Annals of Gastroenterology (2026) **39,** 1-8

Evaluation of the European Society of Gastrointestinal Endoscopy's endoscopic submucosal dissection training curriculum in a Western tertiary center: outcomes of first-year fellows in training

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Abstract

Background The European Society of Gastrointestinal Endoscopy (ESGE) curriculum defines competency standards for endoscopic submucosal dissection (ESD) training, but evidence supporting its implementation in Western centers is limited. We evaluated first-year outcomes of 2 advanced endoscopy fellows in a UK tertiary center.

Methods All consecutive ESD procedures performed under expert supervision between October 2024 and September 2025 were recorded prospectively. Procedures were performed using the Saline-Immersion/irrigation TEchnique (SITE). Demographics, lesion characteristics, technical performance, histopathology, safety outcomes and learning progression were analyzed. Outcomes were benchmarked against ESGE standards.

Results Forty-two ESD procedures were performed. Trainee 1 participated in 29 procedures and trainee 2 in 25, including 12 procedures in which both trainees contributed to different procedural steps. Fifteen procedures (35.7%) were completed entirely by fellows and 27 (64.3%) with partial expert assistance. Median trainee contribution was 60% (interquartile range [IQR] 30-100%). Lesions were located in the colon (61.9%), rectum (31.0%) and stomach (7.1%), with median size 50 mm. *En bloc* resection was achieved in 41/42 cases (97.6%), R0 and curative resection were achieved in 39/42 cases (92.9%). Median resection speed was 13.08 mm^2/min (IQR 7.6-18.7), improving from 9.58 to 18.30 mm^2/min from the first to the third period. Deep muscle injury (7.1%) occurred in 3 cases, managed endoscopically. Conscious sedation was used in 92.9%.

Conclusions Structured ESGE-aligned training achieved key technical and histological performance benchmarks with a favorable safety profile. Predominantly colonic case availability reflects Western practice. Early supervised exposure to selected colonic lesions appears feasible and safe.

Keywords Endoscopic submucosal dissection, training, saline-immersion/irrigation, technique, fellowship

Ann Gastroenterol 2026; 39 (X): 1-8

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Received 5 May 2026; accepted 11 July 2026; published online 17 September 2026

DOI: https://doi.org/10.20524/aog.2026.1110

Introduction

Endoscopic submucosal dissection (ESD) was first introduced by Yamamoto *et al* in 2001, when they reported successful *en bloc* resection of a large superficial gastric cancer [1]. Since then, refinements in technique, accessories and training have established ESD as a standard treatment for selected superficial gastrointestinal neoplasia, particularly in Japan [2-4]. In that setting, high volumes of early gastric cancer have supported a stepwise training model, in which trainees usually begin with supervised gastric ESD before progressing to more technically demanding esophageal, colonic, and rectal lesions [2,4,5].

Translating this model to Western practice is challenging. The lower incidence of early gastric cancer limits the availability of training-appropriate gastric lesions, while Western trainees may encounter colorectal lesions earlier in their learning curve [6-8]. Colorectal ESD is technically demanding, because of a thinner *muscularis propria*, luminal angulation, reduced scope stability, and higher consequences of inadvertent deep mural injury.

These anatomical and epidemiological differences have encouraged adaptations in both technique and training. The pocket-creation method (PCM), introduced by Yamamoto's group, improves submucosal exposure by maintaining lift, providing intrinsic traction and reducing respiratory interference [9,10]. The Saline-Immersion/irrigation TEchnique (SITE), first described in 2017, uses sterile isotonic saline as a conductive medium during dissection and was developed to overcome limitations associated with carbon dioxide insufflation and deionized water [11-13].

Alongside technical refinements, structured training frameworks are essential for safe dissemination. The European Society of Gastrointestinal Endoscopy's (ESGE) ESD curriculum defines the prerequisite skills, minimum supervised exposure, stepwise progression, and performance benchmarks [14]. However, published evidence on whether these standards can be achieved in real-world Western training environments remains limited.

