HAYDARPAŞA NUMUNE MEDICAL JOURNAL

DOI: 10.14744/hnhj.2023.70594
Haydarpasa Numune Med J 2024;64(3):381–390

ORIGINAL ARTICLE

Evaluation of the Efficacy and Safety of Self-Expanding Metal Stents in Malignant Esophageal Strictures Due to Esophageal and Extraesophageal Cancers: A Retrospective Cross-Sectional Cohort Study

Ekrem Aslan[1], Ayça Saltürk[2], Koray Koçhan[3], Serhat Özer[4], Halil Şahin[5], Osman Bedir[6], Mevlüt Kıyak[7], Emine Kanatsız[8], Ali Sürmelioğlu[9], Can Gönen[10], Fatih Güzelbulut[2]

[1]Department of Internal Medicine, Istinye University Faculty of Medicine; Clinic of Gastroenterology, Liv Hospital Ulus Hospital, Istanbul, Türkiye
[2]Department of Gastroenterology, University of Health Sciences Türkiye, Haydarpaşa Numune Training and Research Hospital, Istanbul, Türkiye
[3]Department of Gastroenterology, Bezmialem Vakif University Faculty of Medicine, Istanbul, Türkiye
[4]Department of Gastroenterology, Koç University Hospital, Istanbul, Türkiye
[5]Department of Gastroenterology, Başakşehir Çam and Sakura City Hospital, Istanbul, Türkiye
[6]Department of Gastroenterology, University of Health Sciences Türkiye, Evliya Çelebi Training and Research Hospital, Kütahya, Türkiye
[7]Department of Gastroenterology, Bakirkoy Doctor Sadi Konuk Training and Research Hospital, Istanbul, Türkiye
[8]Department of Gastroenterology, Konya City Hospital, Konya, Türkiye
[9]Department of General Surgery, University of Health Sciences Türkiye, Haydarpaşa Numune Training and Research Hospital, Istanbul, Türkiye
[10]Department of Gastroenterology, Acıbadem Mehmet Ali Aydınlar University Faculty of Medicine, Istanbul, Türkiye

Abstract

Introduction: Malignant esophageal obstructions can lead to malnutrition, mortality, and difficulties in managing the underlying malignancy. Endoscopic stent placement is a palliative treatment method that can provide rapid improvement in dysphagia. The aim of this study is to investigate the short-term effectiveness and safety of endoscopic stent placement in patients with malignant esophageal obstructions.

Methods: Patients who underwent endoscopic stent placement due to malignant esophageal strictures between January 2012 and January 2018 were retrospectively reviewed. Demographics, dysphagia scores, complications, and mortality data of the patients with stent placement were evaluated.

Results: The mean age of the 46 patients was 67.1±13.3 years, and 19 (41.3%) were female. Endoscopic stents were placed mostly for esophageal cancer in 26 (56.5%) patients. The most common pathological diagnosis was esophageal squamous cell carcinoma (58.6%). A fully covered self-expanding metallic stent was placed in 19 (41.3%) and a partially covered one in 27 (58.7%) patients. The technical success rate was 100%. Forty (86.9%) patients began to eat soft foods 24 hours after stent placement. The most common complication was retrosternal pain (56.5%). Complications requiring endoscopic intervention occurred in 5 (10.8%) patients. Mortality occurred in 40 (87%) patients, and 11 (27.5%) survived for more than 3 months (Min-max: 125-512 days).

Discussion and Conclusion: Although the endoscopic placement of a self-expanding metallic stent in patients with malignant dysphagia may have the potential to cause complications, it is a reliable palliative treatment method that can be preferred due to its high technical success rate and rapid relief of dysphagia.

Keywords: Complication; Efficacy; Esophagus; Malignant obstruction; Self-expandable metal stent.

Correspondence: Ekrem Aslan, M.D. Department of Internal Medicine, Istinye University Faculty of Medicine; Clinic of Gastroenterology, Liv Hospital Ulus Hospital, Istanbul, Türkiye
Phone: +90 505 754 60 84 **E-mail:** ekremaslan@yahoo.com
Submitted Date: 02.05.2023 **Revised Date:** 12.08.2023 **Accepted Date:** 10.09.2023
Haydarpaşa Numune Medical Journal

Malignant esophageal obstruction (MEO) primarily arises from esophageal cancers, as well as cancers of the esophagogastric junction, stomach, and lungs. In patients with advanced-stage disease, deep tissue invasion, or metastatic disease who are not candidates for curative surgical treatment, MEO results in dysphagia[1]. Dysphagia due to MEO leads to nutritional deficiencies and significant weight loss, complicating the management of the underlying disease and increasing mortality[2].

