Ann Surg Oncol (2019) 26:756–764
https://doi.org/10.1245/s10434-018-07139-0

Annals of
SURGICAL ONCOLOGY
OFFICIAL JOURNAL OF THE SOCIETY OF SURGICAL ONCOLOGY

ORIGINAL ARTICLE – COLORECTAL CANCER

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

Diane Mege, MD, PhD[1], Charles Sabbagh, MD, PhD[2], Gilles Manceau, MD, PhD[3], Valérie Bridoux, MD, PhD[4], Zaher Lakkis, MD, PhD[5], Diouf Momar, PhD[6], Igor Sielezneff, MD, PhD[1], and Mehdi Karoui, MD, PhD[3]
813
on behalf of the AFC (French Surgical Association) Working Group

[1]Department of Digestive Surgery, Timone University Hospital, Marseille, France; [2]Department of Digestive Surgery, Amiens University Hospital, Amiens, France; [3]Sorbonne University, Assistance Publique Hôpitaux de Paris, Department of Digestive and Hepato-Pancreato-Biliary Surgery, Pitié-Salpêtrière University Hospital, Paris, France; [4]Department of Digestive Surgery, Charles Nicolle University Hospital, Rouen, France; [5]Department of Digestive Surgery, Besançon University Hospital, Besançon, France; [6]Department of Clinical Research and Innovation, Amiens University Hospital, Amiens, France

ABSTRACT

Background. Endoscopic stent (ES) as a bridge to surgery in obstructed left colon cancer (OLCC) is controversial. Our goal was to compare the operative and oncological results of primary diverting colostomy (PDC) and ES for the curative treatment of OLCC.

Methods. Between 2000 and 2015, patients who underwent PDC or ES in a curative intent for OLCC at member centers of the French Surgical Association were included. Patients with unresectable tumors and/or synchronous metastases were excluded. Comparisons between the two groups were performed after ponderation with propensity score for: demographic and tumor characteristics, operative, and oncological results.

Results. A total of 518 patients were included: PDC (n = 327); ES (n = 191). The demographic characteristics were similar between the groups. ES failed in 23% of the patients (11% perforation). Cumulative tumor resection rates were 80% and 86% after PDC and ES, respectively (p = 0.049). The rates of primary anastomosis were 57% in the PDC group and 40% in the ES group ($p < 0.0001$). The permanent stoma rates were similar between the two groups (29% vs. 28%, p = 0.0586). Cumulative overall, surgical, and medical complications were significantly higher in PDC group. The resected tumors were significantly smaller and less frequently perforated and metastatic in the PDC group. The median overall survival was significantly higher after PDC (123.6 vs. 58.5 months, p = 0.046), whereas the median disease-free survival was similar between the two groups (54.1 vs. 53.6 months, p = 0.646).

Conclusions. Although endoscopic stenting is associated with better surgical outcomes than diverting stoma, it may negatively impact histological features and overall survival.

Electronic supplementary material The online version of this article (https://doi.org/10.1245/s10434-018-07139-0) contains supplementary material, which is available to authorized users.

First Received: 13 August 2018;
Published Online: 8 January 2019

M. Karoui, MD, PhD[3]

e-mail: mehdi.karoui@aphp.fr

Surgical management of obstructive left colon cancer (OLCC) is still a matter of debate, and several options may be discussed, including primary diverting colostomy (PDC) as a bridge to elective colectomy, Hartmann's procedure, segmental colectomy with primary anastomosis with or without intraoperative colonic irrigation and total or

subtotal colectomy with anastomosis.[1] The use of an endoscopic stent (ES) has been developed as a bridge to surgery and it has given the same advantages than PDC: initial decompression of the colon with low postoperative morbidity, optimization of the patient's condition, adequate oncological staging, and secondary elective resection of the primary tumor with anastomosis. However, conflicting results have been reported in randomized trials, and some of them have been stopped before the end of the inclusion period due to ES related morbidity.[2–6] In contrast, some meta-analyses reported that ES was associated with lower postoperative mortality and stoma rates.[7–9] The recent French and European guidelines state that ES is not indicated as an curative intent but can be an option in obstructed palliative patients.[10,11] ES as a bridge to surgery has been associated with poor oncological results compared to primary resection.[12–14] However, two recent retrospective series have reported that ES is as safe and efficient as PDC in the treatment of OLCC in palliative or curative intents.[15,16]

The goal of our large, multicenter, retrospective French study therefore is to compare the postoperative and oncological results of PDC with those of ES in the curative treatment of OLCC. To minimize biases related to the retrospective nature of the present cohort study, we used a propensity score analysis.

