



Colorectal endoscopic submucosal dissection in the United States: Why do we hear so much about it and do so little of it?

Endoscopic submucosal dissection (ESD) was developed in Japan for the nonoperative treatment of early gastric cancer. In Japan and some other Asian countries, the indications for ESD expanded to colorectal lateral spreading tumors (LSTs).¹⁻³ It seems reasonable to speculate that more than 99% of American endoscopists have never performed an ESD, and probably the overwhelming majority are not interested in learning and performing ESD. Anecdotally, this reluctance to embrace ESD in the United States is a source of frustration to some Japanese endoscopists, many of whom are virtuoso masters of ESD and firm believers that a subset of lesions in the colorectum should be approached only endoscopically by ESD.

Why aren't we listening in the United States? It's not for lack of awareness of ESD. Given the technical challenge of ESD relative to other endoscopic resection methods, combined with the still relative novelty in the colorectum, endoscopy journals in the West seem inundated with a steady stream of ESD publications from centers of excellence across the world. Live endoscopy courses commonly feature experts performing ESD in the stomach or colorectum. The American Society for Gastrointestinal Endoscopy has offered courses entirely devoted to ESD. Device companies that make ESD tools are eager to train the willing and sometimes seem desperate for the technique to proliferate in the United States and Europe. Still, we hesitate. Are we making a mistake with our reluctance to embrace colorectal ESD?

Many considerations bear on the answer to this important question. First, the United States has arguably different and more important issues to address in colonoscopy than whether and how many of us should be taking up ESD (Table 1).⁴⁻¹³ The huge volumes of screening colonoscopies and the relative rarity of colorectal lesions that demand ESD suggest that 1 skilled interventional endoscopist could perform ESD on all appropriate lesions discovered by a hundred or more colonoscopists performing screening examinations. Every year there are more than 600,000 surgical colon resections in the United States, and more resections for benign lesions than for cancers. In our experience, the overwhelming fraction of benign LSTs that are

intercepted by us as they head for surgery can be resected by piecemeal EMR. Others have reported this observation.¹⁴ This suggests that the common practice of referring benign LSTs that are removable by EMR to surgeons is a much bigger public health problem than the small group of colorectal lesions for which patients benefit from ESD rather than EMR.

Second, the practice environment in the United States is quite different from that in Japan. ESD is easier and safer to learn on gastric lesions, but there are fewer early gastric cancers in the United States on which interventional endo-

Colorectal ESD, and en bloc resection in general, are powerful concepts that currently come with a high price tag for most American colonoscopists. However, we acknowledge that as with many evolving technologies, deciding whether to learn colorectal ESD is "gray," not "black and white."

scopists can hone their ESD skills. Extensive and time-consuming practice in animals is needed before a beginner starts a first case in humans. In the colorectum, physicians learning ESD typically start with rectal lesions, where the risk of ESD is lower than in the colon. However, many LSTs in the rectum are easily removable by EMR, which raises the ethical issue that American endoscopists may learn ESD on lesions in the rectosigmoid colon solely for the purpose of improving their ESD skills. Third, ESD in the colorectum is consistently complicated by an approximately 5% perforation rate.¹⁻³ These perforations are largely managed by clipping or occasionally by suturing, but in general perforation is a feared adverse event in the United States, mostly because of our plethora of lawyers and our relatively poor medical-legal climate compared with Japan. The most detrimental aspect of the high perforation rate is that many more patients are admitted to hospital for observation compared with EMR, and hospitalization in the United States is very expensive relative to Japan. Finally, physicians in Japan receive about a 2-fold higher payment for EMR relative to colonoscopy

TABLE 1. The authors' suggestions of priorities for American colonoscopy (references)

1. Systematic measurement of detection and correction of poor detection⁴⁻⁸
2. Full incorporation of split and same-day dosing⁹
3. Consistent use of recommended screening and surveillance intervals¹⁰
4. Employment of effective polypectomy techniques and increased use of EMR¹¹
5. Reduce surgical resection of endoscopically resectable benign lesions^{12,13}

and standard polypectomy and about a 5 times higher payment for ESD. In the United States, there is an incremental payment for EMR (current procedural terminology [CPT] code 45390.59), but there is no code for ESD. Because ESD takes longer to perform than EMR for any given lesion, even in expert hands, reimbursement is worse for ESD than for EMR in the United States. For physicians in the United States, ESD entails higher risk and lower financial reward. As we learned about the supervision of nurse-administered propofol, the combination of high risk and low reward is a deterrent to uptake even when patients benefit.¹⁵