In the palliation of dysphagia caused by MEO, various therapeutic options such as radiotherapy, brachytherapy, laser treatment, and endoscopic stent placement are available[3]. Endoscopic stent placement is more frequently preferred in patients with a short expected survival time due to its rapid alleviation of dysphagia and its minimally invasive nature[4]. Currently, various designs of plastic or metallic stents of different lengths and diameters are used for this purpose.

Following the first use of self-expanding stents for the palliation of malignant dysphagia by Domchke et al.[5] in 1990, stent technology has advanced, and fully or partially covered self-expanding metallic stents (SEMS) have become the preferred first choice[3]. Although endoscopic stent placement is generally a safe procedure, complications such as reflux, retrosternal pain, bleeding, stent obstruction, and stent migration may occur[6].

The present study aims to investigate the short-term efficacy and safety outcomes of SEMS and mortality data in our cohort of patients undergoing endoscopic stent placement for MEO.

Materials and Methods

Study Population and Design

The records of 69 patients who underwent endoscopic stent placement in the endoscopy unit of our gastroenterology clinic between January 2012 and January 2018 were reviewed retrospectively. Stents placed in the esophagus for benign esophageal diseases, as well as those placed in the stomach, duodenum, and colon for diseases affecting these segments of the digestive tract, were excluded from the study. Records of 46 patients diagnosed with MEO due to esophageal, esophagogastric junction, gastric, and lung cancers who underwent placement of SEMS were included in the study (Fig. 1).

Demographic data including age and gender, underlying malignancy necessitating stent placement, length and type (fully or partially covered) of the stent, early and late complications post-stent placement, and pre-and post-placement swallowing scores were recorded from the hospital information system. Post-procedural survival was determined by monitoring vital status (alive or deceased) through the death notification system (DNS). Survival duration for deceased patients was recorded as days survived.

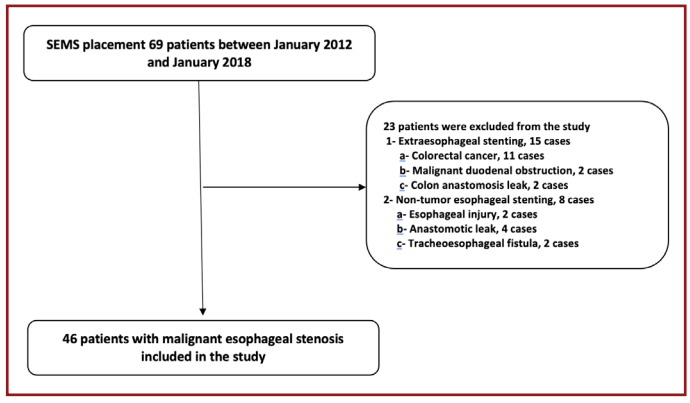

Figure 1. Enrollment of study population.

The study received ethical approval from the Haydarpaşa Numune Training and Research Hospital Clinical Research Ethics Committee on June 27, 2022, with approval number HNEAH-KAEK 2022/142-3731. The study was conducted in accordance with the Helsinki Declaration.

Endoscopic SEMS Placement Procedure

Patients referred to the endoscopy unit due to MEO underwent endoscopic examination using a standard gastroscope (Fujinon EG-450WR5, EG-590-WL, and Olympus GIF-H180J) before stent placement to determine the location and length of the stricture. The length of the stricture was measured by using length markers on the endoscope in cases where the stricture could be traversed by the endoscope. In patients where the stricture could not be passed with the endoscope, a single-lumen catheter loaded with a 0.035 mm diameter guidewire was advanced through the endoscope's working channel under fluoroscopic guidance. After positioning the catheter across the stricture, a contrast medium was injected through the catheter, and the length was calculated using markers on the catheter.

After determining the length of the stricture, experienced gastroenterologists selected a covered or partially covered stent measuring 6, 8, 10, 12, 13, or 14 cm from various brands (MICRO-TECH, Nanjing, China; HANARO, Seoul, Korea; CHANGZHOU ZHIYE, Jiangsu, China) based on the length of the stricture. The stent was positioned such that its proximal

and distal ends extended 2 cm beyond the proximal and distal margins of the stricture under fluoroscopic guidance and endoscopic visualization. After the stent placement procedure was completed, fluoroscopic imaging was used to confirm that the contrast medium passed through the stent and reached the stomach, ensuring that there was no leakage outside the lumen and that the stent remained patent. All patients were monitored at least 24 hours post-procedure in the inpatient clinic. For patients without complications, a liquid diet was initiated eight hours after the procedure. Patients who tolerated the liquid diet were transitioned to a soft diet at 24 hours. Those who tolerated the soft diet were advised to progress to solid foods 72 hours later. For patients who could not tolerate the soft diet, it was recommended to maintain a liquid diet for 48 hours (stent's full expansion period) before transitioning to a soft diet.

