

Primary incisional therapy with a modified method for patients with benign anastomotic esophageal stricture

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Background: Benign anastomotic esophageal stricture after surgical resection is not uncommon and requires repeated dilation sessions to maintain patency because of the significant recurrence rate with bougie or balloon dilation.

Objective: Our study was designed to evaluate whether a modified method of incisional therapy is effective and maintains a good patency in a benign anastomotic esophageal stricture.

Design: A prospective outcome study.

Setting: Tertiary-care academic medical centers.

Patients: A total of 24 patients with benign anastomotic esophageal strictures after esophagojejunostomy.

Interventions: Under direct vision through a transparent hood, radial incisions parallel to the longitude of the esophagus were performed by pulling up the Iso-Tome or insulated-tip-knife.

Main Outcome Measurements: Efficacy, safety, and long-term patency after procedures were evaluated.

Results: During 24 months of follow-up observations, 21 of 24 patients (87.5%) who received only 1 dilation session resumed eating solid meals and had no dysphagia. Only 3 patients (12.5%) developed restructre at a mean of 1.6 months. Of the patients with a recurrence, 2 experienced no recurrence after one additional dilation session, and another patient was refractory and underwent 5 dilation sessions. The occurrence of restructre after incisional therapy was statistically more prevalent in long-segment stricture (> 1 cm) (2/3 [66.7%]) than short-segment stricture (< 1 cm) (1/21 [4.8%]) ($P = .032$). There were no significant procedure-related complications.

Limitation: Our study included a small number of patients. Therefore, further prospective randomized controlled trials are needed.

Conclusions: A modified method of incisional therapy as a primary treatment is safe and feasible, and appears to maintain a longer duration of patency in benign anastomotic esophageal stricture. (Gastrointest Endosc 2009;69:1029-33.)

Benign anastomotic stricture of the esophagus after surgical resection occurs in 5% to 46% of patients.¹⁻³ Causes of anastomotic stricture include postoperative complications, such as leakage, fistula formation, bleeding, and infection at the anastomosis site; the use of circular staplers; and ischemia of the upper part of the gastric tube.¹⁻⁵ Usually, benign esophageal strictures are success-

Abbreviation: IT-knife, insulated-tip-knife.

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fully managed by using endoscopic techniques, such as bougie or balloon dilation, stent placement, corticosteroid injection, and laser ablation, with only 5% to 15% of patients requiring surgery.⁵⁻⁹ The success rate of dilation varies from 78% to 100%.^{2,5,10} However, no one dilation method has proven to be superior to all others. Also, there is a significant recurrence rate that requires repeated dilation sessions to maintain patency.^{1-3,5,11} Electrocautery treatment of anastomotic esophageal stricture has been reported in a small number of patients and refractory anastomotic strictures.^{12,13}

In this study, a modified method of endoscopic incisional therapy is presented for the primary treatment of patients with benign anastomotic esophageal strictures,

TABLE 1. Patients characteristics (N = 24)

Age (y), mean $\pm$ SD	55.92 $\pm$ 12.59
M/F	19/5
No. indications (%)	
Stomach cancer operation*	18 (75)
Esophageal cancer operation*	6 (25)
No. postoperative complications (%)	4 (16.7)
Fistula	0
Leakage	3 (12.5)
Infection	1 (4.2)
Stricture develop (mo), mean $\pm$ SD	2.54 $\pm$.509

*Esophagojejunostomy.

and the efficacy and long-term patency of the method are evaluated.

PATIENTS AND METHODS

Patients

This study was designed as a prospective outcome study in endoscopy follow-up. From May 2005 until December 2007, a total of 24 patients who had developed anastomotic stricture after esophagojejunostomy were observed. The eligibility criteria for benign anastomotic stricture excluded etiologically peptic, corrosive-induced, radiation-induced, drug-induced, or malignant strictures. All patients had undergone surgical treatment for gastric and esophageal cancer (18 and 6 patients, respectively). None had previously received dilation therapy with bougies, balloons, or stents. The ethics committee of the Soonchunhyang University Cheonan Hospital approved the study protocol. All participants gave written informed consent.

