



## **Endoscopic Approach to Benign Anastomotic Stricture in the Upper Gastrointestinal Tract**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. Author OE writing first draft, making the last checks. Author UM design, data acquisition, or data analysis, manuscript editing. Author EU made a literature review, manuscript editing. Author SD design, final approval of the version to be published. All authors read and approved the final manuscript.*

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## **ABSTRACT**

**Introduction:** Benign anastomosis strictures are frequently seen in anastomoses performed after upper gastrointestinal system resections. Although the first step in treatment is the preferred endoscopic procedures, surgical treatment is also an option. Mortality and morbidity of surgical treatment is at a very high rate compared to endoscopic approaches.

**Materials Methods:** 523 surgical operations, which underwent UGI resection and anastomosis between 31 December 2014 and 31 December 2019 at the surgical oncology clinic, were retrospectively scanned from the hospital database. All patients were those who had surgery for malignancy.

**Results:** The median age of the patients was  $55 \pm 12$  (32-78) and 55% (n = 10) patients were male and 44% (n = 8) patients were female. When the patients were evaluated in terms of their current symptoms at the time of admission, the most common symptom was reported as dysphagia with 83% (n = 15) of the patients. 66% (n = 12) nausea was present.

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**Discussion:** Indication should be selected by considering the indications in stent and balloon dilatation in anastomosis strictures. Balloon dilation can be considered as the main procedure. Strictureotomy, cauterization are also among the options of treatment. Endoscopic treatment can be done safely in qualified hands

*Keywords: Anastomosis; stricture; malignancy; endoscopy.*

## ABBREVIATIONS

Upper gastrointestinal tract (UGI)  
Benign anastomosis strictures (BAS)  
Trough-the-scope (TTS)  
Self expandable metallic stent (SEMS)  
Oxygen saturation (SpO<sub>2</sub>)

## 1. INTRODUCTION

For the upper gastrointestinal tract (UGI), such as primary esophageal and gastric malignancies, it may be particularly difficult to manage postoperative benign anastomosis strictures (BAS) with nonsurgical measures. These anastomosis strictures are often resistant to endoscopic dilation and require multiple dilation sessions to correct [1-4]. Various endoscopic tools used (Savary-Gilliard dilators, Maloney dilators, trough-the-scope (TTS) balloon dilators, fluoroscopically guided balloon dilators, electrocautery, argon plasma, self expandable metallic stent (SEMS)) have a relatively low complication rate [5]. Cardiovascular risk factors such as diabetes and obesity, and previous chemoradiation history are among the factors associated with the development of anastomosis stenosis after UGI resections [2]. The factors associated with stricture recurrence are smaller luminal diameter, anastomosis leak at the first dilation, intraoperative bleeding, weak vascularization of the tissues used for anastomosis (gastric tube, jejunum loop, gastric pouch) and the type of anastomosis (small diameter staples, suture preferences) [1,2,4]. The presence of suture material or staples protruding into the lumen is a common endoscopic finding in patients with anastomosis stenosis. The presence of a foreign body in the lumen contributes to inflammation and scarring, thereby disrupting stricture remodeling [6].

This study aims to determine the long-term clinical success of endoscopic dilation and clinical and endoscopic findings associated with

the rates of refractory anastomosis stenosis of the upper gland.

## 2. MATERIALS AND METHODS

### 2.1 Patient Selection

523 surgical operations, which underwent UGI resection and anastomosis between 31 December 2014 and 31 December 2019 at the surgical oncology clinic, were retrospectively scanned from the hospital database. All patients were those who had surgery for malignancy. In postoperative follow-ups, patients with anastomosis stenosis were identified. Of these patients, endoscopic procedures in our clinic endoscopy unit were noted and included in the study. Patients with unregulated follow-up, active fistula associated with the anastomosis line, surgery was preferred as the first treatment for stenosis (patients with no normal oral intake / technically narrow anastomosis since the first surgery), and the recurrence was detected or suspected to be tumor recurrence. In the light of all these criteria, the number of patients included in the study was 18.

### 2.2 Endoscopic Procedures

The patients were treated after 12 hours of fasting. In our clinic, pre-procedure preparation, anesthesia / analgesia and post-procedure reanimation are performed by anesthesia and reanimation specialists in all endoscopic procedures. Electrocardiogram, noninvasive blood pressure and peripheral oxygen saturation (SpO<sub>2</sub>) monitoring were performed to patients who came to the endoscopy unit. All patients were vascularized with 20 G cannula and 0.9% saline infusion was started. Oxygen was given with a face mask at 4lt / min. During the procedure, intravenous (iv) midazolam 1-5 mg iv, propofol 0.5 mg / kg iv, ketamine 0.2 mg / kg iv, and spasmolyticly hyoscine-N-butyl bromide (Scopolaminbutyl bromide) 20-50 mg iv were given. When an additional dose was needed, half the initial dose was added.