The present study evaluated the first-year outcomes of 2 post-Certificate of Completion of Specialty Training (post-CCST) advanced endoscopy fellows undergoing structured ESD training in a Western tertiary referral center. By benchmarking supervised trainee performance against ESGE curriculum standards, we aimed to assess the feasibility, safety, and practical applicability of an adapted ESD training program within the constraints of Western case availability and lesion distribution.

Materials and methods

Study design

This was a single-center, prospective observational study conducted at a Western tertiary referral center with an established advanced endoscopy program. All consecutive ESD procedures performed by 2 post-CCST advanced endoscopy fellows under direct expert supervision between October 2024 and October 2025 were included. Cases referred for hybrid resection or standard endoscopic mucosal resection (EMR) were excluded.

Data were prospectively recorded in an electronic registry. Collected variables included patient demographics (age, sex, American Society of Anesthesiologists [ASA] score), lesion characteristics (location, size, Paris, laterally spreading tumor subtype, fibrosis grade F0-F2), and procedural metrics (procedure time, resection speed, trainee contribution, need for expert takeover and completeness of dissection). Histopathologic outcomes included *en bloc*, R0 and curative resection rates. Adverse events recorded included intraprocedural perforation, delayed bleeding, abandonment or any other relevant events. Delayed adverse events were identified through review of hospital records, emergency attendances, readmissions, endoscopy reports, surgical records and follow-up correspondence.

Training progression was assessed by dividing the 12-month (from October 2024 to September 2025) study period into three 4-month (4M) training periods and analyzing performance metrics, procedural autonomy and safety outcomes.

Trainee background and training pathway

Both trainees had completed specialty training certification in Spain and Greece, respectively, and had achieved independent competency in diagnostic colonoscopy, therapeutic polypectomy and EMR. Before performing ESD in patients, each trainee had completed the recommended preparatory elements of the ESGE ESD curriculum, including observation of >50 expert-performed ESD cases and participation in >3 accredited hands-on ESD courses with *ex vivo* animal models, performing ≥20 ESD procedures and at least ≥8 *en bloc* resections without adverse events. Trainees also underwent stepwise supervised progression, including lesion assessment, mucosal incision and initial submucosal dissection. In addition, a synthetic gel-based simulator (EndoGel®, Fujifilm Healthcare, Tokyo, Japan) was used during early training, because of its ease of use within the endoscopy unit and because it did not require specialized animal facilities. This simulator was considered a cost-effective adjunct to traditional preclinical *ex vivo* training. Training milestones and procedural autonomy levels were prospectively mapped to ESGE curriculum standards.

ESD technique

All ESD were performed by 2 fellows in training (EMB, GK), under direct supervision of expert endoscopists (EJD, AM), under operator-delivered conscious sedation or general anesthesia, according to clinical indication. Single-channel endoscopes with a dedicated water jet were used (Fujifilm

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Conflict of Interest: EMB: No conflict of interest; GK: No conflict of interest; ED: No conflict of interest; LC: No conflict of interest; AM: Personal payments/honoraria/fees: Olympus Medical, Laborie, Boston Scientific and Fujifilm Healthcare Europe; EJD: Educational grants in support of conference organization, and honoraria, from Fujifilm Healthcare Europe, Pentax, and Olympus Medical and honoraria from Ambu

Healthcare, Tokyo, Japan or Olympus Medical, Tokyo, Japan). The endoscope was equipped with a conical, short transparent hood (ST-hood Fujifilm Healthcare, Tokyo, Japan) to facilitate ESD using the PCM [9,10]. SITE-PCM is employed as standard practice in our center for all ESD procedures, replacing intraluminal gas with continuous irrigation of isotonic saline solution (0.9% sodium chloride), completely flooding the relevant part of the colorectal lumen. As part of routine practice, all procedures were performed with the assistance of a dedicated drainage tube (The "Asclepius tube") [15,16], consisting of a slim 8-Fr fenestrated nasojejunal tube wrapped around the endoscope, secured with vinyl tape, and connected to low-flow suction to facilitate saline drainage and prevent luminal overdistension. Submucosal lift was achieved using a combination of 4% succinylated gelatin, 1:200,000 adrenaline and indigo carmine dye. Needle-type electrosurgical knives (Flush-knife BTs, Fujifilm Healthcare, Tokyo, Japan and HYBRIDKnife Flex, Erbe Elektromedizin GmbH, Tubingen, Germany) and an electrosurgical unit (VIO3, Erbe Elektromedizin GmbH, Tubingen, Germany), with predefined settings for incision, dissection and coagulation, were used.