Given these obstacles to colorectal ESD in the United States, a critical issue is understanding which patients will actually benefit from ESD as opposed to EMR. [Figure 1](#) demonstrates the typical flow of patients from resection of an LST to cure by piecemeal EMR versus ESD. For benign LSTs, piecemeal EMR is curative in almost all cases, but it carries a higher short-term recurrence rate of 10% to 20% (compared with as low as 2% for ESD).^{16,17} Therefore patients undergoing piecemeal EMR must return for follow-up, where recurrences are typically easily and definitively managed.¹⁸ Certainly, patients with benign LSTs who fail to return for follow-up colonoscopy after piecemeal EMR might benefit from initial resection by ESD. At the other end of the histologic spectrum, patients with cancer (defined as submucosal invasion) that invades the deep submucosa (defined as >1000 μm of submucosal invasion depth) have a substantial risk of lymph-node metastasis¹⁹ and therefore generally need surgical resection even after ESD. After piecemeal EMR, the identification of whether cancer is present is straightforward, but measuring the depth of cancer invasion is generally unreliable because the specimen fragments are typically poorly oriented. This leads to patients with any cancer after piecemeal EMR usually being considered candidates for surgical resection. Therefore, those with superficial (<1000 μm) submucosal cancer invasion are a distinct group of patients who benefit from ESD because they may avoid surgery. To reiterate: if patients with superficial submucosal invasion receive an en bloc resection (either by ESD or by EMR) and the depth of invasion is reliably established

pathologically as less than 1000 μm , these patients may avoid the surgery that would probably be recommended if their lesion were to be removed by piecemeal EMR.

Can we endoscopically predict which patients will have superficial submucosal invasion? There are endoscopic signs, but these signs have limited ability to discriminate benign LSTs from those with superficial submucosal invasion from those with deep submucosal invasion. For example, granular LSTs have a very low risk of any invasion.²⁰ Nodular Paris 1s areas in otherwise 2a predominant lesions signal the potential for worse histologic features. Nongranular LSTs have a higher risk of invasion in general,²⁰ particularly if there is a depressed component. Type III features according to the narrow-band imaging international colorectal endoscopic classification are associated with deep invasion,²¹ but if present over only a tiny portion of the lesion surface (<5 mm) they may be associated with only superficial invasion. These associations were recently acknowledged by the European Society of Gastrointestinal Endoscopy guideline on ESD, which states that "ESD can be considered for removal of colonic and rectal lesions with high suspicion of limited submucosal invasion that is based on two main criteria of depressed morphology and irregular or nongranular surface pattern, particularly if the lesions are larger than 20 mm."²² This is a sensible evidenced-based recommendation, but nongranular, depressed LSTs larger than 20 mm are only a small fraction of all LSTs. Those in the rectum can be removed by transanal surgical methods, and those in the colon require the same very substantial ESD experience that, as noted above, is challenging to acquire. If we send more nongranular depressed colonic lesions with early submucosal invasion for surgical resection than do our Japanese colleagues, is that issue a major negative in the big picture of colonoscopic prevention of colorectal cancer in the United States ([Table 1](#))?

To extend this concept, consider the study by Shigita et al²³ in this issue of *Gastrointestinal Endoscopy*, which demonstrates that ESD is an effective procedure for LSTs for as long as 5 years. However, although they selected patients they considered would benefit the most from ESD (those with nongranular LSTs, or nodular areas in LSTs, or predictors of fibrosis), only 7.1% of lesions resected by ESD had superficial submucosal invasion of cancer. This means that despite the selection of patients who would benefit the most from ESD, 14 patients needed ESD for 1 patient with a superficially invasive cancer to benefit by avoiding surgery. A full 79.1% of the lesions were benign (including intramucosal cancer or T1s lesions, which are benign and not cancer at all) and would have been effectively treated by EMR, and 13.8% had deep submucosal invasion and were optimally treated by surgery.

[Table 2](#) shows the frequency of superficial submucosal invasion in several of the largest colorectal ESD series

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