The surgical anastomoses had been sewn by using a 31-mm EEA stapler (US Surgical Corporation and Auto Suture UK, Ascot, U.K.) (15 patients) or had been sewn by hand (9 patients). Postoperative complications, such as leakage, fistula, and infection, at the anastomosis were observed in 3 patients (Table 1). The average time of recurrence from surgery to presentation was a mean (SD) of 2.54 $\pm$ 0.51 months. All the patients had severe dysphagia and could not take solid food. These patients had a stricture such that it was difficult to pass the endoscope, as demonstrated by EGD. Response to therapy was evaluated by assessing the symptom of dysphagia that resulted from consumption of solid foods at baseline and after the procedure for 24 months or until the development of the symptom. The presence of dysphagia was subjectively evaluated by the patients and objectively demonstrated by

Capsule Summary

What is already known on this topic

- Benign anastomotic esophageal strictures require multiple dilation sessions to maintain patency.

What this study adds to our knowledge

- In a prospective study of benign anastomotic esophageal strictures treated by using a modified method of incisional therapy, 21 of 24 patients who received only 1 dilation session resumed eating solid meals and had no dysphagia.

EGD. However, dysphagia was not assessed by a validated format or scale.

Endoscopic incisional procedure by using the modified method

All patients underwent EGD with a 9.8-mm-diameter endoscope (GIF-Q240; Olympus Optical Co, Ltd, Tokyo, Japan), while in the left lateral decubitus position and under conscious sedation with intravenous midazolam (0.05 mg/kg) and/or propofol (0.5 mg/kg). The esophageal stricture and its location were shown by EGD. Upper-GI radiography was then carried out before intervention to measure the length of the anastomotic stricture.

To manage the anastomotic stricture, the tip of a transparent hood, which was attached to the endoscope, was positioned under direct visualization just proximal to the stricture. The Iso-Tome (MTW Endoskopie, Wesel, Germany), which has a semi-oval-shaped tip of epoxide adhesive, or an insulated-tip knife (IT-knife) (Olympus) was introduced through the working channel. Under direct vision through a transparent hood to ensure the safety margin, radial incisions parallel to the longitude of the esophagus were carefully performed by pulling up the Iso-Tome or IT-knife (Fig. 1). Eight to 12 radial incisions were performed, and the procedure was terminated when the endoscope could easily pass the stricture without pressure. The number and length of incisions required to completely remove the rim of the stenosis were quantified. An electrosurgical unit (UES-30 generator; Olympus) was used, with a pure-cutting current at a power output setting of 40 W/s. Clinical evaluation and EGD were carried out for every patient 1 month after the procedure. Patients were observed for 24 months. In the case of recurrent stricture and dysphagia, incisional therapy was repeated by using the same modality as described above.

Statistical analyses

Statistical analyses were performed by using SPSS 12.0 (SPSS Inc, Chicago, Ill), and a 2-tailed *P* value < .05 was considered statistically significant. Differences in variables were analyzed by the χ^2 and Fisher exact tests.

