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Endoscopic Treatment of Postoperative Esophageal Anastomotic Strictures: A Single Center Experience

Postoperatif Özofageal Anastomoz Darlıklarının Endoskopik Tedavisi: Tek Merkez Deneyimi

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Abstract

Aim: To evaluate the analysis, treatment methods and results of endoscopic treatments of esophagojejunostomy and esophagogastric anastomotic strictures.

Material and Method: Data from patients treated between 2009 and 2019 was collected and analyzed. The primary endpoint was defined as the absence of dysphagia for at least 6 months after the final endoscopic treatment session. The improvement in dysphagia scores at 1 and 6 months was accepted as the secondary endpoint.

Results: Of 18 patients (10 male), there were 11 patients with esophagogastric anastomotic stricture and 7 patients with esophagojejunostomy anastomotic stricture. Only balloon or bougie dilatation was applied to 13 patients, while 5 patients received a full-covered metal stent (FCMS) in addition to balloon or bougie dilatation due to persistent dysphagia symptoms. The primary endpoint was reached in 10 of the 13 patients (76.9%) who received only balloon or bougie dilatation. The secondary endpoint was reached in 3 patients. The primary endpoint was reached in 4 of the 5 patients (80%) who received a FCMS in addition to balloon or bougie dilatation. 6 patients (33.3%) had a recurrence. Major complications occurred in 4 (22.2%) patients, including perforation in 2 and stent migration in 2 patients.

Conclusion: The study demonstrated that endoscopic treatment of esophageal anastomotic strictures is a reliable and effective treatment option with a high success rate. The use of FCMS, either as a primary treatment option or in the treatment of perforation as a complication of endoscopic treatment, showed good effectiveness in our study.

Keywords: Esophagojejunostomy, esophagogastric, anastomotic stricture, full-covered metal stent

Öz

Amaç: Özofagojejunostomi ve özofagogastrik anastomoz darlıklarının endoskopik tedavilerinin analizi, tedavi yöntemleri ve sonuçlarının değerlendirilmesi.

Gereç ve Yöntem: 2009 ve 2019 yılları arasında endoskopik olarak tedavi edilen hastaların verileri toplandı ve analiz edildi. Primer sonlanım noktası, son endoskopik tedavi seansından sonra en az 6 ay süreyle disfaji olmaması olarak tanımlandı. 1. ve 6. aylarda disfaji skorlarındaki iyileşme ikincil sonlanım noktası olarak kabul edildi.

Bulgular: 18 hastanın (10 erkek) 11'inde özofagogastrik anastomoz darlığı, 7'sinde Özofagojejunostomi anastomoz darlığı vardı. 13 hastaya sadece balon veya buji dilatasyonu uygulanırken, 5 hastaya devam eden disfaji semptomları nedeniyle balon veya buji dilatasyonuna ek olarak tam kaplı metal stent uygulandı. Sadece balon veya buji dilatasyonu uygulanan 13 hastanın 10'unda (%76.9) primer sonlanım noktasına ulaşıldı. İkincil sonlanım noktasına 3 hastada ulaşıldı. Balon veya buji dilatasyonuna ek olarak tam kaplı metal stent uygulanan 5 hastanın 4'ünde (%80) primer sonlanım noktasına ulaşıldı. 6 hastada (%33.3) nüks görüldü. 2 hastada perforasyon ve 2 hastada stent migrasyonu olmak üzere 4 (%22,2) hastada majör komplikasyon gelişti.

Sonuç: Çalışmamız, özofagus anastomoz darlıklarının endoskopik tedavisinin yüksek başarı oranı ile güvenilir ve etkili bir tedavi seçeneği olduğunu göstermiştir. Tam kaplı metal stentin hem primer tedavi seçeneği olarak hem de endoskopik tedavinin bir komplikasyonu olarak perforasyon tedavisinde kullanılması çalışmamızda iyi etkinlik göstermiştir.