Definitions

The tumors causing MEO were classified by location as esophageal, esophagogastric junction, gastric, and lung tumors. The severity of dysphagia due to MEO was graded using the Mellow–Pinkas scoring system: score 0, able to eat a normal diet/no dysphagia; score 1, able to swallow some solid foods; score 2, able to swallow only soft foods; score 3, able to swallow only liquids; and score 4, unable to swallow liquids or solids/total dysphagia[7]. The dysphagia scores of the patients were recorded immediately before the procedure and at 24 and 48 hours after the procedure, with any improvement in swallowing score defined as clinical success. Stent patency duration was calculated as the interval from stent placement to the development of obstruction symptoms in patients who presented to our hospital with tumor ingrowth or migration requiring endoscopic intervention. For patients without hospital records of follow-up visits, stent patency was calculated as the interval from stent placement to the date of death recorded in the DNC. Complications occurring within the first seven days post-endoscopic SEMS placement were classified as early complications, whereas those occurring after the seventh day were classified as late complications.

Statistical Analysis

Descriptive statistics were used to summarize the data obtained from the study. For continuous variables, depending on the distribution, the results were presented as mean±standard deviation or median with interquartile range or minimum-maximum. Categorical variables were summarized as counts and percentages. The normality of numerical variables was assessed separately for stent type, complication, and mortality variables using the Shapiro-Wilk, Kolmogorov-Smirnov, and Anderson-Darling tests.

For comparisons of numerical variables based on stent type, complication, and mortality, the Independent Samples t-test was used when the variables showed normal distribution, and the Mann-Whitney U test was used when they did not. For comparisons of categorical variables based on stent type, complication, and mortality, the Pearson Chi-Square test was used for 2x2 tables when cell counts were 5 or more, the Fisher's Exact test was used for 2x2 tables when cell counts were less than 5, and the Fisher's Exact test was used for RxC tables when cell counts were less than 5.

Statistical analyses were performed using the Jamovi (Version 2.3.24) (Retrieved from https://www.jamovi.org) and JASP (Version 0.17.1) (Retrieved from https://jasp-stats.org) software packages, with a significance level of 0.05 (p-value) considered for statistical analyses.

Results

Basic Patient Characteristics

A total of 46 patients who had stents placed in the esophagus due to malignant obstructive dysphagia were included in the study. The mean age of the patients was 67.1±13.3 years (range: 41-92), and 19 patients (41.3%) were women. The demographic data and basic patient characteristics are summarized in Table 1. The most common indication for stent placement was esophageal cancer, observed in 26 patients (56.5%). This was followed by cancers of the esophagogastric junction, stomach, and lung (9 [19.6%], 6 [13%], and 5 [10.9%] patients, respectively). Among the patients with esophageal and esophagogastric junction cancers, 13 (28.2%) had adenocarcinoma and 22 (47.8%) had squamous cell carcinoma based on pathological examination. Six patients (13.0%) who had stents placed in the esophagus due to stomach cancer (four located in the gastric cardia and two in the lesser curvature of the gastric body) had a pathological diagnosis consistent with adenocarcinoma. Among the five patients with lung cancer, three (6.5%) had squamous cell carcinoma, and two (4.3%) had adenocarcinoma.

SEMS Placement and Clinical Findings

Six different stent lengths (6, 8, 10, 12, 13, and 14 cm) were used in the study cohort. The most frequently used stent length was 10 cm (39.1%). A "fully covered"

Table 1. Clinical and demographic variables of the patients

	Overall (n=46)
Age (year) †	67.1±13.3
Gender ‡	
Female	19 (41.3)
Male	27 (58.7)
Technical success ‡	46 (100.0)
Stent patency time (days)§	59 (13-475)
Stent type ‡	
Covered	19 (41.3)
Partially covered	27 (58.7)
Indication for stent placement ‡	
Esophageal cancer	26 (56.5)
Esophagogastric junction cancer	9 (19.6)
Gastric cancer	
Cardia	4 (8.6)
Corpus	2 (4.3)
Lung cancer	5 (10.8)
Stent length ‡	
6 cm	3 (6.5)
8 cm	7 (15.2)
10 cm	18 (39.1)
12 cm	10 (21.7)
13 cm	1 (2.1)
14 cm	7 (15.2)
Pathology ‡	
Esophagus adenocarcinoma	4 (8.6)
Esophagus squamoscarcinoma	22 (47.8)
Esophagogastric junction adenocarcinoma	9 (19.5)
Gastric adenocarcinoma	6 (13.0)
Lung adenocarcinoma	2 (4.3)
Lung squamoscarcinoma	3 (6.5)
Pre-procedural dysphagia score ‡	
Score 3	20 (65.2)
Score 4	26 (34.8)
Dysphagia score 24h after the procedure ‡	
Score 2	40 (86.9)
Score 3	6 (13.1)

‡: n (%), †: mean±standard deviation, §: median [min-max].

