

Endoscopic management of early GI tract bleeding in a group of bariatric patients undergoing a fast track protocol

Michał Szymański¹, Iwona Marek², Andrzej Hellmann¹, Agastya Patel¹, Justyna Bigda¹, Łukasz Kaska¹,
Monika Proczko-Stepaniak¹

¹Department of General, Endocrine and Transplant Surgery, Faculty of Medicine, Medical University of Gdansk, Gdansk, Poland

²Department of Gastroenterology and Hepatology, Faculty of Medicine, Medical University of Gdansk, Gdansk, Poland

Videosurgery Miniinv 2021; 16 (1): 139–144
DOI: <https://doi.org/10.5114/witm.2020.99146>

Abstract

Introduction: Enhanced recovery after bariatric surgery (ERABS) and other fast track protocols are currently being implemented in bariatric surgery. This approach has several benefits. However, early complications may occur and require urgent re-hospitalization and management. Gastrointestinal (GI) bleeding following bariatric surgery remains one of the most serious complications requiring endoscopic treatment.

Aim: To evaluate the potential influence of early endoscopic intervention on bariatric patients' management.

Material and methods: A clinical database was searched for patients undergoing endoscopic treatment because of GI tract bleeding following bariatric surgery under the ERABS protocol. 14 out of 1431 patients operated on were identified and their data were extracted for the purposes of this study. Patients readmitted to the hospital due to developing GI tract bleeding (group 2) were compared with patients undergoing endoscopic intervention during the initial stay (group 1), for the same purpose.

Results: We found no statistically significant differences in hemoglobin level or length of hospital stay before endoscopy between groups. Based on the analyzed data, the percentage of GI bleeding in patients operated on under the ERABS protocol in our center is 0.97% (n = 14). The rate of early (up to 30 days) readmissions due to GI tract bleeding is 0.4% (n = 5) with an overall early readmission rate of 0.91% (n = 13) in the study period since the ERABS protocol was implemented.

Conclusions: Long-term effects (% total weight loss, %TWL) of bariatric surgery do not depend on the need of early endoscopic intervention and rehospitalization. Endoscopic intervention is a safe treatment modality, not associated with risk of reoperation or complications.

Key words: obesity, endoscopy, enhanced recovery after bariatric surgery, enhanced recovery after surgery, gastrointestinal tract bleeding.

Introduction

The enhanced recovery after bariatric surgery (ERABS) protocol is a feasible concept, which is safely implemented globally in several bariatric centers with acceptable morbidity and mortality outcomes [1–4]. Moreover, such fast track protocols are also claimed

to be cost effective. These programs of perioperative care allow patients to be discharged from the hospital as soon as functional recovery is achieved, thereby reducing the length of hospital stay. However, this in turn results in some complications occurring outside the hospital which remain unnoticed or require urgent re-hospitalization and management [5].

Address for correspondence

Dr Michał Szymański, Department of General, Endocrine and Transplant Surgery, Faculty of Medicine Medical University of Gdansk, Gdansk, Poland, phone: +48 722 198 710, e-mail: szymanski@gumed.edu.pl

Early postoperative gastro-intestinal (GI) tract hemorrhage is defined as bleeding occurring from the GI tract within 2 weeks after surgery [6]. Endoscopy plays an important role in early management and diagnosis of such postoperative complications following bariatric surgery [7]. It is most commonly indicated when symptoms such as hematemesis, melena and/or a drop in hemoglobin level occur, indicating potential GI tract bleeding [8]. Endoscopic management of acute bleeding in the early postoperative period is often challenging due to the altered post-operative anatomy and the risk of disrupting the stapler line [9].

To the best of our knowledge, evidence regarding the occurrence of early GI tract bleeding, its endoscopic management and long-term influence on weight loss in patients managed under ERABS or other fast track protocols is lacking. We present a single center experience in the field of early endoscopic interventions following bariatric surgery performed in accordance with the ERABS protocol.

Aim

To evaluate the potential influence of early endoscopic intervention on bariatric patients' management pathway. The primary objective was to compare results between patients who underwent endoscopic intervention during the initial hospital stay and those who were readmitted following complications of early GI tract bleeding.

Material and methods

A prospectively maintained clinical database of patients operated on at the hospital was searched for patients who underwent bariatric surgery under the ERABS protocol. Data of patients operated on between 1.01.2015 and 1.01.2019 were collected.

