

Management of postoperative bleeding after laparoscopic left colectomy

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Abstract

Background Lower gastrointestinal bleeding after left colectomy is an uncommon complication that can lead to critical situation. Diagnostic and therapeutic manoeuvres should be performed in emergency with step-by-step strategy in order to avoid reoperation. This study aims to identify bleeding risks factors and describe a management strategy.

Methods This is a retrospective study of patients who underwent left colectomy with primary anastomosis, from May 2004 to December 2013. We studied their demographic characteristics, surgical procedures and postoperative courses, more specifically hemorrhagic complications, management of bleeding and outcomes.

Results Hemorrhagic anastomotic complication occurred in 47 of the 729 (6.4 %) patients after left colectomy. Neither anticoagulant nor antiaggregant treatment was associated with postoperative bleeding. Among the 47 patients with bleeding, endoscopy was performed in 37 (78.7 %). At the time of endoscopy, the bleeding was spontaneously stopped in nine (24.3 %). Therapeutic strategy used clips in 10 (27.0 %) cases, mucosal sclerosis in 11 (29.7 %) and both in 7 (18.9 %) cases. Four (8.5 %) patients required blood transfusion for treatment of this gastrointestinal bleeding. Five (10.6 %) patients with bleeding were reoperated in this group because early endoscopy showed associated anastomotic leakage. Based on a multivariate analysis, stapled anastomosis and diverticular disease

were independent factors associated with anastomotic bleeding.

Conclusions Postoperative anastomotic bleeding is not so uncommon after left colectomy. This complication should be particularly dreaded in patients who underwent stapled colorectal anastomosis for diverticular disease. With the use of clip or mucosal sclerosis, early endoscopy is a safe and efficient treatment.

Keywords Laparoscopic left colectomy · Anastomotic bleeding · Colonoscopy · Haemostasis

Introduction

Anastomotic bleeding is one of the most dangerous complications at the early postoperative stage of colorectal surgery after anastomotic leakage, with associated morbidity and mortality [1]. Although uncommon [2], its presentation is as a limited haematochezia with the first bowel movement, but severe bleeding can occur in about 1 % of patients and diagnostic and therapeutic manoeuvres are challenging [3], particularly if we take into account the risk of anastomotic breakdown depending on its management. Appropriate management includes a diagnostic test to locate the origin and to plan the therapeutic strategy [4]. Even in early bleeding, the first option is cautious colonoscopy and afterwards in patients with negative endoscopy or massive bleeding, selective mesenteric angiography or reoperation should be considered [5].

The present study aimed to report here our experience of postoperative anastomotic bleeding after laparoscopic left colectomy, its management and risk factors.

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Materials and methods

Patient selection

All patients who underwent laparoscopic left colectomy were enrolled between May 2004 and December 2013. Patients who developed persistent bleeding per rectum after colorectal anastomosis within the first four postoperative weeks were included if there was one or more of the following criteria: a significant fall in haemoglobin, need for blood transfusion, hemodynamic instability or shock and, finally, the need for any emergency therapy such as endoscopy or surgery. Data from our prospectively collected computer database were extracted, and further clinical information was extracted from reviews of medical charts.

Surgical procedure

The laparoscopic approach was considered in all patients except in the case of adjacent organ involvement or previous multiple open laparotomies, after the risks and benefits of the approaches had been explained adequately. The technique of laparoscopic left colectomy has been previously described. In brief, multiport laparoscopy was performed in all cases. The intraabdominal pressure was maintained at 10 to 12 mmHg. Laparoscopic left colectomy was systematically started with mobilization of the left colonic flexure [6], followed by vascular control with preservation as much as possible of the left superior colonic artery. Anastomosis was performed intracorporeally after the specimen had been retrieved through a small incision of about 5 cm. All procedures were performed by expert surgeons in laparoscopic colorectal surgery. After surgery, patients were seen daily by a physician until hospital discharge. Blood tests were routinely measured on postoperative day (POD) four. All patients received antegrade intestinal preparation and standard deep vein thrombosis prophylaxis with low molecular weight heparin from admission the day before the surgery to hospital discharge.