For each case, lesion assessment was initially performed by the trainees under direct expert supervision. The supervising expert confirmed lesion characteristics, access, estimated technical difficulty and endoscope maneuverability, before determining the appropriate level of trainee involvement. Trainee participation was decided dynamically and stepwise during each procedure, according to lesion complexity, procedural progress, and the trainee's demonstrated ability. Depending on these factors, trainees performed lesion assessment, marking, mucosal incision, submucosal entry and/or submucosal dissection. If technical challenges arose that were considered beyond the trainee's current level of experience, the expert took over the relevant procedural step to ensure safety and procedural completion.

Trainee contribution was recorded prospectively for each procedure. Total ESD procedure time, and the time during which the trainee actively performed the resection, were measured using the integrated timer in the endoscopy stack. Trainee contribution was calculated as trainee active procedure time divided by total ESD procedure time and expressed as a percentage.

Outcome measures

The primary outcome was achievement of relevant ESGE-defined performance benchmarks, including supervised case exposure, *en bloc* and R0 resection rates, curative resection rate, and adverse event rates. Secondary outcomes included trainee progression, assessed by procedural autonomy and changes in resection speed over time.

En bloc resection was defined as removal of the lesion in a single piece. R0 resection was defined as histologically complete resection with both lateral and vertical margins free of neoplasia. Curative resection was reported if the specimen met the R0 definition with no other risk factors for lymph node metastasis: no lymphovascular/peri-neural invasion, well-differentiation, absence of budding and no submucosal infiltration deeper than 1000μm. Adverse events were recorded as separate outcomes as perforation, delayed bleeding, abandonment, and deep muscle injury according to the Sydney deep mural injury classification [17]

Statistical analysis

Continuous variables were presented as mean ± standard deviation or median with interquartile range (IQR). Categorical variables were reported as frequencies and percentages. Temporal learning trends were assessed by comparing performance metrics across the three 4-month training periods (4M1-4M3). All data analysis was conducted using IBM SPSS Statistics version 30.0 (SPSS Inc., Chicago, Illinois, United States).

Ethical considerations

The study adhered to the Declaration of Helsinki. It was conducted as an observational evaluation of established clinical practice using anonymized prospectively collected data and did not modify patient care pathways. Written informed consent for the endoscopic procedure was obtained from all patients before ESD. Formal research ethics committee approval was not required, because the work evaluated established clinical practice.

Results

Patient and lesion characteristics

A total of 42 ESD procedures/lesions were included. Trainee 1 participated in 29 procedures and Trainee 2 in 25, with overlap in 12 procedures in which both trainees participated during different steps of the same resection. Fifteen procedures (35.7%) were completed entirely by trainees without expert takeover, and 27 (64.3%) were performed with partial expert assistance. The mean patient age was 66.9±14.4 years, and 64.3% were men. The most prevalent ASA category was 1. Lesions were most commonly located in the colon (61.9%), followed by the rectum (31.0%) and stomach (7.1%). Median lesion diameter was 50 mm (IQR 40-65), with a corresponding median lesion area of 1472.50 mm^2 (IQR 942-2640). Macroscopic morphology consisted of laterally spreading tumor, granular type (57.1%), laterally spreading tumor, non-granular type (28.6%), sessile (4.8%), semi-pedunculated (4.8%), pedunculated (2.4%) and submucosal lesions (2.4%). Recurrent lesions and IBD-associated dysplasia were each present in 7.1% of cases. Patient and lesion characteristics are detailed in Table 1.