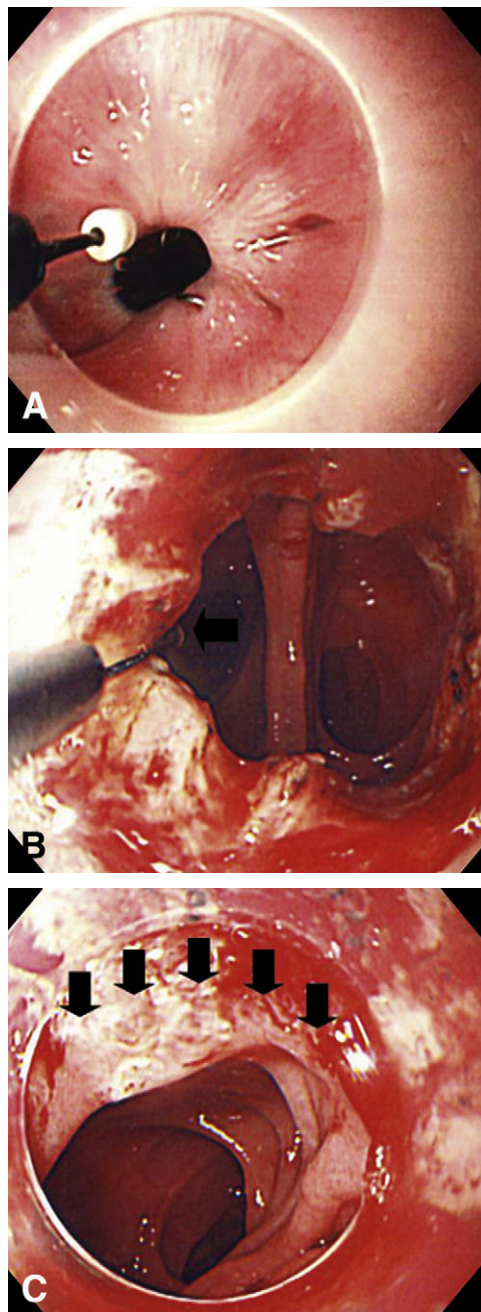


Figure 1. EGD. **A**, Endoscopic view of benign anastomotic esophageal stricture before incisional therapy, showing the Iso-Tome and transparent hood (left). **B**, On incisional therapy, showing that the positioning of the Iso-Tome and radial incision parallel to the longitude of the esophagus is carefully performed by pulling up the Iso-Tome (*arrow*) (middle). **C**, Direct view through the transparent hood enables the safety margin to be ensured (*multiple arrows*) (right).

RESULTS

The length of stricture was less than 1 cm for 21 of 24 patients (87.5%) and more than 1 cm for 3 of 24 patients (12.5%). Postoperative complications and whether or not staplers were used were not statistically significantly re-

TABLE 2. Clinical outcomes

Mean no. radial incisions*	9.21 (range 8-12)
Mean no. sessions	1.29 (range 1-6)
Procedure time (min), mean $\pm$ SD	6.63 $\pm$ 1.38
No. complications	
Significant bleeding	0
Perforation	0
No. restructure (%)	3 (12.5)
Mean time to develop (mo)	1.6
Follow-up (mo), mean $\pm$ SD	24.08 $\pm$ 1.25

*Iso-Tome (16 patients) and IT-knife (8 patients).

TABLE 3. The relationship between stricture length and restructure

	Stricture length		Total
	< 1 cm	$\geq$ 1 cm	
Restricture			
Absent	20	1*	21
Present	1	2†	3
Total	21	3	24

*Stricture length of 1.3 cm.

†Stricture lengths of 1.2 cm and 1.5 cm, respectively.

lated to the length of stricture. Both the Iso-Tome (16 patients) and IT-knife (8 patients) were used according to the same methodology. In all patients, dilation of the strictures was successfully performed in a single treatment session, without any immediate procedure-related complications, such as significant bleeding or perforation. A mean of 9 radial incisional procedures (range 8–12) were successfully completed within 10 minutes. After treatment, the absence of severe dysphagia was subjectively observed in all patients and was endoscopically confirmed. The condition of the patients was observed for 1 day in the hospital, and none of the patients experienced any life-threatening complications, such as severe bleeding that required transfusion or perforation that required prolonged hospitalization (Table 2).

