

Stop the Bleeding – Endoscopic Management of Postoperative Stapled Anastomotic Site Hemorrhage in Minimal Invasive Colorectal Surgery

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Rezumat

Protocolul “Stop the Bleeding” – managementul endoscopic al hemoragiilor anastomotice postoperatorii, în chirurgia colorectală minim invazivă

Introducere: Sângerarea postoperatorie din anastomoză este o complicație relativ subestimată a chirurgiei colorectale. În ciuda protocoalelor de prevenție intraoperatorie, care vizează limitarea incidenței acestei complicații, ea persistă și în unele cazuri poate fi dramatică. Prin urmare, am decis să aflăm dacă protocolul nostru („Stop-the-bleeding”) de abord endoscopic în urgență este fezabil, eficient și sigur.

Metodă: Între 1 ianuarie 2017 și 1 iulie 2024, am desfășurat un studiu prospectiv monocentric, care a inclus toți pacienții care au suferit o rezecție colorectală cu anastomoză mecanică și au prezentat rectoragii semnificative în primele 30 de zile postoperator. Parametrii principali urmăriți au vizat fezabilitatea și eficacitatea abordului endoscopic, complicațiile asociate și mortalitatea.

Rezultate: În centrul nostru au fost 599 pacienți cu rezecții colorectale și cu anastomoză mecanică, dintre care 48 (8%) au prezentat rectoragii postoperator. Sângerările au fost întâlnite în toate tipurile de anastomoză: anastomoze recto-colice (28 de pacienți, 10,1%), anastomoze colo-colice latero-laterale (5 pacienți, 3,7%) și anastomoze ileo-colice laterolaterale (15 pacienți, 8%). Hemostaza a fost obținută endoscopic în toate cazurile, în majoritatea situațiilor într-o singură ședință. În această serie, nu au fost fistule anastomotice sau decese legate de complicația hemoragică, sau de procedura endoscopică.

Concluzii: Hemostaza endoscopică în urgență pentru sângerările postoperatorii din anastomozele colorectale este fezabilă, eficientă și sigură.

Cuvinte cheie: complicații ale chirurgiei colorectale, sângerare anastomotică, hemostază endoscopică

Abstract

Background: Early anastomotic bleeding is a relatively understated compli-

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cation of colorectal surgery. Despite intraoperative preventing protocols aiming to limit postoperative anastomotic hemorrhage, in some cases it can be dramatic. Therefore, we have decided to find out if our protocol of prompt emergency endoscopic management ("Stop-the-Bleeding" Protocol) is feasible, effective and safe.

Methods: Between January, 1st 2017 and July 1st 2024 we run a prospective single-center study including all the patients who underwent colorectal resection with stapled anastomosis and experienced significant per rectum bleeding within the first 30 postoperative days. Primary outcomes were feasibility and efficacy of the endoscopic approach, related complications and mortality.

Results: We had 599 patients who underwent colorectal resections with mechanical anastomosis in our Center, of whom 48 patients (8%) experienced per rectum bleeding. Bleeding was encountered after all types of stapled anastomosis: recto-colic anastomoses (28 patients, 10.1%), side-to-side colo-colic anastomoses (5 patients, 3.7%), and side-to-side ileocolic anastomoses (15 patients, 8%). Hemostasis was obtained endoscopically in all the cases, mostly by only one session. No anastomotic dehiscence/ leakage or fatality related to the hemorrhagic complication, or the endoscopic procedure were encountered in these series.

Conclusions: Emergency endoscopic hemostasis for postoperative bleeding after colorectal stapled anastomosis is feasible, effective, and safe.

Keywords: colorectal surgery complications, anastomotic bleeding, endoscopic hemostasis

Background

Early anastomotic site bleeding is a relatively understated complication of colorectal surgery since it is generally thought to be self-limiting. Depending on the local expertise, treatment implies conservative, angiographic or endoscopic management and eventually surgery for the dramatic cases.

In the last 5 years, the literature on the topic: endoscopic hemostasis for colorectal anastomotic bleeding is very scarce, implying only very short series of cases (1-5).

Even if endoscopy accounts for low physiological stress and it is done with mild sedation, there is a general fear that the mechanical trauma of the fibroscope and the air insufflation can result in anastomotic leakage.

Presuming that early hemostasis reduces blood transfusions and hospital stay, we initiated a prospective study with the aim to analyze if prompt endoscopic management is feasible, safe, and effective.

