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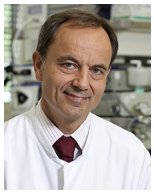
Endoscopic Submucosal Dissection: Indications and Application in Western Endoscopy Practice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Endoscopic submucosal dissection was developed in Japan, early in this century, to provide a minimally invasive yet curative treatment for the large numbers of patients with early gastric cancer identified by the national screening program. Previously, the majority of these patients were treated surgically at substantial cost and with significant risk of short- and long-term morbidity. En-bloc excision of these early cancers, most with a limited risk of nodal metastasis, allowed complete staging of the tumor, stratification of the subsequent therapeutic approach, and potential cure. This transformative innovation changed the nature of endoscopic treatment for superficial mucosal neoplasia and, ultimately, for the first time allowed endoscopists to assert that the early cancer had been definitively cured. Subsequently, Western endoscopists have increasingly embraced the therapeutic possibilities offered by endoscopic submucosal dissection, but with some justifiable scientific caution. Here we provide an evidence-based critical appraisal of the role of endoscopic submucosal dissection in advanced endoscopic tissue resection.

Keywords: Endoscopic Submucosal Dissection; Endoscopic Mucosal Resection; Polypectomy; Gastric Cancer.

For the majority of the last century, endoscopic tissue resection techniques were primarily snare-based. This meant that, except for pedunculated lesions, neoplasms >20 mm could not be resected en bloc. The required piecemeal excision compromised the histologic reliability of the resection and, therefore, surgery was frequently performed. In the late 1990s, as a result of screening programs, community awareness, and progress in endoscopic imaging, asymptomatic early neoplastic lesions were increasingly detected. The minimally invasive potential of endoscopic tissue resection and the potential for organ preservation, drove the innovation in this field.[1,2] Later, large multicenter cohort studies demonstrated reduced morbidity and mortality and vastly superior cost efficacy of endoscopic treatment in comparison to surgery.[3,4] Surgery and endoscopic treatment became complementary instead of competing strategies, with endoscopic resection allowing removal of lesions and optimal T-staging, not precluding the possibility of subsequent surgery should it be necessary.

Snare-based resection techniques for early gastric cancer (EGC) arose in Japan in the 1990s as endoscopic mucosal resection (EMR).[5] In the 1970s, the high incidence of gastric cancer had led to the initiation of gastric cancer screening programs, initially with double-contrast radiologic studies and later with endoscopic inspection. As a result, the number of gastric cancers detected at an early stage increased dramatically, and the endoscopic treatment of these early lesions in Japan evolved as a logical consequence.[1]

However, it was recognized that with EMR, single-piece excision is limited to a maximum of 20–25 mm and technical precision to achieve defined margins is lacking for lesions >15 mm, especially in the stomach or esophagus, as mucosal lift after injection is more diffuse and in the case of the stomach, the mucosa is much thicker and less amenable to snare excision. After piecemeal resection, it proved to be difficult to assess the completeness of the resection, particularly at the lateral resection margins and, based on the basic oncologic principle that complete en-bloc excision of the neoplasm with free macroscopic and histologic margins should be achieved, an en-bloc resection technique for larger-sized lesions was deemed necessary.

In the early 2000s, endoscopic submucosal dissection (ESD) was pioneered in Japan as a treatment for en-bloc excision of EGC.[6,7] The high prevalence of this disorder, particularly with early disease being detected by the

Abbreviations used in this paper: **EGC, early gastric cancer; EMR, endoscopic mucosal resection; ESD, endoscopic submucosal dissection; LR-SMIC, low-risk submucosal invasive cancer; LSL, laterally spreading lesion; MBM, multi-band mucosectomy.**

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EDITOR'S NOTES

BACKGROUND AND CONTEXT

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NEW FINDINGS

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LIMITATIONS

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IMPACT

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established national screening program, ultimately resulted in the development of specialized equipment and technical skills to effectively treat this condition endoscopically. The invasiveness and morbidity of the existing surgical standard of gastrectomy was a major driver for this transformative innovation. ESD employs meticulous tissue dissection in the fluid-expanded submucosal space, offering precise control over resection depth and lateral extent. Tissue margins can be predefined, and the lesion excised en bloc, with adequate preselected margins achieving radical excision of the tumor without surgery.

Large cohort studies, primarily from Japan, although not randomized, confirm that ESD is associated with a significantly higher rate of radical en-bloc resection, which reduces the rate of local recurrences during follow-up. These studies, all from expert centers, have shown few complications, although perforation rates of 2%–3% are reported. These perforations are usually small in size and are virtually always detected and managed during the endoscopic intervention without compromising its success. ESD, however, is considered to be technically demanding, with average procedure times of hours, even in expert hands.[8–12]

Endoscopic Submucosal Dissection in the East vs in the West

What is unique about ESD in Japan? The Japanese setting is ideal for learning and practicing ESD. The most frequently encountered early neoplastic lesions in Japan are localized in the distal stomach. In this area, the muscularis propria is relatively thick and endoscopic maneuvers are easier to perform than in the proximal stomach or esophagus. There are also fewer blood vessels, and they are smaller than at more proximal locations in the stomach. Furthermore, endoscopic treatment of early neoplasia is widely practiced in Japan, and most trained endoscopists are familiar with the different EMR techniques. Against this background, moving into the more technically demanding area of ESD is relatively easy. ESD skills are superimposed on EMR skills and a stepwise approach can be followed, starting with ESD of the most frequently encountered lesions in the distal stomach, then moving to lesions in the proximal stomach, with esophageal and colonic lesions as the final step. The esophagus and colon are considered more difficult for ESD because maneuverability is limited and the muscle layer is much thinner. The general rule in Japan is that a minimum of 50 ESDs should be performed in the distal stomach before moving to the more complicated lesions and difficult locations.[1]

In the West, the setting for learning and practicing ESD is completely different. First, EMR is not widely practiced outside of tertiary centers: in most Western countries, endoscopic treatment of early gastrointestinal cancer has only recently become an accepted alternative to surgery. This means that relatively few Western endoscopists within the general endoscopic community have enough EMR experience onto which to superimpose ESD. Second, EGC is relatively uncommon in the West. This makes it difficult to gain enough ESD experience with gastric cases before moving into the more difficult locations in the esophagus or colon. Most tertiary referral centers will see fewer than 20 EGCs per year, making it hard to accumulate the 50 cases required to become proficient according to Japanese standards. Third, because Western endoscopists lack a tradition of endoscopic screening for early neoplasia, many of them also lack the detection attitude and detection skills of their Eastern counterparts: most Western endoscopists are not familiar with the face of early neoplasia and thus small lesions often remain undetected. Western endoscopists starting in the field of ESD, therefore, not only have a relatively low case load of EGCs, their case mix will, even at the outset, consist of the larger and more complex lesions that are less suited to gain experience and where ESD is more challenging; potentially not appropriate; or, in inexperienced hands, unethical or dangerous.

Advanced Endoscopic Tissue Resection in Western Endoscopy Practice

Although there are differences in disease prevalence, training, resources, and culture that may influence the application of the advanced endoscopic tissue resection techniques throughout the developed world in 2018, logic dictates that key fundamental medical principles should drive the therapeutic approach. The chosen therapy should mirror the disease process and aim to deliver the safest, most resourceful, and cost-effective outcomes tailored to the pathology, while avoiding the twin traps of therapeutic compromise and overtreatment. Important drivers here are:

1. Risk of malignant transformation for mucosal disease: The colonic mucosa does not have lymphatics, therefore, a neoplastic process confined to this layer is not at risk of nodal disease and not considered malignant. This in contrast to the risk of lymphatic