Table 1 Procedure, patient and lesion characteristics

Data	Value	Comment
Total number of lesions (n)	42	
Procedures with participation of both trainees n (%)	12 (28.6%)	
Complete resection by trainees n (%)	15 (35.7%)	
Recurrent n (%)	3 (7.1%)	
IBD displasia n (%)	3 (7.1%)	
Sex n (%)		
Men	27 (64.3%)	
Women	15 (35.7%)	
Age (mean, years)	66.87 (SD 14.41, range 30-87)	
ASA score n (%)	1: 25 (59.5%) 2: 15 (35.7%) 3: 2 (4.8%)	
Tumor location n (%)		
Rectum	13 (31%)	
Colon	26 (61.9%)	Cecum 8 (19%), ascending Colon 7 (16.7%), transverse Colon 2 (4.7%), descending Colon 1 (2.4%), sigmoid colon 8 (19%)
Gastric	3 (7.1%)	Antrum 1 (2.4%), body 2 (4.7%)
Macroscopic type n (%)		
Sessile	2 (4.7%)	
LST-G-H	12 (28.6%)	
LST-G-M	12 (28.6%)	
Total LST-G	24 (57.1%)	
LST-NG-FE	6 (14.3%)	
LST-NG-PD	6 (14.3%)	
Total LST-NG	12 (28.6%)	
Semi-pedunculated	2 (4.7%)	
Pedunculated	1 (2.4%)	
Submucosal	1 (2.4%)	
JNET Classification n (%)		
2A	22 (52.4%)	
2B	17 (40.5%)	
3	3 (7.1%)	
Tumor max. diameter (median, mm)	50 (IQR 40-65, range 15-110)	
Area (median, mm^2)	1472.50 (IQR 942-2640, range 177-8639)	

ASA, American Society of Anesthesiologists; IBD, inflammatory bowel disease; LST-G, laterally spreading tumor granular; LST-NG, laterally spreading tumor non-granular; LST-G-H, laterally spreading tumor granular homogeneous; LST-G-M, laterally spreading tumor granular mixed; LST-NG-FE, laterally spreading tumor non-granular flat elevated; LST-NG-PD, laterally spreading tumor non-granular pseudo-depressed; JNET, Japan Narrow-band imaging Expert Team; IQR, interquartile range; SD, standard deviation

ESD outcomes

En bloc resection was achieved in 41/42 cases (97.6%). R0 resection and curative resection were each achieved in 39/42 cases (92.9%). Two cases (4.8%) resulted in R1 resection, and 1 procedure (2.4%) was abandoned because of endoscopic suspicion of deep submucosal invasion. The median procedure duration was 135 minutes (IQR 90-177). The overall median resection speed was 13.08 mm^2/min (IQR 7.6-18.7). Temporal analysis suggested progressive improvement in resection efficiency, with median resection speed increasing from 9.58 mm^2/min in the first 4-month period to 13.46 mm^2/min in the second and 18.30 mm^2/min in the third. Median trainee contribution was 60% (IQR 30-100). Procedural autonomy increased over time, with median trainee contribution increasing from 65% (IQR 8.75-95) in the first period to 100% (IQR 50-100) in the third period, while contribution in the middle period was 40% (IQR 30-70). A degree of submucosal fibrosis (F1-F2) was observed in 54.7% of cases (F0: 45.2%; F1: 35.7%; F2: 19.0%). Procedure outcomes are described in detail in Table 2.

Histopathology results

Histopathology demonstrated low-grade dysplasia in 30 cases (73.2%), high-grade dysplasia in 7 (17.1%), sessile serrated lesion with dysplasia in 2 (4.9%), neuroendocrine tumor in 1 (2.4%), and other benign findings in 1 (2.4%). One procedure was abandoned because of endoscopic suspicion of deep submucosal invasion. The patient subsequently underwent surgery, and final surgical histopathology confirmed invasive adenocarcinoma.

Adverse events and periprocedural management

Deep muscle injury occurred in 3 procedures (7.1%). These included 1 rectal and 2 ascending colon lesions. All were immediately recognized and managed endoscopically with through-the-scope clips, allowing uneventful procedural completion. There were no full-thickness perforations, no delayed perforations, no delayed bleeding events, and no need for surgery or additional intervention for ESD-related adverse events.

Fourteen patients (33.3%) were admitted for observation post-procedure according to local practice (because of age, comorbidities or remote residence as per our standard protocol).