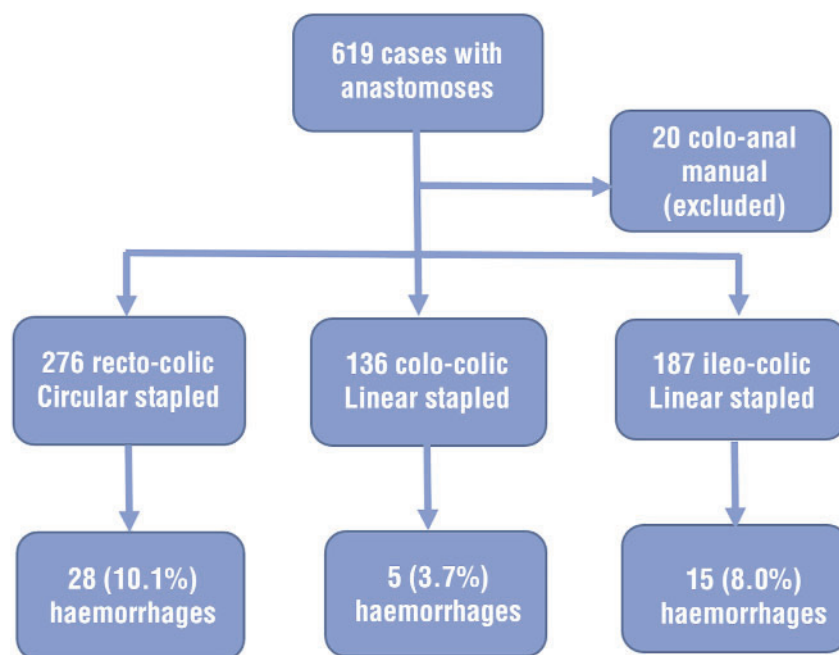
Primary outcomes were: the rate at which the endoscopic approach could reach the anastomotic site, efficacy of hemostasis, procedural complications and related fatality. Secondary outcomes were: time to reach the anastomosis via endoscopy, total time to complete the endoscopic procedure, the impact of the protocol on hospital stay and the need for transfusions.

Methods

In the current analysis, we included all consecutive patients who underwent elective laparoscopic or robotic assisted colorectal surgery between January 1st 2017 and July 1st 2024, with either linear or circular stapled anastomosis. Patients with hand-sewn coloanal anastomosis were excluded from the study.

All the patients with minimal invasive colorectal surgery were entered into an institutional database. All the cases which needed management for significant per rectum bleeding from the anastomotic site, within the first 30 postoperative days, were included into a prospective study. Patients with hand-sewn anastomosis were excluded (*Fig. 1*)

As per institutional protocol for elective surgery, all patients benefited from mechanical bowel preparation (DulcoLax® Sanofi, 5 pills x 2 the day before) and perioperative thromboembolism prophylaxis with low molecular weight heparin (dosage as agreed with the cardiologist), from admission to three weeks after hospital discharge. During the surgical intervention, blood perfusion was assessed with Near-infrared Imaging and Indocyanine Green. Meanwhile, a protocol of intraoperative rising of the systolic blood pressure to check the linear stapled line bleeding was routinely used. The active bleeding was laparoscopically controlled by metallic clips. For lower circular stapled anastomoses, we used flexible recto-sigmoidoscopy (Troidl recto scope KARL STORZ®,

Figure 1. Flowchart with the cases enrolled in the study

Germany) for intraoperative transanal surveillance and hemostasis. Intraoperative hemostasis on the stapling line was achieved according to the surgical procedure, in all cases, by applying metallic clips, energy devices were prohibited. In the postoperative period, patients were allowed liquid oral diet and after first transit for feces a low residue diet.

Endoscopic approach was the first intention treatment for postoperative anastomotic hemorrhage in all the patients.

By hospital protocol, prompt colonoscopy (less than 12 hours from diagnosis), under mild sedation (Midazolam or Propofol) was considered, when massive hematochezia or a drop of hemoglobin level greater than 2 points was observed. Bowel preparation was not required for hemostatic colonoscopy, and the endoscopic procedure was ended after hemostasis was achieved.