Management of anastomotic bleeding

The management of postoperative gastrointestinal bleeding uses a standardized step-by-step protocol. After resuscitation and stabilization measures, endoscopy was performed without any bowel preparation. The first step was to identify the bleeding by removing clots and blood, washing the anastomosis with clear and cold water. In case of active and continuous arterial bleeding, clip was placed (Fig. 1) and electrocoagulation with or without adrenaline injection was performed in case of mucosal bleeding. For patients with persistent bleeding or were unstable, angiography or surgery was indicated.

Variables analysed and definitions

Data collection included demographic characteristics: age, gender, body mass index (BMI), comorbidities (including previous anticoagulant or antiaggregant treatment), primary diagnosis (cancer, diverticulitis, Crohn disease, volvulus) and indication for primary surgery; surgical data: surgical technique and type of anastomosis (manual or stapled anastomosis, protective stoma) and gastrointestinal bleeding data: time from the primary surgical intervention to the appearance of complication, laboratory blood tests, type of treatment and finally the follow-up with special focus on morbidity (including anastomotic leak) and mortality. Morbidity was defined as any complication that affected the normal postoperative course with or without the need for pharmacological treatment or surgical, endoscopic, and radiological interventions. Postoperative complications were stratified according to the Dindo-Clavien classification [7] that defines major complications by a score of three or more. Both complications and operative mortality were considered as those occurring within 90 days of surgery or at any time during the postoperative hospital stay.

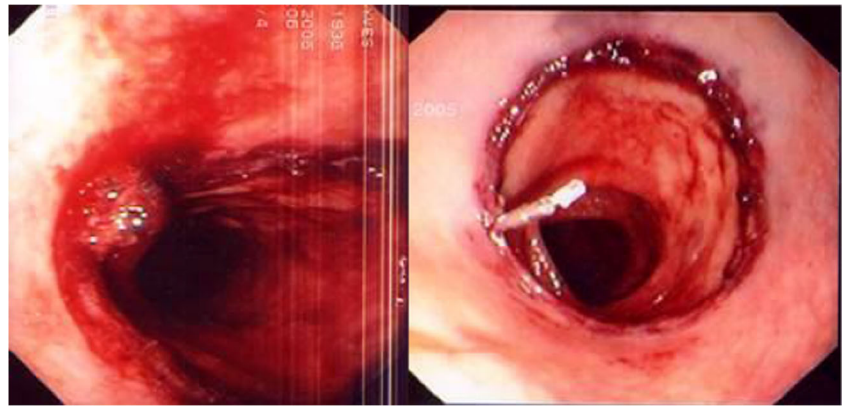
Statistical analysis

Qualitative variables were presented as effective (percentage) and compared between the two groups with a Chi-square test or a Fisher test. Quantitative variables were presented as means \pm standard deviations or as median (range). Differences between the different groups for quantitative variables were assessed with a Student's *t* test. Preoperative and intraoperative variables that reached a univariate *p* value of < 0.1 were entered into a logistic regression model, using a forward stepwise method, to define which parameters were independently associated with postoperative complications. All statistical tests were two-sided and the threshold for statistical significance was set to $p < 0.05$. All statistical analyses were performed using SAS software version 9.2 (SAS Institute, Cary, NC).

