Journal of Clinical and Nursing Research, 2024, Volume 8, Issue 10
http://ojs.bbwpublisher.com/index.php/JCNR
Online ISSN: 2208-3693
Print ISSN: 2208-3685

Endoscopic Treatment of 14 Cases of Small Subepithelial Lesions in the Gastrointestinal Tract Using a Combined Snare, Long Lucency Cap, and Argon Plasma Coagulation Technique

Jian Pang[1,2], Jingyu Wu[2], Chen Sun[2], Yan Jiang[1,2], Xiangyuan Liu[1,2], Chang'en Liu[1,2], Xinwen Lei[1,2], Tengqi Wang[2]*

[1]Inner Mongolia Medical University, Hohhot 010000, Inner Mongolia Autonomous Region, China
[2]Department of Gastrointestinal Surgery, Bayannur Hospital, Bayannur 015000, Inner Mongolia Autonomous Region, China

***Corresponding author:** Tengqi Wang, wangtenqi@bynesyy.com

Abstract: Subepithelial lesions (SEL) of the digestive tract refer to a series of benign and malignant subepithelial masses that appear smooth or rough under gastrointestinal endoscopy. Endoscopic resection of subepithelial lesions in the digestive tract is widely recognized due to its advantages of minimal trauma and rapid recovery. This paper reports and summarizes the experiences of using the combined snare, long lucency cap, and argon plasma coagulation technique to remove small subepithelial lesions in 14 patients.

Keywords: Subepithelial lesions of the digestive tract; Snare; Long lucency cap; Argon plasma coagulation

Online publication: October 24, 2024

1. Introduction

Subepithelial lesions (SEL) of the digestive tract refer to a range of benign and malignant subepithelial masses with either smooth or rough surfaces as observed under gastrointestinal endoscopy. These include gastrointestinal stromal tumors (GISTs), leiomyomas, lipomas, ectopic pancreas, cysts, polyps, varices, lymphomas, metastases, and extramural or compressive lesions. Relying on standard gastrointestinal endoscopy alone often makes it difficult to perform accurate differential diagnoses. Some scholars suggest that intramural masses are not restricted to the submucosal layer but can originate from any layer beneath the epithelium of the gastrointestinal tract. Hence, the term "subepithelial lesion" is considered more accurate than the traditional term "submucosal tumor" (SMT) [1].

In recent years, with advancements in various endoscopic instruments and the improvement of endoscopists' skills, endoscopic treatments have progressed rapidly. Endoscopic submucosal dissection (ESD), in particular, has been widely applied in the treatment of gastrointestinal subepithelial lesions, with its indications continually expanding. Subsequently, developed techniques such as endoscopic submucosal excavation (ESE) and endoscopic full-thickness resection (EFTR) have further extended the limitations of ESD, allowing for a broader and deeper range of endoscopic resections of subepithelial lesions in the gastrointestinal tract, benefitting more patients. However, these advancements have also increased the risks of complications, such as bleeding, perforation, and infection. Due to the high technical difficulty, long learning curve, and high intraoperative and postoperative complication rates associated with ESE and EFTR, their adoption in primary and remote hospitals remains limited.

Finding ways to shorten the learning curve, reduce operational difficulty, and minimize complications has become an urgent issue to address. Since July 2020, the Digestive Endoscopy Center of Bayannur City Hospital has adopted the combined application of snare, long lucency cap, and argon plasma coagulation under endoscopy (SCAE) to remove small subepithelial lesions of the digestive tract in 14 cases, achieving satisfactory results.

2. Materials and methods

2.1. Case information

From July to December 2020, 14 patients at the Digestive Endoscopy Center of Bayannur City Hospital were preoperatively evaluated via endoscopy for submucosal bulging-type lesions. Routine endoscopic ultrasound was performed to assess the nature, depth, and size of the lesions. The inclusion criterion was a lesion diameter of ≤ 10mm. The study included 7 female and 7 male patients, aged 44 to 71 years, with a median age of 57 years. Lesion locations included the gastric body (7 cases), cardia (1 case), gastric fundus (3 cases), and rectum (3 cases).