Data from consecutive cases were collected from clinical, operative, and endoscopy-suite records, including video footage. All procedures were recorded in line with the General Data Protection Regulation and personal data protection requirements of the Institutional Review Board (IRB). All the patients signed an informed consent while the study had the IRB approval.

Data collection focused on: surgical technique, type of anastomosis, laboratory blood tests, time from the primary surgical intervention to the first endoscopic approach, type of treatment, time to

reach the anastomosis, time to complete the hemostasis, need for transfusion, endoscopy related morbidity and mortality.

Basic statistics were calculated using Microsoft Excel 2016 (Microsoft, Redmond, WA, USA); for the continuous data with non-normal distributions, median and interquartile range (IQR) along with a mean (SD). Comparisons were made using Chi-square Test for proportions and t-Student for differences in continuous variables, such as hospital stay. The threshold for statistical significance was set at 0.05 reported with CI 95% for the difference).

Results

Between January 1st 2017 and July 1st 2024, a large case-series (n=619) of patients underwent colorectal resections with anastomosis. Twenty patients had hand-sewn colo-anal anastomosis, and they were excluded from the analysis. The prospective study included 48 (8.0%) cases which experienced significant per rectum bleeding (*Fig. 1*). No patient was excluded or lost to follow-up. For the 48 patients with anastomotic bleeding the indication for surgery is depicted in *Table 1*.

The hemorrhagic episodes occurred between 2nd and 24th postoperative day, with a median of 3 days. Readmission for hemostasis was deemed necessary in four cases, 2 of them needed transfusions, and the

Table 1. Type of pathology

Pathology	No.
Malign Neoplasia	41
Benign Neoplasia	3
Diverticular disease	2
Endometriosis	2
Total	48

other 2 remained overnight for surveillance. Four other patients were treated as outpatients.

Endoscopic approach to anastomosis was successful at every attempt. *Table 2* includes the time needed to reach the anastomosis according to location.

In terms of the bleeding source, in 29 of patients there was bleeding from a capillary source, in six from an arteriolar bleeding source, and for the remaining 13 cases no active bleeding was actually observed. To achieve hemostasis, most patients required one endoscopic session. Two sessions were needed in six patients, whereas one patient required 3 sessions.

Overall, between 6 and 78 (median 22, average 26.1) minutes were needed to complete the hemostasis, with a longer time in case of ileo-colic anastomosis: 14 to 68 (median 32, average 31.9) minutes.

In terms of hemostatic techniques: in 24 cases endoscopic clipping was combined with sub-mucosal diluted adrenaline injection (ratio 1:10000), in 14 cases only clipping was used, and in 12 cases only adrenaline injection. Three cases required both bipolar electrocoagulation and clipping; and in two cases Purastat® was applied. Hemostasis was obtained in all cases.

In the study group, 13 patients needed transfusion to correct secondary anemia, median 1 unit (IQR 0-11 units).

No anastomotic leakage was encountered in this case-series of patients. No reintervention was needed.

There was no complication or death related to the endoscopic procedure.

Only one fatal event was registered and comorbidity was a leading cause of death. A patient with significant comorbidities (chronic lymphatic leukemia, chronic cardiac insufficiency) had anastomotic bleeding on the third day after right colectomy for malignancy. There was a constant drop in hemoglobin despite the fact that hemostasis was obtained, and 11 units of blood were required. An autoimmune anemia was diagnosed.

Table 2. Time to reach the anastomosis

Anastomosis type	Median	IQR
Recto-colic circular	1	1-8
Colo-colic linear	4	1-24
Ileo-colic linear	9	4-20

Ultimately, after 32 days, the patient died because of cardio-pulmonary complications.

The median length of postoperative hospital stay was 7 days for the 48 patients (IQR 3-31 days), with an average value of 7.4 (SD 5.6) days.

Discussions

From the literature it is not clear how frequent anastomotic bleeding occurs. Neutzling et al. (6) in 3 Randomized Controlled Trials found an incidence of 5.3% for stapled recto-colic anastomosis. Fukunaga (7) reports 4% in his series of laparoscopic low anterior resection. Golda et al. (8) in his study on anastomotic bleeding after ileo-colic anastomosis reports an overall incidence of 4.9%, but all 17 cases were recorded in the group of 174 patients with circular, double-stapled, end-to-side anastomosis, which means an incidence of 9.7%.