PATIENTS AND METHODS

Study Population

All consecutive patients treated for OLCC by PDC or ES in a curative intent between January 2000 and December 2015 were included in this retrospective, multicenter cohort study that included a propensity score analysis. Patients were identified from institutional review board-approved databases in French member centers of the French Surgical Association. The diagnosis of colonic obstruction was established in patients with clinical symptoms of intestinal obstruction and was confirmed by abdominal X-ray, as performed in the early 2000s, and/or abdominal computed tomography (CT).

Inclusion and Exclusion Criteria

All patients managed in a curative intent for OLCC by PDC or ES were included in this study. The decision between ES or PDC was performed in each center according to the surgeon's preference or according to the availability and expertise of gastroenterologists. Patients managed in a curative intent who underwent a surgical resection at the first step or who presented with a complicated form of OLCC (i.e., peritonitis, diastatic perforation of the cecum, colonic ischemia, etc.), and patients managed in a palliative intent were not included in the study. Colonic stent insertion was performed by experienced gastroenterologists endoscopically and under fluoroscopic control without prior dilatation.

Endpoints

The endpoints of comparison between the groups were as follows: the rate of elective tumor resection; the rates of primary anastomosis and permanent stoma; the overall postoperative morbidity, mortality and length of stay; the access to postoperative chemotherapy when indicated; the pathological data; and the overall and disease-free survival.

Collected Data

Data from the medical records included: demographic data, obstruction characteristics, secondary elective surgery, postoperative outcomes, pathological results, and long-term oncological outcomes.

Definitions

AFC Score The AFC score was defined by the presence of one or several following predictive factors for postoperative mortality: emergency surgery, body weight loss $> 10\%$, neurologic comorbidity, and an age older than 70 years.[17]

Palliative Intent Patients for whom the resection of the primary tumor was not considered, those who had unresectable synchronous metastasis (defined by each investigator in each center), and those for whom the resectability of the metastasis was not clear were considered palliative and were not included in the present study.

Postoperative Morbidity Postoperative morbidity was defined as any complication occurring during the hospital stay or within 30 days after surgery. Complications were classified according to Clavien–Dindo.[18] Severe complications were defined as those requiring surgical or radiological intervention (Dindo III) and life-threatening complications requiring intensive care management (Dindo IV).

Survival Overall survival was defined from the period of time between the date of diversion or the date of stent placement and the date of death for any cause. For the nonmetastatic patients, disease-free survival was defined as

the period of time between the date of diversion or the date of stent placement and the date of first relapse of the disease (locoregional or distant) or death. Patients alive with no evidence of disease at last follow-up were censored.

Statistical Analysis

Quantitative data were reported as the mean (SD), and categorical data were reported as the absolute numbers and percentages. Normally distributed quantitative data were analyzed with Student's t test, the Mann–Whitney test, or the Kruskal–Wallis test, as appropriate. Qualitative data were compared using Pearson's χ^2 test or Fisher's exact test, as appropriate. Survival curves were plotted according to the Kaplan–Meier method, and differences between survival distributions were assessed by the log-rank test. Patients with technical failure of ES insertion were analyzed in the ES group. Preoperative variables with $p < 0.2$ differences between the two groups in univariate analysis were included in the propensity score analysis: age, body mass index (BMI), ASA grade, ECOG performance status, AFC score, comorbidities, previous history of cancer, hemodynamic instability, cecal dilatation, peritoneal effusion, synchronous colorectal tumor, lymph node metastasis, and tumor necrosis factor (TNM) stage.

For each patient, the inverse probability of belonging to its actual group was used to calculate weights. Weights less than the 10th percentile or greater than the 90th percentile were rounded to these respective values in order to avoid under- or overrepresentation of some patients in the analyses. Comparisons of the overall survival and PFS were performed using the inverse probability of treatment weighting (IPTW). Comparisons of all of the other endpoints were also adjusted for the propensity score. All tests were two-sided with a level of significance set at $p < 0.05$. The statistical analyses were performed using R software version 3.4.0 (R Foundation for Statistical Computing, Vienna, Austria; www.r-projet.org) through the RStudio interface version 1.0.143 (© 2009–2016), SAS® software (version 9.4, SAS Institute Inc., Cary, NC), and the Statistical Package for the Social Sciences (SPSS) software (SPSS Inc., version 24.0, Chicago, IL). This study was conducted according to the ethical standards of the Committee on Human Experimentation of our institution and was reported according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines (Strobe).

RESULTS

Patient Characteristics

Between 2000 and 2015, 1500 patients with OLCC were included in the national database. Among these patients, 727 were managed by PDC or ES as a first-stage procedure. Among the 518 patients managed with a curative intent, 327 (63%) were in the PDC group and 191 (37%) were in the ES group (online-only supplemental). The ES placement failed in 44 patients (23%). There was no difference between the two groups regarding the preoperative data, except for the location of the primary tumor ($p < 0.001$; Table 1). Splenic flexure tumors were more frequent in cases of PDC (18% vs. 8%, $p = 0.001$), whereas descending colon tumors were more frequent in cases of ES (16 vs. 30%, $p = 0.0001$). The two groups were also different in regards to the rate of synchronous metastatic disease with the PDC group having a lower rate (15% vs. 22%, $p = 0.046$).

