International Journal of Surgery 33 (2016) 136–139

Contents lists available at ScienceDirect

International Journal of Surgery

journal homepage: www.journal-surgery.net

Original research

Massive and recurrent diverticular hemorrhage, risk factors and treatment☆

Hayim Gilshtein [a, b], Yoram Kluger [b], Areen Khoury [b], Nidal Issa [c], Wisam Khoury [a, b, *]

[a] Colorectal Surgery Unit, Rambam Health Care Campus, Haifa, Israel
[b] Department of General Surgery, Rambam Health Care Campus, Haifa, Israel
[c] Department of General Surgery, Hasharon Medical Center, Petah Tikva, Israel

HIGHLIGHTS

- Diverticulosis site is a risk factor for recurrent diverticular hemorrhage.
- Right colon diverticular hemorrhage prompt early surgical treatment.
- Anti coagulant treatment does not increase risk of recurrent bleeding.

ARTICLE INFO

Article history:
Received 10 June 2016
Received in revised form
26 July 2016
Accepted 29 July 2016
Available online 5 August 2016

Keywords:
Diverticular hemorrhage
Rebleeding
Operative treatment

ABSTRACT

Aim: Diverticular hemorrhage may be massive or recurrent, requiring surgical management. The aim of our study is to define risk factors that predict rebleeding or need for urgent operation in patients with diverticular hemorrhage.

Methods: Retrospective study was conducted on patients who were admitted for diverticular hemorrhage. Data pertaining to patient and bleeding characteristics, method of diagnosis, blood transfusion and type of operation were collected. Multivariate analysis model compared patients who experienced single bleeding episode with those with recurrent episodes, and patients who underwent surgery with those who did not.

Results: One hundred and four patients met the inclusion criteria. Thirty four patients experienced more than one bleeding episode. Ten patients needed surgery for recurrent bleeding. Five patients presented with hemodynamic instability, none of them required surgical treatment. Neither patients' comorbidity nor anticoagulant and antiaggregant treatments were associated with increased risk for recurrent hemorrhage. Diabetes mellitus was correlated with decreased risk for recurrent hemorrhage, OR = 0.21, (CI 95% (0.06–0.73)); p = 0.014. Independent risk factor for massive recurrent diverticular hemorrhage requiring surgery was right sided diverticulosis, OR = 4.6(CI 95% (2.1–19)); p = 0.006.

Conclusions: Right colon diverticulosis rather than patient characteristics and medical treatment should prompt for aggressive management with lower threshold for surgical intervention.

1. Introduction

Diverticular hemorrhage (DH) is the most common etiology for lower gastrointestinal bleeding (LGIB) in the adult population [1]. Fifteen percent of the patients with colonic diverticulosis will experience at least one episode of bleeding. Of them, one third is clinically significant [2]. Although it is more common in the left colon, more than 50% of massive hemorrhages originate from the right colon [3–5].

There have been several suggested risk factors for DH, including non steroidal anti inflammatory drugs (NSAID), hypertension, atherosclerotic disease, anticoagulant treatment and obesity [6–9,13]. The risk for recurrent bleeding is 10–43% [10,11].

DH is correlated with advanced age and comorbidities. Early prophylactic surgery in this group of patients is recommended to avoid the high morbidity and mortality rates associated with urgent

☆ The paper was presented at the 8th annual meeting of ESCP 2013, Belgrade, Serbia.

* Corresponding author. Department of General Surgery, Rambam Health Care Campus, 8th Haalia st, Haifa, Israel.
E-mail address: wekhoury@gmail.com (W. Khoury).

http://dx.doi.org/10.1016/j.ijsu.2016.07.076
1743-9191/

operations [12]. Apparently, defining risk groups for massive hemorrhage or rebleeding, may help establishing an evidenced-based algorithm for the treatment of DH [13].

The aim of our study is to define risk factors for massive DH requiring surgery and recurrent DH requiring readmission and potentially surgical treatment, in a large group of patients.

2. Patients and methods

All patients who were admitted to the general surgery department for LGIB and were found to have DH, between the years 1990 and 2011 were identified and consist the study group. LGIB was defined as history of recent bloody bowel movement and fresh blood at digital rectal exam (DRE). The diagnosis of DH was established if diverticular disease is confirmed and there is no additional possible source of bleeding at the different diagnostic modalities, or if bleeding from diverticula was documented during colonoscopy despite the presence of other pathologies. If additional possible bleeding source is present or DH can not be definitely confirmed, patients were excluded from the study.

