

Total Gastrektomi Sonrası Gelişen Özofagojejunal Anastomoz Kaçaklarının Floroskopik Olarak Tam Kaplı Self Ekspandıbl Metalik Stent ile Tedavisi; Tek Merkez Çalışması

Treatment of Esophagojejunal Anastomosis Leaks with Full Covered Self-Expanding Metal Stents after Total Gastrectomy: A One Center Study

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ÖZ

GİRİŞ ve AMAÇ: Radikal gastrektomi sonrası anastomoz kaçağı medikal olarak acil bir durum olup zaman geçirmeden tedavi edilmelidir. Literatürde kaçaklar için kullanılan parsiyel veya tam kaplı self ekspandıbl metalik stentlerin çoğu endoskopik olarak yerleştirilmiş olup skopik uygulamadan sadece birkaç çalışmada bahsedilmiştir. Bu çalışmanın amacı, radikal total gastrektomi (TG) sonrası postoperatif özofagojejunostomi (ÖJ) kaçaklarının yönetiminde deneyimimizi gözden geçirmek, skopik olarak yerleştirilen tam kaplı self ekspandıbl metalik stent (TKSEMS) kullanımının güvenilirlik, etkinlik, teknik ve klinik başarısını değerlendirmek ile literatürde endoskopik olarak yerleştirilmiş stentler ile bu parametrelerin karşılaştırılmasıdır.

YÖNTEM ve GEREÇLER: 2014 ve 2017 arasında mide kanseri nedeni ile TG yapıp sonrasında ÖJ kaçağı gelişen toplam 20 hasta retrospektif olarak tarandı ve çalışmaya dahil edildi. TKSEMS'ler girişimsel radyoloji ünitesinde skopi eşliğinde yerleştirildi.

BULGULAR: Teknik başarı %100 olarak değerlendirildi. Klinik başarı %80 olarak ölçüldü. 2 hastada (%10) stent migrasyonu izlendi. Bir hasta sepsis ve sonucu kaybedildi. Bu sonuca göre mortalite oranı %5 olarak değerlendirildi. Hastalarda işlem ile ilişkili komplikasyon gelişmedi. Klinik başarı ile mortalite ile ilişkili faktörler arasındaki ilişki istatistiksel olarak tespit edilemedi ($P > 0,05$).

TARTIŞMA ve SONUÇ: TG sonrası gelişen ÖJ kaçaklarında floroskopik olarak TKSEMS yerleştirilmesi teknik olarak uygulanması kolay ve major komplikasyon gelişmeksizin güvenle kullanılabilen etkili bir tedavi yöntemidir.

Anahtar Kelimeler: gastrik karsinom, anastomoz kaçağı, skopi, kaplı stent

ABSTRACT

INTRODUCTION: Anastomosis leak after radical gastrectomy is a medical emergency and should be treated without delay. Most of the self-expanding metallic stents used for leaks in the literature are endoscopically placed and application with scopy have been mentioned only in a few studies. The aim of this study is to evaluate our experience in management of postoperative esophagojejunostomy (OJ) leaks after radical total gastrectomy, to evaluate the safety, efficacy, technical and clinical success of a scopically placed fully covered self expanding metallic stents (FCSEMS) and compare these parameters with endoscopically placed stents in the literature.

METHODS: A total of 20 patients who underwent TG with gastric cancer and subsequently developed OJ leak for the remaining period between 2014 and 2017 were screened retrospectively and added to the study. FCSEMSes were placed in the interventional radiology unit with scopy.

RESULTS: Technical success was evaluated as 100%. Clinical success was measured as 80%. Stent migration was observed in 2 patients (10%). One patient died of sepsis. Mortality rate was evaluated as 5%. There were no procedural complications in the patients. The relationship between clinical success and mortality related factors could not be determined statistically ($P > 0,05$).

DISCUSSION and CONCLUSION: FCSEMS is a safe and effective treatment method that can be safely used without complications.

Keywords: gastric carcinoma, anastomotic leak, scopy, covered stent

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INTRODUCTION

Surgery is the best treatment for gastric cancer. However, these surgeries are technically difficult and have high morbidity and mortality. Of patients undergoing radical gastrectomy, 4% to 27% develop perioperative anastomosis leak (1-3). Leakage is a medical emergency with a mortality rate of about 30% (2). Early diagnosis of leaks significantly reduces the rates of complication and mortality (4).