Results

Demographics characteristics

From 2004 to 2013, 729 patients underwent an elective left colectomy with primary colorectal anastomosis. There were 382 (52.4 %) males and 347 (47.6 %) females with a median age of 62 years old, ranging from 24 to 92. The mean BMI was 25.5 ± 4.4 kg/m². The most frequent comorbidity was diabetes mellitus in 54 (7.4 %) patients, and 55 (7.5 %) were treated with anticoagulant or antiaggregant treatment for either ischemic heart disease, stroke or atrial fibrillation. The two most frequent indications of left colectomy were colorectal

Fig. 1 Endoscopic management of active arterial bleeding

cancer (55.4 %) and diverticular disease (41.3 %). The remaining 3.3 % of patients had either Crohn disease or sigmoid volvulus. Among the 729 patients, 47 (6.4 %) developed

postoperative gastrointestinal bleeding. As shown in Table 1, patients with anastomotic bleeding had similar comorbidities except an higher rate of active smokers (25.5 vs. 14.0 %,

Table 1 Characteristics of the population who underwent left colectomy with or without postoperative anastomotic bleeding (univariate and multivariate analysis)

	Univariate analysis			Multivariate analysis		
	No bleeding (<i>N</i> =682) <i>N</i> (%)	Anastomotic bleeding (<i>N</i> =47) <i>N</i> (%)	<i>p</i> value	HR	95 % CI	<i>P</i> value
Demographics characteristics						
Gender (male)	361 (52.9)	21 (44.6)	0.27			
Age (years)	62.5±0.47	60,9±1,94	0.42			
>75 years	118 (17.3)	10 (21.2)	0.49			
BMI (kg/m ²)	25.6±0.20	24.3±0.59	0.08			
Obesity (BMI >30)	87 (12.7)	4 (8.5)	0.50			
Hypertension	184 (26.9)	13 (27.6)	0.92			
Diabetes mellitus	52 (7.6)	2 (4.2)	0.57			
Dyslipidemia	159 (23.3)	9 (19.1)	0.51			
Ischemic heart disease	43 (6.3)	1 (2.1)	0.35			
Chronic pulmonary obstructive disease	17 (2.5)	2 (4.3)	0.35			
Active smoking	96 (14.0)	12 (25.5)	0.03	1.697	0.825–3.488	0.150
Anticoagulant and/or antiaggregant therapy	52 (7.1)	3 (6.3)	0.84			
Charlson score	1.81±0.07	0.97±0,20	0.12			
Previous abdominal surgery	424 (62.1)	24 (51.0)	0.13			
Indications						
Colorectal cancer	389 (57.0)	15 (31.9)	<0.0001			
Diverticular disease	270 (39.5)	31 (65.9)		2.486	1.288–4.787	0.007
Other diseases	23	1				
Surgical procedures						
Laparoscopic approach	628 (92.0)	47 (100)	0.05	1.002	0.912–2.103	0.481
Preservation of the left colic superior artery	580 (85.0)	44 (93.6)	0.13			
Operative time	196±6.26	165.3±13.18	0.15			
Blood loss	93.1±5.4	72.58±12.82	0.33			
Stapled anastomosis	479 (70.2)	46 (97.8)	<0.0001	8.437	2.520–14.746	0.009
Abdominal drainage	82 (12)	3 (6.4)	0.35			

Table 2 Series reporting postoperative anastomotic bleeding after colorectal anastomosis

