to the muscularis mucosa; tumor stage [T]1a) and HGD had few, if any, lymph node metastases (0%–1.3%). Conversely, lesions involving the submucosa (T1b) had high rates of lymph node involvement (12%–34%). The likelihood of lymph node metastasis continues to increase with T2 (43%), T3 (77.2%), and T4 tumors (66.7%).[1,5–8] Understanding this relationship, it has been shown that superficial mucosal tumors can be safely resected endoscopically without further evaluating the draining lymph nodes.

Endoscopic Mucosal Resection

EMR is an endoscopic procedure that allows removal of the mucosa and submucosa of the esophagus or stomach by creating a pseudopolyp of tissue containing the diseased mucosa. The mucosa is suctioned into a cap placed on the distal end of the endoscope and the polyp is elevated by applying a rubber band. This is then resected using a snare (Fig. 1). EMR has both diagnostic and therapeutic functions. Complete removal of a lesion of the mucosa may result in cure; however, a lesion that demonstrates deeper invasion provides accurate tumor staging for a new cancer.

The technique has been used for the resection of nodular BE, early esophageal adenocarcinoma, and early squamous cell carcinoma (T1a).[9–12] Professional societies recommend using EMR for lesions 20 mm or smaller, involving less than one-third the circumference of the esophagus, and limited to the submucosa.[11] It has been the authors' practice to apply these guidelines particularly when a lesion is small enough for complete resection as a single specimen. Despite these recommendations, EMR is frequently used for the removal of lesions larger than 2 cm, with debate regarding the oncologic rigor of this practice. Complete resection of superficial lesions by EMR (negative deep and radial margins) is curative; however, this can only be determined following resection and pathologic review.

ENDOSCOPIC MUCOSAL RESECTION TECHNIQUES

EMR can be performed under moderate sedation or general anesthesia based on the planned duration of the procedure, need for multiple endoscope passes, or the use of larger endoscope distal caps. In addition to white light and electronic chromoendoscopy imaging capabilities and EMR instruments, it is useful to have coagulation forceps and endoclips readily available for hemostasis and control of microperforations. The procedure is

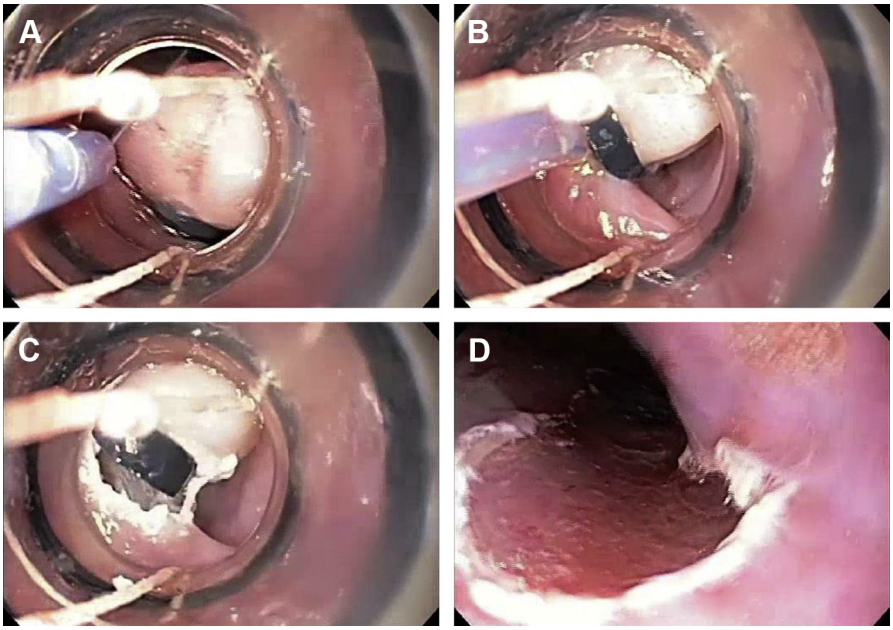

Fig. 1. EMR using a multiband resection technique. The lesion is identified and a pseudopolyp is developed by applying a band to the involved mucosa (*A*). Once the mucosa is elevated, a snare cautery is used to encircle and divide the stalk below the band (*B*) and (*C*). The technique is applied repeatedly until all the involved mucosa is resected. The ulcer bed is inspected for hemostasis (*D*).