Conscious sedation was used in 92.9% of procedures, including all colorectal ESD, with median doses of 7.5 mg midazolam and 200 μg fentanyl. General anesthesia was reserved for gastric lesions. No adverse event resulted in abandonment of an otherwise resectable lesion.

Training progression relative to ESGE standards

Both trainees exceeded ESGE minimum exposure requirements, with >10 supervised ESD procedures within

Table 2 ESD outcomes and histopathology

Data	Value
En bloc resection n (%)	41 (97.6%)
R0 resection n (%)	39 (92.9%)
R1 resection n (%)	2 (4.8%)
Abandoned n (%)	1 (2.4%)
R0 curative resection n (%)	39 (92.9%)
Resection time (median, minutes)	135 (IQR 90-177, range 60-660)
Resection speed (median, mm^2/min)	13.08 (IQR 7.6-18.7, range 1.2-34.9)
4M1	9.58 (range 1.2-17.6)
4M2	13.46 (range 3.4-26.2)
4M3	18.30 (range 6.5-34.9)
Trainee contribution (median, %)	60% (IQR 30-100)
Submucosal fibrosis n (%)	
F0 (none)	19 (45.2%)
F1 (mild)	15 (35.7%)
F2 (severe)	8 (19%)
Histopathological findings n (%)	
LGD	30 (73.2%)
HGD	7 (17.1%)
SSL+dysplasia	2 (4.9%)
NET	1 (2.4%)
Other (hyperplastic)	1 (2.4%)
Adverse events n (%)	
Deep muscle injury (intraprocedural, endoscopically closed)	3 (7.1%)
Need for surgery (due to ESD-related adverse event)	0 (0%)
Hospital admission n (%)	14 (33.3%)
Anesthetics	
Conscious sedation n (%)	39 (92.9%)
Midazolam (median, mg)	7.5 (IQR 5-10, range 2.5-10)
Fentanyl (median, μg)	200 (IQR 125-250, range 75-500)

ESD, endoscopic submucosal dissection; IQR, interquartile range; LGD, low-grade dysplasia; HGD, high-grade dysplasia; SSL, sessile serrated lesion; NET, neuroendocrine tumor

the training year. The ESGE curriculum does not specify a mandatory timeframe for completion of initially supervised cases.

Key ESGE benchmarks achieved included:

- *En bloc* resection >90%: Achieved (97.6%)
- Curative resection >75%: Achieved (92.9%)
- Need for surgery due to complications <1%: Achieved (0%)
- Case complexity and diversity: Achieved within the constraints of a colon-predominant Western referral practice

The ESGE recommendation to begin with small rectal or antral lesions and avoid colonic lesions initially was not fully followed because of local case availability. Instead, selected colonic lesions were incorporated under direct expert supervision with stepwise trainee participation. Deep muscle injury occurred in 7.1% of cases, but all events were managed endoscopically and no full-thickness or delayed perforation occurred. Trainee performance relative to ESGE curriculum benchmarks is summarized in Table 3.

Discussion

In this prospective study evaluating the first year of ESD training in a Western tertiary referral center, trainees achieved high rates of technical and histopathological success, fulfilling key ESGE curriculum performance benchmarks. The overall *en bloc* (97.6%) and curative (92.9%) resection rates exceeded the competency thresholds recommended by the ESGE, highlighting that when training is performed under direct expert supervision and instruction, it can enable safe and effective ESD training in Western environments.

These findings should be interpreted within a specific training context. This study was not an assessment of independent fellow performance, as 64.3% of procedures involved expert assistance. Rather, it evaluates the outcomes of a structured supervised training pathway, which represents the expected model for early clinical ESD training. The increasing trainee contribution over time, reaching a median of 100% in the final period, supports progressive acquisition of procedural autonomy with expert oversight.

The case selection differed from the ideal early sequence proposed in the ESGE curriculum, which recommends starting with small rectal or antral lesions, avoiding colonic lesions, but restricting participation to only those cases would have substantially reduced training exposure. Our data therefore reflect a pragmatic Western adaptation: selected colonic lesions can be incorporated into early supervised training when case selection, direct expert supervision and institutional support are available.

