Case Report

Management of Malignant Left-Side Colonic Obstruction Using Self-Expandable Metal Stents as a Bridge to Elective Surgery: A Case Report and Literature Review

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Enrico Andolfi[1], Daniele Fusario[1,2], Lucia Barni[1], Gianmario Edoardo Poto[2], Diego Giulitti[1], Salvatore Spiezia[3], Elena Cavargini[4]

[1]General Surgery Unit, Tiber Valley Hospital, USL Toscana Sud-Est, 52037 Sansepolcro, Italy
[2]Department of Medicine, Surgery and Neuroscience, University of Siena, 53100 Siena, Italy
[3]Department of Medicine and Health Sciences "V. Tiberio", University of Molise, 86100 Campobasso, Italy
[4]Unit of Gastroenterology, San Donato Hospital, USL Toscana Sud-Est, 52100 Arezzo, Italy

AIM: Colonic obstruction is a life–threatening condition, requiring emergency surgery (ES) that usually implies laparotomy and stoma construction. Self-expandable metal stents (SEMS) can be used to overcome the occlusion, realizing the so-called "bridge to surgery (BTS)", allowing management of the patient in an elective setting.

CASE PRESENTATION: We present a case of a 59-year-old man with left colonic obstruction related to stenosing colorectal cancer (CRC) successfully treated with SEMS placement and early laparoscopic definitive surgery. The patient had an excellent course with no stenting or surgery-related complications. Probably young age, no comorbidity and endoscopic expertise played a main role in this favourable outcome, at least in the short term.

RESULTS: Our critical review of the literature published over a period spanning more than two decades, encompassing 41 studies, indicates that SEMS used as a BTS in patients with malignant colorectal obstruction is associated with improved short-term outcomes compared to ES. Specifically, SEMS placement has been shown to reduce postoperative morbidity, lower stoma formation rates, and facilitate preoperative optimization in selected patients. Nevertheless, concerns remain regarding potential adverse oncological outcomes, particularly in terms of local recurrence and disease-free survival. These concerns are compounded by the heterogeneity of available studies, which are predominantly retrospective and underpowered, and by the scarcity of large-scale randomized controlled trials (RCTs). Furthermore, the limited dissemination of technical expertise and institutional experience in SEMS placement continues to restrict its widespread implementation in clinical practice.

CONCLUSIONS: The clinical success of SEMS placement as a BTS strategy is contingent upon rigorous patient selection, coordinated multidisciplinary team involvement, and the availability of experienced endoscopists and surgical teams. When these prerequisites are met, SEMS offers an effective means of converting an acute surgical emergency into an elective procedure, thereby mitigating perioperative risk and improving patient-centered outcomes. However, the lack of robust long-term oncological data and the limited penetration of stenting expertise across healthcare institutions remain major impediments to broader adoption. Continued efforts to generate high-quality evidence and promote structured training programs are essential to fully define the role of SEMS in the management of malignant bowel obstruction.

Keywords: SEMS; colonic obstruction; colonic cancer; surgery

Introduction

Colorectal cancer (CRC) is the third most frequently diagnosed malignancy and the second leading cause of cancer-related mortality [1,2]. CRC exhibits intestinal obstruction in 10%–30% of patients resulting in emergency hospitalization with immediate postoperative mortality ranging from 15 to 30% versus about 5% for elective surgery [3,4]. The corona virus disease 2019 (COVID-19) pandemic has contributed to delays also in the early diagnosis of CRC, so, since the spread of the COVID-19 pandemic [5], CRC cases, revealed with intestinal obstruction, have increased. The sigmoid is the most common part of the colon that is involved in obstruction [6].

The radical change in surgical context with innovative techniques and surgical approaches improved short- and long-term outcomes in various fields of abdominal cancer [7].

Currently, minimally invasive surgery (MIS) represents the gold standard in CRC surgical management in elective sce-

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Correspondence to: Daniele Fusario, General Surgery Unit, Tiber Valley Hospital, USL Toscana Sud-Est, 52037 Sansepolcro, Italy; Department of Medicine, Surgery and Neuroscience, University of Siena, 53100 Siena, Italy (e-mail: dani.fusario@gmail.com); Salvatore Spiezia, Department of Medicine and Health Sciences "V. Tiberio", University of Molise, 86100 Campobasso, Italy (e-mail: salvatorespiezia00@gmail.com).
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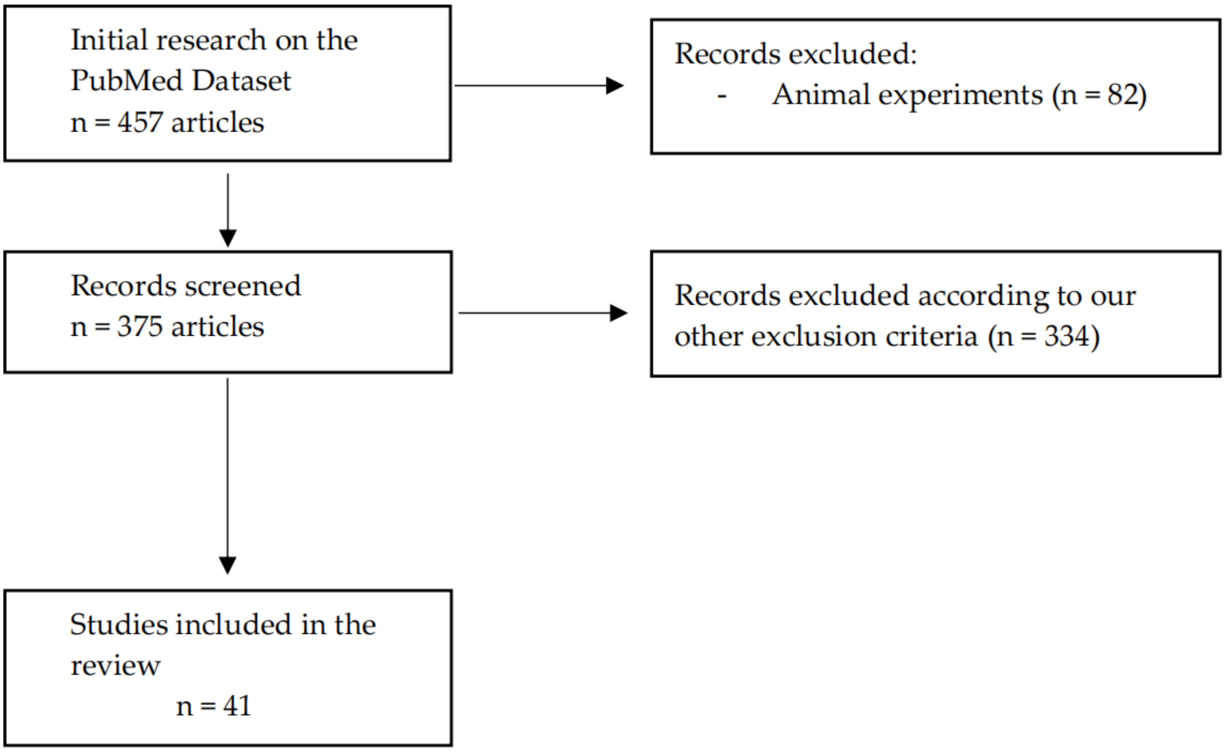

Fig. 1. Flow chart documented the literature review process.

narios [4,8,9], due to better short-term and non-inferior oncologic outcomes compared to the open approach [10].

Colonic obstruction is linked to impaired ventilatory function due to abdominal distension and reduced diaphragmatic excursion [11]. In addition, clinical conditions are compromised by a triplet: intraluminal microbial proliferation with potential intraperitoneal translocation of bacteria with septic shock, fluid and electrolyte imbalances caused by vomiting and third space loss, and ischemia as results of intestinal distension by gas and fecal material impairing microcirculation [11]. These findings could be associated with intestinal wall perforation [11]. In this clinical scenario, the colonic malignant occlusion is usually approached by open emergency surgery (ES) [12].

Self-expandable metal stents (SEMS) can be used to overcome the occlusion, realizing the supposed “bridge to surgery (BTS)”, allowing patient management in an elective setting thanks to relieving obstruction and restoring normal bowel function [13,14]. Since its clinical introduction in 1991 by Dohmoto [15], SEMS has been widely used as a palliative treatment for CRC obstruction management in patients affected by incurable diseases [16,17]. The first application of SEMS as BTS was reported by Tejero *et al.* [18]. In the last decades, numerous studies have demonstrated SEMS placement benefits before elective surgery [17,19,20]: preoperative stent placement could avoid big laparotomies, increase primary anastomosis, and decrease stoma rates and complications. Additionally, SEMS use allows for scheduling a MIS approach with faster recovery and early access to adjuvant therapies [20]. In spite of these findings, their use relies on hospital equipment availability and professional skills.

We present a case of left colonic obstruction successfully treated with SEMS placement and early laparoscopic definitive surgery.

No ethical approval was needed, while notified consent was obtained from the patient.

Materials and Methods

Search Strategies

We performed literature research (Fig. 1) on PubMed (US National Library of Medicine, http://www.ncbi.nlm.nih.gov/PubMed), using the following medical subject headings: ((SEMS) OR (self-expandable metallic stent) AND (colon cancer OR colorectal cancer)) AND (“English” [Language]).

Inclusion Criteria

We included only original articles, written in English, published from 2000 until December 2023 regarding the use of SEMS as BTS for CRC presented with intestinal obstruction (Table 1, Ref. [21–61]). Articles were first included with title and abstract, then a full-text read was performed.

Table 1. Literature review.

Author	Year	Country	Stage	Treatment strategy	Sample size	Number of males	Mean age, years	Tumor site	Study design	Open/MIS	Stoma, yes/no, n.	Complication rate SEMS	Complication rate ES, DS or TDT	30-day mortality
Martinez-Santos *et al*. [21]	2002	Spain	NA	SEMS vs. ES	43 vs. 29	26 vs. 15	71 vs. 74.6	Left colon 11/10 Sigmoid colon 18/15 Rectum 14/4	Prospective study	NA	4 vs. 17	17 (40%)	18 (62%)	4 vs. 7
Ng *et al*. [22]	2006	Hong Kong	Stage II–IV	SEMS vs. ES	20 vs. 40	17 vs. 29	74 vs. 73.5	Descending colon 3/12 Sigmoid colon 7/28 Rectosigmoid junction 3/0 Rectum 7/0	Prospective study	SEMS: 7 MIS (1 converted to Open)	7 vs. 14	6 (22%) overall complication 1 (5%) surgical	22 (55%) overall 7 (17.5%) surgical	1 vs. 5
Dastur *et al*. [23]	2008	UK	NA	ES vs. SEMS	23 vs. 19	14 vs. 10	68 vs. 75	Left colon 8/2 Sigmoid colon 14/12 Rectum 1/5	Retrospective study	SEMS: 3 MIS	12 vs. 5	NA	NA	3 vs. 1
Cheung *et al*. [24]	2009	China	Stage I–IV	ES vs. SEMS	24 vs. 24	12 vs. 14	68.5 vs. 64.5	Between the splenic flexure and the rectosigmoid junction	RCT	SEMS: 20 MIS; ES: 24 Open	0 vs. 6	NA	NA	0 vs. 0
Pirlet *et al*. [25]	2011	France	NA	SEMS vs. ES	30 vs. 30	16 vs. 13	70.4 vs. 74.7	Splenic flexure 0/3 Descending colon 6/2 Sigmoid colon 15/18 Rectosigmoid junction 8/7 Not available 1/0	RCT	NA	13 vs. 17	15 (50%)	17 (56.6%)	1 vs. 3
van Hooft *et al*. [26]	2011	Netherlands	NA	SEMS vs. ES	47 vs. 51	24 vs. 27	70.4 vs. 71.4	Left-sided colorectal	RCT	NA	27 vs. 34	25 (55.5%)	23 (45%)	5 vs. 5
Guo *et al*. [27]	2011	China	NA	SEMS vs. ES	34 vs. 58	19 vs. 28	77 vs. 76	Splenic flexure 4/6 Descending colon 5/7 Sigmoid colon 15/25 Rectosigmoid junction 4/9 Rectum 6/11	Retrospective study	NA	2 vs. 7 (permanent stoma)	17 (50%)	56 (96.55%)	1 vs. 11

Table 1. Continued.