Minor esophagojejunostomy (OJ) leaks that have not developed sepsis can be treated conservatively. However, major leaks require intervention, and techniques involving clipping and fibrin glue have been proposed to avoid surgical intervention (5, 6). Another treatment option includes the placement of an endoscopic partial or fully covered self-expanding metallic stent. These stents create a barrier between the intraluminal contents and the anastomosis, which allows the tissue to heal, prevents infection, and provides oral nutrition. Initially, plastic-covered self-expanding plastic stents were used, but their use was eventually abandoned due to high migration and other major complications (7). To minimize these complications, fully covered self-expanding metallic stents (FCSEMS) were developed. Many studies have reported that these stents can be used endoscopically for the treatment of anastomotic leaks (9-13).

A literature review reveals that the majority of the partial or fully covered self-expandable metallic stents used for leakage are endoscopically placed, while only a few are scopically placed (13,14).

The current study aimed to review our experience in the management of postoperative OJ leaks after radical total gastrectomy. It also aimed to evaluate the safety, efficacy, and technical and clinical success of the use of scopically placed FCSEMS, and to compare these parameters with results of endoscopically placed self-expanding metallic stents in the literature.

METHODS

A total of 20 patients who underwent total gastrectomy due to gastric cancer and subsequently developed OJ leak between January 2014 and June

2017 were retrospectively screened and included in this study. This study was designed and constructed in accordance with the principles of the Helsinki Declaration. Approval for this study was obtained from the institution's ethical committee. All of the included patients provided written informed consent.

All of the patients included in this study were clinically diagnosed with sepsis, which originated from infected material from the surgical drains. Leaks were diagnosed with either an upper gastrointestinal system (GIS) study or thoracoabdominal computerized tomography (CT), both of which utilized the same contrast medium (Gastrografin, Schering, West Sussex, UK). All stents were placed with scopy in the interventional radiology unit. A diagnostic catheter (Boston Scientific Inc., Miami, FL) was positioned near the OJ. The localization of the leak was determined by injecting water-soluble contrast material through the catheter (Figure 1).



Figure 1: Contrast radiography image showing fistula from the esophagojejunostomy line

Subsequently, a guide (Back-up Meier 0.35 ", j type, 300 cm, Boston Scientific Inc., Miami, FL) was used to place the FCSEMS (Microtech Co. Ltd., Nanjing, China) in this area. All of the stents were 100-120 mm long and 20-22 mm wide. Controls were performed via catheter with a contrast material proximal stent (Figure 2). Patients who did not improve clinically with the stent underwent oral contrast-enhanced CT examinations

Table 1: Patient characteristics.

Number	Sex	Age	Stent size	Additional disease	Early stent migration	Early mortality	Late stent migration	Current patient status
1	M	56	20x100 mm 22x120 mm	DM CAD	+	-	-	Live
2	M	48	22x120 mm	CRT	-	-	-	Live
3	F	76	22x120 mm	CRT CAD	-	-	-	Live
4	M	65	22x120 mm	DM CAD		-	-	Live
5	F	68	20x100 mm 22x120 mm	CRT	+	-	-	Live
6	M	59	22x120 mm	-	-	-	+	Live
7	M	66	22x120 mm	DM CAD	-	-	-	Live
8	M	63	20x100 mm	-	-	-	-	Live
9	F	49	20x100 mm	-	-	-	-	Live
10	M	51	22x120 mm 22x120 mm	CRT DM	-	Septicemia	-	Ex
11	M	60	22x120 mm	-	-	-	-	Live
12	F	64	20x100 mm	CRT	-	-	-	Live
13	M	78	20x100 mm	-	-	-	-	Live
14	M	73	22x120 mm	CRT CAD	-	-	-	Live
15	F	64	22x120 mm	-	-	-	-	Live
16	F	69	20x100 mm	CRT	-	-	-	Live
17	F	54	20x100 mm	-	-	-	-	Live
18	M	57	20x100 mm	CAD	-	-	-	Live
19	F	52	22x120 mm 22x120 mm	CRT DM	-	-	-	Live
20	M	63	22x120 mm	CAD	-	-		Live

CRT: Preoperative chemoradiotherapy, DM: Diabetes mellitus, CAD: Coronary artery disease

to investigate whether there was a persistence of extravasation and whether pleural or abdominal collections were required for drainage. The stents were removed endoscopically after 6-8 weeks and the patients were evaluated with either upper GIS study or CT.

