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RESEARCH ARTICLE

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Segmental Splenic Flexure Resection in Colonic Carcinoma: A Single Center Experience

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ABSTRACT

Aim: to evaluate the outcomes of segmental splenic flexure resection and to compare our experience with the literature.

Materials and Method: Between April 2017 and May 2021, 18 patients with splenic flexure colon cancer and not resectable endoscopically polyps, were enrolled in the study. We divided these patients into two groups: Group A consisted of 5 patients with polyps of the splenic flexure of the colon defined as not-resectable endoscopically; group B consisted of 13 patients with splenic flexure cancers. All patients underwent splenic flexure resection. We evaluated the pathological findings and outcomes of all patients, and we compared our experience with three recent papers by Degiuli M et al, Wang X et al e di Rega D et al.

Results: In the group A: No post-operative complications. The postoperative histology confirmed high-grade dysplasia in 4 cases. 1 case (20%) of intraglandular adenocarcinoma. The mean number of lymph nodes removed was 8 (range 6-13). Endoscopic follow-up at 12 months was negative for all patients. Group B: we had only one anastomotic leak (5.5%). The mean number of lymph nodes removed was 19.8 (range 13-31). Post-operative histology: 3 pT4aN1aM0 patients. 1 pT4bN2M1a patient with lung metastases, 3 pT3N0M0 patients, 3 pT3N1aM0 patients, 2 pT2N0M0 patients, and 1 pT1N0M0 patient. We had one death after six months in a pT4bN2bM1a patient with lung metastases. One pT4aN1aMo patient showed liver metastases after 12 months. 1 patient pT1N0M0 presented, after 28 months, intramucosal adenocarcinoma of the hepatic flexure of the colon. 12-month follow-up not yet performed in 3 patients.

Conclusions: There is currently no recommendation on the best surgical approach for splenic flexure tumors. According to our results, the partial resection of splenic flexure was not associated with a worse prognosis, and it was leading to a satisfactory oncological outcome.

ARTICLE HISTORY

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Introduction

Cancers located between 10 cm distal transverse and 10 cm proximal descending colon, usually known as "splenic flexure cancers" (SFC), are approximately 5% of all colon cancers treated surgically [1,2]. In the literature, SFC tends to be diagnosed at a more advanced stage, with more obstruction, more pT3-T4 tumors, more lymph node involvement, and more patients with synchronous metastases, thus resulting in a poorer prognosis in comparison with other colonic subsites [3]. Because SFC are located on the border between the superior and inferior mesenteric vasculature, it is still debated in the surgical community whether SFC should be considered as right-sided or left-sided tumors. In clinical practice, three types of colectomy can be discussed: Segmental Splenic Flexure Resection (SSFR), Extended Right Hemicolectomy (ERH), and Extended Left Hemicolectomy (ELH) [4]. The SSFR seems both a safe and effective alternative for splenic flexure tumors and ERH or ELH have no statistically significant clinical benefits over less aggressive approaches such as SSFR [5,6].

Materials and Methods

This is a single-center, retrospective, observational study. Between April 2017 and May 2021, at our General and Oncological Surgery Unit, we performed 18 SSFR in 18 patients suffering from lesions of the splenic flexure of the colon. We divided these patients into two groups.

Group A consisted of 5 patients with polyps of the splenic flexure of the colon defined as non-resectable endoscopically. Polyps averaged size 2.98 cm (range 2.4-3.5 cm) and with pre-operative histological diagnosis of high-grade dysplasia (HGD), 4 peduncolated polyps, and 1 sessile polyp. All patients underwent the same preoperative workup and staging, which included: endoscopy marking and chest-abdomen CT scan. Preoperative antibiotic prophylaxis with second-generation cephalosporins and metronidazole was administered to all patients. 4 patients

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were treated with laparoscopic SSFR and 1 patient required SSFR laparotomy due to severe comorbidity. In the case of polyps that cannot be endoscopically resected, laparoscopic colonic resection is approved in the indication for treatment of both benign and malignant lesions, as it is reported in the literature that ~ 15% of these polyps are already cancerous [7].

Group B consisted of 13 patients with SFC. SFC were the 8.1% of all colon cancers treated in our Unit, in the same period. The routine preoperative evaluations included: endoscopy with biopsy and marking, CEA serum test, and chest-abdomen CT scan. Preoperative antibiotic prophylaxis with second-generation cephalosporins and metronidazole was administered to all patients. 9 patients were treated with laparoscopic SSFR (69%) the others underwent SSFR laparotomy.

