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Endoprosthetics for the treatment of esophageal leaks and fistula

Arnaud Lemmers, MD, PhD, Pierre Eisendrath, MD, Jacques Devière, MD, PhD, Olivier Le Moine, MD, PhD*

Department of Gastroenterology, Hepatopancreatology and Digestive Oncology, Erasme Hospital, Université Libre de Bruxelles (ULB), Route de Lennik, 808, Brussels 1070, Belgium

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ABSTRACT

Esophageal leaks, perforations, and fistula represent life-threatening complications, with a reported mortality of 12%-50% in the surgical literature. Endoscopic treatment by stenting has been reported in a large number of patients with good outcomes. The principles of this method might be described with the acronym DCWR (drain, close, water-tightness, and remove). Briefly, after the drainage of associated collections, the insertion of a self-expandable esophageal stent across the leakage region enables diversion of the esophageal contents from the wound cavity. When the stent allows water-tightness, the leak closes by second intention. Some weeks later, the stent is removed. The global sealing rate and clinical success reaches 79% and 76%, respectively, in pooled data analysis of available published cohorts. Reported mortality is approximately 11%. We reviewed the details of published cohorts emphasizing on the factors associated with endoscopic treatment success, the stent choice in respect to relative advantages and complications, the removal protocols, and development perspectives.

1. Introduction

Esophageal perforations, leaks, and fistulae are rare, but life-threatening situations. They may occur spontaneously, as in the Boerhaave syndrome, or as a complication of surgery, or during endoscopic procedures. Anastomotic leakage after esophagectomy occurs in 4%-30% of cases and represents a severe complication [1]. The mortality rate with operative treatment ranges from 12%-50% [2,3]. Surgery has long been the "gold standard" for these emergencies, accompanied by broad-spectrum antibiotics, nasogastric decompression, total parenteral nutrition, and drainage of collections [4,5]. During the past 15 years, an increasing number of case series studies have described an endoscopic approach to esophageal leaks sealing by self-expandable stents. Four letters summarize the principle of this method: DCWR (drain collections, cover the leakage, ensure water-tightness, and remove the stent). First, as for both medical and surgical treatment, associated collections must be drained. Then, the insertion of a self-expandable esophageal stent across the leakage region enables to cover the leak and divert the esophageal content from the wounded cavity. When the stent allows water-tightness, the leak closes by secondary intention. Some weeks later, the stent is removed with a high probability to be free of persistent leakage.

The endoscopic insertion of self-expandable covered stents is a well-established technique for the palliation of malignant esophageal obstruction and the treatment of esophageal benign refractory strictures [6]. The use of covered stents for the treatment of esophageal perforations, leaks, or fistula is largely used worldwide, although no randomized controlled trial has compared endoscopic stenting with surgery for the management of these patients. The potential disadvantage of self-expandable metal stents (SEMS) in this indication includes the risk of migration when inserted in the absence of stenosis, the difficulty of removal related to the development of hyperplasia in uncovered parts, and the risk of secondary hyperplasia-related stricture after removal. However, the use of self-expandable stents for the healing of esophageal leaks, perforations, and fistula is associated with high clinical success rates and low mortality rates for this life-threatening complication. This article reviews the current available literature assessing the clinical effectiveness and safety of treating benign esophageal ruptures and anastomotic leaks with temporary stent placement.

2. Clinical success

A growing experience has been reported mostly through case series since 2001 involving more than 500 patients in different centers (Tables 1 and 2). The last systematic review on the topic

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* Corresponding author.
E-mail address: Olivier.Lemoine@erasme.ulb.ac.be (O. Le Moine).