Endpoints

The tumor resection rates were 80% ($n = 260$) in the PDC group and 86% ($n = 165$) in the ES group (odds ratio [OR] = 0.006; 95% confidence interval [CI] 0.001–0.105]; $p = 0.0004$). In patients who underwent resection of the primary tumor, anastomosis was performed in 56.8% ($n = 186$) of those in the PDC group and 40% ($n = 76$) of those in the ES group. After adjustment for the propensity score was performed, the anastomosis rate was higher in the PDC group (OR 0.56; 95% CI 0.43–0.74; $p < 0.0001$). At the end of follow-up, the permanent stoma rates were 31% ($n = 96$) in the PDC group and 30% ($n = 53$) in the ES group. After adjustment for the propensity score was performed, the definitive stoma rate was not different between groups (OR 0.8; 95% CI 0.60–1.06; $p = 0.1$).

The overall postoperative morbidity rates were 49% ($n = 161$) in the PDC group and 40% ($n = 77$) in the ES group (Table 2). The surgical morbidity rates were 35% ($n = 114$) in the PDC group and 19% ($n = 37$) in the ES group, while the medical complication rates were 28% ($n = 91$) in the PDC group and 20% ($n = 38$) in the ES group. The severe morbidity rates were 21% in the PDC group and 25% in the ES group (OR 1.34; 95% CI 0.99–1.8; $p = 0.05$). The overall mortality rates were 6% in the PDC group and 6% in the ES group (OR 0.96; 95% CI 0.57–1.63; $p = 0.8$). Among the 12 patients who died in the ES group, 3 had stent-related perforation. By excluding these three perforated patients, postoperative mortality was still similar between the two groups ($p = 0.5$). After adjustment for the propensity score was performed, the cumulative length of stay was significantly longer in the

TABLE 1 Demographic characteristics of 518 patients with OLCC treated in a curative intent by primary diverting stoma or endoscopic stent

	Primary diverting colostomy	Endoscopic stent	*p*
n	327	191	
Gender			0.13
Male/female[a]	185 (57)/142 (43)	95 (50)/96 (50)	
Age (years)	71 ± 15[b]	72 ± 14	0.2
BMI (kg/m^2)	24 ± 5	24 ± 5	0.8
ASA score			0.08
1/2	69 (23)/145 (47)	29 (16)/74 (43)	
3/4	80 (26)/12 (4)	64 (37)/7 (4)	
Missing	21	17	
ECOG performance status			0.17
0/1	90 (34)/90 (34)	68 (40)/45 (27)	
2/3	54 (21)/23 (9)	33 (20)/21 (13)	
4/missing	4 (2)/69	0/24	
AFC score			0.08
1/2	114 (38)/127 (43)	57 (32)/99 (55)	
3/4	52 (18)/3 (1)	23 (12.5)/1 (0.5)	
Missing	31	11	
Comorbidities	193 (65)	113 (62)	0.6
Vascular	124 (42)	79 (43)	0.7
Respiratory deficiency	48 (16)	25 (14)	0.5
Neurologic deficiency	45 (15)	25 (14)	0.7
Renal deficiency	25 (8)	10 (6)	0.2
Hepatic deficiency	10 (3)	5 (3)	0.7
Malnutrition	38 (13)	17 (9)	0.3
Other cancer	33 (11)	25 (14)	0.3
Abdominal surgical history	64 (21)	42 (23)	0.6
Known cancer	23 (7)	12 (7)	0.8
Location			< **0.0001**
Splenic flexure	60 (18)	16 (8)	
Descending colon	51 (16)	58 (30)	
Sigmoid colon	201 (62)	112 (59)	
High rectum	15 (5)	5 (3)	
Synchronous colonic tumor	22 (7)	8 (4)	0.2
Synchronous metastasis	44 (15)	37 (22)	**0.046**
Liver/peritoneal	41/3	34/4	
Lung/other	3/2	3/1	

BMI body mass index, *ASA* American Society of Anesthesiologists, *ECOG* Eastern Cooperative Oncology Group

[a]Number (percentage from the available data)

[b]Mean ± SD

*Percentage of the available data

$P < 0.05$ was considered significant (in bold)

PDC group than it was in the ES group (− 11.7 days [− 17.3; − 6.1]; $p < 0.0001$).