Data collection

The following data were extracted: demographic information (age, sex), type of bariatric surgery, length of primary hospital stay (LOS), location and type of bleeding (Forrest classification [10]), type of technique used to achieve hemostasis, total number of endoscopic interventions per patient, number of reoperations, number of early readmissions (within 30 days), basic laboratory parameters, intensive

care unit (ICU) stay, late readmission rate (within 6 months) and long-term effect of bariatric intervention (%TWL).

Study design

Patients were divided into two groups: group 1 (occurrence of GI tract bleeding during initial hospital stay) and group 2 (readmission due to GI tract bleeding). Statistical analysis was performed to compare the groups.

ERABS intervention

In accordance with the enhanced recovery after surgery (ERAS) protocol, the pathway utilized in the management of patients undergoing bariatric surgery included preoperative preparation, and standardized intraoperative and postoperative care. The preoperative preparation included patient counseling, liver-shrinking diet for 2 weeks and smoking cessation for at least 2 weeks before the surgery. The patients were orally administered pantoprazole (40 mg), paracetamol (1000 mg), metoclopramide (10 mg) and gabapentin (300 mg) on the day of the surgery. All patients were also preoperatively screened by a multidisciplinary team (consisting of a surgeon, anesthesiologist and nutritionist). During the surgery, an optimized anesthetic protocol with restrictive fluid therapy and low dose opioid anesthesia was utilized. The surgical team included a dedicated bariatric team of a scrub nurse, anesthesiologist and a surgeon. The postoperative care involved early full mobilization of the patient within 4 h after the surgery and multimodal, non-opioid analgesia. The patients were discharged on postoperative day one if specific criteria were fulfilled: good tolerance of liquid diet, adequate pain control on oral analgesia, adequate mobilization and stable hemoglobin level (Hb). Additionally, the patients were prescribed pantoprazole (40 mg) for 3 months after laparoscopic sleeve gastrectomy (LSG), and for 6 months after one anastomosis gastric bypass (OAGB) and Roux-en-Y gastric bypass (RYGB).

Endoscopic technique

All endoscopic procedures were performed by an endoscopist and nurse with experience in the field of upper GI tract interventions. The procedures were performed using Pentax EG-3490K or EG29-i10 endoscopes in a dedicated endoscopic suite.

Statistical analysis

Assumptions of normality and equality of variances of the collected variables were assessed using the Shapiro-Wilk test and Leven's tests, respectively. Student's *t*-test and Pearson's correlation coefficient were used to evaluate the differences and relationships between the variables. For analysis of categorical variables, Fisher's exact test was used. Statistical significance was assumed if *p*-values were < 0.05. Statistical analysis was performed using Statistica 12.5 (StatSoft).

Results

Between 1st January 2015 and 1st January 2019, 1431 patients underwent bariatric surgery in accordance with the ERABS protocol at our center. Of these, 14 (6 males, 43%) patients requiring endoscopic interventions in the postoperative period were included for analysis in this study. The mean age of the included cohort was 44.7 years (range: 28–61). The patients underwent three types of bariatric surgery: OAGB (11 patients), LSG (2 patients) and RYGB

(1 patient). The indications for gastroscopy were as follows: hematemesis (*n* = 12, 86%), decrease in serum Hb level (*n* = 13, 93%) and hypovolemic shock (*n* = 2, 14%). The time interval between surgical procedure and bleeding complications ranged from 4 to 40 h (mean = 28 h). The endoscopic intervention was performed after a mean time of 32 h after the surgery (range: 8–48 h). Details are presented in Table I. The majority of the patients (*n* = 10, 71%) were found to have active, oozing bleeding (Forrest classification 1b) upon endoscopic intervention. The most common site of bleeding was the gastro-jejunal anastomosis in 12 (86%) patients. Of the 2 patients who underwent LSG, 1 was observed to have multifocal bleeding (esophagus and stapler line) and the other to have isolated stapler line bleeding.