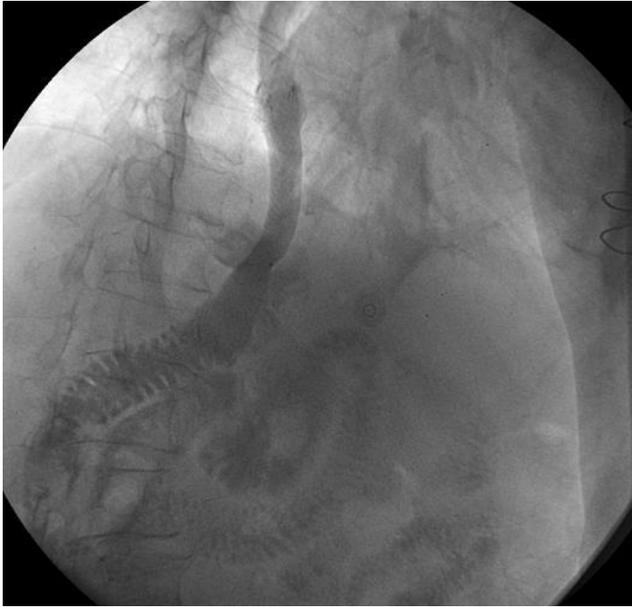


Figure 2: Control contrast radiography image after the covered stent implantation to the esophagojejunostomy line

Technical success was defined as complete closure of the fistula line by FCSEMS and the absence of extravasation opaque material on the control. Clinical success was defined as an improvement in clinical status, the ability to tolerate oral food intake, the absence of migration in the first 15 days, and the withdrawal of existing drains. For each participant, the following data were recorded: time (days) since the fistula operation, time since the stent was inserted, technical success, clinical success, time to begin oral feeding after stenting, drain withdrawal times, and mortality-related factors (e.g., radiotherapy history, diabetes, neoadjuvant chemotherapy, coronary artery disease). In addition, post-procedure morbidity and mortality were also recorded (Table 1).

Statistical analysis was performed with the SPSS program 18.0 (IBM Co., Armonk, NY, USA). The T-test and Chi square test were used to evaluate the data. Values of $P < 0.05$ were considered significant.

RESULTS

The median age of the 20 included patients (12 males, 8 females) was 63 (48-78) years. A total of 24 stents was placed. Eight patients received chemoradiotherapy prior to the stent placement. Five patients had diabetes and seven had coronary artery disease. Postoperative fistulas were detected at the 8.7th day (4- 17). Postoperative median stent placement time was 12, 1 day (6- 18). Patients were followed for an average of 8.6 weeks (7.3-9.5).

The opaque material after the procedure was not extravasated in any of the patients, and therefore, the technical success rate of this study was determined to be 100%. Of the patients, 16 had clinical improvement, and oral intake was started after treatment on the 4.2nd day (3-7). A total of 9 abscess drain catheters were placed in the pleural space and/or in the subdiaphragmatic location, except for the 5 patients who had existing drains placed during their operations. The average withdrawal time of all drains was 23.5 days (18-28).

Four of the patients had no clinical improvement after the procedure, and therefore, the clinical success rate of this study was determined to be 80%. During follow-up of these 4 cases, it was noted that 2 stents (10%) were distally displaced. These stents were reintroduced into the correct areas. Although the other two patients did not have stent migration, radioopaque continued to leak. These patients had their stents placed a second time with similar dimensions. Following this procedure, one patient was clinically resolved, but the other died due to leakage that could not be controlled, which led to sepsis and multiorgan failure on the 22nd day (Table 1). Therefore, the 30 day mortality rate of the current study was 5%. None of the other patients had any complications related to the procedure. There were no significant relationships between clinical success and mortality related

factors (i.e., radiotherapy history, diabetes, neoadjuvant chemotherapy history, coronary artery disease) ($P > 0.05$).

The median stent removal date was 7.2 (6.2-8.3) weeks. Although the stent was not in place at the 7th week after the procedure (Figure 3) in one patient, this patient did not experience any leakage, early stent migration, or clinical improvement. The late migrating stent was removed with a double balloon enteroscope without any complications.



Figure 3: Coronal reformat CT image with oral contrast at 7th week control showing the stent migration to distal jejunum

CONCLUSION

Total gastrectomy is a standard treatment for stomach carcinoma. Despite recent developments in total gastrectomy, post-operative leakage after surgery remains an important cause of postoperative morbidity and mortality. Saliva and secretions that extravasate from the anastomosis in the pleura and the mediastinum are responsible for the development of 40% of the postoperative morbidity (15). Published studies have indicated that fistula development rates range from 6 to 12.8% (2,16). However, the guidelines indicate that this ratio should not exceed 5% (17).