Author	Year	Country	Stage	Treatment strategy	Sample size	Number of males	Mean age, years	Tumor site	Study design	Open/MIS	Stoma, yes/no, n.	Complication rate SEMS	Complication rate ES, DS or TDT	30-day mortality
Ho *et al.* [28]	2012	Singapore	Stage II–IV	SEMS vs. ES	20 vs. 19	13 vs. 9	68 vs. 65	Splenic flexure 2/2 Descending colon 3/6 Sigmoid colon 10/8 Rectosigmoid junction 5/3	RCT	SEMS: 8 MIS (of which 3 converted to Open) and 12 Open; ES: 0 MIS and 19 Open	2 vs. 6	35%	58%	0 vs. 3
Sabbagh *et al.* [29]	2013	France	Stage I–IV	SEMS vs. ES	48 vs. 39	29 vs. 20	69.7 vs. 74.9	Upper left colon 8/15 Sigmoid colon 33/17 Rectosigmoid junction 7/7	Retrospective study	NA	24 vs. 21	33.3%	51.3%	4 vs. 4
Gorissen *et al.* [30]	2013	UK	Stage I–IV; 12 carcino-matosis	SEMS vs. ES	62 vs. 43	36 vs. 20	70.6 vs. 72	Splenic flexure 12/15 Descending colon 14/5 Sigmoid colon 36/23	Prospective study	SEMS: 37 MIS (of which 10 converted to Open) and 23 Open; ES:10 (of which 5 converted to Open) and 33 Open	11 vs. 13	5 (0.08%)	9 (20.9%)	2 vs. 4
Lee *et al.* [31]	2013	Korea	Stage I–IV	SEMS vs. ES	49 vs. 28	31 vs. 21	63.6 vs. 56.6	Left colon 34/21 Rectum 15/7	Retrospective study	SEMS: 13 MIS and 36 Open; ES: 0 MIS and 28 Open	6 vs. 16	8 (16.3%)	7 (25.0%)	0 vs. 1
Kim *et al.* [32]	2013	Korea	Stage I–III; 1 vs 0 (peritoneal metastases)	SEMS vs. ES	43 vs. 48	28 vs. 34	68 vs. 66	Left colon 32/29 Rectum 11/19	Retrospective study	SEMS: 25 MIS; ES: 20 MIS	7 vs. 16 (initial stoma) 3 vs. 7 (permanent stoma)	9 (20.9%)	18 (35.7%)	0 vs. 0

Table 1. Continued.

Author	Year	Country	Stage	Treatment strategy	Sample size	Number of males	Mean age, years	Tumor site	Study design	Open/MIS	Stoma, yes/no, n.	Complication rate SEMS	Complication rate ES, DS or TDT	30-day mortality
Shigeta *et al*. [33]	2014	Japan	Stage II–IV	TDT vs. ES	33 vs. 10	21 vs. 8	70 vs. 72.5	Left colon 29/9 Rectum 4/1	Retrospective study	NA	32% vs. 7% (primary anastomosis rate)	TDT: 7 (21.2%)	5 (50%)	NA
van den Berg *et al*. [34]	2014	Netherlands	Stage I–IV	SEMS vs. ES	43 vs. 34	22 vs. 20	71 vs. 72	Left side of the colon	Retrospective comparative study	SEMS: 5 MIS and 37 Open ES: 3 MIS and 31 Open	1 vs. 1 (definitive stoma)	19 (44.1%)	24 (70.58%)	2 vs. 4
			Stage I–IV 1 vs 1 Carci-nomatosis	SEMS vs. ES	16 vs. 17	9 vs. 9	71 vs. 71	Right side of the colon	Retrospective comparative study	SEMS: 0 MIS and 16 Open ES: 2 MIS and 15 Open	0 vs. 0	10 (62.5%)	7 (41.17%)	1 vs. 0
Qureshy *et al*. [35]	2014	Canada	Stage II–IV	SEMS vs. ES	28 vs. 39	23 vs. 28	73.5 vs. 74	Left side of the colon	Prospective study	SEMS: 12 MIS; ES: 9 MIS	10 vs. 13	8 (28.57%)	22 (56.41%)	1 vs. 5
Kim *et al*. [36]	2015	Korea	Stage II–IV 3 vs 1 peritoneal seeding after the technique	SEMS vs. ES	27 vs. 29	18 vs. 16	64.6 vs. 70.7	Left and right sides of the colon	Retrospective study	SEMS: 19 MIS; ES: 16 MIS	7 vs. 8	3 (11.11%)	NA	NA
Tanis *et al*. [37]	2015	Netherlands	Stage I–IV	ES vs. SEMS vs. DS	1485 vs. 196 vs. 135	805 vs. 119 vs. 76	70 vs. 71 vs. 68	Splenic flexure 199/18/22 Descending colon 243/34/17 Sigmoid colon 1043/144/96	Prospective study	ES: 136 MIS and 1340 Open; SEMS: 77 MIS and 118 Open; DS: 34 MIS and 101 Open	885 vs. 68 vs. 47	61 (31.3%)	ES: 631 (42.8%); DS: 40 (29.6%)	102 vs. 11 vs. 5
Kwak *et al*. [38]	2016	Korea	Stage I–IV	SEMS vs. ES	42 vs. 42	28 vs. 26	62 vs. 60	Above rectum 28/24 Rectum 14/18	Retrospective study	SEMS: 5 MIS, 37 Open; ES 1 MIS, 41 Open	Temporary: 3 vs. 6; Definitive: 0 vs 0	4 (9.5%)	7 (16.7%)	NA

Table 1. Continued.

Author	Year	Country	Stage	Treatment strategy	Sample size	Number of males	Mean age, years	Tumor site	Study design	Open/MIS	Stoma, yes/no, n.	Complication rate SEMS	Complication rate ES, DS or TDT	30-day mortality
Öistämö *et al*. [39]	2016	Sweden	NA	ES vs. DS vs. SEMS	57 vs. 23 vs. 20	31 vs. 13 vs. 7	74 vs. 67 vs. 71	Splenic flexure colon 11/5/2 Descending colon 7/7/2 Sigmoid colon 39/10/15 Rectosigmoid junction 0/1/1	Retrospective study	NA	20 vs. 1 vs. 8	6 (30%)	DS: 8 (35%); ES: 20 (35%)	12% vs. 0% vs. 0%
Min *et al*. [40]	2016	Korea	Stage I–IV	ES vs. SEMS	24 vs. 70	12 vs. 46	71.8 vs. 65.4	Descending colon 9/11 Sigmoid colon 15/59	Retrospective study	ES: 4 MIS and 20 Open; SEMS: 62 MIS and 8 Open	NA	26 (37.1%)	2 (8.3%)	0 vs. 2
Ribeiro *et al*. [41]	2016	Portugal	Stage I–III	SEMS vs. ES	27 vs. 15	17 vs. 8	68.2 vs. 68.1	Splenic flexure 1/3 Descendent colon 8/7 Sigmoid colon 11/4 Rectosigmoid junction 7/1	Retrospective study	SEMS: 4 MIS and 23 Open; ES: 0 MIS and 15 Open	7 (25.9%) vs 13 (86.7%)	19 (70.3%)	12 (80%)	0 vs. 0
Amelung *et al*. [42]	2016	Netherlands	Stage I–IV	DS vs. SEMS	37 vs. 51	14 vs. 25	66.6 vs. 71.8	Splenic flexure 3/4 Descending colon 7/8 Sigmoid colon 27/39	Retrospective study	DS: 13 MIS and 19 Open; SEMS: 8 MIS and 43 Open	Permanent stoma: 6 (16.2%) vs. 9 (17.6%)	23 (45.1%)	12 (32.4%)	1 vs. 1
Ho *et al*. [43]	2017	Hong Kong	Stage I–IV	SEMS vs. ES	62 vs. 40	49 vs. 30	70.2 vs. 70.9	Splenic flexure 8/9 Descending colon 16/11 Sigmoid colon 38/20	Retrospective comparative study	SEMS: 51 MIS (5 converted to Open); ES: 0 MIS	Permanent stoma 10 vs. 21	0–II 52 III–V 10 Major 14 (22.5%)	0–II 24 III–V 16 Major 26 (65%)	2 vs. 7
Arezzo *et al*. [44]	2017	Italy	NA ES: 1 Carcinomatosis	SEMS vs. ES	56 vs. 59	28 vs. 32	72 vs. 71	Splenic flexure 5/13 Descending colon 43/34 Sigmoid colon 8/12	RCT	SEMS: 23 MIS: ES: 0 MIS	1 vs. 23	51.8%	57.6%	1 vs. 0

Table 1. Continued.