2.2. Instruments and equipment

(1) Olympus CV-290 endoscopy system
(2) Olympus GIF Q260J/PCF Q260JI endoscopes
(3) Erbe Argon Plasma Coagulator (APC®2 model)
(4) Snare: COOK polypectomy snare (ASM-1-S model)
(5) Long lucency cap: COOK banding device kit transparent cap (MBL-6-F model)

2.3. Preoperative preparation

Routine gastrointestinal preparation was performed. Standard examinations were conducted to ensure the patients met the criteria for endoscopic treatment and informed consent for endoscopic treatment was obtained.

2.4. Procedure

The subepithelial lesion (SEL) was located and marked endoscopically. A long lucency cap was attached to the endoscope tip, and an electrosurgical snare was prepared. The snare was placed in the groove at the tip of the cap. The endoscope was positioned directly over the target lesion. Suction was applied to retract the mucosa and tumor into the lucency cap. The snare was tightened around the base of the lesion, and the lesion was excised using standard snare resection techniques. Argon Plasma Coagulation (APC) was applied to the wound to ensure hemostasis. After ensuring there was no active bleeding, the wound was closed with a metal clip or nylon suture.

2.5. Postoperative management

2.5.1. Gastric SEL

Routine placement of a nasogastric tube for decompression. Intravenous esomeprazole was administered for 3 days. On the third postoperative day, the nasogastric tube was removed, and the patient was switched to oral omeprazole and a liquid diet. Prophylactic antibiotic treatment with ceftazidime was given for 48 hours and extended to 5 days if full-thickness resection was performed.

2.5.2. Colorectal SEL

Patients were kept nil by mouth and received intravenous nutritional support. A residue-free diet was initiated after the patient passed gas and had a bowel movement. Prophylactic antibiotics (ceftazidime) were administered for 72 hours.

3. Results

All 14 lesions were completely excised in a single procedure. Lesion diameters ranged from 5–10 mm, with operative times ranging from 30–60 minutes (mean: 47.5 minutes). Postoperative pathology results included 6 cases of leiomyoma, 5 cases of stromal tumors, and 3 cases of neuroendocrine tumors (G1). All resection margins were negative, and there were no postoperative complications. The length of hospital stay ranged from 2–9 days (median: 7 days), and the average surgical cost (including consumables and anesthesia) was 4,780 Chinese yuan.

Case 1 (**Figure 1**): A 63-year-old female patient had a gastric SEL on the greater curvature of the gastric body, with endoscopic ultrasound suggesting the lesion originated from the muscularis propria. The lesion measured 8 mm and was excised using the SCAE technique. Postoperative pathology confirmed a leiomyoma with negative margins.