In the patients who required adjuvant chemotherapy, this was performed in 53% of patients in the PDC group and 53% of patients in the ES group. The median overall survival rates were 123.6 months [77.6 to NA months] in the PDC group and 58.5 months [56.8–83.0] in the ES group. After adjustment for the propensity score was performed, the overall survival was significantly higher in the PDC group (HR 1.40 [1.01; 1.96], $p = 0.046$; Fig. 1). The median disease-free survival rates were 54.1 months [38.4 to NA months] in the PDC group and 53.6 months

TABLE 2 Cumulative postoperative results of 518 patients with OLCC treated in a curative intent by primary diverting stoma or endoscopic stent

	Primary diverting colostomy	Endoscopic stent	p*
n	327	191	
Operative length (min)	N = 200	N = 86	
	226 ± 148[a]	207 ± 96	0.2
Length of hospital stay (days)	29 ± 37	17 ± 20	< **0.0001**
Mortality	21 (6)[b]	12 (6)	0.8
Overall morbidity	161 (49)	77 (40)	**0.049**
Surgical morbidity	114 (35)	37 (19)	< **0.0001**
Anastomotic complication	23 (7)	11 (6)	0.6
Wound complication	42 (13)	13 (7)	**0.03**
Stoma-related complication	17 (5)	4 (2)	0.2
Bleeding complication	16 (5)	5 (3)	0.2
Medical morbidity	91 (28)	38 (20)	**0.04**
Urinary tract infection	22 (7)	5 (3)	**0.04**
Respiratory complication	27 (8)	16 (8)	0.96
Cardiac complication	16 (5)	4 (2)	0.1
Thrombo-embolism	7 (2)	1 (0.5)	0.15
Neurologic complication	15 (5)	5 (3)	0.3
Dindo classification			**0.05**
I–II	93 (28)	30 (16)	
III–IV	68 (21)	47 (25)	
Unplanned reoperation	38 (12)	16 (8)	0.2
Tumor resection	260 (80)	165 (86)	**0.0004**
Permanent stoma	96 (31)	53 (30)	0.1

[a]Mean ± SD

[b]Number (percentage)

$p < 0.05$ was considered significant (in bold); *p value is calculated after matching

[36.9–58.5] in the ES group. After adjustment for the propensity score, there was no difference between the groups for disease-free survival (HR 1.07 [0.80; 1.44], p = 0.6; Fig. 2). In the PDC group, the death was due to postoperative course in 22% (n = 21), to the evolution of the tumour in 50% (n = 47), and to other medical conditions in 28% (n = 26). In the ES group, the death was due to postoperative course in 13% (n = 12), the evolution of cancer in 62% (n = 55), and other medical conditions in 25% (n = 22).

On the pathological report, the perforation rates were 6% in the PDC group and 11% in the ES group (OR 1.73; 95% CI 1.09–2.76; p = 0.01). The rates of vascular invasion were 31% in the PDC group and 31% in the ES group (OR 0.79; 95% CI 0.59–1.97; p = 0.1). The rates of lymphatic invasion were 23% in the PDC group and 31% in the ES group (OR 1.22; 95% CI 0.88–1.68; p = 0.2), and the rates of perineural invasion were 33% in the PDC group and 33% in the ES group (OR 0.8; 95% CI 0.59–1.08; p = 0.1; Table 3).

DISCUSSION

This is the largest multicenter study comparing ES and PDC in a curative intent for obstructive colonic cancer using a propensity score analysis. We reported that although ES was associated with better surgical outcomes compared with PDC, ES increased the risk of colonic perforation and worse pathological features and negatively impacted overall survival.

The management of colonic obstruction is a hot topic. Many authors have reported conflicting results about ES as a bridge-to-surgery to treat OLCC in a curative intent. Most retrospective studies reported the safety of ES with technical and clinical success rates of 96% and 92%, respectively.[19] The outcomes of ES insertion are not as good in randomized, controlled trials. In the trial by Pirlet et al., the success rate was 46.7%, and the perforation rate was 3.7%.[3] These outcomes were discussed as being the result of the use of a first generation of ES with insertion under radiological guidance only.[3] Nevertheless, these