Anahtar Kelimeler: Özofagojejunostomi, özofagogastrik anastomoz darlığı, tam kaplı metal stent

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INTRODUCTION

In a normal adult, when the esophageal luminal diameter is larger than 18 mm, those who can maintain a normal diet, dysphagia occurs when it is smaller than 13 mm.[1] Dysphagia can be caused on by a variety of conditions, including gastroesophageal reflux disease, achalasia, malignancies, corrosive esophagitis, eosinophilic esophagitis, radiotherapy-induced damage, esophageal webs, and postoperative esophageal anastomotic strictures.[2] Postoperative esophageal anastomotic strictures, which occur in 2%-30% of patients following esophageal surgery,[3] can be challenging to treat due to the fibrotic tissue, synechiae, and inherent risks associated with reoperating in these patients.[4] Endoscopic treatment options for postoperative esophageal strictures include balloon and bougie dilatation, as well as the use of full-covered metal stents.[5] However, significant esophageal stenosis or complex strictures often require multiple dilatation sessions,[6,7] and there is no consensus on the optimal endoscopic surgical method, follow-up intervals, time between sessions, or termination point.[8] In this study, we aim to evaluate the analysis, treatment methods, and outcomes of endoscopic treatments for esophagojejunostomy (EJ) and esophagogastric (EG) anastomotic strictures.

The most common cause of dysphagia is gastroesophageal reflux disease. Other causes will include achalasia, malignancies, corrosive esophagitis, eosinophilic esophagitis, failure secondary to radiotherapy, dysphagia, esophageal webs, and postoperative esophageal anastomotic strictures. Postoperative esophageal anastomotic strictures can be seen in 2%-30% of patients who have undergone esophageal surgery.[2] Strictures may form in the anastomosis or staple line following procedures such esophagogastric-esophagojejunal anastomosis, surgeries for achalasia, Nissen fundoplication, and bariatric surgery. Due to the fibrotic tissue created by these patient organs, synechiae, and the dangers of operating, surgical treatment of these strictures is an operation with substantial morbidity postoperatively. Additionally, several dilatation treatments may be necessary for the resolution of the instances following surgical intervention.[3] Balloon and bougie dilatation are used for endoscopic treatment of postoperative esophageal strictures.[4] Recently, endoscopic treatment of refractory benign esophageal strictures with a full-covered self-expandable metal stent (FC-SEMS) has also been widely used.[5]

Significant esophageal stenosis or complex stricture-sized endoscopic treatment requires multiple dilatation sessions from patients.[6,7] There is no common consensus regarding endoscopic surgical methods, follow-up times, time between sessions, and termination point.[8]

In this study, we aimed to evaluate the analysis, treatment methods and results of endoscopic treatments of esophagojejunostomy (EJ) and esophagogastric (EG) anastomotic strictures.

MATERIAL AND METHOD

Study Participants

This study included patients who had postoperative EG and EJ anastomotic stenosis and underwent endoscopic treatment at Turkey Yuksek Ihtisas Hospital between March 2009 and July 2019. During the postoperative period, an endoscopist checked each patient at the stenosis site and recommended them all to the hospital for endoscopic diagnosis and treatment of dysphagia. These patients' data, including those who were unable to complete the required interventions for the study and those who experienced a cancer recurrence, were gathered retrospectively and examined.

Study Setting and Equipment

All procedures were performed using an Olympus endoscope (Olympus, Tokyo, Japan). The endoscopic treatment utilized Micro-Tech (Micro-Tech Medical Company, Nanjing, China) dilatation balloons with lengths of 40-80 mm and diameters of 12-18 mm, Savary-Gilliard dilator system (Wilson-Cook Medical, USA) bougie dilators with lengths of 80-140 mm and diameters of 20-22 mm, and Micro-Tech (Micro-Tech Medical Company, Nanjing, China) full-covered metal stents with bell-shaped ends. The Mellow-Pinkas dysphagia score was calculated for all patients prior to the procedure (**Table 1**). All patients gave informed consent prior to the procedure, which was carried out by a single endoscopist while they were sedated with midazolam and pethidine. The operation was guided using fluoroscopy.

Table 1. Dysphagia score

Score 0	Able to tolerate normal diet.
Score 1	Can tolerate some solid foods
Score 2	Can tolerate semi-solid foods
Score 3	can only tolerate liquids
Score 4	Complete obstruction

Procedure:

The location and size of the stenosis was first evaluated using a gastroscope. Based on this evaluation, the endoscopist determined the appropriate balloon, bougie, or full-covered metal stent to use. A guide wire was advanced to the distal end of the stenosis and a balloon dilator was placed over the wire and centered on the stenosis. The balloon was inflated until the waist inside the balloon disappeared, and then the balloon was deflated and removed without waiting (**Picture 1**). This was repeated in this way, with the balloon diameter increasing in subsequent sessions (starting at 12 mm and increasing to 14-16 mm).