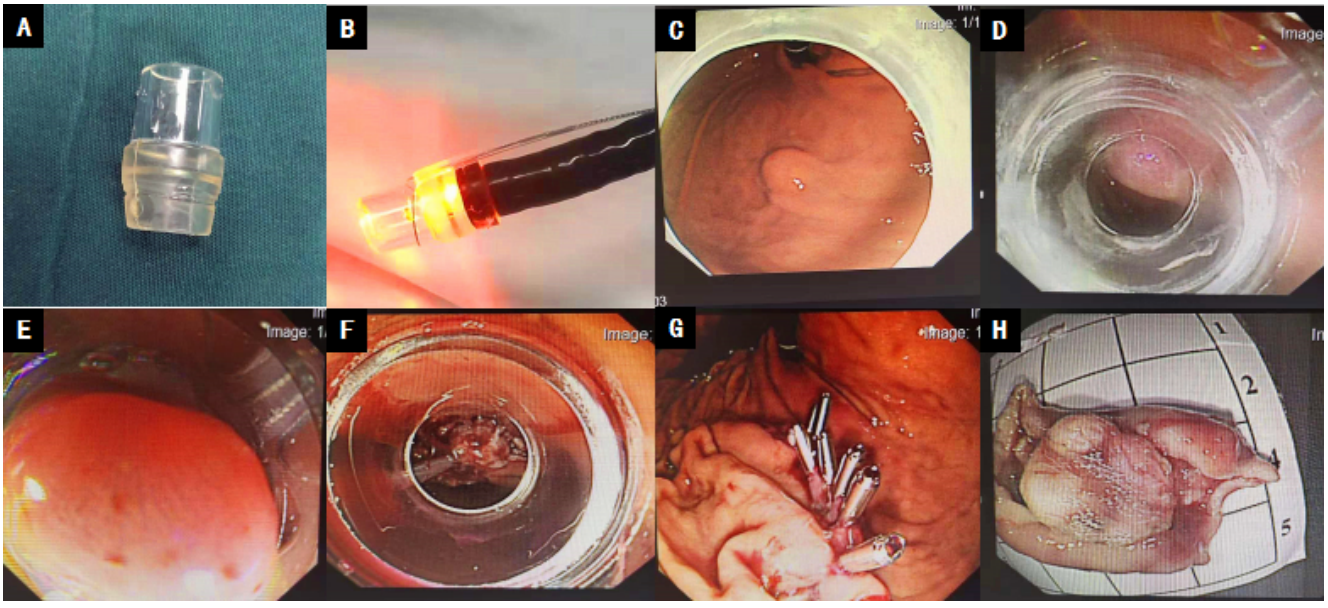

Figure 1. (A) The long lucency cap used in this technique. **(B)** Installation and usage of the snare and long lucency cap. **(C)** A 10mm submucosal bulge at the junction of the gastric body and fundus. **(D)** Targeting the submucosal lesion with the long lucency cap. **(E)** Suctioning the lesion into the cap. **(F)** Tightening the snare around the base of the lesion and excising it. **(G)** Treating the wound with APC, followed by suturing with a titanium clip or nylon suture. **(H)** Confirming complete excision of the lesion and sending the specimen for pathology.

Case 2 (**Figure 2**): A 60-year-old male patient had a rectal SEL located 6 cm from the anus on the posterior rectal wall. Endoscopic ultrasound suggested the lesion originated from the superficial muscle layer and protruded into the rectal cavity. The lesion measured 7 mm and was excised using the SCAE technique. Postoperative pathology confirmed a G1 neuroendocrine tumor with negative margins.

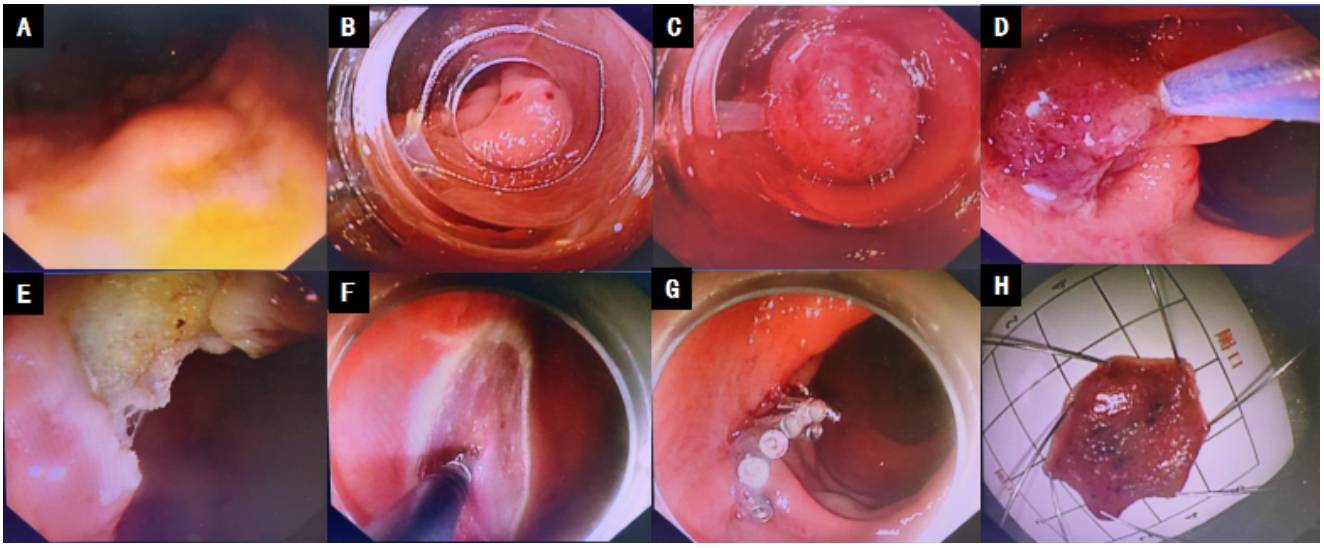

Figure 2. (A) A 7mm SEL on the posterior rectal wall. **(B)** Installation of the snare and long lucency cap. **(C)** Targeting the SEL with sufficient suction. **(D)** Snaring and excising the lesion. **(E)** Post-excision rectal wound. **(F)** Treating the wound with APC to stop bleeding and eliminate potential residual tumor cells. **(G)** Closing the wound with titanium clips. **(H)** Confirming complete excision of the lesion and sending the specimen for pathology.