Endoscope and TTS dilation balloons were used in endoscopic dilation. After the balloon passed through the biopsy channel of the endoscope was placed in the stenosis, dilatation was made by inflating under the endoscopic vision. The balloon, which was inflated three times in each session, was kept inflated for three minutes each time. While performing dilatation with spark plug, maloney dilatator, which is suitable for up to 50 fr width starting with 20 fr without endoscopic examination, was tried to be advanced distally. For stenting, stenting was applied to the stenosis area using partially covered SEMs of appropriate size. The comfortable transition of the endoscope with a diameter of 11 mm to the distal was accepted as the measure of adequacy of dilation. After the anesthetic effect was overcome, patients started to receive food without pulp.

### 2.3 Collection and Processing of Data

All data were collected and processed by general surgery specialists. The operation and anastomosis technique was noted by looking at the operation notes of the patients. During postoperative discharge, symptoms such as dysphagia, oral intake restriction, vomiting, nausea and weight loss were noted. The endoscopy reports made to the patients were read and the procedures performed were examined in detail. The data were analyzed using SPSS 21.0 software package. The age, gender, previous surgery, symptoms, type of anastomosis, the length of the narrow segment, the endoscopic intervention method and the number of interventions according to the patients were investigated. Numerical data are expressed as mean standard deviation or percent.

## 3. RESULTS

The median age of the patients was  $55 \pm 12$  (32-78) and 56% (n = 10) patients were male and 44% (n = 8) patients were female. When the patients were evaluated in terms of their current symptoms at the time of admission, the most common symptom was reported as dysphagia with 83% (n = 15) of the patients. 66% (n = 12) nausea was present. Half of the patients had vomiting, including food, and 8 patients had weight loss. The average time between the diagnosis of stenosis after the operation was 3.5 months (1.5 months-6 months). When the surgical procedure that caused stenosis was reviewed, it was observed that the most common occurrence after gastrectomy operations (50%). Regarding other surgeries, it was observed that it was distributed with a relatively balanced

distribution. In terms of anastomosis type with stenosis, stenosis was detected in 55% (n = 10) esophagojejunostomy anastomosis. Stenosis was present in 27% (n = 5) patients of gastrojejunostomy and in 16% (n = 3) patients of esophagogastronomy anastomosis. 72% (n = 13) of the stricture areas were related to the segment less than 2 cm.

All patients (including spark plug dilatation and stent insertion), all patients, primarily balloon dilatation was tried. Balloon dilatation was applied as the first treatment step and SEMs was applied to patients who developed recurrent stenosis despite 3 dilation sessions. When the endoscopic intervention of patients (treatment with improved symptoms) is examined; Balloon dilatation was the most beneficial method with 10 patients. While 8 of these patients had stenosis shorter than 2 cm, 3 patients had narrow segments longer than 2 cm. One patient who underwent balloon dilatation was operated due to perforation that caused clinical symptoms (retroperitoneal and mediastinal free air, contrast leakage, chest and abdominal pain). One patient was taken to the operation because dilatation with balloon and spark plug was attempted and the stenosis area was not fully opened and did not receive symptomatic benefit. In this patient, the narrow segment was longer than 2 cm. One patient was treated with spark plug dilation and 5 with SEMs. In 1 patient, the patency was achieved only by placing a stent inside the stent.

Infiltration bleeding developed in 7 (38.8%) of all patients and this bleeding stopped with conservative treatment and follow-up. Massive bleeding developed in one of the patients who tried dilatation with a dilator. 2 units of erythrocyte suspension replacement, nasogastric decompression and cold water lavage were performed and bleeding was stopped. In 3 patients with stent, the feeling of foreign body presence in the throat (globus sensation) continued for approximately 1 week. Intense gag reflexes and vomiting were observed in these patients. With inpatient follow-up, symptoms regression was observed and control endoscopies were performed considering the risk of stent dislocation. On the other hand, 2 patients who had stents reported complaints of mild pain they felt while swallowing.

## 4. DISCUSSION

The prevalence of esophageal stenosis after esophagectomy ranges from 9% -48% [1] These benign strictures may develop as a result of fibrin

production and collagen deposition and from chronic inflammation. (7)Risk markers related to stricture formation in the anastomosis line can be defined as conditions such as anastomosis tension, suture preferences, stapler preferences and anastomosis ischemia. Endoscopic interventions [7-10], which are used primarily in rectal cancer anastomosis strictures, especially balloon dilatation, have become frequently used in the treatment of BAS, which occurs after UGI surgery [11].