Surgical Laparoscopic Technique SSFR

The induction of the pneumoperitoneum to 12 mmHg was performed by Veress in Palmer point and accessing the right para-umbilical optic trocar of 12mm. It has been used a 10mm Optics for 30 degrees Laparoscopy. Two additional 5 mm trocars were positioned in right hypochondrium and in the left iliac fossa. One trocar 12 mm in right iliac fossa.

Opening of the coloepiploic ligament up to the splenic flexure. Isolation of the inferior mesenteric vein and opening of the superior aorto-mesenteric window (Figure: 1) by detaching the Toldt fascia from the Gerota. Opening of the inferior aorto-mesenteric window starting from the right iliac artery. Once the inferior mesenteric artery has been identified, the onset of the left colonic artery is identified (Figure: 2) which is clipped and sectioned with removal of the central lymph nodes. Clipping and sectioning of the inferior mesenteric vein at the inferior margin of the pancreas. Opening of the Melani window (Figure: 3) by accessing the retrocavity of the epiploon for complete mobilization of the distal transverse meso colon. Opening of the left lateral shower up to the section of the brake-spleno-colic ligament. Clipping and section of the right branch of the middle colic artery at the origin (Figure: 4). Intraoperative real-time visualization of the lymph flow using indocyanine green fluorescence imaging during laparoscopic surgery might be a helpful technique for identifying central arteries to be ligated and for determining an appropriate surgical resection 9 (Figure: 5). Section of the middle third of the transverse colon using Signia® (Medtronic-Italy) 60mm purple charge and of the descending colon, about 10 cm from the splenic flexure, with 60mm purple charge. Anisoperistaltic L-L colo-colic anastomosis using Signia® purple filler 60mm (Figure: 6) and closure of the breach in V-Loc® (Medtronic-Italy) 3/0 barbed suture and overedge in PDS * II® (Ethicon) 3/0. Extraction of the surgical piece in endobag using mini-Pfannenstiel. No drainage. The laparoscopic procedures were always performed by the same surgeon.

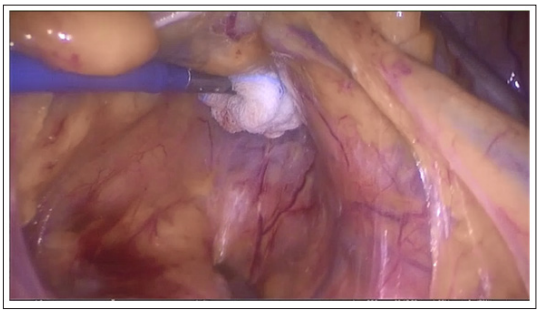

Figure 1: Inferior Aorto-Mesenteric Window

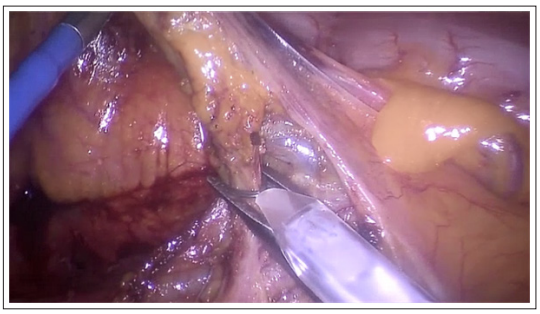

Figure 2: the left colonic artery

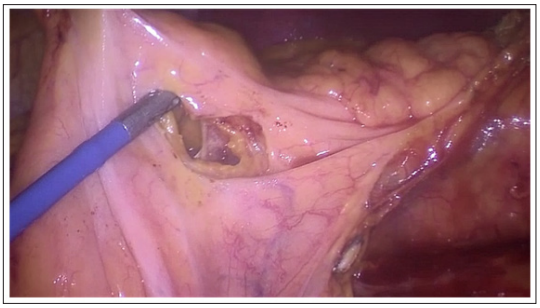

Figure 3: the Melani window

Figure 4: Clipping and section of the right branch of the middle colic artery at the origin