In all cases, an injection of epinephrine solution with osmotically active medium (glucose, Voluven) was initially used to achieve hemostasis. If necessary, extra hemostatic clips were used (Olympus, Cook). The technique used to achieve hemostasis (use of one method (epinephrine injection OR hemostatic clips) or a combined method (epinephrine

Table I. Patients' baseline characteristics

Type of surgery	Number of patients	Age	Hematemesis	Time to bleeding	Time to endoscopy	Forrest scale	LOS	Total number of interventions
LSG	2	59 (71–61)	100%	4–36 h	8–48 h	1b–2b	4–9	2–3
OAGB	11	42.5 (28–52)	82% (<i>n</i> = 9)	10–41 h	12–48 h	1b = 63%	3–7	1–2
RYGB	1	41	100%	40 h	48 h	2a	7	1

Table II. Comparison of technique of endoscopic hemostasis used

Parameter	One method (<i>n</i> = 8)			Combined method (<i>n</i> = 6)			<i>P</i> -value
	Mean	Range	SD	Mean	Range	SD	
Age [years]	40.63	28–57	8.67	48.67	43–61	6.92	0.087
Follow-up [months]	17.63	3–31	10.00	13.67	8–24	6.71	0.420
Time before endoscopy [h]	27.50	8.00–48.00	15.18	38.00	24.00–48.00	9.03	0.160
Hb level preOP [g/dl]	13.44	10.40–16.70	2.13	14.43	12.60–15.30	0.94	0.309
Hb level preGastro [g/dl]	11.59	8.20–15.50	2.70	11.20	7.00–12.70	2.12	0.777
BMI pre OP [kg/m ²]	37.25	31.00–41.00	3.41	38.00	34.00–43.00	3.35	0.689
BMI during follow-up [kg/m ²]	28.36	22.80–36.80	4.52	30.83	29.50–32.60	1.03	0.218
LOS [days]	4.75	3–7	1.39	5.50	4–9	2.07	0.432
%TWL [%]	32.03	8.93–43.82	11.43	29.74	21.30–38.16	6.53	0.670

injection AND hemostatic clips)) did not have any significant influence on BMI during follow-up, LOS or %TWL (Table II). The patients requiring additional endoscopic intervention were significantly older than those who achieved hemostasis with single endoscopic intervention ($p = 0.015$). The need for repeated endoscopic intervention did not affect %TWL ($p = 0.429$) (Table III).

None of the patients included in this study required surgical re-intervention or ICU admission. Two patients required blood transfusion (a total of 14 units of packed red blood cells and 3 units of frozen fresh plasma was used). There were no deaths during the study period with a mean follow-up period of 15.93 months.

Patients were divided into two groups. Group 1 ($n = 9$) included patients who developed hemorrhage during the initial hospital stay and were compared to the patients in group 2 ($n = 5$), who required re-admission because of upper GI tract bleeding. The patients in group 1 had the following comorbidities: diabetes mellitus (DM) ($n = 3$) and hypertension (HA) ($n = 5$). In group 1, two additional patients were receiving rivaroxaban (Xarelto) prior to surgery due to cardiological comorbidities (atrial fibrillation and mitral valve replacement, respectively), which was switched to low molecular weight heparin during the perioperative period. In group 2, concomitant comorbidities such as DM ($n = 1$) and HA ($n = 3$) were also present. There was 1 active smoker in each group. In both groups, none of patients had obstructive sleep apnea syndrome. The time interval between surgery and endoscopic intervention was significantly shorter for group 1 in comparison to group 2 ($p = 0.014$). Serum Hb levels before endoscopy and the length of hospital stay were similar between the groups

($p = 0.658$ and 0.403 , respectively). At long-term follow-up, the post-operative weight loss (%TWL) of patients in group 2 was similar to that in group 1 ($p = 0.298$) (Table IV).

Discussion

To the best of our knowledge, this is the first article addressing the issue of early re-admission due to GI tract bleeding following bariatric surgery among patients treated in accordance with the ERABS protocol. In the community of bariatric surgery, the causes and frequencies of re-admission following discharge are a topic of ongoing discussion [11]. Potential risk factors for prolonged hospital stay as well as early re-admissions, such as intraoperative adverse events and low oral fluid intake on the day of surgery, have been identified [12]. Furthermore, the incidence of GI tract bleeding after LSG and RYGB has been well documented. Early upper GI hemorrhage has been mostly reported after laparoscopic RYGB (1–4%) with bleeding lesions being often identified at the gastrojejunostomy staple lines and rarely at the jejunojejunostomy, in the gastric pouch, or bypassed stomach [13]. The majority of patients included in this study who underwent laparoscopic OAGB developed bleeding from the gastrojejunostomy site ($n = 11$, 100%). Some studies have reported concerns over implementation of pre-operative ERABS recommendations [14]. However, in our center, the recommendations are optimally executed, and we did not find any specific comorbidities or preexisting conditions that may affect readmission rate.