Surgical interventions are among the best treatment options for fistula, and the morbidity and

mortality rates of these operations are high. For this reason, surgical treatments are recommended only in cases where conservative treatments are not enough (2). Endoscopic argon plasma coagulation or clipping are effective treatments for limited leak (5, 18). Uncovered metallic stents are not used for patients with limited leak because they are invasive to the intestinal wall and cannot be removed. Self-expansible plastic stents were first described by Langer et al. They do not carry a risk of mucosal invasion and are highly efficacious (19). The advantages of self-expansible plastic stents are that they do not cause mucosal bleeding and epithelial proliferation. However, their migration rates are high due to their flat surface and low radial power. Dasari and colleagues reported that the rate of migration in plastic stents was higher than that of covered stents, and the rates of re-intervention were higher in plastic stents as well. However, one study reported that the postoperative stricture rate was higher in metallic stents (20). Partially covered metallic stents (PCMS) have high radial forces, but they may cause complications (e.g., perforation) when the uncovered tip is removed, as it will often adhere to the mucosa (21). The stent-in-stent technique can be applied to facilitate the removal of PCMS. In this technique, a self-expandable plastic stent is placed inside the PCMS, and both stents are removed after 2 weeks. This method is effective, but costly (21).

Recently, FCSEMS has been successfully applied to anastomotic leaks due to its high radial power, low migration rates, low possibility of mucosa implantation, and easy removal (9-13,20, 22). It is quite easy to place these stents scopically or endoscopically. In the literature, FCSEMS used for leakage are typically placed endoscopically; only a few have been placed scopically. The current study is unique in that we placed these stents scopically.

In the literature, the clinical success rates of FCSEMS are variable but high (13,23,24). In our current study, the clinical success rate was 80%, which is compatible with the literature. Clinical success is affected by some factors, including whether the patient was receiving preoperative chemoradiotherapy or had diseases such as diabetes

or coronary artery disease. However, we could not statistically determine this relationship in our current study due to the small sample size. Also in our current study, the early migration rate was 10%, which is consistent with the literature (13,23,24).

Literature reveals that the mean removal time post-procedure is 6-10 months (23,24). In the current study, the mean removal time was 7.2 months, which is similar to the literature. Six weeks may be enough time for the fistula to heal, but more time is required for complete healing. However, it should be kept in mind that stents remaining for a very long time may cause complications, such as aortoeseophageal fistula development.

In the literature, secondary morbidity rates for stent placement range from 5% to 50% (23-25). In the current study, there was no observed morbidity following the procedure. However, one patient (5%) died of sepsis due to an uncontrollable leak.

Based on our experience, placement of FCSEMS for the treatment of postoperative OJ leaks is much more effective than open surgery. FCSEMS has the advantages of ease of treatment, early oral feeding, short duration of hospital stay, and low mortality and morbidity rates. The main limitations of the current study are the absence of a control group, the limited number of cases, that the study is single center, and that we utilized only one type of stent. In the future, different types of stents should be compared in a study including more cases.

In conclusion, fluoroscopic placement of FCSEMS for the treatment of OJ leakage after total gastrectomy is an effective treatment method that is technically easy and safe to use that typically does not lead to the development of major complications. The technical success, clinical success, mortality and morbidity rates of FCSEMS placement when performed endoscopically or scopically are similar. Either of two methods can be selected according to available equipment and experience.

REFERENCES

1. Ikeguchi M, Oka S, Goymo Y, et al. Postoperative morbidity and mortality after gastrectomy for gastric carcinoma. *Hepatogastroenterology* 2001;48:1517-20.
2. Lang H, Piso P, Stukenborg C, et al. Management and results of proximal anastomotic leak in a serie of 1114 total gastrectomies for gastric carcinoma. *Eur J Surg Oncol* 2000;26:168-71.
3. Nowakowski P, Ziaja K, Ludyga T, et al. Self-expandable metallic stents in the treatment of postesophagostomy/postesophagoenterostomy fistula. *Dis Esophagus* 2007;20:358-60.
4. Shaker H, Elsayed H, Whittle I, et al. The influence of the "golden 24-h rule" on the prognosis of oesophageal perforation in the modern era. *Eur J Cardiothorac Surg* 2010;38:216-22.
5. Rodella L, Laterza E, De Manzoni G, et al. Endoscopic clipping of anastomotic leakages in esophagogastric surgery. *Endoscopy* 1998;30:453-6.
6. García-Moreno JL, Suárez Grau JM, Gómez Bravo MA, et al. Closure of gastrocutaneous fistula using endoscopic biological glue injection. *Rev Esp Enferm Dig* 2007;99:676-7.
7. Gelbmann CM, Ratiu NL, Rath HC, et al. Use of self-expandable plastic stents for the treatment of esophageal perforations and symptomatic anastomotic leaks. *Endoscopy* 2004;36:695-9.
8. Tuebergen D, Rijcken E, Mennigen R, et al. Treatment of thoracic esophageal anastomotic leaks and esophageal perforations with endoluminal stents: Efficacy and current imitations. *J Gastrointest Surg* 2008;12:1168-76.
9. Bakken JC, Wong Kee Song LM, de Groen PC, et al. Use of a fully covered self-expandable metal stent for the treatment of benign esophageal diseases. *Gastrointest Endosc* 2010;72:712-20.
10. Wilson JL, Louie BE, Farivar AS, et al. Fully covered self-expanding metal stents are effective for benign esophagogastric disruptions and strictures. *J Gastrointest Surg* 2013;17:2045-50.
11. Rajan PS, Bansal S, Balaji NS, et al. Role of endoscopic stents and selective minimal access drainage in oesophageal leaks: Feasibility and outcome. *Surg Endosc*