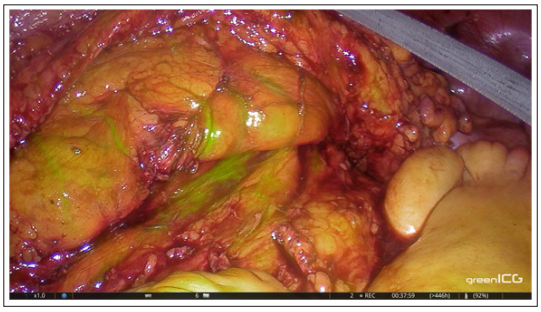

Figure 5: indocyanine green fluorescence imag

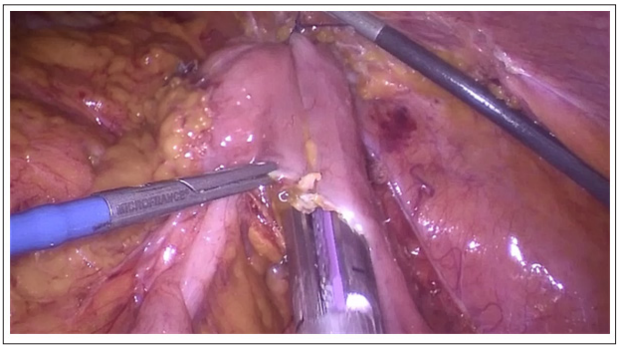

Figure 6: Anisoperistaltic L-L colo-colic anastomosis

Results

Group A: No post-operative complications. Discharge on the sixth postoperative day with antithrombotic prophylaxis. The postoperative histology confirmed high-grade dysplasia in 4 cases. In 1 case (20%) the post-operative histology concluded with intraglandular adenocarcinoma. The average length of the surgical piece is 18.8 cm (range 12-28 cm) reported by the pathologist and not in vivo. The mean number of lymph nodes removed was 8 (range 6-13). The distance of the polypoid lesion from the distal section margin, reported by the pathologist, was on average 4.3 cm (range 3-6 cm). Endoscopic follow-up at 12 months is negative for all patients.

Group B: We had only one anastomotic leak (5.5%), in a patient with severe obesity and a heavy smoker, treated by laparoscopic washing on the third day, ostomy and drainage placement. The discharge occurred on average on the seventh day (range 5-12) with antithrombotic prophylaxis. The average length of the surgical piece, reported by the pathologist, is 24.8 cm (range 12-35 cm). The mean number of lymph nodes removed was 19.8 (range 13-31). The distance of the tumor from the distal section margin, reported by the pathologist (not in vivo), was on average 5 cm (range 3.5-10 cm) with a 23.07% margin <5 cm (3 / 13). The distance from the proximal section margin averaged 13.4 cm (range 6-22 cm). Post-operative histology: 3 pT4aN1aM0 patients (2 of these patients, with macroscopically evident infiltration of the serosa, underwent lymphadenectomy according to the "Bicycle Wheel Dreinage" with removal of the lymph nodes of the left gastroepiploic artery, the splenic hilum and pancreatic tail10), 1 pT4bN2M1a patient with lung metastases, 3 pT3N0M0 patients, 3 pT3N1aM0 patients, 2 pT2N0M0 patients, and 1 pT1N0M0 patient.

A total body CT scan at six and twelve months and a pancoloscopy at 12 months were performed. We had one death after six months in a pT4bN2bM1a patient with lung metastases. One pT4aN1aMo patient showed liver metastases after 12 months. 1 patient pT1N0M0 presented, after 28 months, intramucosal adenocarcinoma of the hepatic flexure of the colon. This last patient was subjected to genetic investigation, it showed heterozygosity of the variant c.229T> C in the MLH1 gene. After a multidisciplinary evaluation, she underwent laparoscopic total colectomy. 12-month follow-up not yet performed in 3 patients.

The average duration of laparoscopic surgery was 175 min (range 160-210). No conversion needed.

Discussions

We compared (Table 1) our experience with three recent papers, years 2019, 2020 e 2021, by Degiuli M et al, Wang X et al, e di Rega D et al. [4,8,9].

Tabel 1: Comparison of our Data with Degiuli Group A and Rega Group A

	Group A Colon polyps	Group B SSFR	Degiuli et al A=SSFR; B=ERH+ELH	Rega et al A=SSFR; B=ERH+ELH
Laparoscopy	80 %	69 %	62,07 % (A)	17,5 % (A)
Length of specimen	18,8 cm	24,8 cm	20 cm (A)	
Lymph node	8	19,8	16,85 (A)	21,5 (A)
Distal margin	4,3 cm	5 cm	7,1 cm (A)	
Proximal margin		13,4 cm	9,29 cm (A)	
Distal margin < 5cm	60%	23,07%	25% (A+B)	
Operation Time	175 min	175 min	165 min (A)	105 min (A)
Leak		5,5 % (A+B)	2,91 % (A+B)	2,91 % (A+B)
Reoperation		5,5% (A+B)	5,59 % (A+B)	
Length of stay (day)	6	7	7 (A)	6,9