Surgical treatment of anastomosis strictures is technically difficult, especially in esophageal anastomoses, but it is also a method open to many complications. For this reason, endoscopic approach can be defined as the gold standard in BAS developing in UGI. As endoscopic approach methods, the use of methods such as Savary-Gilliard dilators, Maloney dilators, TTS balloon dilators, fluoroscopically guided balloon dilators, electrocautery, argon plasma, SEMS has been

reported in the literature. [12-15] The most commonly used among these methods is direct endoscopic examination or balloon dilatation with fluoroscopic imaging. Although these methods are low, there are complications such as bleeding and perforation [16]. However, these methods are easy to apply and have a low complication rate, and because of the high recurrence rates, multiple procedure requirements of the patients are high[17]. In addition, SEMS is actively used not only for the treatment of stenosis, but also for the treatment of anastomosis leaks and fistula, especially those covered [14]. Although the most frequent dysphagia symptom in patients when diagnosed with stenosis is typical for UGI stenosis, it can be confused with standard postoperative symptoms by clinicians who do not have a BAS pre-diagnosis. In general, foods are taken from vomiting due to bile diversion after UGI system surgery and removal of antrum where gastric acid secretion occurs.

**Table 1. Demographic and clinicopathological features of patients**

	n / %
Age(median)	55±12
Gender	
Female	8 / 44
Male	10 / 56
Operation	
Gastrectomy	9 / 50
Esophagectomy	3 / 16.6
Whipple	2 / 11.1
Other	4 / 22.2
Symptoms	
Dysphagia	15 / 83.3
Vomiting	9 / 50
Nausea	12 / 66.6
Weight loss	8 / 44.4
Anastomosis type	
Esophagojejunostomy	10 / 55.5
Gastrojejunostomy	5 / 27.7
Esophagogastrostomy	3 / 16.6
Radiotherapy	7 / 38.8
Time until diagnosis(median)	3.5 ay
Length of narrow segment	
<2 cm	13 / 72.2
>2cm	5 / 27.7
Endoscopic procedure to treat	
Balloon dilatation	10 / 55.5
Maloney dilatation	1 / 5.5
Endoscopic stenting	5 / 27.7
Number of endoscopic interventions	
1	4 / 22.2
1-3	9 / 50
>3	5 / 27.7
Number of endoscopic interventions (median)	2.44

**Table 2. Patients with complications and problems after endoscopic intervention**

Complications and Problems	Balloon dilatation	Endoscopic stenting	Maloney dilatator
Oozing bleeding	5	1	1
Massive bleeding	0	0	1
Perforation	1	0	0
Globus sensation	0	3	0
Persistent pain	0	2	0

In our study, the reason for the most common stenosis after gastrectomy operations is that gastric cancer surgery is frequently performed in our clinic and the number is high. We think the reason why it is seen more frequently in esophagojejunostomy anastomoses is the same. In our study, male and female distribution was determined as U-D. In the literature, there are different studies in which female gender is high [18], male gender is dominant in p ratios [19] and balanced distribution is observed in both sexes [20]. In a study in which 164 patients were examined and 474 dilatation procedures were performed, the average number of dilatations per patient was reported to be 2.87 [18]. However, the rate of strictures due to anastomosis in this study is 5. In our study, an average of 2.44 endoscopic interventions were performed for each patient. 5 patients had more than 3 procedures and when these patients were accepted as refractory strictures, 7% refractory strictures were observed in our study. In a series of 74 patients, the recurrent and refractory stricture rates were reported [20].

In the United States, there is a study examining 591,187 patients in which a comparison is made in terms of race to which patients belong [21]. In this study, malignant and benign stenoses were separated and it was seen that the Caucasian race was affected in both etiological conditions. In our study, no comparison was made since the race information that patients belonged to was not available.

When the complications after the procedure are examined, it is seen that the bleeding that develops in most of our patients stops only with follow-up and conservative treatment. Apart from this, although there is an intense gag reflex that develops in some patients after stenting and a foreign body sensation in the throat, an endoscopy performed with the suspicion of stent dislocation was not found in all of these patients. When all these conditions are reviewed, the only serious complication of the procedures is the

perforation situation that occurs during balloon dilatation in a patient. This situation does not change the index surgery procedure for the patient's stenosis.

## 5. CONCLUSION

Indication should be selected by considering the indications in stent and balloon dilatation in anastomosis strictures. Balloon dilatation can be considered as the main procedure. Strictureotomy, cauterization are also among the options of treatment. Endoscopic treatment can be done safely in qualified hands. Consequently, endoscopic dilatation and other procedures should be tried as the first treatment option in BAS because of the high technical success and low complication rates.

## CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

## ETHICAL APPROVAL

The processes of the patients after endoscopic treatment were noted from clinical and outpatient epicrises. This study was approved by the Ankara University Faculty of Medicine Ethics Committee.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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