The safety outcomes also require careful interpretation. Three deep muscle injuries occurred (7.1%), all during colorectal ESD and all closed endoscopically. These events were not full-thickness or delayed perforations and did not lead to surgery, readmission for complication management, or abandonment of otherwise resectable lesions. Nevertheless, they represent an important safety signal and underline the need for close supervision, careful lesion selection, and immediate availability of advanced endoscopic closure techniques during early colorectal ESD training.

Emerging evidence suggests that ESD can be implemented safely outside traditional Japanese training environments, provided that trainees possess strong baseline expertise in advanced interventional endoscopy, and that institutional support structures are in place. For example, Ebigbo *et al* demonstrated that a structured step-up program in a German high-volume center enabled excellent early outcomes in the

Table 3 Summary of trainee performance relative to ESGE curriculum benchmarks

Domain	ESGE recommendation/benchmark	Study outcomes
Prerequisite training	Fully trained endoscopist with EMR proficiency and adverse event management skills	Both trainees completed specialist training and had EMR competency
Preclinical training	≥20 ESD procedures on *ex vivo*/animal models; ≥8 *en bloc* resections in last 10 cases without perforation	Completed *ex vivo* and simulation-based training (EndoGel)
Observation & assistance	≥20 observed cases and ≥5 assisted procedures	>50 cases observed and assisted prior to hands-on training
Initial human cases	Start with small (<30 mm) rectal or antral lesions; avoid colon initially	Recommendation not fully followed because of local case availability; selected colonic lesions were included with direct expert supervision and stepwise trainee participation
Supervision	First ≥10 cases under direct expert supervision	All cases performed under direct expert supervision
Annual volume (maintenance)	≥25 ESD procedures/year to maintain proficiency	Not assessed as maintenance of independent proficiency; supervised first-year exposure comprised 29 and 25 trainee participations, with overlap in 12 procedures
En bloc resection rate	>90%	97.6%
Curative resection rate	>75%	92.9%
Perforation rate	<3%	0 full-thickness or delayed perforations; 3 deep muscle injuries (7.1%) were recognized intraprocedurally and closed endoscopically
Need for surgery due to complications	<1%	0%
Case complexity	Progressive increase in lesion complexity	High proportion of fibrotic lesions (F1-F2, 54.7%) and laterally spreading tumors
Case diversity	Exposure across organs encouraged	Colon 61.9%, rectum 31.0%, stomach 7.1%; case mix was colon-predominant, reflecting local Western lesion availability

ESGE, European Society of Gastrointestinal Endoscopy; EMR, endoscopic mucosal resection

first 30 independent cases, mainly rectal and gastric, although the proximal colon remained a challenge [18]. Similarly, a prevalence-based experience from Greece showed that ESD could be delivered safely in a low-volume, non-academic setting by a junior endoscopist with broad interventional training, even without formal tutoring, although the learning curve remained slower because of limited case volumes and lesion diversity [19]. Hadjinicolaou *et al* reported acceptable outcomes with an untutored step-up approach in esophagogastric ESD after intensive preparation, but emphasized the need for careful case selection, institutional infrastructure and multidisciplinary backup to mitigate risk in the absence of direct expert supervision [20]. These findings suggest that, in low-volume settings, self-directed training, with animal models, workshops and online resources, may help establish an ESD program, provided adequate time and multidisciplinary support are available, with careful case selection, particularly for proximal colonic lesions.

Preclinical training remains a cornerstone of ESD education. Parra-Blanco *et al* showed that structured training incorporating *ex vivo* and live porcine models can improve efficiency and support safe transition to clinical ESD [21]. However, access to animal models is often limited by cost, specialized facilities and decontamination of equipment used in animal tissue. Trainees may also struggle to find the time and funding to attend multiple hands-on courses while maintaining clinical commitments. As a practical alternative, we have found gel-based simulators, such as EndoGel® (Fujifilm Healthcare, Tokyo, Japan), to provide a more accessible format to train hand-skills for tissue dissection without the logistical burden of animal training. These systems allow trainees to practice marking and injection, circumferential incision, submucosal dissection, myotomy and clipping within the standard endoscopy unit, and without specialised decontamination processes, offering a potentially cost-effective adjunct to Western preclinical training.