Author	Number	Frequency	Pathology	Type of anastomosis	Time to postoperative bleeding (median)	Hemodynamic instability	Blood transfusion	Treatment	Success
Tuchmann A	1	1.3 %	–	Linear 100 %	–	–	100 %	Transfusion	0 %
McGinn FP	1	1.7 %	–	Circular 100 %	–	–	100 %	Rectal packing	100 %
DuBois JJ	1	–	–	Circular 100 %	POD 1	–	–	Surgery	100 %
Aurelio P	7	3.3 %	–	Circular 100 %	POD 1	0 %	100 %	Endoscopy 71 %	100 %
Atabek U	2	–	–	Linear 100 %	POD 15	0 %	100 %	Embolization 100 %	100 %
Ciocco WC	1	–	–	Circular 100 %	–	0 %	0 %	Endoscopy 100 %	100 %
Fingerhut A	5	0.5 %	–	Circular 100 %	–	–	60 %	Non-operative 100 %	100 %
Neutzling CB	28	4.2 %	–	Circular 51 %	–	–	–	–	–
Pishori T	7	2.4 %	Malignancy 0 %	Circular 100 %	–	–	–	Endoscopy 100 %	100 %
Martinez-Serrano MA	7	0.5 %	Malignancy 71 %	Circular 86 %	POD 1	29 %	57 %	Endoscopy 86 % Surgery 14 %	100 %
Zhao WT	2	1.2 %	Malignancy 100 %	Circular 100 %	POD 1	–	–	Surgery 100 %	100 %
Perez RO	1	–	Malignancy 0 %	Circular 100 %	POD 1	100 %	100 %	Endoscopy 100 %	100 %
Linn TY	6	4 %	Malignancy 50 %	Circular 100 %	POD 2	50 %	66 %	Endoscopy 50 %	100 %
Amr MA	16	0.1 %	Malignancy 38 %	Circular 66 %	–	0 %	–	Endoscopy 100 %	100 %
Lou Z	6	0.3 %	Malignancy 100 %	Circular 100 %	POD 1	0 %	33 %	Endoscopy 100 %	100 %
Present series	47	6.4 %	Malignancy 55 %	Circular 98 %	POD 2	0 %	8.5 %	Non-operative 21 % Endoscopy 79 %	100 %

POD postoperative day

$p=0.032$). Neither anticoagulant nor antiaggregant treatment was associated with postoperative bleeding. Tumour location was comparable in the two groups; however, patients with bleeding were treated more frequently for diverticular disease compared to patients with no bleeding (65.9 % and 39.5 %, $p<0.0001$).

Surgical procedures

As shown in Table 1, colectomy was performed by laparoscopy in 92.6 % of the cases with a conversion rate of 7.5 %. The left colic superior artery was preserved in 624 (85.5 %) patients with no difference in the two groups ($p=0.13$). Patients who experienced postoperative bleeding had more stapled anastomosis (97.8 vs. 70.2 %, $p<0.0001$). There was no difference among the groups in terms of operative time, blood loss or ureteral injury.

Postoperative outcomes

Overall mortality was of 0.6 % including five patients who died from septic shock after anastomotic leakage ($n=2$), myocardial infarction ($n=2$) and total ischemia of the colon ($n=1$). No patient died in patients who developed bleeding. Overall morbidity was 24.6 % and the rate of postoperative anastomotic leakage was 6.7 % ($n=49$). Even though this rate was higher in patients with bleeding, the difference was not significant (8.5 vs. 6.5 %, $p=0.547$).

Among the 47 patients with anastomotic bleeding, endoscopy was performed in 37 (78.7 %) as a diagnostic tool because the bleeding was significant or/and persistent. At the time of endoscopy, the bleeding was spontaneously stopped in nine (24.3 %). Therapeutic strategy used clips in 10 (27.0 %) cases, mucosal sclerosis in 11 (29.7 %) and both in 7 (18.9 %). Four (8.5 %) patients required blood transfusion for treatment of gastrointestinal bleeding. Five (10.6 %) patients with bleeding were reoperated in this group because early endoscopy showed associated anastomotic leakage.

The median length of stay of the whole population was 7 days, ranging from 4 to 70, without any significant difference in the two groups. Based on multivariate analysis, stapled anastomosis (OR 8.43; CI 95 % 2.52–14.74, $p=0.009$) and diverticular disease (OR 2.48; CI 95 %, 1.28–4.78, $p=0.007$) were independent factors associated with anastomotic bleeding (Table 1).