After the procedure, patients were observed for 24 months. Twenty-one of 24 patients (87.5%) had no subjective dysphagia or endoscopic recurrence during follow-up. Only 3 patients (12.5%) developed a restructure at a mean of 1.6 months. They developed a subjective symptom of dysphagia for solid foods or liquids, which was confirmed by EGD. Restrictures occurred in 2 of 3 patients with a long-segment stricture (> 1 cm) and in 1 of 21 patients with

a short-segment stricture (<1 cm) (Table 3). Of the patients with a recurrence, 2 (with stricture lengths of 0.4 cm and 1.2 cm, respectively) had no recurrence after one additional dilation session. However, 1 patient (with a stricture of 1.5 cm in length) was refractory and underwent 5 incisional therapy sessions over 14 months and had no dysphagia during a 10-month follow-up period. The mean session of procedures was 1.29 (range 1-6). Restricture after incisional therapy was statistically more prevalent in long-segment (>1 cm) (2/3 [66.7%]) than short-segment strictures (<1 cm) (1/21 [4.8%]) ($P = .032$). The use of a stapler and distortion of stapling did not affect the recurrence of strictures.

DISCUSSION

The occurrence of benign anastomotic esophageal stricture after surgical resection is not uncommon. However, a significant rate of recurrence is problematic, and no one dilation method has proven to be superior. In various studies, the median number of dilation sessions varied between 2 and 9 per patient.^{1-3,5,11,12} With these considerations in mind, electrocautery therapy has been proposed. In a study by Hordijk et al,¹⁴ 20 patients with fibrotic anastomotic esophageal stenosis were observed for 12 months after electrocautery therapy. The study showed that electrocautery therapy was easy to administer, well tolerated, and safe. However, electrocautery therapy was performed only in patients who were refractory and were treated with repeated dilations by using Savary bougies. Electrocautery therapy was also performed in patients with various postoperative strictures of the esophagus, stomach, pylorus, or colon as a primary or rescue therapy.^{13,15-17} However, this study had neither an adequate number of patients nor follow-up.

This study showed that the endoscopic incisional procedure by using an Iso-Tome or IT-knife with a transparent hood appears to be a safe and feasible technique, especially as a primary therapy. However, the results of this study cannot be directly compared with existing standard methods, because this study was not controlled or comparative. Only a pure-cutting current was used to reduce tissue damage induced by the heat and burning produced by the electrosurgical current.¹⁸ Radial incisions were performed by pulling up the Iso-Tome or IT-knife under direct vision through a transparent hood; this technique ensured the safety margin and reduced unintentional injury during incision. With respect to complication rates, dilation with bougies or balloons resulted in complications, including perforation rates of 0.1% to 0.4%. A significant hemorrhage occurred in 0.4% of patients, and mild bleeding was commonly reported.^{3,11,19,20} In our incisional therapy, effective esophageal dilation of the stricture was performed in all cases, and no procedure-related immediate or delayed complications (significant bleeding or perforation) were noted during follow-up observations. The low complication rate appears to be com-

parable with other modalities of therapy. All patients were observed for 24 months and remained patent over the long term. Restricture after incisional treatment occurred in 3 patients (12.5%). The mean sessions of procedures were 1.29 (range 1-6). However, only 1 patient (4.5%) in the short-segment stricture group experienced restricture. This patient exhibited good patency after 1 additional session. Consequently, the frequency of mean dilation sessions required in incisional therapy appears to be significantly lower than in bougie or balloon dilation and may be more cost effective for short-segment strictures. A long-segment stricture was the only risk factor for restricture. Unlike the results of a previous report,²¹ the use of a stapler and the occurrence of distortion caused by stapling did not affect the recurrence of stricture in this study. However, a limited number of patients were included in this study.

In conclusion, our study showed that a modified method of endoscopic incisional therapy is a safe, effective, and feasible procedure as a primary treatment for benign anastomotic esophageal stricture. This procedure results in the maintenance of good patency, especially in short-segment strictures. However, this study was conducted by using a limited number of patients. To confirm these results, further prospective randomized controlled trials compared with bougie or balloon dilation, stent placement, laser ablation, and steroid injection should be conducted.

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