Degiuli includes 1304 patients by dividing them into arm A (SSFR = 791 patients) and arm B (ERH + ELH = 513 patients). Rega, on the other hand, presents a retrospective study on 103 patients treated for SFC, of which 57 (55.3%) with SSFR, 22 patients (21.4%) with ERH and 24 patients (23.3%) with ELH. In table 1 we compared our data with the experience of Degiuli and Rega. Our group B was compared with those of Degiuli's arm A and Rega's group A. Our percentage of minimally invasive surgery is higher (69% Vs 62.07% Vs 17.5%). In his meta-analysis Wang points out that there are no substantial differences between the percentage of minimally invasive surgery (69.9%) between ERH, ELH and SSFR but that SSFR ranked best with the highest probability for the utilization rate of minimally invasive surgery. Length of specimen is also higher (24.8 cm Vs 20 cm) as is the number of lymph nodes removed (19.8 Vs 16.85 Vs 21.5). The number of lymph nodes removed for an oncologically valid resection must be greater than 12 [10]. In Wang analysis of 992 patients from five studies showed no difference in the rate of the number of lymph nodes harvested ≥ 12 among SSFR, ERH and ELH. We need to improve on the distance of the distal margin of the lesion (5 cm Vs 7.1 cm) since, although there is still discussion in the literature on the adequacy of the margin placed at 10 cm or 5 cm, we have observed that in SSFR in patients with endoscopically

non-resectable polyps, we have much less extensive margins and fewer lymph nodes removed. Obviously, this happens because we consider the lesions of group A as benign lesions but, even in our small series, we observed that 20% of the endoscopically non-resectable polyps were cancerous (15% in literature) therefore they deserve a more radical approach [7]. From an oncological perspective, the curative resection of the colon tumor should include a segment of the colon of at least 5 cm on either side of the tumor according to ESMO guideline, but wider margins are often included due to the mandatory ligation of the arterial supply [11]. Our operative time was comparable to Wang (175 min Vs 165 min) while Rega has shorter times (105 min) influenced by the lowest laparoscopic rate. Our anastomotic leak rate is higher compared to Rega and Degiuli (5,5% Vs 2,91% Vs 2,91%). In the percentage of anastomotic leak, we must consider two aspects: the first is that our percentage represents only one case out of 18(ASA score 4, ASA score 4, considered as an independent risk factor for post-operative complications, obesity and smoking) and the second is that in the Degiuli case series, 2.91% anastomotic leak is the mean of 3.16% in SSFR, 4% in ERH and 2.17% in ELH [8]. In Wang's meta-analysis SSFR ranked worst with the highest probability for anastomotic dehiscence, whereas subtotal colectomy (STC) ranked the best. The reoperation rate (5.5% Vs 5.59%) and the length of stay (7 Vs 7 Vs 6.9) are comparable with Degiuli and Rega experience. Wang showed no difference in the rate of reoperative surgery among ERH, ELH and SSFR. SSFR ranked best with the lowest probability for reoperative surgery, whereas subtotal colectomy (STC) ranked the worst. In the rate of local recurrence, SSFR ranked worst with the highest probability for local recurrence, whereas STC ranked the best. No differences in the disease-free survival at 5 years between the surgical techniques of SSFR, ERH and ELH were observed in the European multicentre study by de'Angelis et al [12].

Conclusions

The optimal surgical approach for splenic flexure cancer has not been clearly established and it is debated, mainly for the incomplete understanding of the peculiar dual lymphatic drainage of this region, related to the superior and inferior mesenteric vessels. The choice of the surgical treatments depends on several factors; in Great Britain and Ireland the ERH is the preferred option (63%) followed by ELH (23%) and SSFR (14%); in France, the SSFR is the preferred option (70%) followed by ELH (17%) and STC (13%); in Italy on total of 1304 patients the 60,7% were submitted to SSFR and Rega on total of 103 patients the 55,3% submitted to SSFR [4,8,13,14]. Similar survival for SSFR, ERH, ELH and STC were found by meta-synthesis of the latest evidence [9]. The primary outcome of overall survival, as well as the oncological outcomes of local recurrence and distant recurrence, was equivalent among the most limited resection of SSFR and other extended resections [9]. Therefore, segmental colonic resection is a safe and effective treatment option for colon cancer of the splenic flexure [15-18].

Disclosure/Conflict of Interests

All authors have no conflicts of interest or financial ties to disclose.

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