SEMS was placed in 19 patients (41.3%), and a "partially covered" SEMS was placed in 27 patients (58.7%). The technical success rate was 100%. The median duration of stent patency was 59 (range, 13-475) days. Before stent placement, 20 patients (43.4%) were restricted to a liquid diet (dysphagia score 3), while 26 patients (56.5%) had total dysphagia (dysphagia score 4). After stent placement, 40 patients (86.9%) were able to tolerate soft foods by the 24th hour, with six patients (13.1%) beginning soft food intake by the 48th hour (Table 1).

Complications and Associated Factors

Through the hospital operating system, it was determined that 25 (54.3%) patients were readmitted to the hospital due to complications. It was found that 13 (52%) patients developed early complications, two (8%) patients developed late complications, and 10 (40%) patients developed both early and late complications. Among the early complications, retrosternal pain developed in 19 (82.6%) patients, reflux occurred in two (8.7%) patients, and both pain and reflux complaints developed together in two (8.7%) patients. Among the late complications, it was determined that 7 (58.3%) patients developed pain, two (16.7%) patients experienced migration, and three (25%) patients developed obstruction due to tumor growth inside the stent. In the analysis conducted through DNS, the median survival after SEMS placement was 69 days (min: 13, max: 512 days), and mortality was detected in 40 (87%) of the patients (Table 2).

When considering the presence of complications in patients who underwent stent placement, no significant differences were found between the two groups regarding age, gender, stent type, length of the inserted stent, mortality rates, survival time, tumor pathology, pre-procedure dysphagia score, and post-procedure dysphagia scores ($p>0.05$ for each). Among patients who did not develop complications after the procedure, the incidence of gastric tumors was significantly higher ($p=0.030$). There was no significant difference between the groups in terms of the incidence of other types of tumors (Table 3).

Table 2. Complications and survival

	Overall (n=46)
Complication, present ‡	25 (54.3)
Complication time ‡	
Early	13 (52.0)
Late	2 (8.0)
Early+Late	10 (40.0)
Early complications‡	
Pain	19 (82.6)
Reflux	2 (8.7)
Pain+Reflux	2 (8.7)
Late complications ‡	
Pain	7 (58.3)
Migration	2 (16.7)
Tumor ingrowth	3 (25.0)
Mortality ‡	
Alive	6 (13.0)
Death	40 (87.0)
Survival (days) §	69.0 (13.0–512.0)

‡: n (%), †: mean±standard deviation, §: median (min-max).

Table 3. Comparison of demographic and clinical characteristics according to the presence of complications

	Complications		p
	Absent (n=21)	Present (n=25)	
Age (year) §	61.0 (51.0–88.0)	67.0 (41.0–92.0)	0.494**
Gender ‡			
Female	9 (42.9)	10 (40.0)	0.999*
Male	12 (57.1)	15 (60.0)	
Stent type ‡			
Covered	9 (42.9)	10 (40.0)	0.999*
Partially covered	12 (57.1)	15 (60.0)	
Indication for stent placement ‡			
Esophageal cancer	9 (42.9) a	17 (68.0) a	0.030*
Esophagogastric junction cancer	3 (14.3) a	6 (24.0) a	
Gastric cancer	6 (24.0) a	0 (0.0) b	
Lung cancer	3 (19.0) a	2 (8.0) a	
Stent length (cm) §	10.0 (6.0–14.0)	10.0 (6.0–14.0)	0.491**
Mortality ‡			
Alive	2 (9.5)	4 (16.0)	0.673*
Death	19 (90.5)	21 (84.0)	
Survival (days) §	66.0 (13.0–475.0)	86.0 (13.0–512.0)	0.588**
Tumor pathology ‡			
Adenocancer	15 (71.4)	6 (24.0)	0.225*
Squamous cancer	6 (28.5)	19 (76.0)	
Pre-procedural dysphagia score ‡			
Score 3	5 (23.8)	15 (60.0)	0.617*
Score 4	16 (76.2)	10 (40.0)	
Dysphagia score 24h after the procedure ‡			
Score 2	19 (90.4)	21 (84.0)	0.479*
Score 3	2 (9.6)	4 (16.0)	

‡: n (%), §: median (min-max); *. Pearson Chi-Square, Fisher's Exact veya Fisher Freeman Halton test; **. Mann-Whitney U test.

Clinical Findings According to Stent Type

According to the type of stent used, there were no significant differences between groups who received fully covered and partially covered stents in terms of age, gender, stent indication, length of the inserted stent, survival time, tumor pathology, pre-procedure dysphagia score, presence of complications, complication period, early and late complications (p>0.05 for each). However, among patients who received partially covered stents, survival was significantly higher compared to those who received fully covered stents (p=0.034). Significant differences were also observed between the groups in post-procedure dysphagia scores, with patients who received partially covered stents showing greater improvement compared to those who received fully covered stents (p=0.025). Therefore, improvement in dysphagia scores was significantly more frequent in patients treated with partially covered stents compared to those treated with fully covered stents (Table 4).