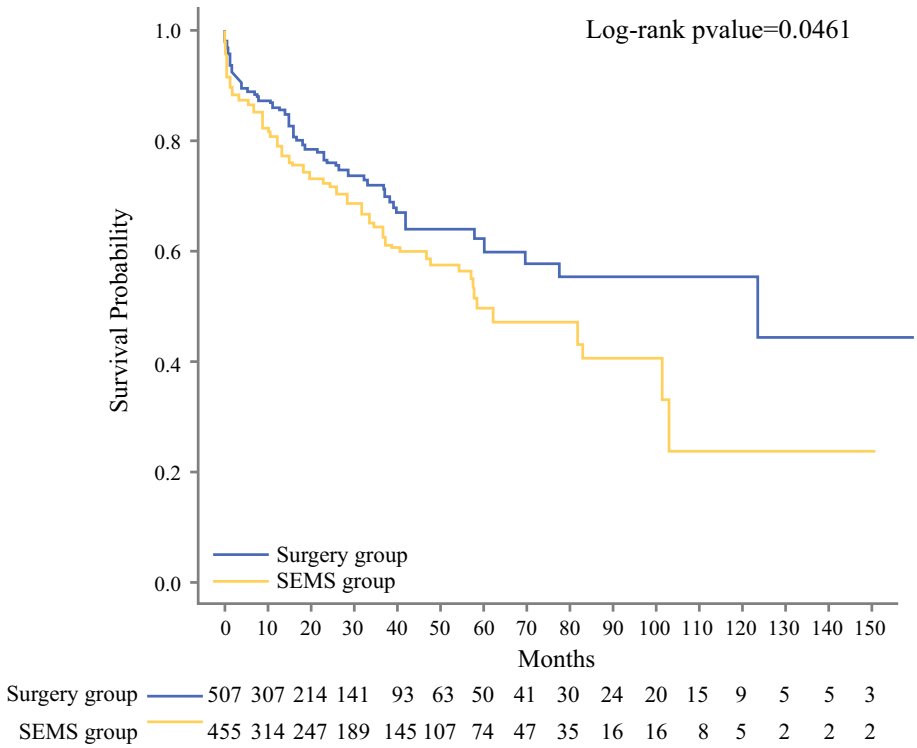

FIG. 1 Overall survival according to initial management of left colonic malignant obstruction: primary diverting colostomy (PDC) group (blue line) and endoscopic stent (ES) group (yellow line)

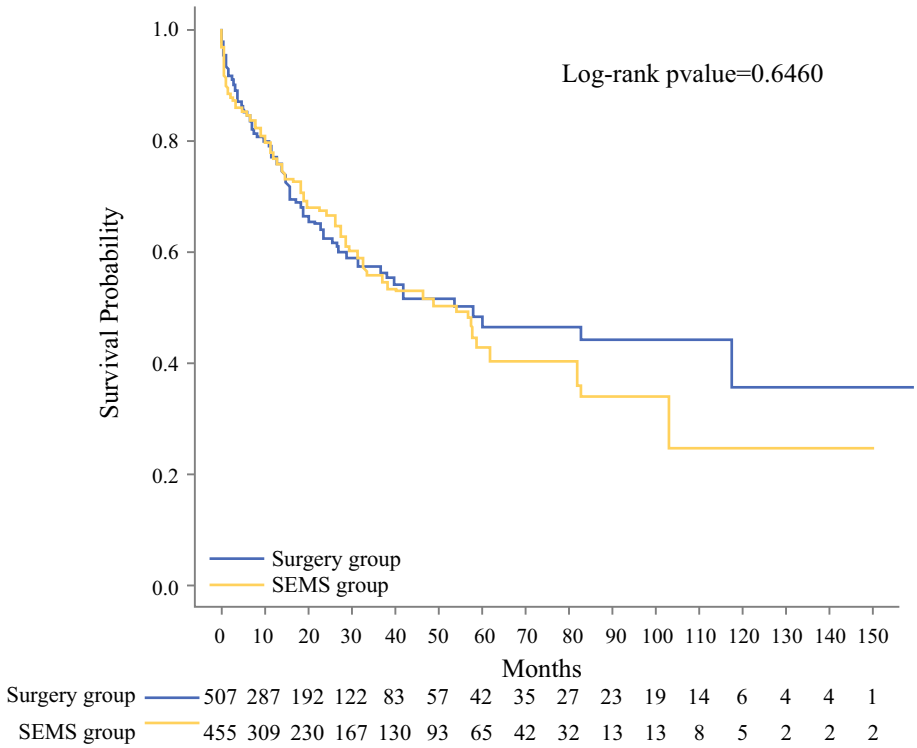

FIG. 2 Disease-free survival according to initial management of left colonic malignant obstruction: primary diverting colostomy (PDC) group (blue line) and endoscopic stent (ES) group (yellow line)

results were confirmed in the Dutch stent-in 2 randomized trial, which was stopped after the second interim analysis because of an increased morbidity in the ES group.[5]

In contrast, in a recent retrospective study comparing 173 PDC and 172 ES from a New York state database, the authors state that palliative stenting was safe and that it had a procedural complication rate and a perforation rate of less than 6%.[15] This difference in perforation rates between the

TABLE 3 Pathological results of 425 patients with OLCC who underwent tumor resection after primary diverting stoma or endoscopic stent