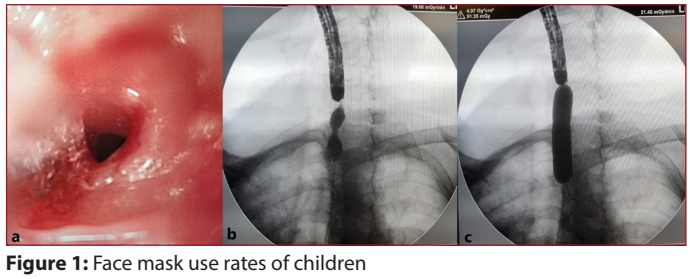

Figure 1: Face mask use rates of children

Dilatation with a bougie dilator was performed by advancing the bougie dilator up to 7 or 9 mm over the wire of the guide plate and increasing the diameter by a maximum of 3 mm. In subsequent sessions, the diameter was increased up to 15 mm. If dysphagia symptoms persisted despite the placement of a full-covered metal stent, balloon dilatation, and bougie dilatation, alternative treatment was considered. Full-covered metal stents were also used as a procedure for the treatment of perforation plates. Prior to stent placement, the stenosis site was marked visually by placing a metal object (such as a scalpel) on the tissue. The metal stent was then taken out of the scope and placed with the anastomosis line centered over the guidewire. To prevent beyond migration, hemoclips (1-4 pieces) were used to fix the metal stent's proximal end to the esophageal lining (**Picture 2**).

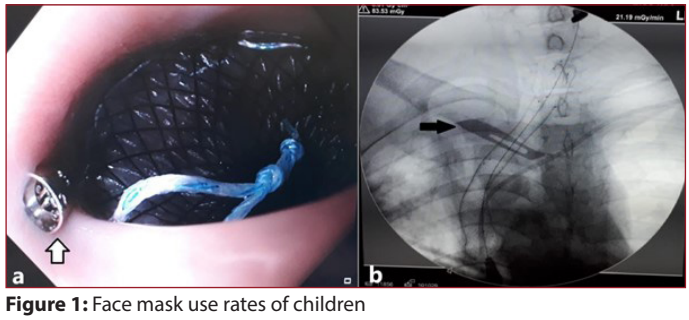

Figure 1: Face mask use rates of children

After the procedure, the presence of periesophageal free air was not evaluated using fluoroscopy. To identify subcutaneous emphysema, the neck area was consistently palpated. Any minor bleeding that occurred during the procedure was noted, and patients were closely monitored for 2 hours for major bleeding or perforation. At the end of the 2-hour period, patients without active complaints were discharged and provided with information about any complications. The dysphagia score was recalculated one week after the procedure. For patients with no significant reduction in dysphagia score, endoscopic treatment was administered at 1-2 week intervals during the first month. From the first month on, endoscopic dilatation was administered at 2-4 week intervals for 3 months, followed by 4-12 week intervals thereafter as needed. Dysphagia scores were recorded for patients at 1, 3, and 6 months.

The success of endoscopic treatment was defined as the absence of dysphagia for at least 6 months after the final endoscopic treatment session. This was the primary endpoint of our study. The improvement in dysphagia scores at 1 and 6 months was accepted as the secondary endpoint. Recurrence of dysphagia after a period of longer than 6 months without dysphagia was defined as recurrence.[9]

RESULTS

Endoscopic treatment was administered to 29 patients who developed postoperative esophageal anastomotic stricture. Adequate data was not available for 8 patients, and 3 patients were excluded from the study due to cancer recurrence at the anastomosis line, resulting in a total of 18 patients (10 male) with a median age of 64 (26-81) being included in the study. Squamous cell carcinoma of the esophagus in 6 patients, adenocarcinoma of the esophagus in 4, and adenocarcinoma of the stomach in 8 patients were the surgical indications for the formation of stricture in these individuals. Both the esophagojejunal and esophagogastric anastomotic strictures affected 11 and 7 individuals, respectively. The location of the stricture was at the lower end of the esophagus in 9 patients, at the upper end of the esophagus in 5 patients, and in the middle of the esophagus in 4 patients. Demographic data, surgical indications, type of anastomosis, and location of stricture for the included patients are listed in **Table 2**. The median time between surgery and the development of stricture was 6 months (2-16 months).