Mortality and Associated Conditions

No significant differences were found between groups regarding age, gender, length of the inserted stent, pre-procedure dysphagia score, post-procedure dysphagia score, presence of complications, early and late complications based on the presence of mortality (p>0.05 for each). It was observed that partially covered stents were used significantly more in surviving patients (p=0.034), while there was no significant

difference in the type of stent used among patients who experienced mortality. Among patients who experienced mortality, esophageal and esophagogastric junction tumors were significantly more frequent (p=0.024), whereas there was no significant difference in gastric and lung tumors (Table 5).

Table 4. Comparison of demographic and clinical characteristics according to stent type

	Stent type		p
	Covered (n=19)	Partially covered (n=27)	
Age (year) §	64.7±13.9	68.8±12.9	0.318***
Gender ‡			
Female	7 (36.8)	12 (44.4)	0.832*
Male	12 (63.2)	15 (55.6)	
Indication for stent placement ‡			
Esophageal cancer	13 (68.4)	13 (48.1)	0.236*
Esophagogastric junction cancer	2 (10.5)	7 (25.9)	
Gastric cancer	3 (15.8)	3 (11.1)	
Lung cancer	1 (5.3)	4 (14.8)	
Stent length (cm) §	12.0 (6.0–14.0)	10.0 (6.0–14.0)	0.088**
Mortality ‡			
Alive	0 (0.0)	6 (22.2)	0.034*
Death	19 (100.0)	21 (77.8)	
Survival (days) §	66.0 (16.0–475.0)	72.0 (13.0–512.0)	0.807**
Tumor pathology ‡			
Adenocancer	6 (31.5)	14 (51.8)	0.296*
Squamous cancer	13 (68.4)	13 (48.1)	
Pre-procedural dysphagia score ‡			
Score 3	7 (36.8)	13 (48.1)	0.999*
Score 4	12 (63.1)	14 (51.8)	
Dysphagia score 24h after the procedure‡			
Score 2	14 (73.6)	26 (96.2)	0.025*
Score 3	5 (26.3)	1 (4.8)	
Complication, present ‡	10 (52.6)	15 (55.6)	0.999*
Complication time ‡			
Early	5 (50.0)	8 (53.3)	0.999*
Late	1 (10.0)	1 (6.7)	
Early+Late	4 (40.0)	6 (40.0)	
Early complications‡			
Pain	8 (88.9)	11 (78.6)	0.734*
Reflux	1 (11.1)	1 (7.1)	
Pain+Reflux	0 (0.0)	2 (14.3)	
Late complications ‡			
Pain	3 (60.0)	4 (57.1)	0.147*
Migration	2 (40.0)	0 (0.0)	
Tumor ingrowth	0 (0.0)	3 (42.9)	

‡: n (%), †: mean±standard deviation, §: median (min-max); *. Pearson Chi-Square, Fisher's Exact veya Fisher Freeman Halton test; **. Mann-Whitney U test; ***. Independent Samples T-Test.

Discussion

Endoscopic stent placement in patients with MEO is a palliative treatment method. The primary objectives of palliative treatment in this patient population are to rapidly alleviate dysphagia without hospital admission, ensure the maintenance of swallowing during the remaining lifespan, and prevent serious complications related to the disease (such as aspiration pneumonia, malnutrition, and fistula formation)[8]. This retrospective study, which examines a 6-year cross-sectional patient cohort that underwent endoscopic SEMS placement due to MEO, aims to demonstrate the short-term efficacy and safety of SEMS and to analyze the mortality data of this patient group.

Studies have shown that the technical success rate of

Table 5. Comparison of demographic and clinical characteristics according to mortality results

	Mortality		p
	Alive (n=6)	Death (n=40)	
Age (year) §	66.0 (59.0–84.0)	65.5 (41.0–92.0)	0.806**
Gender ‡			
Female	2 (33.3)	17 (42.5)	0.999*
Male	4 (66.7)	23 (57.5)	
Stent type ‡			
Covered	0 (0.0)	19 (47.5)	0.034*
Partially covered	6 (100.0)	21 (52.5)	
Indication for stent placement ‡			
Esophageal cancer	1 (16.7) a	25 (62.5) b	0.024*
Esophagogastric junction cancer	3 (50.0) a	6 (15.0) b	
Gastric cancer	2 (33.3) a	4 (10) a	
Lung cancer	0 (0.0) a	5 (12.5) a	
Stent length (cm) §	10.0 (8.0–12.0)	10.0 (6.0–14.0)	0.476**
Survival (days) §	NA (Inf – -Inf)	69.0 (13.0–512.0)	NA
Tumor pathology ‡			
Adenocancer	5 (83.3) a	16 (40.0) b	0.021*
Squamous cancer	1 (16.7) a	24 (60.0) b	
Pre-procedural dysphagia score ‡			
Score 3	4 (66.7)	16 (40.0)	0.999*
Score 4	2 (33.3)	24 (60.0)	
Dysphagia score 24h after the procedure ‡			
Score 2	4 (66.7)	36 (90.0)	0.367*
Score 3	2 (16.6)	4 (10.0)	
Complication, present ‡	4 (66.7)	21 (52.5)	0.673*
Complication time ‡			
Early	3 (75.0)	10 (47.6)	0.103*
Late	1 (25.0)	1 (4.8)	
Early+Late	0 (0.0)	10 (47.6)	
Early complications‡			
Pain	2 (66.7)	17 (85.0)	0.446*
Reflux	0 (0.0)	2 (10.0)	
Pain+Reflux	1 (33.3)	1 (5.0)	
Late complications ‡			
Pain	0 (0.0)	7 (63.6)	0.434*
Migration	0 (0.0)	2 (18.2)	
Tumor ingrowth	1 (100.0)	2 (18.2)	