Author	Year	Country	Stage	Treatment strategy	Sample size	Number of males	Mean age, years	Tumor site	Study design	Open/MIS	Stoma, yes/no, n.	Complication rate SEMS	Complication rate ES, DS or TDT	30-day mortality
Kim *et al.* [45]	2017	Korea	NA	SEMS vs. ES	156 vs. 56	54 vs. 26	64.6 vs. 64.5	Splenic flexure 5/4 Descending colon 18/10 Rectosigmoid junction 89/42	Retrospective study	SEMS: 66 MIS; ES: 30 MIS	11 vs. 10	3 (2.7%) (postoperative complication)	5 (8.9%) (postoperative complication)	1 vs. 2
Park *et al.* [46]	2018	Korea	Stage I–IV	SEMS vs. ES	94 vs. 17	52 vs. 9	64 vs. 69	Descending colon 13/4 Sigmoid colon 59/7 Rectum 22/6	Retrospective study	SEMS: 51 MIS and 43 Open; ES: 8 MIS and 9 Open	13 vs. 7	2 (2.1%)	1 (5.9%)	NA
Kawachi *et al.* [47]	2018	Japan	Stage II–IV	SEMS vs. TDT vs. ES	19 vs. 12 vs. 25	8 vs. 5 vs. 15	69.4 vs. 74.1 vs. 68.9	Splenic flexure 3/0/4 Descending colon 5/1/3 Sigmoid colon 11/11/18	Retrospective study	NA	1 vs. 6 vs. 14	9 (47.3%)	6 (50%) vs. 13 (52%)	2 vs. 1 vs. 2
Veld *et al.* [48]	2019	Netherlands	NA	ES vs. DS vs. SEMS	2013 vs. 345 vs. 229	1071 vs. 205 vs. 128	71 vs. 68 vs. 72	Splenic flexure 274/54/15 Descending colon 375/58/45 Sigmoid colon 1364/233/169	Multicenter cohort-retrospective study	SEMS: 94 MIS DS: 167 MIS ES: 159 MIS	1285 vs. 226 vs. 67	40.7%	DS: 34.3% ES: 39.0%	NA
Lara-Romero *et al.* [49]	2019	Spain	Stage I–III	SEMS vs. ES	71 vs. 66	43 vs. 30	69 vs. 73.5	Left colon 23/23 Sigmoid colon 32/36 Rectosigmoid junction 4/3 Rectum 12/4	Retrospective study	NA	12 vs. 36	11 (15.5%)	19 (28.8%)	5 vs. 5
Rodrigues-Pinto *et al.* [50]	2019	Portugal	Stage I–IV	SEMS vs. ES	48 vs. 46	25 vs. 25	67 vs. 75	Descending colon 11/17 Sigmoid colon 30/24 Rectum 7/5	Retrospective study	SEMS: 21 MIS and 23 Open; ES: 1 MIS and 45 Open	13 vs. 32	16 (33.33%)	19 (41.3%)	2 vs. 3

Table 1. Continued.

Author	Year	Country	Stage	Treatment strategy	Sample size	Number of males	Mean age, years	Tumor site	Study design	Open/MIS	Stoma, yes/no, n.	Complication rate SEMS	Complication rate ES, DS or TDT	30-day mortality
Morita *et al*. [51]	2019	Japan	Stage I–IV	SEMS vs. ES	81 vs. 52	41 vs. 27	70 vs. 70	Descending colon 22/8 Sigmoid colon 34/26 Rectosigmoid junction 15/6 Rectum 10/12	Retrospective multicenter cohort study	SEMS: 47 MIS; ES 11 MIS	25 vs. 27	26 (32.1%)	22 (42%)	1 vs. 2
Zhang *et al*. [52]	2019	China	Stage I–IV	SEMS vs. ES	36 vs. 36	23 vs. 24	NA	Splenic colon 5/10 Descending colon 9/9 Sigmoid colon 18/15 Rectum 4/2	Retrospective study	NA	10 vs. 6	36 (100%)	36 (100%)	0 vs. 1
Han *et al*. [53]	2020	China	Stage II–IV	SEMS vs. ES	84 vs. 218	50 vs. 131	60.2 vs. 61	Descending colon 32/76 Sigmoid colon 40/113 Rectum 12/29	Retrospective study	NA	NA	14 (16.6%)	102 (46.7%)	NA
Arezzo *et al*. [54]	2020	Italy	Stage I–IV	SEMS vs. ES	56 vs. 59	28 vs. 32	72 vs. 71	Splenic flexure 5/13 Descending colon 43/34 Sigmoid colon 8/12	RCT	SEMS: 23 MIS	11 vs. 23	6 (22.2%)	23 (39%)	18 vs. 20 (median follow-up of 37 months)
Lovero *et al*. [55]	2020	Italy	Stage I–IV	SEMS vs. ES	22 vs. 23	14 vs. 13	64.7 vs. 71.2	Splenic flexure 0/2 Left colon 0/3 Sigmoid colon 8/5 Rectosigmoid junction 9/9 Rectum 5/4	Retrospective study	SEMS: 8 MIS; ES: 3 MIS	7 vs. 9	7 (31.8%)	5 (21.7%)	NA
Jung *et al*. [56]	2020	Korea	Stage III–IV	DS vs. SEMS	27 vs. 23	12 vs. 15	69 vs. 70	Left colon 17/21 Rectum 10/2	Retrospective study	DS: 22 MIS; SEMS 23 MIS	4 vs. 0	3 (13.0% major); 7 (30.4% any)	8 (29.6% major); 13 (48.1% any)	NA
Katsuki *et al*. [57]	2021	Japan	Stage II–III	ES vs. SEMS	498 vs. 498	271 vs. 272	72 vs. 73	Splenic flexure 9/9 Descending colon 150/145 Sigmoid colon 339/344	Retrospective study	ES: 257 MIS and 241 Open; SEMS 252 MIS and 246 Open	145 vs. 52	116 (23%)	107 (22%)	NA

Table 1. Continued.

Author	Year	Country	Stage	Treatment strategy	Sample size	Number of males	Mean age, years	Tumor site	Study design	Open/MIS	Stoma, yes/no, n.	Complication rate SEMS	Complication rate ES, DS or TDT	30-day mortality
Cao *et al*. [58]	2021	China	Stage I–IV; 4 vs. 4 (peritoneal metastases)	SEMS vs. ES	49 vs. 49	36 vs. 37	68.8 vs. 68.8	Splenic flexure 8/5 Descending colon 6/12 Sigmoid colon 35/32	Retrospective observational study	SEMS: 31 MIS and 18 Open; ES: 8 MIS and 41 Open	13 vs. 26	11 (22.4%)	9 (18.3%)	1 vs. 1
Khomvilai and Pattarajierapan [59]	2023	Thailand	Stage II–IV; 7 vs. 7 (peritoneal metastases at the time of diagnosis); 5 vs. 2 (peritoneal metastases not at the time of diagnosis)	SEMS vs. ES	49 vs. 77	32 vs. 49	68 vs. 61	Splenic flexure 0/7 Descending colon 8/8 Sigmoid colon 21/26 Rectosigmoid junction 20/36	Retrospective study	SEMS: 25 MIS and 24 Open; ES: 7 MIS and 70 Open	14 vs. 37	14 (28.6%)	34 (44.2%)	NA
Endo *et al*. [60]	2021	Japan	Stage II–III; Peritoneal recurrence: 4 vs 6 vs 8	ES vs. SEMS vs. TDT	103 vs. 113 vs. 85	64 vs. 69 vs. 43	67 vs. 69 vs. 69	Descending colon 25/19/19 Sigmoid colon 71/87/52 Rectum 7/7/14	Retrospective multi-center observational study	ES: 3 MIS and 100 Open; SEMS: 56 MIS and 57 Open; TDT: 21 MIS and 64 Open	58 vs. 8 vs. 42	23 (20.3%)	ES: 36 (34.9%); TDT: 25 (29.4%)	NA
CReST Collaborative Group [61]	2022	UK	NA	SEMS vs. ES	110 vs. 107	72 vs. 77	69.9 vs. 69.1	Transverse 8/4 Splenic flexure 5/5 Descending colon 19/21 Sigmoid 50/55 Rectosigmoid 13/15 Rectum 4/4	RCT	NA	47 vs. 72	40 (32.5%)	46 (37.7%)	4 vs. 6

NA, not available; SEMS, self-expandable metal stents; TDT, transanal decompression tubes; ES, emergency surgery; DS, diverting stoma; RCT, randomized controlled trial; MIS, minimally invasive surgery.

Exclusion Criteria

Studies involving animal experiments, studies published in languages other than English, conference abstracts, editorials, expert opinions and review papers were excluded. The number of patients was not used as an exclusion criterion in studies that met the inclusion criteria. Certain studies were also included if they were considered highly relevant to the topic or of significant value to the breadth of the paper (Fig. 1).

Data Extraction

We identified surgical studies on the application of SEMS in intestinal obstruction for CRC. We acquired 457 articles. Firstly, articles not related to the topic and duplicates were excluded according to the title and the abstract. After initial screening, full-text versions of the selected manuscripts were obtained. Subsequently, the entire text of the selected studies was collected and reviewed. Disagreements on article selection were resolved by discussion and consensus among the authors. The final review of the articles was carried out in November 2024 and we obtained and examined 41 articles (Fig. 1). The Primary objective was to review the use of SEMS as a BTS for CRC, shown with intestinal obstruction. In addition, tumor stage and treatment strategy have also been reviewed and summarized. Furthermore, the following indispensable features were systematically collected: sample size, number of males, mean age, tumor site, study design, open surgery or minimally invasive surgery (MIS), if a stoma was performed or not, complication rate for SEMS and for other surgery treatment such as emergencies surgery (ES) or diverting stoma (DS) and 30-day mortality.

Results

The literature research identified 457 studies. According to the exclusion criteria, we included 41 studies [21–61]. Among these, we examined 29 retrospective studies, 5 prospective studies, and 7 randomized controlled trials (Fig. 2). Of the included studies, 33 conducted a comparative analysis of the outcomes associated with ES alone versus those resulting from the emergency placement of colonic SEMS as a temporary measure leading to surgery. One study compared the outcomes of transanal decompression tube (TDT) placement against emergency surgical intervention, while two studies scrutinized the distinctions between DS and SEMS. Additionally, we incorporated three articles that juxtaposed the outcomes of ES, SEMS, and DS, alongside two articles addressing the perioperative outcomes of SEMS, TDT, and ES.

We also found out that the tumor stage in 17 articles was I–IV, in 8 was II–IV, in 3 was I–III, in 2 was II–III and in 1 was III–IV. Furthermore, in 10 articles tumor stage was not available.

In 24 studies, the sample size was $<$100 people, while in 17 studies the sample size was $\geq$100 (Fig. 2).

Case Report

A 59-year-old man presented to the emergency department with complaints of abdominal distension, nausea, and vomiting. The patient had no significant past medical history, and blood tests were normal. The symptoms dated from 5 days showed progressive worsening. Contrast-enhanced abdominal computed tomography (CE-CT) was performed, displaying an intestinal occlusion sustained by a left-sided colon stenosis. Stenosis was in the proximal sigmoid colon, extending 4 to 5 centimetres in length, with no lymphadenopathy along the inferior mesenteric vessels. The right and transverse colon were dilated, as well as the distal small bowel, due to ileocecal valve incompetence, with no signs of intestinal ischaemia. The maximum diameter of the dilated colon was approximately 8.5 cm, measured at the cecum. No liver metastasis and peritoneal carcinomatosis were reported. A chest CT was completed to investigate lung metastasis, without signs of malignancy (Fig. 3).

The patient was treated with medical therapy for the next 2 days, with a nasogastric tube and total parenteral nutrition (TPN), but, even if clinically well tolerated, progression of intestinal occlusion was evidenced by the persistence of air-fluid levels, enteric reflux, and persistent bowel closure to gas: due to these clinical conditions urgent operative management became mandatory.

After a multidisciplinary team discussion, a SEMS placement strategy was proposed to avoid an emergency laparotomy and stoma, owing to the endoscopist's expertise that considered tumor length and location to be at low risk of stent-related perforation. The procedure was successfully performed, and a 9 cm long SEMS was positioned under fluoroscopic control, with no procedural-related complications (Fig. 4).