Table 2. Demographic data of patients, surgical details and stenosis localizations.

	n (%)
Median age (range)	64y (26-81)
Sex (male/%)	10 (55.5%)
Surgical indication	
Gastric adenocarcinoma	8 (44.4%)
Esophageal squamous cell carcinoma	6 (33.4%)
Esophageal adenocarcinoma	4 (22.2%)
Type of anastomosis	
Esophagogastric	11 (61.1%)
Esophagojejunal	7 (38.9%)
Stricture site	
Upper-esophagus	5 (27.8%)
Mid-esophagus	4 (22.2%)
Distal esophagus	9 (50%)

Only balloon or bougie dilatation was applied to 13 patients, while 5 patients received a full-covered metal stent in addition to balloon or bougie dilatation due to persistent dysphagia symptoms. The primary endpoint was reached in 10 of the 13 patients (76.9%) who received only balloon or bougie dilatation. The secondary endpoint was reached in 3 patients. The primary endpoint was reached in 4 of the 5 patients (80%) who received a full-covered metal stent in addition to balloon or bougie dilatation. One patient died from pulmonary embolism 3 months after the metal stent was removed.

The primary endpoint was reached in a total of 14 patients (77.7%), and the secondary endpoint was reached in 17 patients (94.4%). The mean duration to reach the primary and secondary endpoints was 8.1 months (1-25 months) and 18 days (3-34 days), respectively. The dysphagia scores, number of endoscopic treatment sessions, and clinical outcomes for the patients are listed in **Table 3**.

Table 3. Dysphagia scores and clinical outcomes of the patients.

Patient no.	Dysphagia Score			Total sessions	Duration to reach the primary endpoint (month)	Dysphagia free-period after last procedure (month)	fully covered metal stent replacements	Reaching the primary endpoint	Reaching the secondary endpoint	Recurrence
	Before the procedure	1. month	6. month							
1.	3	2	1	10	11	11		+	+	-
2.	3	1	0	13	12	12	+	+	+	-
3	3	1	0	12	25	35	+	+	+	+
4.	3	1	1	6	7	12		+	+	+
5.	2	1	0	9	7	12		+	+	-
6.	3	1	1	3	11	7		+	+	-
7.	2	0	0	12	1	39	+	+	+	+
8.	4	2	1	5	-	5		-	+	-
9.	4	1	2	5	-	3		-	-	-
10.	3	1	1	7	-	4		-	+	+
11.	3	1	0	6	7	9		+	+	-
12.	3	2	1	15	-	4	+	-	+	+
13.	3	1	0	5	4	12		+	+	-
14.	3	1	0	4	5	32		+	+	-
15.	3	2	1	15	24	12	+	+	+	+
16.	4	2	1	5	2	16		+	+	-
17.	3	2	0	5	-	22		+	+	-
18.	4	1	0	9	3	9		+	+	-

Seven patients in total received FC-SEMSs. Two patients received the stents as a result of the development of perforation associated with the treatment, whereas five patients had them for the purpose of dilatation. A total of 146 sessions of treatment were performed. During the first month, the average number of procedures was 2 (range: 1-4). The average follow-up period was 25 months (range: 8-47 months). Through the whole follow up period, the average number of procedures was 8.1 (range: 3-15).

6 patients (33.3%) had a recurrence. The recurrence occurred at an average of 10.5 months (range: 7-24 months) after treatment. Of the 4 patients with recurrence, 2 were followed asymptomatically after 2 sessions of endoscopic balloon dilatation, and 2 continue to receive endoscopic balloon dilatation sessions. In 2 patients, the cause of the stricture was cancer recurrence and total obstruction occurred, preventing endoscopic treatment. Percutaneous jejunostomy was performed surgically on both patients.