‡: n (%), §: median (min-max); *. Pearson Chi-Square, Fisher's Exact veya Fisher Freeman Halton test; **. Mann-Whitney U test.

endoscopic SEMS placement ranges from 97% to 100%[9,10]. There are also studies reporting higher success rates in patients where SEMS was placed using only fluoroscopy[11]. In our research, the technical success rate was 100%, and it was observed that the concurrent use of fluoroscopic imaging under endoscopic guidance contributed to this high technical success rate.

In our cohort, all patients who underwent SEMS placement (n=46, 100%) experienced rapid relief from dysphagia by the end of 48 hours, and in 87% of cases, this relief occurred within the first 24 hours, allowing a transition to soft food intake. In a retrospective study by Stewart et al.[12] involving 138 patients using different types of SEMS, significant improvement in post-procedural dysphagia scores was demonstrated (74.2% of patients had scores of 2-3 before SEMS placement, and 90.3% had scores of 0-1 after SEMS

placement, p<0.0001). Another retrospective study by Battersby et al.[13] examining 231 patients showed that in patients who underwent SEMS placement due to MEO, the median Mellow-Pinkas dysphagia score improved from a score of 3 to a score of 1 by the time of hospital discharge.

Previous studies have reported complication rates ranging from 22.9% to 56% following SEMS placement[2,12]. In our retrospective cohort, data from a total of 25 patients (54.3%) who presented to the hospital with stent-related complaints after SEMS placement were analyzed for complications. In patients who underwent SEMS placement, the most common reason for both early (n=19, 41.3%) and late (n=7, 15.2%) hospital visits was retrosternal pain. The literature reports the incidence of retrosternal pain following SEMS placement to range from 17% to 56%[1,14]. A study by Reijm et al.[9] involving 997 patients who received SEMS found that the most common adverse event was retrosternal pain (29.9%), which, similar to our study, frequently developed in the early period (one day after stent placement).

In our cohort, complications requiring endoscopic intervention were observed in 5 patients (10.8%) who presented to the hospital after SEMS placement. All patients requiring endoscopic intervention due to complications presented in the late period. No records were found of patients presenting in the early period with complications requiring endoscopic intervention. Among our patients, 3 (6.5%) developed obstruction due to tumor ingrowth within the stent, and 2 (4.3%) experienced stent migration into the stomach. In the literature, a study by Kumar et al.[15] involving 242 patients and 20 years of data found a late complication rate of 10.7% for stent migration and 20% for obstruction due to tumor ingrowth in patients who received SEMS for malignant dysphagia.

Fully covered self-expanding metal stents (SEMS), coated with polyurethane to prevent tissue embedding, resist tumor ingrowth into the stent. However, they tend to migrate more frequently compared to partially covered stents[16]. In a retrospective study examining 152 patients treated with either covered or uncovered stents, Saranovic et al.[17] found that covered stents were associated with higher migration rates (10% vs. 0%), but lower tumor ingrowth (53% vs. 100%) and reduced obstruction rates. In our cohort, similar to the literature, obstruction due to tumor ingrowth occurred in three patients, all of whom had partially covered SEMS. The two stents that migrated were fully covered SEMS. For patients with obstruction, a new stent was placed within the existing stent, whereas for those with stent migration, the stent was endoscopically removed and a new stent was placed at the stricture site.

Upon reviewing our study results, it was found that patients who received partially covered SEMS exhibited a significantly greater improvement in dysphagia scores compared to those who received fully covered SEMS. However, since the choice of stent type was based on the availability of the stent in the endoscopy unit at the time, the correlation between stent type and dysphagia scores appears to be coincidental. A review of the literature revealed no studies demonstrating a positive or negative impact on whether the SEMS is fully or partially covered on dysphagia scores.