	Primary diverting colostomy	Endoscopic stent	*p*
n	260	165	
Tumor size (cm)			**0.03**
≤ 2	22 (10)[a]	14 (12)	
> 2–≤ 5	110 (50)	39 (33)	
> 5–≤ 10	83 (38)	61 (52)	
> 10	5 (2)	4 (3)	
Missing	40	47	
Tumor perforation	20 (9)	21 (17)	**0.03**
TNM classification			**0.04**
Stage 0–I	2 (1)	1 (1)	
Stage II	94 (38)	45 (33)	
Stage III	114 (45)	50 (37)	
Stage IV	41 (16)	39 (29)	
Missing	9	30	
Harvested lymph nodes	22 ± 12[b]	25 ± 14	**0.03**
Missing	17	13	
Involved lymph nodes	2 ± 4	2 ± 3	0.8
Missing	12	11	
Vascular invasion	103 (47)	61 (42)	0.3
Missing	39	18	
Lymphatic invasion	77 (42)	59 (45)	0.5
Missing	75	35	
Perineural invasion	109 (50)	63 (44)	0.3
Missing	42	22	
Involved margins	12 (5)	8 (6)	0.7
Missing	38	38	

[a]Number (percentage from the available data)

[b]Mean ± SD

$p < 0.05$ was considered significant (in bold)

series is not related to center's experience; Abelson et al.[15] observed that ES was more frequently performed in high-volume or academic hospital than PDC, as in our series. Moreover, Amelung et al. [16] reported in their retrospective series that perforation occurred in only 1 patient among 51 patients (2%).

These results are not in accordance with ours, because we observed perforation and failure in 11% and 23% of patients, respectively. One explanation of this difference between failure rates could be the high number of stented patients in our study. Our results are similar to those reported by Tan et al. [20] in the meta-analysis of randomized, controlled trials only, with high failure and perforation rates: cumulative failure rate at insertion of 29% and a perforation rate of 16%. The high rate of failure of ES insertion in our study might explain the low rate of anastomosis in the ES group (40%).

The oncological outcomes of ES also have been questioned several times. In 2003, Saida et al.[21] compared the outcomes of 40 patients operated on in emergency and 40 patients treated by ES in a retrospective study. The authors found no difference in the survival rates between the groups. These results were confirmed in most retrospective studies that were without matching. In 2013, Sabbagh et al.[13] compared emergency surgery to ES in a propensity-matched study. The authors found a lower overall survival at 3 years (44% vs. 66%, $p = 0.015$) and at 5 years (25% vs. 62%, $p = 0.0003$). Gorissen et al. found a higher local recurrence rate in the ES group compared with the emergency surgery patients older than aged 75 years (32% vs. 8%, $p = 0.038$).[14] In 2014, Sloothaak et al. published the survival data of the Dutch stent-in 2 trial and found a lower survival rate for the patients in the ES group who had a complication at insertion.[22]

In the present study, overall survival was significantly lower in the ES group compared with the PDC group. We observed that recurrence occurred more frequently after PDC (57%) than ES (47%), but this difference was not statistically significant ($p = 0.5$). After adjustment for the propensity score, there was no difference between the two groups for disease-free survival. It is our hypothesis that although not significant, stented patients are at lower risk of recurrence but are at higher risk to die from a recurrence when it occurs.

Some authors have tried to explain these survival outcomes. In 2007, Marutachalam et al.[23] evaluated the rate of CK-20 mRNA in patients who had a colonoscopy compared with patients who had an ES insertion. They found a higher rate of CK-20 mRNA in the ES group. Sabbagh et al. evaluated, in a case match study, the pathological data of patients operated on in emergency and of patients who had an ES.[24] They found that tumor ulceration ($p < 0.0001$), peritumor ulceration ($p < 0.0001$), perineural invasion ($p = 0.008$), and lymph node invasion ($p = 0.005$) were significantly more frequent in the ES group. In 2013, Kim et al.[12] also evaluated the pathological data of emergency surgery and those of ES. They found a higher rate of perineural invasion in the ES group (76% vs. 51%, $p = 0.03$).

We decided to compare ES with PDC only, considering these two approaches as a bridge to "tumor resection." Another study performed the same comparison between 37 patients with PDC and 51 patients with ES.[16] However, the authors did not report a difference between the groups regarding number of harvested lymph nodes (14.5 [10.5–19.8] vs. 13 [10.5–18.5], $p = 0.71$), cumulative overall morbidity (32.4% vs. 45.1%, $p = 0.23$), median length of stay (14 days (11–17 days) in each group, $p = 0.78$), or 5-year survival (73.7% vs. 63.2%, p = 0.43), whereas these data differed significantly in our study. Permanent stoma rates were not different between the two groups (16.2% vs. 17.6%, $p = 0.86$), as ours (29.4% and 27.8%, $p = 0.69$). However, our permanent stoma rates were probably more important than those reported by Amelung et al., because our patients were older and frailer than those from the Amelung series.[16] Finally, the authors reported that long-term complications rates were significantly less favorable after PDC than after ES, which is mainly due to a higher percentage of incisional hernia in the PDC group than in the ES group (18.9% vs. 8.9%).[16]