Discussion

Although postoperative anastomotic bleeding is supposed to be rare, we report a series with 47 patients who developed anastomotic bleeding after left colectomy among a population of 729 patients. As shown in the Table 2 [2–4, 8–19], this rate

(6 %) is higher than those described in previous studies. First of all, most of the previous articles focused on bleeding requiring active therapy, whereas our goal was to establish a general description of all cases of anastomotic bleeding whatever the severity. Indeed, more than 20 % of these patients who experienced bleeding did not require any procedure (i.e. neither blood transfusion nor endoscopy). Interestingly, the endoscopy was useless in almost 20 more percent of patients since the bleeding was spontaneously stopped in 9 cases. Second, in a recent review about stapled versus hand-sewn methods for colorectal anastomosis surgery [2], the authors reported a global incidence of 4.2 % among 662 patients. Interestingly, the observed postoperative bleeding after stapled colorectal anastomosis was 5.4 % (18 of 336 patients) that is comparable to those observed in the present series. In addition, only patients who underwent left colectomy were selected in our series and therefore, no patient had anterior resection of rectum with low colorectal anastomosis. This difference of selected patients with intraperitoneal anastomosis could partially explain the difference in the different series. Interestingly, the present study showed that, even in an expert team, anastomotic bleeding is as frequent as anastomotic leakage. However, none of these 47 patients presented massive bleeding with hemodynamic instability while this clinical life-threatening postoperative complication has been reported to occur in approximately 1 % of cases [13].

There are some reports about the importance of comorbidities on bleeding occurrence; however, no demographic characteristic was associated with anastomotic bleeding in the present series. Additionally, neither anticoagulant nor antiaggregant treatment influenced the occurrence and severity of this postoperative complication. Not surprisingly but based on a multivariable analysis, we confirmed previous reports including the Cochrane Group analysis [2] suggesting that the risk of anastomotic bleeding was higher with the stapled procedure in comparison to the hand-sewn technique. However, for practical reasons, most colorectal anastomoses are performed mechanically in laparoscopic left colectomy. More interestingly, the present series suggests that diverticular disease was independently associated with postoperative anastomotic bleeding. This result may be explained by the modification of the surgical technique in patients treated for diverticular disease. Indeed, since lymphadenectomy is unnecessary in benign disease, the superior rectal artery is preserved as much as possible. In this setting, the changes in the vascular flux may result in increasing bleeding on colorectal anastomosis.

When anastomotic bleeding occurs, non-operative treatment is usually successful in almost all cases. The utility of colonoscopy to confirm the anastomotic bleeding has been suggested, and the safety of sclerotherapy, clips or electrocoagulation to stop the haemorrhage has been investigated [3, 13, 20]. Nevertheless, physicians and surgeons are

sometimes reluctant to perform colonoscopy in a patient who experienced gastrointestinal bleeding in the early outcomes, taking into accounts its risks and potential secondary complications. Indeed, theoretically, air insufflation and sclerotherapy during endoscopy could be considered as risk factors for anastomosis leakage. However, no patient developed anastomotic leakage after endoscopy in our experience and, conversely, endoscopy allowed diagnosing anastomosis dehiscence in five patients. In a quarter of the cases, endoscopy was negative, without active bleeding and these patients did not require additional treatment. No recurrence of bleeding was observed in the present series. Likewise, when anastomotic bleeding stopped spontaneously, conservative strategy without endoscopic exploration appears to be safe. These excellent results provided by early endoscopy have been already shown by previous series (Table 2). Indeed, in the great majority of cases, repeat surgery is not mandatory and endoscopy allowed an adequate stop of the anastomotic bleeding.

To conclude, postoperative anastomotic bleeding is not so uncommon after left colectomy. This complication should be particularly dreaded in patients who underwent stapled colorectal anastomosis for diverticular disease. With the use of clip or mucosal sclerosis, early endoscopy is a safe and efficient treatment.

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Christine Denet: acquisition of data, approval of the version to be published

Laurence Bruyns: acquisition of data, approval of the version to be published

Hugues Levard: acquisition of data, approval of the version to be published

Brice Gayet: revising the article, approval of the version to be published

David Fuks: conception and design, analysis and interpretation of data, drafting the article, approval of the version to be published

Thierry Perniceni: revising the article, approval of the version to be published

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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