Intestinal transit was restored, and the patient was discharged on postoperative day (POD) 2 with a low-fibre diet. A biopsy taken during the procedure confirmed the diagnosis of colonic adenocarcinoma.

Fifteen days after SEMS placement, the patient was readmitted to the surgical department for cancer resection. The surgical team performed a laparoscopic left hemicolectomy with primary anastomosis, without stoma. The course was uneventful, and the patient was discharged on POD 4. The pathology report was pT3N1c, absence of lymphovascular invasion (LVI-), presence of perineural invasion (PNI+) involvement of the outermost layers of the colon (T3) and it spread into areas of fat near the lymph nodes, but not the nodes themselves (N1c); LVI-; PNI+ and no metastasis in 20 regional nodes, free margins (Fig. 5).

Post-operative multidisciplinary team discussion suggested that the patient undergo adjuvant treatment with 4 cycles of Oxaliplatin and Capecitabine at 60 days after surgery.

During the follow-up period on POD 180, the patient was admitted to the Emergency Department for nausea, vomiting and bowel closure to gas: a successful non-operative approach was started with a nasogastric tube, TPN and water-

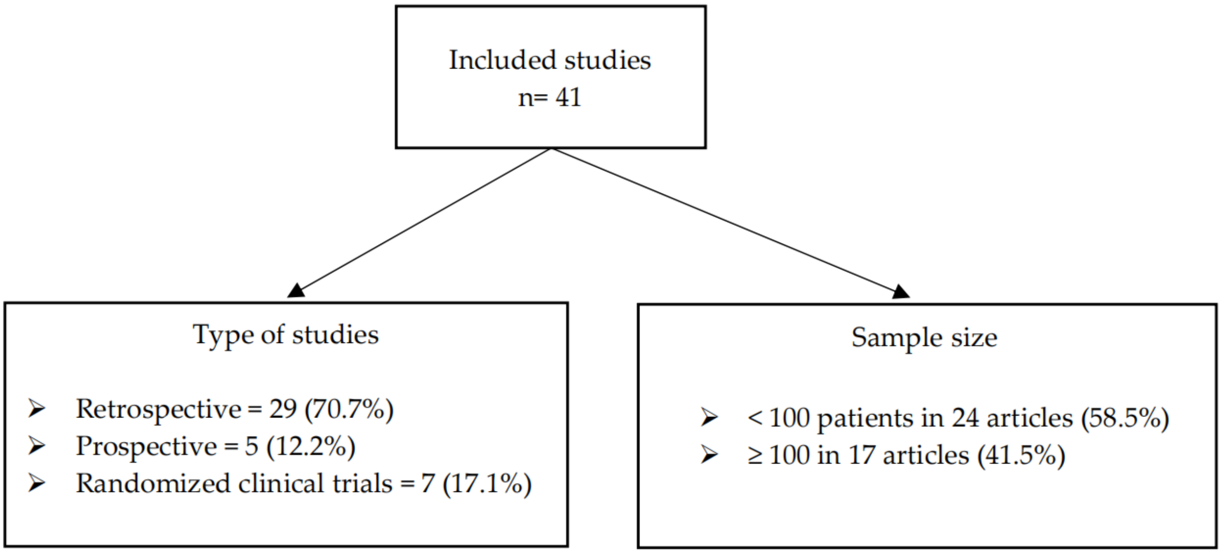

Fig. 2. Basic characteristics of the included literature. The figure summarizes the 41 studies included in the review by study design and sample size. Most were retrospective (70.7%), while 17.1% were randomized trials and 12.2% prospective studies. Over half of the studies (58.5%) enrolled fewer than 100 patients.

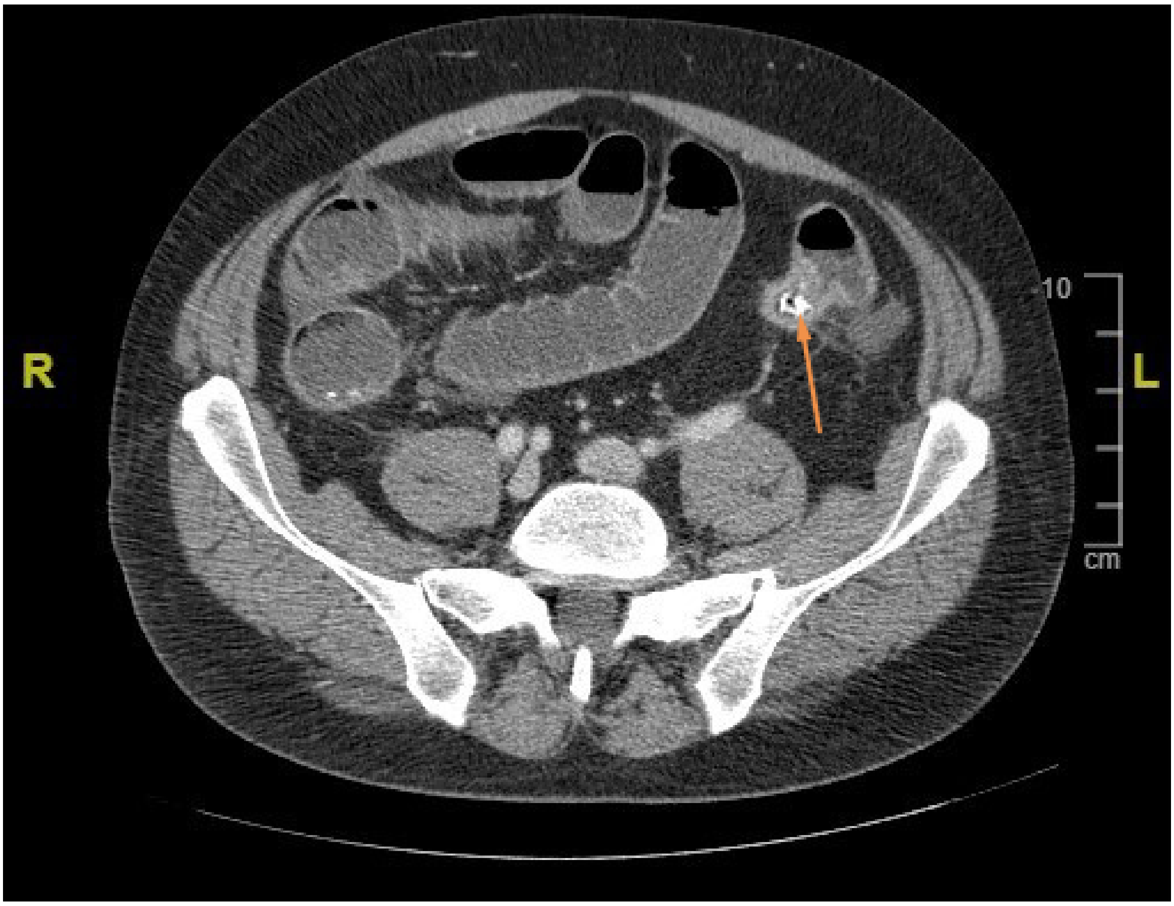

Fig. 3. Computed tomography (CT) scan showing intestinal obstruction. The arrow indicates the malignant stenosis. R, right; L, left.

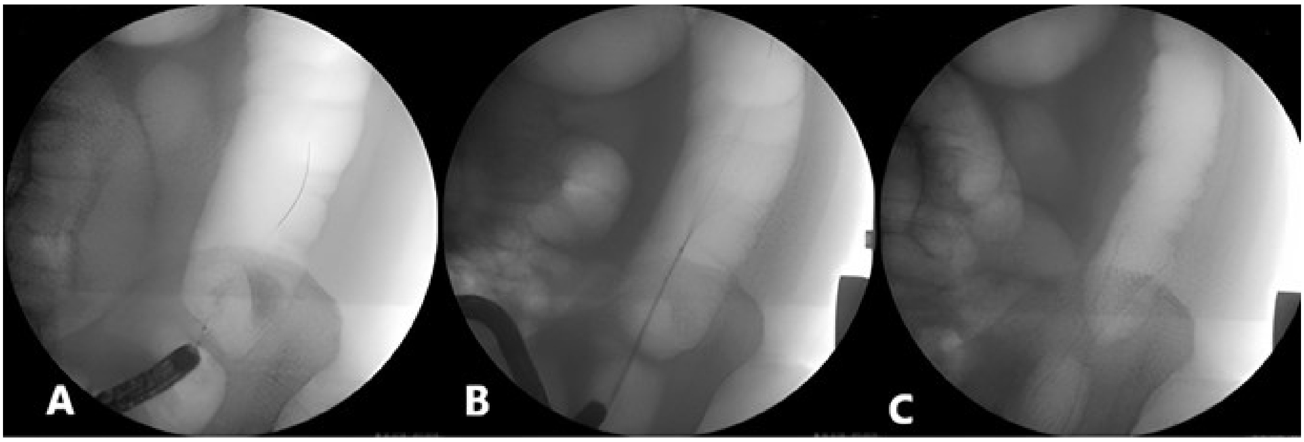

Fig. 4. Main procedure steps by radiology. (A) Guidewire advancement. (B) SEMS release. (C) SEMS deployment with the typical "hourglass" appearance.