The present study is limited by its retrospective nature, which leads to missing data, not well balanced groups before any matching, or an absence of the evolution of functional results and quality of life. It also is to our knowledge that the choice between stent insertion or diverting colostomy was not randomized. Rather, it was solely determined according to the surgeon's preference or according to the availability and expertise of gastroenterologists. These disadvantages are offset by the large size of the series and that the data analysis was performed with a propensity score. Kuss et al.[25] reported that the results of randomized, controlled trial and a propensity score analysis were very similar and concluded that the remaining bias in a propensity score analysis is low. Therefore not well-balanced groups before matching are corrected by the propensity score analysis, which limit the risk of bias. Another limitation of the study is that centers have different level of expertise. This could explain some outcomes, which are hard to analyze, and seems to be in contradiction as the tumor resection rate, which is higher in the ES group. Whereas in resected patients, the anastomosis rate was higher in the PDC group without difference for the rate of permanent stoma.

CONCLUSIONS

Despite endoscopic stenting as a bridge to surgery in the curative management of obstructive left colonic cancer still being a matter of debate, we have reported in the largest series that, although endoscopic stenting is associated with better surgical outcomes than diverting stoma, its colonic perforation, pathological results, and overall survival seem to be worse. Thus, endoscopic stenting as the first stage in the curative strategy of obstructive left colonic cancer should be discussed with caution, even for elderly or frail patients.

COLLABORATOR LIST FROM THE AFC WORKING GROUP Aurélien Venara, Thibault Voron, Jean-Marc Regimbeau, Tatiana Codjia, Marie Dazza, Guillaume Gagnat, Servane Hamel, Laure Mallet, Paul Martre, Guillaume Philouze, Edouard Roussel, Pauline Tortajada, Anne Stéphanie Dumaine, Bruno Heyd, Zaher Lakkis, Brice Paquette, Nicola de' Angelis, Francesco Esposito, Vincenzo Lizzi, Mehdi Ouaissi, Nicolas Michot, Quentin Denost, Christophe Tresallet, Oriana Tetard, Pauline Rivier, Elie Fayssal, Maxime Collard, David Moszkowicz, Frederique Peschaud, Jean Charles Etienne, Ludovic loge, Laura Beyer, Thierry Bege, Hélène Corte, Elsa D'Annunzio, Marine Humeau, Julien Issard, Nicolas Munoz, Julio Abba, Yaqoub Jafar, Laurence Lacaze, Pierre Yves Sage, Lilija Susoko, Bertrand Trilling, Catherine Arvieux, François Mauvais, Béatrice Ulloa Severino, Sophie Pitel, Arthus Vauchaussade de Chaumont, Bogdan Badic, Benjamin Blanc, Marine Bert, Paul Rat, Pablo Ortega-Deballon, Amélie Chau, Clémentine Dejeante, Christophe Mariette, Guillaume Piessen, Emilie Grégoire, Abdallah Alfarai, Jérémie-Henri Lefèvre, Magali Cabau, Anaelle David, Deborah Kadoche, Fanny Dufour, Géraldine Goin, Yvain Goudard, Ghislain Pauleau, Philippe Sockeel, Bruno De la Villeon, Karine Pautrat, Clarisse Eveno, Antoine Brouquet, Anne Cécile Couchard, Gregoire Balbo, Jean Yves Mabrut, Justine Bellinger, Martin Bertrand, Aurélie Aumont, Emilie Duchalais, Anne-Sophie Messière Adrien Tranchart, Jean-Baptiste Cazauran, Virginie Pichot-Delahaye, Vincent Dubuisson, Leon Maggiori, Bilem Djawad Boumediene, David Fuks, Xavier Kahn, Eve Huart, Jean Marc Catheline, Grégory Lailler, Oussama Baraket, Patrick Baque, Jean Marie Diaz de Cerio,

Philippe Mariol, Bernard Maes, Philippe Fernoux, Philippe Guillem, Eric Chatelain, Charlotte de Saint Roman, Kévin Fixot.