Major complications occurred in 4 (22.2%) patients, including perforation in 2 and stent migration in 2 patients. The 2 patients with perforation were treated with FC-SEMS and broad-spectrum antibiotics. After 4 weeks in one patient and 6 weeks in the other, the stents were withdrawn. There was no procedure-related mortality. During the study period, 2 patients died due to cancer recurrence and 1 patient died due to pulmonary thromboembolism.

DISCUSSION

The surgical treatment of postoperative esophageal anastomotic strictures involves surgical resection and re-anastomosis. The surgical approach is associated with perioperative morbidity and mortality due to comorbidities and secondary adhesions to previous surgery.[10] Endoscopic treatment of esophageal anastomotic strictures is an effective and safe treatment method for reducing dysphagia symptoms or significant decrease in dysphagia score, even if it requires multiple endoscopic sessions.[11] The first option in endoscopic treatment is balloon and bougie dilatation. If there is no significant symptomatic relief after multiple balloon dilatation sessions, a fully covered metal stent can be applied.[12] However, fully covered metal stents are not recommended as the first treatment option due to their high risk of migration.[13] In the study, we applied fully covered metal stents to patients who did not respond to endoscopic balloon and bougie treatment.

Studies have reported that effective endoscopic treatment of esophageal anastomotic strictures requires 2-9 dilatation sessions.[14] The average number of dilatation sessions in the present study was 8.1, which is similar to the literature.

The number of dilatation sessions administered to patients in the first month was an average of 2 (range: 1-4 months). We observed that the patients' need for dilatation decreased in subsequent months due to the increase in the diameter of the balloon and bougie sizes used in the subsequent dilatation sessions.

A total of 77.7% of patients and 94.4% of patients, respectively, reached the primary and secondary endpoints. This high percentage of success was comparable to earlier research published in the literature.[12] In a study by Lu et al.[11] the success rates of balloon dilatation and fully covered metal stent application were 70.9% and 35%, respectively. The higher success rate of endoscopic treatment in this study may be due to our combination of balloon/bougie dilatation with fully covered metal stent application.

The time to reach the primary endpoint was an average of 8.1 months. The time to reach the secondary endpoint was an average of 18 days. Dysphagia scores reduced quickly after endoscopic therapy, but it took a while for patients to reach a stage where they were no longer in need of endoscopic treatment. In this research, the recurrence rate was 33.3%. This rate can reach up to 50% in previous studies.[15] After recurrence, patients were treated endoscopically. The duration of endoscopic treatment is related to the recurrence rate. In previous studies, the recurrence rate was higher in patients treated for a shorter duration.[16] In the current study, the recurrence rate was not significantly different between the group treated for a shorter duration and the group treated for a longer duration.

The proportion of patients who reached the primary and secondary endpoint was 77.7% and 94.4%, respectively. This high success rate was similar to that in previous studies in the literature.[12] In a study by Lu et al.[11] the success rates of balloon dilatation and fully covered metal stent application were 70.9% and 35%, respectively. The higher success rate of endoscopic treatment in the present study may be due to our combination of balloon/bougie dilatation with fully covered metal stent application.

The time to reach the primary endpoint was an average of 8.1 months. The time to reach the secondary endpoint was an average of 18 days. Endoscopic treatment resulted in a rapid decrease in dysphagia scores, but it took a long time for patients to reach a period of dysphagia-free status without the need for further endoscopic treatment. The recurrence rate in our study was 33.3%. This rate can reach up to 50% in previous studies.[15] After recurrence, patients were treated endoscopically. However, there is no consensus regarding the optimal management with endoscopy. Therefore, continuing endoscopic treatment may be a reasonable option for patients in whom surgical treatment is not possible.

FC-SEMS are used not only in the treatment of esophageal anastomotic strictures, but also in the treatment of perforation, a complication of endoscopic treatment. Patients who developed perforation during endoscopic treatment were treated with FC-SEMS. The effectiveness of FC-SEMS in the iatrogenic perforation of the esophagus has been demonstrated in the literature.[16]

The limitations of our study include its retrospective design and the lack of a sufficient number of patients to compare endoscopic treatment methods. Although larger, controlled prospective studies are needed, we believe that the study can contribute to such studies.