The median survival time of the patients in the cohort was determined to be 69 days (range: 13 to 512 days). Previous studies have reported this duration to be between 61 and 209 days[18]. An evaluation through the DNS revealed that 11 out of 40 patients (27.5%) who experienced mortality survived for more than three months. Furthermore, the 30-day mortality rate following stent placement was found to be 25% (n=8).

In our cohort, the use of partially covered stents was significantly higher among patients who were alive according to the DNS, while there was no significant difference in the use of fully or partially covered stents among patients who experienced mortality. This observation is thought to be related to the fact that patients who received partially covered stents were predominantly diagnosed with adenocarcinoma (1 esophageal, 3 esophagogastric junction, and 2 gastric), whereas those who received fully covered stents were more frequently diagnosed with the more fatal squamous cell carcinoma (22 squamous cell vs. 13 adenocarcinoma).

The relationship between stent type and mortality was examined in a recent study by Alzanbagi et al.[19] involving 32 patients. They found that the median survival time was longer in patients with fully covered SEMS compared to those with partially covered SEMS. A detailed review of the study revealed that the majority of patients had adenocarcinoma of the lower esophagus and predominantly received fully covered SEMS. As a result, these patients had better survival outcomes compared to those who received partially covered stents, although the difference was not statistically significant (p=0.48).

Furthermore, in our series, esophageal and esophagogastric junction tumors were more frequently observed in patients who developed mortality during the follow-up period. A retrospective study by Kim et al.[2] supports our findings, showing nearly double the survival time in patients with non-esophageal cancers who received SEMS.

Study Limitations

Our study has several limitations. The first and most important is that it is a retrospective cross-sectional cohort study. Due to the retrospective nature of the study, long-term efficacy data were not available in the hospital records; thus, changes in dysphagia scores for patients who underwent SEMS placement for MEO were only assessed within 48 hours. Secondly, the inclusion of patients with malignant esophageal strictures and the exclusion of those with benign causes led to a lower number of cases. However, a review of the literature reveals numerous national and international retrospective studies conducted with even fewer patients[11,14,20-24]. Thirdly, the selection of stents was limited to those already available and accessible in the endoscopy unit, which prevented a balanced distribution of patient groups. Lastly, while evaluating complications, we only considered data from patients who presented to our hospital. We could not access data from patients who may have sought treatment for complications at other hospitals, leading to potential underreporting of complication rates and affecting the reliability of our findings.

Despite these limitations, our study provides valuable insights into the early clinical outcomes of esophageal stents in malignant esophageal strictures. These results can support and inform the design of future studies on malignant esophageal obstructions.

Conclusion

In conclusion, the placement of SEMS in patients with MEO proves to be an effective palliative treatment method, rapidly alleviating dysphagia in the early stages. Despite advancements in stent technology, complications such as pain, migration, and obstruction are common; however, the risk of life-threatening major complications remains relatively low.

Ethics Committee Approval: Ethical approval for the study was obtained from the Clinical Research Ethics Committee of the Haydarpaşa Numune Training and Research Hospital on June 27, 2022, with decision number HNEAH-KAEK 2022/142-3731.

Peer-review: Externally peer-reviewed.

Use of AI for Writing Assistance: Not declared.

Authorship Contributions: Concept: C.G., E.A.; Design: E.A.; Supervision: E.A., C.G.; Fundings: No fundings; Materials: No material used; Data Collection or Processing: E.A., K.K., A.S., S.Ö., H.Ş., O.B.; Analysis or Interpretation: E.A., A.S., F.G.; Literature Search: M.K., E.K., E.A.; Writing: E.A.; Critical Review: M.K., A.S., E.K., A.S.

Conflict of Interest: None declared.

Financial Disclosure: The authors declared that this study received no financial support.