In this study, several elements of the training pathway may have supported the outcomes. Both fellows had completed specialist training and had prior competency in diagnostic colonoscopy, therapeutic polypectomy and EMR before ESD training. They also underwent observation of expert cases, hands-on *ex vivo* courses, synthetic simulator practice, and stepwise participation in supervised clinical cases. This multimodal approach is consistent with the ESGE curriculum and with Western recommendations that combine observerships, simulation, formal courses and supervised clinical exposure.

Technical adjuncts may also facilitate safer early ESD training, particularly for colorectal lesions. Traction-assisted

techniques [22] and immersion-based approaches have been shown to improve visualization, stabilize the dissection plane, and enhance procedural efficiency. Although this study cannot isolate the independent effect of SITE-PCM, it may have contributed to the high *en bloc* resection rates and progressive improvements shown in efficiency. These features may be particularly advantageous during early training, when visual clarity and tissue control are critical.

ESD training extends beyond technical skill acquisition. Continuous academic engagement, including participation in research, conference attendance and critical appraisal of emerging evidence, is essential in maintaining high standards in this rapidly evolving field. Equally important is structured multidisciplinary discussion, both before and after procedures, to support appropriate case selection, procedural planning, and reflective learning based on histopathologic outcomes.

Our findings reflect the realities of Western ESD training, with most lesions located in the colon and relatively few rectal or gastric cases. However, this study had several limitations. It was conducted in a single high-volume tertiary referral center, with internationally experienced ESD trainers and 2 highly selected post-CCST fellows; therefore, the findings should not be generalized to all Western centers or to unsupervised practice. The sample size was modest, follow-up was limited to first-year training outcomes, and the study was not designed to compare SITE-PCM with other ESD techniques.

In summary, structured, ESGE-aligned ESD training incorporating early supervised exposure to colonic lesions can achieve high technical success and acceptable safety outcomes in a Western tertiary center. These findings support flexible adaptation of ESD curricula to reflect real-world availability, and suggest that multimodal training strategies, including simulation, stepwise supervision and technical adjuncts, may enhance early learning. As previously highlighted by Herreros de Tejada in 2014 [23], ESD training in the West is "a challenging path to excellence"—yet since then, Western training opportunities and structured pathways have continued to evolve, supported by increasing expertise, improved access to dedicated courses and simulation, and growing procedural volumes in specialised centers. Continued refinement of Western ESD training models, tailored to local epidemiology and institutional resources, remains essential to ensure safe dissemination of ESD and optimal patient care.

In conclusion, this prospective evaluation demonstrates that a structured, ESGE-aligned ESD training program can be implemented in a highly specialised Western tertiary referral center under direct expert supervision. Despite a predominance of colonic lesions, and limited access to traditional early gastric training cases, fellows achieved high *en bloc* and curative resection rates with progressive gains in procedural efficiency and autonomy. According to the results of the present study, carefully selected colonic lesions may be incorporated into early supervised training when supported by multimodal preparation, standardized technique, expert oversight and an appropriate institutional safety infrastructure.

Summary Box

What is already known:

- Endoscopic submucosal dissection (ESD) is the gold-standard endoscopic treatment for superficial gastrointestinal neoplasia, providing high *en bloc* and R0 resection rates
- Most established ESD training models originate from high-volume Japanese centers, where trainees typically begin with gastric lesions before progressing to colorectal ESD
- In Western countries, implementation of these training pathways is challenging, given the lower gastric cancer prevalence, smaller case volume, and limited access to expert tutors
- The ESGE curriculum provides structured competency standards and benchmarks for ESD training, but real-world feasibility data from Western programs remain limited

What the new findings are:

- A structured, ESGE-aligned ESD training program in a Western tertiary center achieved high *en bloc* resection and curative resection rates during the first year of training: 97.6% and 92.9%, respectively
- Despite predominantly colonic cases, trainees demonstrated progression in autonomy and procedural efficiency
- Procedural completion and patient safety were maintained, with no patients requiring surgery for ESD-related adverse events
- Early supervised exposure to selected colonic lesions may provide a feasible adaptation to Western lesion availability while maintaining safety and effectiveness

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