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Table 1
Technical characteristics of studies on stent placement for esophageal leaks and fistula.*

Study	Stent type	Etiology (A, P, B, F, and O)	*n* (Patients)	*n* (Stents)	Drainage, *n* (%)	Time before placement (d)	Technical success	
							Placement, *n* (%)	Removal, *n* (%)
Van Boeckel et al [7]	SEPS FcSEMS PcSEMS	A: 137 P: 66 B: 46 F: 9 O: 9	267	NA	87 (59)	10.5	231 (99)	139 (98)
Swinnen et al [10]	PcSEMS	A: 4 P: 11 B: 4 F: 9 O: 5	33 (Esophagus†)	49	12 (36)	86.7	33 (100)	25/27 (92) Stent-in-stent technique
Nguyen et al [9]	FcSEMS	A: 9	9	9	2 (22)	9	9 (100)	9 (100)
Van Boeckel et al [18]	FcSEMS PcSEMS SEPS SEPS FcSEMS	A: 32 P: 13 B: 4 O: 3 A: 29	52	83	24 (46)	NA	83 (100)	44 (84) Added endoscopic technique: +7 (98)
El Hajj et al [11]	PcSEMS	P: 10 F: 15	54	117	11 (20)	10.2	54 (100)	54 (100)
Leenders et al [1]	FcSEMS PcSEMS	A: 18	18 (Eso†)	23	NA	7.5	18 (100)	14/16 (88)
Brangewitz et al [23]	FcSEMS SEPS	A: 31 P: 6 B: 2	39	40	NA	NA	NA	NA
Gubler and Bauerfeind [16]	PcSEMS FcSEMS	A: 31 P: 32 B: 7 F: 7 O: 8	85	113	47 (55)	NA	85 (100)	107 (95)
Total		A:291 P:138 B: 63 F: 40 O: 25	557	434/290 (1.5) stent/patient	183/500 (37)			

Abbreviations: A, anastomotic leak; P, endoscopic perforation; B, Boerhaave syndrome; F, fistula; O, other; NA, not available. The systematic review from Van Boeckel et al was used as a base for cohort data collections. Further published available series were collected and pooled in the table.

* The computation was limited to those studies in which the information was available.

† For mixed gastric and esophageal studies, data were extracted for esophageal cases when possible, otherwise, the study was not integrated to the table.

was published in 2011 showing an 88% sealing rate and an 85% clinical success rate for esophageal benign ruptures or anastomotic leaks with the insertion of covered stents [7]. When pooling the extractable data from these published series, 79% and 76% sealing and clinical success rates are reached for perforations, leaks, and fistula, respectively. The mean duration of stenting was 6 weeks. The global mortality rate for those published series reached 11%, a number that compares favorably with the 12%-50% mortality rate reported for surgical management [8]. It is necessary to mention that the high clinical success rate of esophageal stenting in these

Table 2
Outcome of studies reporting esophageal leaks and fistula stenting.

Study	Complications		Reinterventions		Stenting time (wk)	Sealing rate, *n* (%)	Clinical success, *n* (%)	Mortality, *n* (%)
	Migrations, *n* (%)	Tissue growth, *n* (%)	Endoscopic procedure	Surgical procedure				
Van Boeckel et al [7]	56 (29)	9 (5)	53 (25)	18 (13)	7.2	224 (88)	192 (85)	31 (13)
Swinnen et al [10]	6 (18)	6 (18)	10 (30)	2 (6)	12	23 (70)	24/31 (77)	4 (12)
Nguyen et al [9]	0 (0)	0 (0)	NA	0 (0)	6	9 (100)	9 (100)	0 (0)
Van Boeckel et al [18]	10 (19)	8 (15)	NA	4 (7)	5.5	34/45 (76)	34/52 (65)	7 (13)
El hajj et al [11]	15 (28)	15 (28)	15 (28)	9 (17)	5	45 (83)	45/60 (75)	1 (2)
Leenders et al [1]	7 (39)	NA	6 (33)	NA	8	15 (83)	10 (56)	5 (28)
Brangewitz et al [23]	6 (15)	11 (28)	6 (15)	3 (8)	4.5	21 (54)	21 (54)	11 (28)
Gubler and Bauerfeind [16]	10 (9)	NA	NA	NA	2	67 (79)	62 (73)	5 (5.8)
Total	110 (20)	49 (10)		36 (8)	6.1	438/557 (79)	397 (76)	64 (11)

Abbreviation: NA, not available. The pooled data analysis was done taking in consideration the missing data; percentages were calculated based on the number of patients for whom data were available.