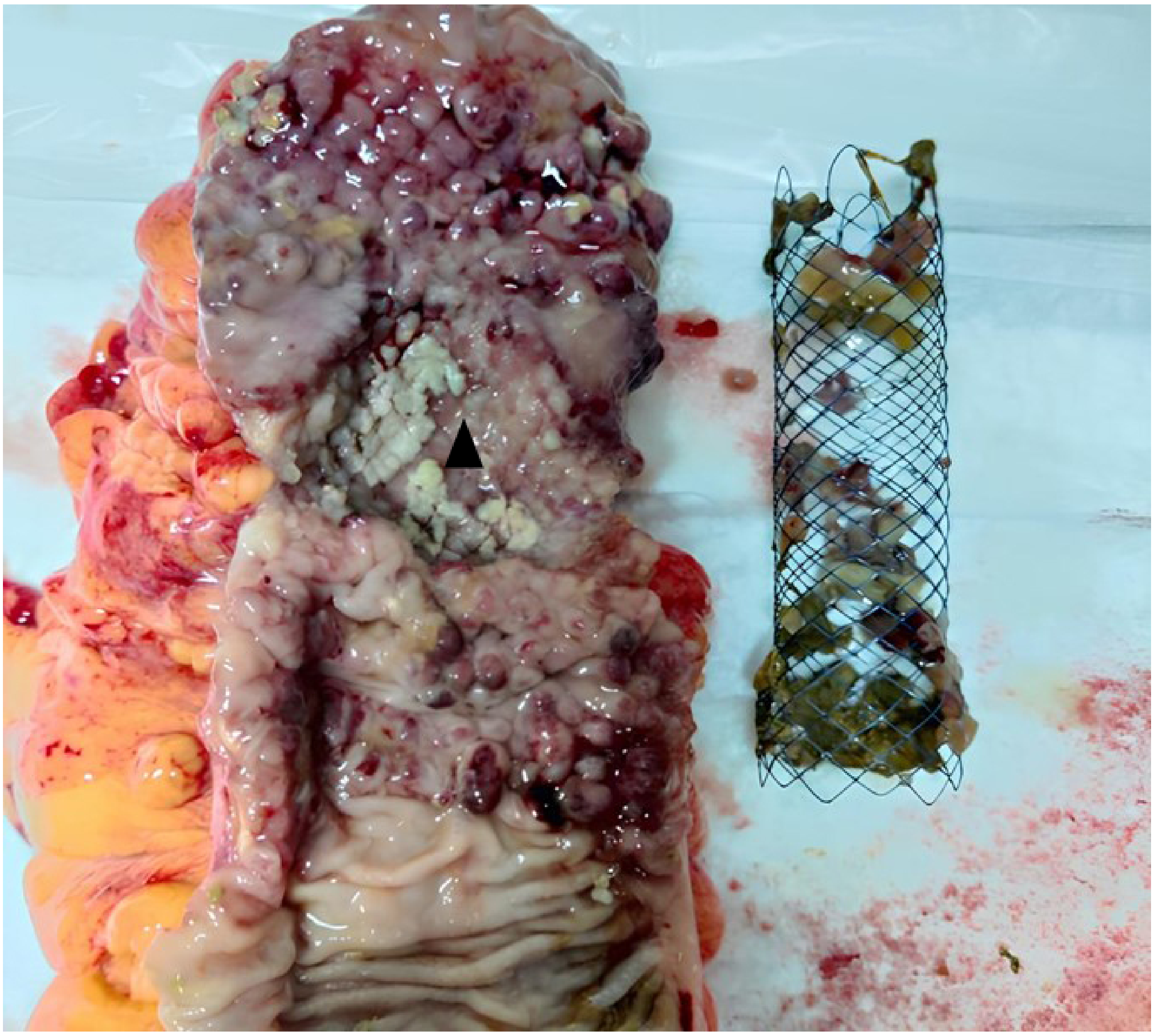

Fig. 5. Pathological Specimen and SEMS (removed) Mucosal tattoo shows stent perfectly centered upon the lesion (triangle).

soluble contrast agents (sodium meglumine diatrizoate, Gastrografin) administration. CE-CT scan showed bowel canalization with a hypodense nodular lesion at V–VI hepatic segment, compatible with secondaries from CRC (Fig. 6). Magnetic Resonance Imaging was not performed due to the patient's claustrophobia. Still, a CT-Positron Emission Tomography (PET) scan showed no Standardized Uptake Value (SUV) on the lesion, and contrast-enhanced

Fig. 6. CT scan of liver nodular lesion (white arrow).

liver ultrasound (CEUS) was not diagnostic for metastasis. After a multidisciplinary team discussion, a close follow-up strategy was chosen.

A total body CE-CT scan performed 14 months after surgery showed no radiological signs of locoregional or distant disease; the patient's clinical conditions are optimal. This case has been reported in line with the case report guidelines: Case Report (CARE) Guidelines to ensure the accuracy and completeness of the report (**Supplementary Material**).

Discussion

In 1994, Tejero *et al.* [18] first described the technique of positioning the SEMS as BTS in 2 patients with CRC acute occlusion; since then, improvements in expertise and technology have been made, but some concerns remain, and clear recommendations are still lacking.

ES outcomes for patients with CRC occlusion are worse than elective surgery, with higher mortality (17% vs. 6%) and morbidity rate [62], and this is mainly due to the poor and unstable clinical conditions of the patient at the time of surgery [63].

Surgical management by open Hartmann procedure (HP) is still one of the most common procedures in ES of the left colon, with the majority of stomas never getting reversed for many reasons [64–67]. HP is common because it is technically safe and feasible, but also because of the surgeon's concern to perform a primary anastomosis in a compromised patient with the risk of an eventual anastomotic leak and its related mortality, also after indocyanine green fluorescence administration to verify colon perfusion [68,69]. Moreover, HP has a high rate of surgical site infection (SSI), with possible development of incisional hernias (IH) as well stoma stoma-related complications [70]. Physical (altered body image, obesity) and psychological (anxiety, depression, adaptation problems) aspects related to the stoma also impair the global quality of life (QoL) [71,72]. And, not least, Hartmann's reversal is a complex procedure.

An easier surgical opportunity, especially in patients with metastatic disease, candidates for multimodal adjuvant treatments or unfit for major surgery, is represented by a simple DS. Otherwise, when a stoma is intended as a BTS, usually it results in serious short-term outcomes if compared to SEMS placement [66]: on the other hand, if technically a DS is simpler than a SEMS, it must be carried out under general anesthesia with greater post-operative pain and a consequent greater hospitalization and home activation of stoma care.

Recently, two large nationwide trials have been published [73,74], but the results are conflicting regarding short and long-term outcomes, probably due to different limitations and selection biases. Nevertheless, MIS is less likely after a DS and is exposed to the risk of IH on the DS closure that can reach 30%, half of this requiring surgery [75,76].

Despite resection and primary anastomosis (RPA) being encouraged in the last few years by the surgical community also in emergency [64], low adoption should mainly be addressed to concerns about colon distension and consequent radial mismatch between the bowel proximal and distal to the stenosis, fear for relative hypoperfusion of the dilatated colon, patient fragility and metabolic and hydro electrolyte imbalance, all factors definitely affecting the risk of anastomotic leaks. SEMS offers the opportunity to overcome all these problems, converting a clinical situation requiring an ES to be scheduled for a delayed elective surgery. Moreover, it allows for a minimally invasive approach, otherwise very challenging in conditions of abdominal distension due to the occlusion, reducing the risk for SSI and IH. Indications, modality and timing represent today a still important question to debate among the surgical community.

Use of SEMS as a BTS was initially discouraged based upon the presumption, sustained by some old reports [77, 78], arguing that the radial stent dilatation force leads to an increase in circulating tumour cells [11] and promotes perineural and linfovascular invasion [79–81], as such affecting aggressive pathological features of the neoplasm. Moreover, a high rate of stent-related perforation and a low technical success rate, probably related to still limited endoscopic expertise, were reported. For all these reasons, the European Society of Gastrointestinal Endoscopy (ESGE) discouraged the use of SEMS as a BTS in 2014 [82].

Stent-related perforations are a real problem, causing acute complications requiring ES and peritoneal tumor spillage. Literature reports a clear correlation between perforation rate and worse oncological long-term outcomes. The Dutch stent trial I, even if intended to evaluate stenting vs. ES as palliation in stage IV colon cancer, was closed due to the high rate of perforation [83]. The second edition of the Dutch trial, designed to evaluate ES vs. stenting as a BTS, reported a 23% perforation rate [84], but in more recent studies, the safety of stent insertion in experienced hands has led to negligible complications with a consensual alignment of the oncologic long term outcomes [44,54,61]. In 2014, van Halsema *et al*. [85] reported less than 8% and in 2022 the CReST Collaborative Group randomized study [61] reported no substantial differences in a 3-year recurrence or mortality, related to a series in which the SEMS-related perforation rate was very low (3.3%). Increasing data in the most recent literature show that BTS, when performed by experienced endoscopists or interventional radiologists, can be performed safely, with a low rate of complications and without negatively affecting oncologic outcomes. Based on these reports, the updated 2020 ESGE guidelines recommend stenting as a BTS as an alternative to ES [82].

What is also well reported in the literature are the clearly better short-term outcomes when comparing a successful SEMS positioning versus an ES [65,86–88], especially in terms of post-procedural pain, return to oral feeding, length of stay and better global QoL. In any case, according to the negative effects due to stent-related complications on short and long-term outcomes, it is mandatory to make a good patient selection and to have a skilled endoscopist.

Patient selection relies on the patient's clinical conditions, with vital signs, abdominal distension and blood tests playing the main role when addressing stenting or ES. Also, a CT scan showing signs of abdominal wall ischaemia (as pneumatosis) is mandatory for surgery, owing to the chance of a resection. Tumor characteristics (especially length and location of the stenosis) are important during patient selection because, in some cases (e.g., tumor located at the splenic flexure or tumor length exceeding 5 cm) risk of perforation and/or clinical failure despite technical success may increase [89]. Therefore, it is appropriate that the decision is discussed and shared with a multidisciplinary team involving a surgeon and a skilled interventional endoscopist. Unfortunately, whereas doctors able to perform diagnostic endoscopy are usually present in any hospital, the same is not true for more complex interventional endoscopic procedures [90]. In the author's opinion, this is the main reason for the slow diffusion of this management in malignant colonic strictures. As hepatobiliary diseases can be managed endoscopically also in a scheduled "hub & spoke" setting [91], the urgent onset of occlusion and the rapidly worsening of the patient's condition usually lead to an ES procedure with DS [2].

To reduce the onset of stent-related complications and to optimize preoperative general, optimal management of cancer patients, even in acute and complex settings, requires a tailored and evidence-based therapeutic approach and nutritional conditions, timing for surgery is suggested about 14 days after stent placement [82,92], even if to date there is still no single choice on the correct surgical timing [87].

Limitations

This study presents several limitations that must be acknowledged. First, the manuscript is based on a single case report, which inherently limits the generalizability and external validity of the observations. As such, the clinical outcomes and procedural considerations discussed cannot be extrapolated to the broader patient population without caution. A single case cannot provide definitive evidence regarding the efficacy or safety profile of SEMS in the setting of malignant bowel obstruction, and must therefore be interpreted just as an option of treatment.

Second, although the manuscript is supported by a narrative review of the literature, the search was conducted solely through the PubMed database. While PubMed is a widely used and reputable resource, reliance on a single database may have led to the omission of relevant studies indexed in

other databases. Consequently, the comprehensiveness of the literature review may be limited.
Third, no formal assessment of study quality or risk of bias was performed for the included articles. In addition, heterogeneity among the studies in terms of design, population characteristics, endpoints, and definitions of outcomes was not systematically evaluated. These factors further limit the strength of any conclusions drawn from the literature analysis. As such, the review should be considered descriptive in nature, rather than a rigorous evidence synthesis.
Future studies, including prospective multi-center analyses and randomized controlled trials, are necessary to better define the role of SEMS in clinical practice and to generate high-quality evidence regarding its short- and long-term outcomes.

Conclusions

We showed a case of a malignant left-sided colonic obstruction managed by stenting as BTS and delayed MIS. The patient had an excellent course with no stenting or surgery-related complications. Probably young age, no comorbidity and endoscopic expertise played an important role in this favorable outcome, at least in the short term. The histology report showed no LV but positive PN invasion, according to an increase in this pathology finding in the literature when an SEMS is used. Otherwise, it is important to state that patients presenting with a CRC-related intestinal occlusion usually have a worse tumor stage, negatively affecting prognosis, and such features should have been present also before stent insertion. Nevertheless, our patient had a short hospital stay in the 2 admissions, could be managed with laparoscopic surgery, had no stoma, early access to adjuvant treatment and is disease-free at the last follow-up.
Furthermore, it is clear that only the endoscopist's expertise can now guarantee a low perforation rate and consequently a lower stoma and higher primary anastomosis rate, lower morbidity and oncological outcomes comparable to ES for this type of procedure.
Concerns deriving from the oncologic long-term outcomes, reported by several studies, represented the main obstacle to the widespread use of stenting, together with the low availability of skilled endoscopists. Nevertheless, the potential advantages of managing an oncologic patient in an elective setting seem to be the main reason to justify all the efforts of the scientific community, and the recently updated ESGE guidelines are the main evidence of this cultural shift.