CONCLUSION

Our study demonstrated that endoscopic treatment of esophageal anastomotic strictures is a reliable and effective treatment option with a high success rate. The success rate of endoscopic treatment increased with multiple sessions, but the recurrence rate was also high. The use of FC-SEMS, either as a primary treatment option or in the treatment of perforation as a complication of endoscopic treatment, showed good effectiveness in our study. However, further larger, controlled prospective studies are needed to confirm these findings and to compare different endoscopic treatment methods. Despite its retrospective design and the limitations in the number of patients, our study contributes to the existing literature and can provide guidance for the management of esophageal anastomotic strictures. Overall, endoscopic treatment should be considered as an option for patients with esophageal anastomotic strictures, particularly for those in whom surgical treatment is not possible or not desired.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Ankara City Hospital Clinical Researches Ethics Committee (Date: 26.05.2021, Decision No: E1/1809/2021).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

REFERENCES

1. Dryden GW, McClave SA. Methods of treating dysphagia caused by benign esophageal strictures. Tech Gastrointest Endosc 2001;3:135-43
2. Kumbum K, Talavera F, Anand BS et al. Esophageal Stenosis. Medscape 20 August 2019.
3. Honkoop P, Siersema PD, Tilanus HW, Stassen LP, Hop WC, van Blankenstein M. Benign anastomotic strictures after transhiatal esophagectomy and cervical esophagogastrostomy:risk factors and management. J Thorac Cardiovasc Surg. 1996;111(6):1141–6.
4. Siddiqui UD, Banerjee S, Barth B, et al. Tools for endoscopic stricture dilatation. Gastrointest Endosc 2013;78:391–404.
5. Wadhwa RP, Kozarek RA, France RE, et al. Use of self-expanding metallic stents in benign gastrointestinal diseases. Gastrointestinal Endosc. 2003;58(2):207–12.
6. Chiu YC, Hsu CC, Chiu KW, et al. Factors affecting clinical applications of endoscopic balloon dilation for benign esophageal strictures. Endoscopy 2004;36:595–600.
7. Saeed ZA, Ramirez FC, Hepps KS, et al. An objective endpoint for dilation improves outcome of peptic esophageal strictures:a prospective, randomized trial. Gastrointest Endosc 1997;45:354–9.

8. Sami SS, Haboubi HN, Ang Y, et al. UK guidelines on oesophageal dilatation in clinical practice. Gut. 2018;67(6):1000-23.
9. Kochman ML, McClave SA, Boyce HW. Resistant and recurrent esophageal stricture:a definition. Gastrointest Endosc 2005;62:474-5.
10. Siersema Police. Treatment options for esophageal strictures. Nat Clin Pract Gastroenterol Hepatol. 2008;5(3):142–52.
11. Lu Q, Yan H, Wang Y, et al. The role of endoscopic dilatation and stents in resistant benign esophageal strictures:a retrospective analysis. BMC Gastroenterol 2019;19:95.
12. Lee J, Song HY, Ko HK, et al. Fluoroscopy-guided balloon dilation or temporary stent placement in patients with gastric conduit strictures after esophagogastrostomy and esophagectomy. AJR Am J Roentgenol 2013;201:202–7.
13. Fuccio L, Hassan C, Frazzoni L, Miglio R, Repici A. Clinical outcomes following stent placement in resistant benign esophageal stricture:a systematic review and meta-analysis. Endoscopy. 2016;48(2):141-8.
14. van Hooft JE, van Berge Henegouwen MI, Rauws EA, et al. Endoscopic treatment of benign anastomotic esophagogastric strictures with a biodegradable stent. Gastrointestinal Endosc. 2011;73(5):1043-7.
15. Poincloux L, Rouquette O, Abergel A. Endoscopic treatment of benign esophageal strictures:a literature review. Expert Rev Gastroenterol Hepatol. 2017;11(1):53-64.
16. Park JY, Song HY, Kim JH and others. Benign anastomotic strictures after esophagectomy: long-term efficacy of balloon dilatation in 155 patients and factors affecting recurrence. AJR AmJ Roentgenol. 2012;198(5):1208-13.
17. Saxena P, Khashab MA. Endoscopic management of esophageal perforations: who, when and how? Curr Treatment Options Gastroenterol. 2017;15(1):35-45.