Based on the analyzed data, the percentage of GI bleeding in patients operated on under the ERABS protocol in our center was 0.98% ($n = 14$). Between implementing the ERABS protocol in January 2015 to January 2019, the rate of readmissions due to GI

Table III. Impact of repeated endoscopic interventions on the results of treatment

Parameter	Re-scope						P-value
	No ($n = 9$)			Yes ($n = 5$)			
	Mean	Range	SD	Mean	Range	SD	
Age	40.11	28–48	6.39	51.20	43–61	8.14	0.015
BMI pre OP [kg/m ²]	37.89	31.00–43.00	3.92	37.00	34.00–39.00	1.87	0.243
BMI during follow-up [kg/m ²]	29.88	22.80–36.80	3.97	28.60	25.00–31.00	3.07	0.646
LOS [days]	4.67	3.00–7.00	1.32	5.80	4.00–9.00	2.17	0.547
%TWL [%]	29.50	8.93–43.67	10.17	33.84	24.26–43.82	8.01	0.429

Table IV. Comparison of studied groups

Parameter	Group 1 (n = 9)			Group 2 (n = 5)			P-value
	Mean	Range	SD	Mean	Range	SD	
Age [years]	44.89	28.00–61.00	10.71	42.60	38.00–48.00	3.65	0.656
Follow-up [months]	17.89	8.00–28.00	7.13	12.40	3.00–31.00	10.90	0.273
Time before endoscopy [h]	25.78	8.00–48.00	12.51	43.20	36.00–48.00	6.57	0.014
Hb level preOP [g/dl]	14.32	10.40–16.70	1.92	13.04	11.50–14.50	1.10	0.198
HB level pre Gastro [g/dl]	11.64	7.00–15.50	2.92	11.02	9.20–11.90	1.05	0.658
BMI pre OP [kg/m ²]	38.56	34.00–43.00	2.79	35.80	31.00–41.00	3.63	0.137
BMI during follow-up [kg/m ²]	30.02	25.00–36.80	3.57	28.34	22.80–32.00	3.82	0.425
LOS [days]	4.78	3.00–9.00	1.92	5.60	4.00–7.00	1.14	0.403
TWL [%]	33.07	21.30–43.82	7.10	27.41	8.93–43.67	12.64	0.298

tract bleeding was 0.4% ($n = 5$) with an overall readmission rate of 0.91% ($n = 13$). Several studies have reported readmission rates ranging from 1.87% to 14.46% when implementing the ERABS protocol [15–22]. There is still a lack of reliable data on long-term treatment outcomes in patients with GI tract bleeding. Our study demonstrates that endoscopic treatment is a safe method for managing GI tract bleeding occurring in the post-bariatric surgery period. It provides proof that patients who are discharged on the 1st postoperative day under the ERABS protocol and develop complications outside of the hospital can be managed with endoscopic interventions as effectively as those developing early complications during the initial hospital stay. Additionally, our study also shows that such management does not affect the long-term outcomes of bariatric surgery in terms of %TWL.

However, this study has several limitations. The number of patients included in both groups is small. Our data also lack homogeneity as the patients included in the study underwent three different types of bariatric procedures (LSG, OAGB and RYGB). Furthermore, the mean follow-up period was relatively short (15.93 months, range: 8–31 months). Despite these limitations, our study does provide an essential input to the current discussion on patient safety under fast track protocols such as ERABS.

Conclusions

Endoscopic management of postoperative bleeding complications in patients undergoing bariatric

surgery in accordance with the ERABS protocol is feasible and safe. Furthermore, the time of occurrence of bleeding complications as well as the method of hemostatic management does not seem to influence long-term outcomes of bariatric surgery.

Conflict of interest

The authors declare no conflict of interest.