Availability of Data and Materials

All data generated or analyzed during this study are included in this article and there are no further underlying data necessary to reproduce the results.

Author Contributions

EA, DF and SS have given substantial contributions to the conception and design of the manuscript. EA, LB, DG, GEP, SS and EC contributed to the acquisition, analysis and interpretation of the data. All authors have participated in drafting the manuscript and EA contributed to the critical revision of the manuscript for important intellectual content. All authors read and approved the final version of the manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

No ethical approval was needed, while notified consent was obtained from the patient. The study conformed to the provisions of the Declaration of Helsinki.

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Conflict of Interest

The authors declare no conflict of interest.

Supplementary Material

Supplementary material associated with this article can be found, in the online version, at https://doi.org/10.62713/aic.3894.

References

[1] Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, *et al*. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. CA: a Cancer Journal for Clinicians. 2021; 71: 209–249. https://doi.org/10.3322/caac.21660.

[2] Rocca A, Avella P, Scacchi A, Brunese MC, Cappuccio M, De Rosa M, *et al*. Robotic *versus* open resection for colorectal liver metastases in a "referral centre Hub&Spoke learning program". A multicenter propensity score matching analysis of perioperative outcomes. Heliyon. 2024; 10: e24800. https://doi.org/10.1016/j.heliyon.2024.e24800.

[3] Cao Y, Gu J, Deng S, Li J, Wu K, Cai K. Long-term tumour outcomes of self-expanding metal stents as 'bridge to surgery' for the treatment of colorectal cancer with malignant obstruction: a systematic review and meta-analysis. International Journal of Colorectal Disease. 2019; 34: 1827–1838. https://doi.org/10.1007/s00384-019-03372-5.

[4] Coccolini F, Mazzoni A, Cremonini C, Cobuccio L, Pucciarelli M, Vetere G, *et al*. Colorectal neoplastic emergencies in immunocompromised patients: preliminary result from the Web-based International Register of Emergency Surgery and Trauma (WIRES-T trial). Updates in Surgery. 2023; 75: 1579–1587. https://doi.org/10.1007/s13304-023-01521-8.

[5] Aldrighetti L, Boggi U, Falconi M, Giuliante F, Cipriani F, Ratti F, *et al*. Perspectives from Italy during the COVID-19 pandemic: nationwide survey-based focus on minimally invasive HPB surgery.

Updates in Surgery. 2020; 72: 241–247. https://doi.org/10.1007/s13304-020-00815-5.

[6] Frago R, Ramirez E, Millan M, Kreisler E, del Valle E, Biondo S. Current management of acute malignant large bowel obstruction: a systematic review. American Journal of Surgery. 2014; 207: 127–138. https://doi.org/10.1016/j.amjsurg.2013.07.027.

[7] Marcellinaro R, Rocca A, Avella P, Grieco M, Spoletini D, Carlini M. How aging may impact the failure to rescue after colorectal laparoscopic surgery. Analysis of 1000 patients in a single high-volume center. Updates in Surgery. 2025; 10.1007/s13304–10.1007/s13304–025–02173–6. https://doi.org/10.1007/s13304-025-02173-6.

[8] Manigrasso M, Musella M, Elmore U, Allaix ME, Bianchi PP, Biondi A, *et al*. Safety and efficacy of totally minimally invasive right colectomy in the obese patients: a multicenter propensity score-matched analysis. Updates in Surgery. 2022; 74: 1281–1290. https://doi.org/10.1007/s13304-022-01298-2.

[9] Costa G, Frezza B, Fransvea P, Massa G, Ferri M, Mercantini P, *et al*. Clinico-pathological Features of Colon Cancer Patients Undergoing Emergency Surgery: A Comparison Between Elderly and Non-elderly Patients. Open Medicine (Warsaw, Poland). 2019; 14: 726–734. https://doi.org/10.1515/med-2019-0082.

[10] Zeng H, Lan Q, Li F, Xu D, Lin S. Comparison of the short-term and long-term outcomes of three different types of inferior mesenteric artery ligation in left colonic and rectal cancers: a network meta-analysis. Updates in Surgery. 2023; 75: 2085–2102. https://doi.org/10.1007/s13304-023-01631-3.

[11] Ziani H, Nasri S, Kamaoui I, Skiker I. An unusual case of diastatic perforation of the transverse colon: Case report and literature review. Radiology Case Reports. 2024; 19: 2434–2437. https://doi.org/10.1016/j.radcr.2024.02.109.

[12] McHugh FT, Ryan ÉJ, Ryan OK, Tan J, Boland PA, Whelan MC, *et al*. Management Strategies for Malignant Left-Sided Colonic Obstruction: A Systematic Review and Network Meta-analysis of Randomized Controlled Trials and Propensity Score Matching Studies. Diseases of the Colon and Rectum. 2024; 67: 878–894. https://doi.org/10.1097/DCR.0000000000003256.

[13] Kim DH, Lee HH. Colon stenting as a bridge to surgery in obstructive colorectal cancer management. Clinical Endoscopy. 2024; 57: 424–433. https://doi.org/10.5946/ce.2023.138.

[14] Sekioka A, Ota S, Ito T, Mizukami Y, Tsuboi K, Okamura M, *et al*. Long-Term Outcomes of Self-Expandable Metallic Stents as a Bridge to Surgery for Obstructive and Symptomatic Primary Tumors of Stage IV Colorectal Cancer: A Propensity-Score Analysis. Journal of Laparoendoscopic & Advanced Surgical Techniques. Part a. 2024; 34: 561–567. https://doi.org/10.1089/lap.2024.0050.

[15] Dohmoto M. New Method: Endoscopic Implantation of Rectal Stent in Palliative Treatment of Malignant Stenosis. Endoscopy Digestive. 1991; 3: 1507–1512.

[16] Giordano A, Podda M, Montori G, Botteri E, Fugazzola P, Ortenzi M, *et al*. Colonic Resection, Stoma, or Self-expanding Metal Stents for Obstructive Left Colon Cancer: the CROSCO-1 study protocol. Minerva Surgery. 2024; 79: 7–14. https://doi.org/10.23736/S2724-5691.23.09969-0.

[17] Mu C, Chen L. A retrospective evaluation of short-term results from colonic stenting as a bridge to elective surgery versus emergency surgery for malignant colonic obstruction. Scientific Reports. 2023; 13: 1600. https://doi.org/10.1038/s41598-023-28685-y.

[18] Tejero E, Mainar A, Fernández L, Tobío R, De Gregorio MA. New procedure for the treatment of colorectal neoplastic obstructions. Diseases of the Colon and Rectum. 1994; 37: 1158–1159. https://doi.org/10.1007/BF02049822.

[19] Gianotti L, Tamini N, Nespoli L, Rota M, Bolzonaro E, Frego R, *et al*. A prospective evaluation of short-term and long-term results from colonic stenting for palliation or as a bridge to elective operation versus immediate surgery for large-bowel obstruction. Surgical Endoscopy. 2013; 27: 832–842. https://doi.org/10.1007/s00464-012-2520-0.

[20] Alcantara M, Serra X, Bombardó J, Falcó J, Perandreu J, Ayguavives I, *et al*. Colorectal stenting as an effective therapy for preoperative and palliative treatment of large bowel obstruction: 9 years' experience. Techniques in Coloproctology. 2007; 11: 316–322. https://doi.org/10.1007/s10151-007-0372-8.

[21] Martinez-Santos C, Lobato RF, Fradejas JM, Pinto I, Ortega-Deballón P, Moreno-Azcoita M. Self-expandable stent before elective surgery vs. emergency surgery for the treatment of malignant colorectal obstructions: comparison of primary anastomosis and morbidity rates. Diseases of the Colon and Rectum. 2002; 45: 401–406. https://doi.org/10.1007/s10350-004-6190-4.

[22] Ng KC, Law WL, Lee YM, Choi HK, Seto CL, Ho JWC. Self-expanding metallic stent as a bridge to surgery versus emergency resection for obstructing left-sided colorectal cancer: a case-matched study. Journal of Gastrointestinal Surgery: Official Journal of the Society for Surgery of the Alimentary Tract. 2006; 10: 798–803. https://doi.org/10.1016/j.gassur.2006.02.006.

[23] Dastur JK, Forshaw MJ, Modarai B, Solkar MM, Raymond T, Parker MC. Comparison of short-and long-term outcomes following either insertion of self-expanding metallic stents or emergency surgery in malignant large bowel obstruction. Techniques in Coloproctology. 2008; 12: 51–55. https://doi.org/10.1007/s10151-008-0399-5.

[24] Cheung HYS, Chung CC, Tsang WWC, Wong JCH, Yau KKK, Li MKW. Endolaparoscopic approach vs conventional open surgery in the treatment of obstructing left-sided colon cancer: a randomized controlled trial. Archives of Surgery (Chicago, Ill.: 1960). 2009; 144: 1127–1132. https://doi.org/10.1001/archsurg.2009.216.

[25] Pirlet IA, Slim K, Kwiatkowski F, Michot F, Millat BL. Emergency preoperative stenting versus surgery for acute left-sided malignant colonic obstruction: a multicenter randomized controlled trial. Surgical Endoscopy. 2011; 25: 1814–1821. https://doi.org/10.1007/s00464-010-1471-6.

[26] van Hooft JE, Bemelman WA, Oldenburg B, Marinelli AW, Lutke Holzik MF, Grubben MJ, *et al*. Colonic stenting versus emergency surgery for acute left-sided malignant colonic obstruction: a multicentre randomised trial. The Lancet. Oncology. 2011; 12: 344–352. https://doi.org/10.1016/S1470-2045(11)70035-3.

[27] Guo MG, Feng Y, Zheng Q, Di JZ, Wang Y, Fan YB, *et al*. Comparison of self-expanding metal stents and urgent surgery for left-sided malignant colonic obstruction in elderly patients. Digestive Diseases and Sciences. 2011; 56: 2706–2710. https://doi.org/10.1007/s10620-011-1648-4.

[28] Ho KS, Quah HM, Lim JF, Tang CL, Eu KW. Endoscopic stenting and elective surgery versus emergency surgery for left-sided malignant colonic obstruction: a prospective randomized trial. International Journal of Colorectal Disease. 2012; 27: 355–362. https://doi.org/10.1007/s00384-011-1331-4.

[29] Sabbagh C, Browet F, Diouf M, Cosse C, Brehant O, Bartoli E, *et al*. Is stenting as "a bridge to surgery" an oncologically safe strategy for the management of acute, left-sided, malignant, colonic obstruction? A comparative study with a propensity score analysis. Annals of Surgery. 2013; 258: 107–115. https://doi.org/10.1097/SLA.0b013e31827e30ce.