REFERENCES

1. Awotar GK, Guan G, Sun W, et al. Reviewing the management of obstructive left colon cancer: assessing the feasibility of the one-stage resection and anastomosis after intraoperative colonic irrigation. *Clin Colorectal Cancer*. 2017;16:e89–e103.
2. Cheung HY, Chung CC, Tsang WW, et al. Endolaparoscopic approach vs conventional open surgery in the treatment of obstructing left-sided colon cancer: a randomized controlled trial. *Arch Surg*. 2009;144:1127–32.
3. Pirlet IA, Slim K, Kwiatkowski F, et al. Emergency preoperative stenting versus surgery for acute left-sided malignant colonic obstruction: a multicenter randomized controlled trial. *Surg Endosc*. 2011;25:1814–21.
4. Alcantara M, Serra-Aracil X, Falco J, et al. Prospective, controlled, randomized study of intraoperative colonic lavage versus stent placement in obstructive left-sided colonic cancer. *World J Surg*. 2011;35:1904–10.
5. van Hooft JE, Bemelman WA, Oldenburg B, et al. Colonic stenting versus emergency surgery for acute left-sided malignant colonic obstruction: a multicentre randomised trial. *Lancet Oncol*. 2011;12:344–52.
6. Ho KS, Quah HM, Lim JF, et al. Endoscopic stenting and elective surgery versus emergency surgery for left-sided malignant colonic obstruction: a prospective randomized trial. *Int J Colorectal Dis*. 2012;27:355–62.
7. Cirocchi R, Farinella E, Trastulli S, et al. Safety and efficacy of endoscopic colonic stenting as a bridge to surgery in the management of intestinal obstruction due to left colon and rectal cancer: a systematic review and meta-analysis. *Surg Oncol*. 2013;22:14–21.
8. Zhao XD, Cai BB, Cao RS, et al. Palliative treatment for incurable malignant colorectal obstructions: a meta-analysis. *World J Gastroenterol*. 2013;19:5565–74.
9. Liang TW, Sun Y, Wei YC, et al. Palliative treatment of malignant colorectal obstruction caused by advanced malignancy: a self-expanding metallic stent or surgery? A system review and meta-analysis. *Surg Today*. 2014;44:22–33.
10. van Hooft JE, van Halsema EE, Vanbiervliet G, et al. Self-expandable metal stents for obstructing colonic and extracolonic cancer: European Society of Gastrointestinal Endoscopy (ESGE) Clinical Guideline. *Endoscopy*. 2014;46:990–1053.
11. Endoscopy, Cancer Committee of the French Society of Digestive Endoscopy, the French Federation of Digestive Oncology. Place of colorectal stents in therapeutic management of malignant large bowel obstructions. *Endoscopy*. 2014;46:546–52.
12. Kim HJ, Choi GS, Park JS, Park SY, et al. Higher rate of perineural invasion in stent-laparoscopic approach in comparison to emergent open resection for obstructing left-sided colon cancer. *Int J Colorectal Dis*. 2013;28:407–14.
13. Sabbagh C, Browet F, Diouf M, 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. *Ann Surg*. 2013;258:107–15.
14. Gorissen KJ, Tuynman JB, Fryer E, et al. Local recurrence after stenting for obstructing left-sided colonic cancer. *Br J Surg*. 2013;100:1805–9.
15. Abelson JS, Yeo HL, Mao J, et al. Long-term postprocedural outcomes of palliative emergency stenting vs stoma in malignant large-bowel obstruction. *JAMA Surg*. 2017;152:429–35.
16. Amelung FJ, Ter Borg F, Consten EC, et al. Deviating colostomy construction versus stent placement as bridge to surgery for malignant left-sided colonic obstruction. *Surg Endosc*. 2016;30:5345–55.
17. Alves A, Panis Y, Mantion G, et al. The AFC score: validation of a 4-item predicting score of postoperative mortality after colorectal resection for cancer or diverticulitis: results of a prospective multicenter study in 1049 patients. *Ann Surg*. 2007;246:91–6.
18. Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. *Ann Surg*. 2004;240:205–13.
19. Meisner S, Gonzalez-Huix F, Vandervoort JG, et al. Self-expandable metal stents for relieving malignant colorectal obstruction: short-term safety and efficacy within 30 days of stent procedure in 447 patients. *Gastrointest Endosc*. 2011;74:876–84.
20. Tan CJ, Dasari BV, Gardiner K. Systematic review and meta-analysis of randomized clinical trials of self-expanding metallic stents as a bridge to surgery versus emergency surgery for malignant left-sided large bowel obstruction. *Br J Surg*. 2012;99:469–76.
21. Saida Y, Sumiyama Y, Nagao J, et al. Long-term prognosis of preoperative "bridge to surgery" expandable metallic stent insertion for obstructive colorectal cancer: comparison with emergency operation. *Dis Colon Rectum*. 2003;46:S44–9.
22. Sloothaak DA, van den Berg MW, Dijkgraaf MG, et al. Oncological outcome of malignant colonic obstruction in the Dutch Stent-In 2 trial. *Br J Surg*. 2014;101:1751–7.
23. Maruthachalam K, Lash GE, Shenton BK, et al. Tumour cell dissemination following endoscopic stent insertion. *Br J Surg* 2007;94:1151–4.
24. Sabbagh C, Chatelain D, Trouillet N, et al. Does use of a metallic colon stent as a bridge to surgery modify the pathology data in patients with colonic obstruction? A case-matched study. *Surg Endosc*. 2013;27:3622–31.
25. Kuss O, Legler T, Börgermann J. Treatments effects from randomized trials and propensity score analyses were similar in similar populations in an example from cardiac surgery. *J Clin Epidemiol*. 2011;64:1076–84.