- 2014;28:2368-73.
12. Sharaiha RZ, Kim KJ, Singh VK, et al. Endoscopic stenting for benign upper gastrointestinal strictures and leaks. *Surg Endosc* 2014;28:178- 84.
 13. Fahrettin Kucukay, Rıza S. Okten, Erkan Parlak, et al. Self-expanding covered metallic stent treatment of esophagojejunostomy fistulas. *Abdominal Imaging*, April 2013, Volume 38, Issue 2, pp 244–8.
 14. Xu K, Chen S, Bian W, et al. Digital subtraction angiography-guided esophagography, intraluminal drainage, and endoscopic clipping-complex managements for intrathoracic esophagogastric anastomotic leak. *J Surg Res*. 2016 Jul;204(1):68-74.
 15. Freeman RK, Ascoti AJ, Giannini T, et al. Analysis of unsuccessful esophageal stent placements for esophageal perforation, fistula, or anastomotic leak. *Ann Thorac Surg* 2012;94:959-64. Discussion 964- 5.
 16. Bracale U, Marzano E, Nastro P, et al. Side-to-side esophagojejunostomy during totally laparoscopic total gastrectomy for malignant disease: a multicenter study. *Surg Endosc* 2010; 24:2475–79.
 17. Junemann-Ramírez M, Awan MY, Khan ZM, et al. Anastomotic leakage post-esophagogastrectomy for esophageal carcinoma: Retrospective analysis of predictive factors, management and influence on long term survival in a high volume centre. *Eur J Cardiothorac Surg* 2005;27:3-7.
 18. Qadeer MA, Dumot JA, Vargo JJ, et al. Endoscopic clips for closing esophageal perforations: case report and pooled analysis. *Gastrointest Endosc* 2007; 66:605–11.
 19. Langer FB, Wenzl E, Prager G, et al. Management of postoperative esophageal leaks with the polyflex self-expanding covered plastic stent. *Ann Thorac Surg* 2005: 79:398–403.
 20. Dasari BV, Neely D, Kennedy A, et al. The Role of Esophageal Stents in the Management of Esophageal Anastomotic Leaks and Benign Esophageal Perforations. *Annals of Surgery*: May 2014 - Volume 259 - Issue 5 - p 852–60.
 21. Hirdes MM, Vleggaar FP, Van der Linde K, et al. Esophageal perforation due to removal of partially covered self-expanding metal stents placed for a benign perforation or leak. *Endoscopy* 2011;43:156-9.
 22. Rogalski P, Daniluk J, Baniukiewicz A, et al. Endoscopic management of gastrointestinal perforations, leaks and fistulas. *World J Gastroenterol*:2015 Oct 7;21(37):10542–52.
 23. Van Boeckel PGA, Sijbring A, Vleggaar FP, et al. Systematic review: temporary stent placement for benign rupture or anastomotic leak of the oesophagus. *Aliment Pharmacol Ther*. 2011 Jun;33(12):1292-301.
 24. Van Halsema EE, Van Hooft JE. Clinical outcomes of selfexpandable stent placement for benign esophageal diseases: a pooled analysis of the literature. *World J Gastrointest Endosc*. 2015 Feb 16; 7(2): 135–53.
 25. Sung SW, Park JJ, Kim YT, et al. Surgery in thoracic esophageal perforation: primary repair is feasible. *Dis Esophagus*. 2002;15(3):204-9.