[30] Gorissen KJ, Tuynman JB, Fryer E, Wang L, Uberoi R, Jones OM, *et al*. Local recurrence after stenting for obstructing left-sided colonic cancer. The British Journal of Surgery. 2013; 100: 1805–1809. https://doi.org/10.1002/bjs.9297.

[31] Lee GJ, Kim HJ, Baek JH, Lee WS, Kwon KA. Comparison of short-term outcomes after elective surgery following endoscopic stent insertion and emergency surgery for obstructive colorectal cancer. International Journal of Surgery (London, England). 2013; 11: 442–446. https://doi.org/10.1016/j.ijsu.2013.04.010.

[32] Kim HJ, Huh JW, Kang WS, Kim CH, Lim SW, Joo YE, *et al*. Oncologic safety of stent as bridge to surgery compared to emer-

gency radical surgery for left-sided colorectal cancer obstruction. Surgical Endoscopy. 2013; 27: 3121–3128. https://doi.org/10.1007/s00464-013-2865-z.

[33] Shigeta K, Baba H, Yamafuji K, Kaneda H, Katsura H, Kubochi K. Outcomes for patients with obstructing colorectal cancers treated with one-stage surgery using transanal drainage tubes. Journal of Gastrointestinal Surgery: Official Journal of the Society for Surgery of the Alimentary Tract. 2014; 18: 1507–1513. https://doi.org/10.1007/s11605-014-2541-1.

[34] van den Berg MW, Sloothaak DAM, Dijkgraaf MGW, van der Zaag ES, Bemelman WA, Tanis PJ, *et al*. Bridge-to-surgery stent placement versus emergency surgery for acute malignant colonic obstruction. The British Journal of Surgery. 2014; 101: 867–873. https://doi.org/10.1002/bjs.9521.

[35] Quereshy FA, Poon JTC, Law WL. Long-term outcome of stenting as a bridge to surgery for acute left-sided malignant colonic obstruction. Colorectal Disease: the Official Journal of the Association of Coloproctology of Great Britain and Ireland. 2014; 16: 788–793. https://doi.org/10.1111/codi.12666.

[36] Kim SJ, Kim HW, Park SB, Kang DH, Choi CW, Song BJ, *et al*. Colonic perforation either during or after stent insertion as a bridge to surgery for malignant colorectal obstruction increases the risk of peritoneal seeding. Surgical Endoscopy. 2015; 29: 3499–3506. https://doi.org/10.1007/s00464-015-4100-6.

[37] Tanis PJ, Paulino Pereira NR, van Hooft JE, Consten ECJ, Bemelman WA, Dutch Surgical Colorectal Audit. Resection of Obstructive Left-Sided Colon Cancer at a National Level: A Prospective Analysis of Short-Term Outcomes in 1,816 Patients. Digestive Surgery. 2015; 32: 317–324. https://doi.org/10.1159/000433561.

[38] Kwak MS, Kim WS, Lee JM, Yang DH, Yoon YS, Yu CS, *et al*. Does Stenting as a Bridge to Surgery in Left-Sided Colorectal Cancer Obstruction Really Worsen Oncological Outcomes? Diseases of the Colon and Rectum. 2016; 59: 725–732. https://doi.org/10.1097/DCR.0000000000000631.

[39] Öistämö E, Hjern F, Blomqvist L, Falkén Y, Pekkari K, Abraham-Nordling M. Emergency management with resection versus proximal stoma or stent treatment and planned resection in malignant left-sided colon obstruction. World Journal of Surgical Oncology. 2016; 14: 232. https://doi.org/10.1186/s12957-016-0994-2.

[40] Min CK, Kim HO, Lee D, Jung KU, Lee SR, Kim H, *et al*. Obstructive Left Colon Cancer Should Be Managed by Using a Subtotal Colectomy Instead of Colonic Stenting. Annals of Coloproctology. 2016; 32: 215–220. https://doi.org/10.3393/ac.2016.32.6.215.

[41] Ribeiro I, Pinho R, Leite M, Proença L, Silva J, Ponte A, *et al*. Reevaluation of Self-Expanding Metal Stents as a Bridge to Surgery for Acute Left-Sided Malignant Colonic Obstruction: Six Years Experience. GE Portuguese Journal of Gastroenterology. 2016; 23: 76–83. https://doi.org/10.1016/j.jpge.2016.01.003.

[42] Amelung FJ, Ter Borg F, Consten ECJ, Siersema PD, Draaisma WA. Deviating colostomy construction versus stent placement as bridge to surgery for malignant left-sided colonic obstruction. Surgical Endoscopy. 2016; 30: 5345–5355. https://doi.org/10.1007/s00464-016-4887-9.

[43] Ho KM, Chan KM, Kwok SY, Lau PYY. Colonic self-expanding metal stent (SEMS) as a bridge to surgery in left-sided malignant colonic obstruction: an 8-year review. Surgical Endoscopy. 2017; 31: 2255–2262. https://doi.org/10.1007/s00464-016-5227-9.

[44] Arezzo A, Balague C, Targarona E, Borghi F, Giraudo G, Ghezzo L, *et al*. Colonic stenting as a bridge to surgery versus emergency surgery for malignant colonic obstruction: results of a multicentre randomised controlled trial (ESCO trial). Surgical Endoscopy. 2017; 31: 3297–3305. https://doi.org/10.1007/s00464-016-5362-3.

[45] Kim MK, Kye BH, Lee IK, Oh ST, Ahn CH, Lee YS, *et al*. Outcome of bridge to surgery stenting for obstructive left colon cancer. ANZ Journal of Surgery. 2017; 87: E245–E250. https://doi.org/10.1111/ans.13525.

[46] Park J, Lee HJ, Park SJ, Hur H, Min BS, Cheon JH, *et al*. Long-term outcomes after stenting as a bridge to surgery in patients with obstructing left-sided colorectal cancer. International Journal of Colorectal Disease. 2018; 33: 799–807. https://doi.org/10.1007/s00384-018-3009-7.

[47] Kawachi J, Kashiwagi H, Shimoyama R, Isogai N, Fukai R, Miyake K, *et al*. Comparison of efficacies of the self-expandable metallic stent versus transanal drainage tube and emergency surgery for malignant left-sided colon obstruction. Asian Journal of Surgery. 2018; 41: 498–505. https://doi.org/10.1016/j.asjsur.2017.06.003.

[48] Veld JV, Amelung FJ, Borstlap WAA, Eise van Halsema E, Consten ECJ, Siersema PD, *et al*. Changes in Management of Left-Sided Obstructive Colon Cancer: National Practice and Guideline Implementation. Journal of the National Comprehensive Cancer Network: JNCCN. 2019; 17: 1512–1520. https://doi.org/10.6004/jnccn.2019.7326.

[49] Lara-Romero C, Vilches Á, Caunedo-Álvarez Á, Hergueta-Delgado P, Lavín-Castejón I, Andrade-Bellido R, *et al*. Better recurrence-free survival after stent bridge to surgery compared to emergency surgery for obstructive left-sided colonic cancer in patients with stage III status of the American Joint Committee on Cancer (AJCC): a bicentric retrospective study. International Journal of Colorectal Disease. 2019; 34: 1241–1250. https://doi.org/10.1007/s00384-019-03318-x.

[50] Rodrigues-Pinto E, Morais R, Coelho C, Pereira P, Repici A, Macedo G. Bridge-to-surgery versus emergency surgery in the management of left-sided acute malignant colorectal obstruction - Efficacy, safety and long-term outcomes. Digestive and Liver Disease: Official Journal of the Italian Society of Gastroenterology and the Italian Association for the Study of the Liver. 2019; 51: 364–372. https://doi.org/10.1016/j.dld.2018.11.006.

[51] Morita S, Yamamoto K, Ogawa A, Naito A, Mizuno H, Yoshioka S, *et al*. Benefits of using a self-expandable metallic stent as a bridge to surgery for right- and left-sided obstructive colorectal cancers. Surgery Today. 2019; 49: 32–37. https://doi.org/10.1007/s00595-018-1701-4.

[52] Zhang JR, Hou P, Liao TR, Wei Y, Chen XQ, Lin BQ. Do Self-Expanding Metal Stents as a Bridge to Surgery Benefit All Patients with Obstructive Left-Side Colorectal Cancers? Gastroenterology Research and Practice. 2019; 2019: 7418348. https://doi.org/10.1155/2019/7418348.

[53] Han L, Song X, Yu B, Zhou M, Zhang L, Sun G. Safety evaluation of preoperative stent insertion and clinical analysis on comparison of outcomes between preoperative stent insertion and emergency surgery in the treatment of obstructive left-sided colorectal cancer. Pakistan Journal of Medical Sciences. 2020; 36: 376–381. https://doi.org/10.12669/pjms.36.3.1707.

[54] Arezzo A, Forcignanò E, Bonino MA, Balagué C, Targarona E, Borghi F, *et al*. Long-term Oncologic Results After Stenting as a Bridge to Surgery Versus Emergency Surgery for Malignant Left-sided Colonic Obstruction: A Multicenter Randomized Controlled Trial (ESCO Trial). Annals of Surgery. 2020; 272: 703–708. https://doi.org/10.1097/SLA.0000000000004324.

[55] Lovero R, Losurdo G, La Fortezza RF, Spirito F, Di Leo A, Andriulli A, *et al*. Endoscopic stenting for colorectal cancer obstruction as a bridge-to-surgery strategy. European Journal of Clinical Investigation. 2020; e13252. https://doi.org/10.1111/eci.13252.

[56] Jung WB, Shin JY, Park JK. Comparison of short-term outcome between diverting colostomy and colonic stent as a bridge to surgery for left colonic malignant obstruction. Medicine. 2020; 99: e19557. https://doi.org/10.1097/MD.0000000000019557.

[57] Katsuki R, Jo T, Yasunaga H, Ishimaru M, Sakamoto T. Outcomes of self-expandable metal stent as bridge to surgery versus emergency surgery for left-sided obstructing colon cancer: A retrospective cohort study. American Journal of Surgery. 2021; 221: 168–173. https://doi.org/10.1016/j.amjsurg.2020.06.012.

[58] Cao Y, Chen Q, Ni Z, Wu F, Huang C, Zhou J, *et al*. Propensity score-matched comparison of stenting as a bridge to surgery and emergency surgery for acute malignant left-sided colonic obstruction. BMC Surgery. 2021; 21: 148. https://doi.org/10.1186/s12893-021-01144-z.

[59] Khomvilai S, Pattarajierapan S. Comparison of long-term outcomes of colonic stenting as a "bridge to surgery" and emergency surgery in patients with left-sided malignant colonic obstruction. Annals of Coloproctology. 2023; 39: 17–26. https://doi.org/10.3393/ac.2021.00227.0032.

[60] Endo S, Kumamoto K, Enomoto T, Koizumi K, Kato H, Saida Y. Comparison of survival and perioperative outcome of the colonic stent and the transanal decompression tube placement and emergency surgery for left-sided obstructive colorectal cancer: a retrospective multi-center observational study "The CODOMO study". International Journal of Colorectal Disease. 2021; 36: 987–998. https://doi.org/10.1007/s00384-020-03806-5.