4. Discussion

With advancements in gastrointestinal endoscopy, endoscopic ultrasound, and the improvement in public health awareness and living standards, the detection capability for SEL has significantly improved. Data suggest that approximately 15% of SELs are malignant [2]. Due to their origin in the submucosa, the misdiagnosis rate for SELs based on gastrointestinal endoscopy alone can be as high as 30% [3,4]. For SELs ≤ 3 cm, ESD and ESE are currently considered safe and effective. However, for smaller SELs (≤ 1 cm) with no significant clinical symptoms and when auxiliary tests suggest benignity, whether aggressive treatment is necessary remains controversial. Particularly for SELs located in areas like the gastric fundus, the greater curvature of the upper and middle gastric body, the lesser curvature of the lower gastric body, and the ileocecal region, performing ESD is technically challenging, expensive, and prone to complications. Recently, a consensus among domestic experts has pointed out that for SMTs with low metastatic risk that can be completely resected, endoscopic resection can be considered. For benign SMTs, if the patient has a strong desire for endoscopic surgery or is unable to undergo regular follow-up, endoscopic surgery is indicated [5,6]. The resection of small SELs offers several benefits: it provides a complete histopathological specimen, avoids misdiagnosis and the risk of malignancy, and spares some patients from the long-term discomfort of endoscopic follow-up, reducing anxiety and improving their quality of life [7].

The transparent cap, electrosurgical snare, and APC are all commonly used auxiliary tools in endoscopic treatments. Attaching a transparent cap to the tip of the endoscope maintains a certain distance between the

endoscope and the gastrointestinal mucosa, ensuring a clear view and sufficient space while providing a fixed point for the endoscope, which aids in stabilizing the scope and performing the procedure. Compared to ESE, ESD, and EFTR, the advantages of SCAE (Snare, Cap, and APC Endoscopic Technique) include:

(1) A clear surgical field;

(2) No restriction by the lesion's location, particularly in areas that are challenging to observe or operate on, such as the posterior wall and lesser curvature of the stomach, the posterior wall of the duodenal bulb, and the folds of the colon;

(3) Shorter surgery time and simpler operation;

(4) Fewer postoperative complications and lower tumor recurrence rates;

(4) No need for additional consumables. This technique is quite similar to endoscopic mucosal resection with a cap (EMRC), and endoscopists familiar with EMRC do not require additional training. In this report, the average operative time was 47.5 minutes, and the average surgical cost was 4,780 RMB, which is lower than the time and cost associated with ESD procedures [8], offering certain advantages.

Based on the Digestive Endoscopy Center of Bayannur City Hospital's experience, the following issues should be considered when using SCAE for small gastrointestinal SELs:

(1) Routine endoscopic ultrasound should be performed before endoscopic treatment of SELs to rule out vascular impressions, varices, and extramural compression [9,10]. CT scans may be necessary for further clarification, and strict adherence to indications is essential.

(2) Preoperative CT and endoscopic ultrasound should be used to evaluate SELs. If the tumor grows into the lumen, this method is simple and effective for complete tumor resection. For SELs growing externally, there is a risk of incomplete suction, which may lead to tumor rupture. In such cases, traditional ESD should be considered.

(3) For small SELs, injecting a lifting solution beneath the lesion may complicate the identification of the SEL and increase the difficulty of the procedure. Therefore, this method is not recommended.

(4) The endoscope should be positioned directly above the lesion, and sufficient suction should be applied to ensure the tumor is fully drawn into the transparent cap.

(5) The snare should be tightened slowly and appropriately, alternating between electrocoagulation and electrocision to prevent major bleeding caused by mechanical resection.

(6) After complete tumor resection, the wound should be routinely treated with APC to prevent postoperative bleeding and tumor recurrence. If the gastrointestinal wall remains intact after complete tumor removal, titanium clips should be used to close the wound. In cases of perforation, both titanium clips and nylon sutures should be used to close the wound.