Our routine practice for DH includes admission to intermediate intensive surgical care unit, NPO, hemodynamic monitoring, immediate rigid proctoscopy to rule out anorectal source of bleeding, serial hemoglobin levels and full colonoscopy within 24 h from admission. Hemodynamically stable patients who experience ongoing bleeding, undergo computerized tomography angiography, formal angiography or red blood cell (RBC) scan if minor ongoing bleeding is the case. If 6 units of packed red blood cells (PRBC) were consumed, an operative treatment, i.e. resection of the diseased segment, is considered. Patients who experience hemodynamic instability are refered to surgery or angiography (depends on the severity of their hemodynamic condition). Hemodynamic status was defined as unstable if systolic blood pressure <90 mmHg or heart rate >120/min.

Patients with recurrent bleeding episodes refered to emergent surgical treatment if multiple transfusions were needed during multiple admissions or developed hemodynamic instability during a certain hospitalization. If the bleeding was localized prior to surgery, a resection of a certain colonic segment was performed. If not, a total colectomy was then the operation of choice. Surgery was deferred in patients with recurrent mild episodes that did not require blood transfusions.

Of note, patients who did not undergo operative treatment always completed their work up, i.e. colonoscopy, during the same hospitalization. No interval studies were ordered.

Data collection: Patients' demographics, symptoms, hemodynamic status, hemoglobin levels, blood transfusion requirements, comorbidities, use of anticoagulation, NSAIDS or antiplatelets medications at the time of first and recurrent bleeding, were collected. Also were reviewed the diagnostic modalities findings, including colonoscopy, barium enema, angiography and RBC scan at the same time points. All studies were performed and interpreted by experienced gastroenterologists, radiologists, interventional radiologists or nuclear medicine physicians, respectively.

In patients who underwent colonoscopy or barium enema, the diverticular disease extent was indicated. It was defined as sigmoid if the diverticula is localized to the sigmoid, left colon if diverticula located in the left colon and sigmoid, right sided if the diverticuli were seen in the right and transverse colon, and pancolonic disease if the right and left colon were involved. In patients who underwent imaging modalities, i.e. RBC scan or angiography, the site of bleeding and angioembolization, were indicated.

Patients undergoing operative treatment were identified. The operative notes were reviewed and intraoperative findings and type of operation were collected. In such circumstances, post-operative outcomes were evaluated as well.

In order to study risk factors associated with rebleeding, the patients were classified into two subgroups, patients with single bleeding episode and patients with recurrent bleeding. The subgroups were compared, and risk factors for recurrent bleeding were identified using a multivariate analysis model.

The patients were also classified into two different subgroups, based on the need for operative treatment. Those who underwent surgery for massive or recurrent hemorrhage and those who did not. Again, multivariate analysis model was used to assess risk factors for surgery.

3. Statistical analysis

A Chi-square test was used for categorical variables and a *t*-test for quantitative variables. A multivariate analysis with cox regression model was implied for statistically significant factors. A p-value < 0.05 was considered as statistically significant.

4. Results

One hundred and four patients (55 male, 49 female) were admitted for DH between the years 1990 and 2011. In twenty one patients, another possible source of bleeding was documented, thus they were excluded from the study. Rectal bleeding was the presenting symptom of diverticular disease in most cases. Recurrent episodes were documented in 34 patients. The median time to first recurrence was 23 (1–170) months. A total of 10 patients underwent operative treatment. All patients underwent surgery due to recurrent bleeding episodes. Surgical procedures included

Table 1
Comparison between patients with single and multiple episodes of diverticular hemorrhage. *Univariate anlaysis.*

	Single hemorrhage N = 70	Recurrent hemorrhage N = 34	P-value
Age (year) (mean ± SD)	75.3 ± 10.1	76.1 ± 10	0.69
Gender F/M	32/38	18/16	0.488
Comorbidity			
Hypertension	85.2%	63.4%	0.013
Ischemic heart disease	45.9%	51.2%	0.582
Diabetes mellitus	27.9%	12.2%	0.011
Antiaggregant treatment	36 (51.4%)	23 (67.6%)	0.117
Anticoagulant treatment	14 (20%)	2 (5.9%)	0.061
Hemodynamic instability on admission	5 (7.1%)	0%	0.11
Hemoglobin levels at admission			
Blood transfusion			
Diverticular disease distribution			
Right colon	9	5	0.516
Left colon	31	15	
Sigmoid colon	10	8	
Pancolonic	20	6	