[61] CReST Collaborative Group. Colorectal Endoscopic Stenting Trial (CReST) for obstructing left-sided colorectal cancer: randomized clinical trial. The British Journal of Surgery. 2022; 109: 1073–1080. https://doi.org/10.1093/bjs/znac141.

[62] Sagar J. Colorectal stents for the management of malignant colonic obstructions. The Cochrane Database of Systematic Reviews. 2011; 2011: CD007378. https://doi.org/10.1002/14651858.CD007378.pub2.

[63] Marcellinaro R, Grieco M, Spoletini D, Troiano R, Avella P, Brachini G, *et al*. How to reduce the colorectal anastomotic leakage? The MIRACLe protocol experience in a cohort in a single high-volume centre. Updates in Surgery. 2023; 75: 1559–1567. https://doi.org/10.1007/s13304-023-01588-3.

[64] Pisano M, Zorcolo L, Merli C, Cimbanassi S, Poiasina E, Ceresoli M, *et al*. 2017 WSES guidelines on colon and rectal cancer emergencies: obstruction and perforation. World Journal of Emergency Surgery: WJES. 2018; 13: 36. https://doi.org/10.1186/s13017-018-0192-3.

[65] Cirocchi R, Arezzo A, Sapienza P, Crocetti D, Cavaliere D, Solaini L, *et al*. Current Status of the Self-Expandable Metal Stent as a Bridge to Surgery Versus Emergency Surgery in Colorectal Cancer: Results from an Updated Systematic Review and Meta-Analysis of the Literature. Medicina (Kaunas, Lithuania). 2021; 57: 268. https://doi.org/10.3390/medicina57030268.

[66] Veld JV, Amelung FJ, Borstlap WAA, van Halsema EE, Consten ECJ, Siersema PD, *et al*. Comparison of Decompressing Stoma vs Stent as a Bridge to Surgery for Left-Sided Obstructive Colon Cancer. JAMA Surgery. 2020; 155: 206–215. https://doi.org/10.1001/jamasurg.2019.5466.

[67] Fugazzola P, Ceresoli M, Coccolini F, Gabrielli F, Puzziello A, Monzani F, *et al*. The WSES/SICG/ACOI/SICUT/AcEMC/SIFIPAC guidelines for diagnosis and treatment of acute left colonic diverticulitis in the elderly. World Journal of Emergency Surgery: WJES. 2022; 17: 5. https://doi.org/10.1186/s13017-022-00408-0.

[68] Avella P, Spiezia S, Rotondo M, Cappuccio M, Scacchi A, Inglese G, *et al*. Real-Time Navigation in Liver Surgery Through Indocyanine Green Fluorescence: An Updated Analysis of Worldwide Protocols and Applications. Cancers. 2025; 17: 872. https://doi.org/10.3390/cancers17050872.

[69] Su H, Wu H, Bao M, Luo S, Wang X, Zhao C, *et al*. Indocyanine green fluorescence imaging to assess bowel perfusion during totally laparoscopic surgery for colon cancer. BMC Surgery. 2020; 20: 102. https://doi.org/10.1186/s12893-020-00745-4.

[70] Loire M, Bridoux V, Mege D, Mathonnet M, Mauvais F, Massonnaud C, *et al*. Long-term outcomes of Hartmann's procedure versus primary anastomosis for generalized peritonitis due to perforated diverticulitis: follow-up of a prospective multicenter randomized trial (DIVERTI). International Journal of Colorectal Disease. 2021; 36: 2159–2164. https://doi.org/10.1007/s00384-021-03962-2.

[71] Musella M, Velotti N, Schiavone V, Franzese A, D'Amato G, Bartolini C, *et al*. Lesson learned from bariatric surgery: Preventing intra- and perioperative complications in patients with obesity undergoing laparoscopic adrenalectomy: Role of ketogenic preoperative diet: A propensity score matching analysis of a single-center experience. Surgery. 2025; 181: 109147. https://doi.org/10.1016/j.surg.2024.109147.

[72] Mirza KL, Wickham CJ, Noren ER, Hwang GS, Ault GT, Ortega AE, *et al*. Outcomes of colostomy takedown following Hartmann's procedure: successful restoration of continuity comes with a high risk of morbidity. Colorectal Disease: the Official Journal of the Association of Coloproctology of Great Britain and Ireland. 2021; 23: 967–974. https://doi.org/10.1111/codi.15456.

[73] Mege D, Sabbagh C, Manceau G, Bridoux V, Lakkis Z, Momar D, *et al*. What is the Best Option Between Primary Diverting Stoma or Endoscopic Stent as a Bridge to Surgery with a Curative Intent for Obstructed Left Colon Cancer? Results from a Propensity Score Analysis of the French Surgical Association Multicenter Cohort of 518 Patients. Annals of Surgical Oncology. 2019; 26: 756–764. https://doi.org/10.1245/s10434-018-07139-0.

[74] Amelung FJ, Borstlap WAA, Consten ECJ, Veld JV, van Halsema EE, Bemelman WA, *et al*. Propensity score-matched analysis of oncological outcome between stent as bridge to surgery and emergency resection in patients with malignant left-sided colonic obstruction. The British Journal of Surgery. 2019; 106: 1075–1086. https://doi.org/10.1002/bjs.11172.

[75] Amelung FJ, de Guerre LEVM, Consten ECJ, Kist JW, Verheijen PM, Broeders IAMJ, *et al*. Incidence of and risk factors for stoma-site incisional herniation after reversal. BJS Open. 2018; 2: 128–134. https://doi.org/10.1002/bjs5.48.

[76] Bhangu A, Nepogodiev D, Futaba K, West Midlands Research Collaborative. Systematic review and meta-analysis of the incidence of incisional hernia at the site of stoma closure. World Journal of Surgery. 2012; 36: 973–983. https://doi.org/10.1007/s00268-012-1474-7.

[77] Maruthachalam K, Lash GE, Shenton BK, Horgan AF. Tumour cell dissemination following endoscopic stent insertion. The British Journal of Surgery. 2007; 94: 1151–1154. https://doi.org/10.1002/bjs.5790.

[78] Ishibashi R, Yoshida S, Odawara N, Kishikawa T, Kondo R, Nakada A, *et al*. Detection of circulating colorectal cancer cells by a custom microfluid system before and after endoscopic metallic stent placement. Oncology Letters. 2019; 18: 6397–6404. https://doi.org/10.3892/ol.2019.11047.

[79] Kang SI, Oh HK, Yoo JS, Ahn S, Kim MH, Kim MJ, *et al*. Oncologic outcomes of preoperative stent insertion first versus immediate surgery for obstructing left-sided colorectal cancer. Surgical Oncology. 2018; 27: 216–224. https://doi.org/10.1016/j.suronc.2018.04.002.

[80] Hyun MH, Lee CH, Kim HJ, Tong Y, Park SS. Systematic review and meta-analysis of robotic surgery compared with conventional laparoscopic and open resections for gastric carcinoma. The British Journal of Surgery. 2013; 100: 1566–1578. https://doi.org/10.1002/bjs.9242.

[81] Haraguchi N, Ikeda M, Miyake M, Yamada T, Sakakibara Y, Mita E, *et al*. Colonic stenting as a bridge to surgery for obstructive colorectal cancer: advantages and disadvantages. Surgery Today. 2016; 46: 1310–1317. https://doi.org/10.1007/s00595-016-1333-5.

[82] van Hooft JE, Veld JV, Arnold D, Beets-Tan RGH, Everett S, Götz M, *et al*. Self-expandable metal stents for obstructing colonic and extracolonic cancer: European Society of Gastrointestinal Endoscopy (ESGE) Guideline - Update 2020. Endoscopy. 2020; 52: 389–407. https://doi.org/10.1055/a-1140-3017.

[83] van Hooft JE, Fockens P, Marinelli AW, Timmer R, van Berkel AM, Bossuyt PM, *et al*. Early closure of a multicenter randomized clinical trial of endoscopic stenting versus surgery for stage IV left-sided colorectal cancer. Endoscopy. 2008; 40: 184–191.

https://doi.org/10.1055/s-2007-995426.
[84] Slothaak DAM, van den Berg MW, Dijkgraaf MGW, Fockens P, Tanis PJ, van Hooft JE, *et al*. Oncological outcome of malignant colonic obstruction in the Dutch Stent-In 2 trial. The British Journal of Surgery. 2014; 101: 1751–1757. https://doi.org/10.1002/bjs.9645.
[85] van Halsema EE, van Hooft JE, Small AJ, Baron TH, García-Cano J, Cheon JH, *et al*. Perforation in colorectal stenting: a meta-analysis and a search for risk factors. Gastrointestinal Endoscopy. 2014; 79: 970–82.e7; quiz 983.e2, 983.e5. https://doi.org/10.1016/j.gie.2013.11.038.
[86] Pattarajierapan S, Sukphol N, Junmitsakul K, Khomvilai S. Oncologic safety of colonic stenting as a bridge to surgery in left-sided malignant colonic obstruction: Current evidence and prospects. World Journal of Clinical Oncology. 2022; 13: 943–956. https://doi.org/10.5306/wjco.v13.i12.943.
[87] Russo S, Conigliaro R, Coppini F, Dell'Aquila E, Grande G, Pigò F, *et al*. Acute left-sided malignant colonic obstruction: Is there a role for endoscopic stenting? World Journal of Clinical Oncology. 2023; 14: 190–197. https://doi.org/10.5306/wjco.v14.i5.190.
[88] Yagawa Y, Kudo SE, Miyachi H, Mori Y, Misawa M, Sato Y, *et al*. Short- and long-term outcomes of self-expanding metallic stent placement vs. emergency surgery for malignant colorectal obstruction. Molecular and Clinical Oncology. 2021; 14: 63. https://doi.org/10.3892/mco.2021.2225.
[89] Kuwai T, Yamaguchi T, Imagawa H, Yoshida S, Isayama H, Matsuzawa T, *et al*. Factors related to difficult self-expandable metallic stent placement for malignant colonic obstruction: A post-hoc analysis of a multicenter study across Japan. Digestive Endoscopy: Official Journal of the Japan Gastroenterological Endoscopy Society. 2019; 31: 51–58. https://doi.org/10.1111/den.13260.
[90] Yang D, Wagh MS, Draganov PV. The status of training in new technologies in advanced endoscopy: from defining competence to credentialing and privileging. Gastrointestinal Endoscopy. 2020; 92: 1016–1025. https://doi.org/10.1016/j.gie.2020.05.047.
[91] Rocca A, Avella P, Bianco P, Brunese MC, Angelini P, Guerra G, *et al*. Propensity score matching analysis of perioperative outcomes during Hub&Spoke training program in hepato-biliary surgery. Scientific Reports. 2025; 15: 10743. https://doi.org/10.1038/s41598-025-93781-0.
[92] Lee JM, Byeon JS. Colorectal Stents: Current Status. Clinical Endoscopy. 2015; 48: 194–200. https://doi.org/10.5946/ce.2015.48.3.194.