Literature regarding the management of anastomotic bleeding after colorectal surgery is scarce. This is reflected in the fact that the topic is not discussed in guidelines or in their updates (9-11). The current guidelines refer to the experience with lower gastrointestinal bleeding in more frequent pathology (e.g. diverticular disease). Thus, some recommendations are not applicable in the specific setting of our study: bleeding before resuming effective bowel transit, on the first days after surgery on a previously mechanically prepared bowel.

Postponing colonoscopy until the bowel is cleaned with 1-4 liters of prep solution, immediately after surgery, on a freshly made anastomosis, it is not highly accepted by surgeons in our department.

CT angiography is not needed as we are aware of the location of the source. Controlling the bleeding by catheter angiography and embolization of the source is not recommended by radiologists (12) and is not accepted by surgeons as it implies a terminal vascularization with high risk of ischemia and subsequent anastomotic leakage. In a series of 9 cases with embolization, Fernández de Sevilla Gómez (13) reports 4 anastomotic leakages and 4 deaths.

We fully agree with the recommendation that

no patient should proceed to emergency surgery unless every effort has been made to resolve the bleeding by endoscopic modalities (10). In these settings, redoing the anastomosis may have a high morbidity.

The first-line technique for the investigation of digestive luminal hemorrhage remains endoscopy (14,15). While recto-colic anastomosis is easy to reach with the scope, there is a concern regarding the difficulties to reach an ileo-colic anastomosis, in an unprepped, stained with blood colon. In our experience, the median time to anastomosis was 9 minutes.

Even though studies demonstrated 30 years ago that colonoscopy can be done safely in the early postoperative period (16,17), mechanically disrupting the anastomosis remains the main concern. Burst pressure studies (18) showed that the leakage pressure for stapled anastomosis is between 62-124 mm Hg with a median value of 84 mm Hg, and the maximal intraluminal pressures during colonoscopy is 15 to 35 mmHg (16). As technique, we prefer to combine clipping with submucosal diluted adrenaline injection (1/10.000). Submucosal injection was used alone only when the bleeding source was not obvious and when the location of the source does not permit the applying of a hemostatic clip. We do not recommend electrocoagulation on the stapling line, especially in the monopolar form, because of the risk of staple melting and the unpredictable path of the current. Submucosal diluted adrenaline injections were used in 36 of 48 patients and this was ensured with no anastomotic leakage. Endoscopic hemostasis was safely completed on the first attempt in the vast majority of cases. The only fatal event which occurred in this case series of surgical patients was not related to a bleeding complication, but was due to the patient's comorbidities.

Knowing that bleeding from an anastomosis can be self-limiting (13), it remains debatable if all patients from our series have benefited from early endoscopy. The literature offers examples of patients with severe bleeding, with some of them needing surgical intervention (8,13,19).

We consider that the "wait and see" policy is hazardous under circumstances. Thus, when there is a drop of 2 g/dl of hemoglobin from the patient's most recent reading value, or, if there is repeated bleeding per rectum, we promptly resort to colonoscopy. This could potentially reduce the need for transfusion and may not extend the length of hospital stay too much.

Our study highlights that endoscopic manage-

ment of anastomotic bleeding is an effective therapeutic method which can be iterated, if necessary, with minimal stress for the patient. Moreover, submucosal diluted adrenaline injection for controlling the bleeding ensured no ischemic anastomotic leakage occurs.

There are a few limitations of the study: first of all, we cannot comment on the impact on the pre-defined need of transfusions, as such a procedure is done per need. There is a need for a different study design and research protocol to allow for random allocation on a conservative control arm vs endoscopic intervention. The same is for the hospital stay. We do not have a historical group to compare, nor does literature provide sufficient data.

However, we agreed on discussing about future protocols to include a pragmatic trial design with a quasi-experimental analysis method to address effectiveness of a conservative vs endoscopic management for bleeding control in complicated colorectal surgery.

Conclusions

Our study has demonstrated that endoscopic hemostasis procedures for substantial anastomotic bleeding following colorectal surgery are feasible, safe and efficient, including for ileo-colic anastomoses. The hospital protocol: Stop the Bleeding (endoscopy within 12 hours) is likely effective, but further research should explore the potential of prompt endoscopic interventions in reducing the patient's hospital stay and the need for transfusions.

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Conflict of Interest

Bogdan Daniel Dumbrava, Florin Turcu and Catalin Copsescu have no conflicts of interest to disclose.

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