References

1. So H, Ahn JY, Han S, Jung K, Na HK, Lee JH, et al. Efficacy and safety of fully covered self-expanding metal stents for malignant esophageal obstruction. Dig Dis Sci 2018;63:234–41. [CrossRef]
2. Kim JY, Kim SG, Lim JH, Im JP, Kim JS, Jung HC. Clinical outcomes of esophageal stents in patients with malignant esophageal obstruction according to palliative additional treatment. J Dig Dis 2015;16:575–84. [CrossRef]
3. Spaander MCW, van der Bogt RD, Baron TH, Albers D, Blero D, de Ceglie A, et al. Esophageal stenting for benign and malignant disease: European Society of Gastrointestinal Endoscopy (ESGE) Guideline- Update 2021. Endoscopy 2021;53:751–62. [CrossRef]
4. Dai Y, Li C, Xie Y, Liu X, Zhang J, Zhou J, et al. Interventions for dysphagia in oesophageal cancer. Cochrane Database Syst Rev 2014;2014:CD005048.
5. Domschke W, Foerster EC, Matek W, Rödl W. Self-expanding mesh stent for esophageal cancer stenosis. Endoscopy 1990;22:134–6. [CrossRef]
6. Spaander MC, Baron TH, Siersema PD, Fuccio L, Schumacher B, Escorsell À, et al. Esophageal stenting for benign and malignant disease: European Society of Gastrointestinal Endoscopy (ESGE) clinical guideline. Endoscopy 2016;48:939–48. [CrossRef]
7. Mellow MH, Pinkas H. Endoscopic laser therapy for malignancies affecting the esophagus and gastroesophageal junction. Analysis of technical and functional efficacy. Arch Intern Med 1985;145:1443–6. [CrossRef]
8. Homs MY, Kuipers EJ, Siersema PD. Palliative therapy. J Surg Oncol 2005;92:246–56. [CrossRef]
9. Reijm AN, Didden P, Schelling SJC, Siersema PD, Bruno MJ, Spaander MCW. Self-expandable metal stent placement for malignant esophageal strictures- Changes in clinical outcomes over time. Endoscopy 2019;51:18–29. [CrossRef]
10. Conio M, Savarese MF, Filiberti RA, Baron TH, Caruso A, Manta R, et al. Palliation of malignant esophageal obstruction using an anti-migration self-expandable metal stent: Results of a prospective multicenter study. Clin Res Hepatol Gastroenterol 2021;45:101683. [CrossRef]
11. Baş S, Korman U. Palliation in malignant esophageal stricture and fistulas with self-expandable metallic stents. Bagcilar Med Bull 2020;5:185–92. [CrossRef]
12. Stewart DJ, Balamurugan R, Everitt NJ, Ravi K. Ten-year experience of esophageal self-expanding metal stent insertion at a single institution. Dis Esophagus 2013;26:276–81. [CrossRef]
13. Battersby NJ, Bonney GK, Subar D, Talbot L, Decadt B, Lynch N. Outcomes following oesophageal stent insertion for palliation of malignant strictures: A large single centre series. J Surg Oncol 2012;105:60–5. [CrossRef]
14. Bektaş H, Gürbulak B, Düzköylü Y, Çolak Ş, Gürbulak EK, Çakar

E, et al. Clinical outcomes of upper gastrointestinal stents and review of current literature. JSLS 2017;21:e2017.00058. [CrossRef]
15. Kumar S, Bahdi F, Emelogu IK, Yu AC, Coronel M, Ge PS, et al. How much progress have we made? A 20-year experience regarding esophageal stents for the palliation of malignant dysphagia. Dis Esophagus 2022;35:doab085. [CrossRef]
16. Hindy P, Hong J, Lam-Tsai Y, Gress F. A comprehensive review of esophageal stents. Gastroenterol Hepatol (N Y) 2012;8:526–34.
17. Saranovic Dj, Djuric-Stefanovic A, Ivanovic A, Masulovic D, Pesko P. Fluoroscopically guided insertion of self-expandable metal esophageal stents for palliative treatment of patients with malignant stenosis of esophagus and cardia: comparison of uncovered and covered stent types. Dis Esophagus 2005;18:230–8. [CrossRef]
18. Burstow M, Kelly T, Panchani S, Khan IM, Meek D, Memon B, et al. Outcome of palliative esophageal stenting for malignant dysphagia: A retrospective analysis. Dis Esophagus 2009;22:519–25. [CrossRef]
19. Alzanbagi A, Qureshi LA, Ahmed I, Tashkandi A, Khan M, Alhazmi GA, et al. Self-expanding metallic stents for palliation of esophageal cancer: A single center experience from Saudi Arabia. Cureus 2022;14:e32096. [CrossRef]
20. Talreja JP, Eloubeidi MA, Sauer BG, Al-Awabdy BS, Lopes T, Kahaleh M, et al. Fully covered removable nitinol self-expandable metal stents (SEMS) in malignant strictures of the esophagus: A multicenter analysis. Surg Endosc 2012;26:1664–9. [CrossRef]
21. Akkuzu MZ, Sezgin O, Ates F, Özdoğan O, Yaraş S, Aydın F, et al. Gastrointestinal stent applications: Single center experience. Mustafa Kemal Univ Med J [Article in Turkish] 2021;12:5–9.
22. Tuna Y, Başar Ö. Self-expandable metallic stents for palliative treatment of esophageal cancer. Cumhuriyet Med J 2011;33:183–8.
23. Sapmaz F, Başyiğit S, Uzman M, Nazlıgül Y. Evaluation of efficacy and safety of our experiences with internally covered self-expandable metal stent in cases with malignant esophageal dysphagia. Akad Gastroenterol Derg [Article in Turkish] 2015;14:95–100.
24. Koç O, Sarı YS, Bektaş H, Özakay K, Özcan Ö, Tunalı V. Endoscopic Self-expanding esophageal metallic stent placements in inoperable esophageal cancer patients. Laparosc Endosc Surg Sci 2008;15:19–24.