(7) Hospitals equipped for endoscopic surgery in an operating room setting should prepare for immediate intervention in case of significant intraoperative bleeding, using thermal biopsy forceps or other instruments for electrocoagulation hemostasis. If hemostasis or wound closure is difficult, laparoscopic surgery for bleeding control and suturing can be performed. This approach shortens the surgery time, reduces patient trauma, and alleviates family members' anxiety.

5. Conclusion

In summary, compared to traditional ESD and EFTR techniques, SCAE has the advantages of shorter operation

times and simpler procedures for treating small SELs. It shortens the patient's hospital stay, offers precise and safe treatment, enables quicker recovery, reduces postoperative complications, lowers medical costs, and conserves medical resources, bringing economic and social benefits. However, due to the small sample size, limited experience, and lack of postoperative follow-up, further large-scale randomized controlled trials are needed to confirm its advantages. With the development of gastrointestinal endoscopy, new endoscopic techniques will continue to emerge, and as concepts evolve, endoscopic surgery is poised for greater advancements.

Funding

(1) Bayannur City Science and Technology Plan Project (K202026)
(2) Inner Mongolia Autonomous Region Health and Wellness Science and Technology Plan Project (202201628)
(3) National Clinical Key Specialty Construction Project (2023)
(4) Inner Mongolia Autonomous Region Clinical Key Specialty Construction Project (2023)
(5) Bayannur City Clinical Key Specialty Construction Project (2023)

Disclosure statement

The authors declare no conflict of interest.

References

[1] Li Y, Li W, Li Y, et al., 2017, Analysis of Ultrasonographic Endoscopic Imaging Results of Upper Gastrointestinal Subepithelial Lesions. Chinese Electronic Journal of Gastrointestinal Endoscopy, 4(2): 56–60.

[2] Polkowski M, 2005, Endoscopic Ultrasound and Endoscopic Ultrasound-Guided Fine-Needle Biopsy for the Diagnosis of Malignant Submucosal Tumors. Endoscopy, 37(7): 635–645. https://doi.org/10.1055/s-2005-861422

[3] Motoo Y, Okai T, Ohta H, et al., 1994, Endoscopic Ultrasonography in the Diagnosis of Extraluminal Compressions Mimicking Gastric Submucosal Tumors. Endoscopy, 26(2): 239–242. https://doi.org/10.1055/s-2007-1008951

[4] Rösch T, Kapfer B, Will U, et al., 2002, Accuracy of Endoscopic Ultrasonography in Upper Gastrointestinal Submucosal Lesions: A Prospective Multicenter Study. Scand J Gastroenterol, 37(7): 856–862.

[5] Standards of Practice Committee; Faulx AL, Kothari S, et al., 2017, The Role of Endoscopy in Subepithelial Lesions of the GI Tract. Gastrointest Endosc, 85(6): 1117–1132. https://doi.org/10.1016/j.gie.2017.02.022

[6] Zhou P, Zhong Y, Li Q, 2018, Expert Consensus on the Endoscopic Diagnosis and Treatment of Submucosal Tumors in the Digestive Tract in China. Chinese Journal of Gastrointestinal Surgery, 21(8): 841–852.

[7] Wang F, Lin X, 2020, Clinical Application of Endoscopic Resection of Small Submucosal Tumors in the Gastric Fundus with a Transparent Cap with an Inner Groove Combined with a Crescent-Shaped Electrosurgical Snare. Modern Digestive and Interventional Therapy, 25(6): 798–800.

[8] Lu F, Shen M, Zhang S, 2017, Clinical Effect Analysis of Endoscopic Submucosal Dissection in the Treatment of Gastric Stromal Tumors. International Journal of Digestive Diseases, 37(4): 255–258.

[9] Zhang Y, Mao XL, Zhou XB, et al., 2018, Long-Term Outcomes of Endoscopic Resection for Small (≤ 4.0 cm) Gastric Gastrointestinal Stromal Tumors Originating from the Muscularis Propria Layer. World J Gastroenterol, 24(27): 3030–3037. https://doi.org/10.3748/wjg.v24.i27.3030

[10] Hu J, Zhan Y, Ren M, et al., 2018, The Comparison between Endoscopic Submucosal Dissection and Surgery in Gastric Cancer: A Systematic Review and Meta-Analysis. Gastroenterology Research and Practice, 2018(1): 1–10.