References

1. Birkmeyer JD, Dimick JB, Staiger DO. Operative mortality and procedure volume as predictors of subsequent hospital performance. *Ann Surg* 2006; 243: 411-7.
2. Bergland A, Gislason H, Raeder J. Fast-track surgery for bariatric laparoscopic gastric bypass with focus on anaesthesia and peri-operative care. Experience with 500 cases. *Acta Anaesthesiol Scand* 2008; 52: 1394-9.
3. Jacobsen HJ, Bergland A, Raeder J, et al. High-volume bariatric surgery in a single center: safety, quality, cost-efficacy and teaching aspects in 2,000 consecutive cases. *Obes Surg* 2012; 22: 158-66.
4. Mannaerts GHH, van Mil SR, Stepaniak PS, et al. Results of implementing an enhanced recovery after bariatric surgery (ERABS) protocol. *Obes Surg* 2016; 26: 303-12.
5. Awad S, Carter S, Purkayastha S, et al. Enhanced Recovery after Bariatric Surgery (ERABS): clinical outcomes from a tertiary referral bariatric centre. *Obes Surg* 2014; 24: 753-8.
6. Mayer G, Lingenfeller T, Ell C. The role of endoscopy in early postoperative haemorrhage. *Best Pract Res Clin Gastroenterol* 2004; 18: 799-807.
7. Nguyen NT, Rivers R, Wolfe BM. Early gastrointestinal hemorrhage after laparoscopic gastric bypass. *Obes Surg* 2003; 13: 62-5.
8. Gralnek IM, Dumonceau JM, Kuipers EJ, et al. Diagnosis and management of nonvariceal upper gastrointestinal hemor-

- rhage: European Society of Gastrointestinal Endoscopy (ESGE) Guideline. *Endoscopy* 2015; 47: a1-46.
9. Jamil LH, Krause KR, Chengelis DL, et al. Endoscopic management of early upper gastrointestinal hemorrhage following laparoscopic Roux-en-Y gastric bypass. *Am J Gastroenterol* 2008; 103: 86-91.
 10. Forrest JAH, Finlayson NDC, Shearman DJC. Endoscopy in gastrointestinal bleeding. *Lancet* 1974; 304: 394-7.
 11. Lam J, Suzuki T, Bernstein D, et al. An ERAS protocol for bariatric surgery: is it safe to discharge on post-operative day 1? *Surg Endosc* 2019; 33: 580-6.
 12. Major P, Wysocki M, Torbicz G, et al. Risk factors for prolonged length of hospital stay and readmissions after laparoscopic sleeve gastrectomy and laparoscopic Roux-en-Y gastric bypass. *Obes Surg* 2018; 28: 323-32.
 13. Silecchia G, Iossa A. Complications of staple line and anastomoses following laparoscopic bariatric surgery. *Ann Gastroenterol* 2018; 31: 56-64.
 14. Stefura T, Skomarowska O, Wysocki M, et al. Challenges associated with bariatric surgery – a multi-center report. *Videosurgery Miniinv* 2019; 14: 526-31.
 15. Doumouras AG, Saleh F, Hong D. 30-Day readmission after bariatric surgery in a publicly funded regionalized center of excellence system. *Surg Endosc* 2016; 30: 2066-72.
 16. Chen SY, Stem M, Schweitzer MA, et al. Assessment of postdischarge complications after bariatric surgery: a National Surgical Quality Improvement Program analysis. *Surgery* 2015; 158: 777-86.
 17. Aman MW, Stem M, Schweitzer MA, et al. Early hospital readmission after bariatric surgery. *Surg Endosc* 2016; 30: 2231-8.
 18. Abraham CR, Werter CR, Ata A, et al. Predictors of hospital readmission after bariatric surgery. *J Am Coll Surg* 2015; 221: 220-7.
 19. Weller WE, Rosati C, Hannan EL. Relationship between surgeon and hospital volume and readmission after bariatric operation. *J Am Coll Surg* 2007; 204: 383-91.
 20. Saunders JK, Ballantyne GH, Belsley S, et al. 30-Day readmission rates at a high volume bariatric surgery center: laparoscopic adjustable gastric banding, laparoscopic gastric bypass, and vertical banded gastroplasty-Roux-en-Y gastric bypass. *Obes Surg* 2007; 17: 1171-7.
 21. Baker MT, Lara MD, Larson CJ, et al. Length of stay and impact on readmission rates after laparoscopic gastric bypass. *Surg Obes Relat Dis* 2006; 2: 435-9.
 22. Khorgami Z, Andalib A, Aminian A, et al. Predictors of readmission after laparoscopic gastric bypass and sleeve gastrectomy: a comparative analysis of ACS-NSQIP database. *Surg Endosc* 2016; 30: 2342-50.

Received: 20.03.2020, **accepted:** 15.05.2020.