Best Practice & Research Clinical Gastroenterology 42-43 (2019) 101622

Contents lists available at ScienceDirect

Best Practice & Research Clinical Gastroenterology

journal homepage: https://ees.elsevier.com/ybega/default.asp

Is there still a role for the surgeon in the management of gastrointestinal bleeding ?

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ARTICLE INFO

Article history:
Received 23 January 2019
Received in revised form
4 June 2019
Accepted 7 June 2019

Keywords:
Gastrointestinal bleeding
Haemorrhage
Peptic ulcer disease

ABSTRACT

Modern investigation of gastrointestinal bleeds allows for reliable source identification in most cases. Current treatment algorithms utilise therapeutic endoscopy or interventional radiology and surgery now plays a limited role in the treatment of gastrointestinal bleeds. Approximately 2–4% of patients admitted with GI bleeds, however, require surgery to control their haemorrhage.

Introduction

Before the advent of endoscopy, gastrointestinal bleeding that failed to stop spontaneously, or with basic medical treatment alone, was often managed surgically. Now that patients are the beneficiaries of effective drug therapies, therapeutic endoscopy and interventional radiology, the requirement for surgical intervention has decreased substantially. Emergency surgery, for gastrointestinal bleeding of the lower or upper GI tract, is now rare in developed health care systems. This is not to say, however, that there is no role for surgery. Furthermore, the availability and quality of non-surgical intervention is neither ubiquitous nor consistent meaning that surgery may still be necessary treatment for control of exsanguinating haemorrhage or failed endoscopic or interventional radiological treatment.

The indications for surgery are, therefore

1 Failed endoscopic/interventional radiological treatment.
2 Unavailability of endoscopic or radiological treatment
3 Coexisting pathology such as perforation
4 Massive uncontrolled haemorrhage

Scope of the problem

Primary GI bleeding

There are 75000 admission in the UK annually for GI bleeding [1] with a mortality rate of 10% for upper gastrointestinal (UGI) sources and 15% for lower GI (LGI) sources [2].

Surgery is rarely the first intervention for the diagnosis or management of patients with GI bleeds. Data on the number of patients who have massive haemorrhage are limited as they will usually have undergone at least an attempt at endoscopic localisation within the operating theatre environment in order to direct the surgical intervention and are therefore not easily represented in institutional or health system databases. Data on the use of surgery as the definitive treatment modality from large population based cohorts are lacking but these data can be extrapolated from randomised controlled trials of interventions for patients with GI bleeding such as the Cochrane review of 8 randomised studies of tranexamic acid for upper GI bleeds, including 1701 patients [3]. Trials included spanned the period 1973 to 2011, a time period over which endoscopic and radiological interventions have vastly improved. The requirement for surgery was 154 per 1000 patients included. Data from large prospective HALT-IT trial [4] should provide more contemporaneous data on outcomes and interventions in modern practice.

The 2015 UK TRIGGER study, which assessed a liberal versus restrictive transfusion policy in upper GI bleeds, reported surgical or radiologic intervention in 21 of 936 patients enrolled [5]. There was a 4.2% mortality rate in the patients included in the study and a

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https://doi.org/10.1016/j.bpg.2019.101622
1521-6918/

large number of the patients assessed for eligibility did not consent to inclusion (n = 273). In a 2013 Spanish RCT enrolling 927 patients with UGI bleeds to study transfusion strategies, of patients with peptic ulcer disease as an aetiology of the UGI bleed, 16 of 437 patients (3.7%) required emergency surgery as a rescue intervention [6].

Thus, it is evident for the limited existing data, that surgical intervention for gastrointestinal bleeds is a relatively rare event (approximately 2–4%).

Secondary GI bleeding

Bleeding from the GI tract as a complication of an acute medical or surgical illness appears to be rare. Overt GI bleeding occurred in 224 of 75723 patients admitted to a US academic medical centre (0.29%) and was clinically important (with negative haemodynamic consequences) in 176 patients (0.23%) [7]. Within the ICU population those with shock, coagulopathy or liver disease or, on anticoagulants, renal replacement therapy or mechanical ventilation, are at risk of stress induced ulceration resulting in GI bleeding. Overt GI bleeding occurs in approximately 5% of these patients [8], with mechanical ventilation for more than 48 h, coagulopathy [9] and extra-corporeal life support [10] being definite risk factors. A randomised controlled trial (SUP-ICU) assessing whether routine prophylactic pantoprazole reduced the risk of GI bleeding in 3298 patients in ICU reported an incidence in the treatment and control populations of clinically significant gastrointestinal bleeding of 2.5% and 4.2% respectively [11]. Clinically important GI bleeding was defined as overt bleeding and at least one of the following features without other cause: a decrease in systolic blood pressure of 20 mmHg or more, initiation of treatment with a vasopressor or 20% increase in vasopressor dose, decrease in haemoglobin of at least 2 g/dL or transfusion of two or more units of packed red cells. Overt GI bleeding occurred in 5.4% and 9% of the treatment and control arms respectively. In total, 8 of the 236 patients with GI bleeding (3.3%), required surgery; of whom, 3 were in the PPI arm. 44 patients were managed with endoscopy and 6 with coiling.

Defining the risk of patients with GI bleeds

A number of scoring systems exist which attempt to stratify patients with GI bleeding into high and low risk cohorts for both upper [12–14] and lower GI sources [15–20]. The high risk cohort are variously defined as those at risk of dying, requiring intervention or having a recurrent bleed. None specifically predict requirement for surgery but may be useful in triaging patients to level of care and timing of endoscopy [21]. Markers of increased risk are patients with haemodynamic instability, ongoing bleeding, comorbidity, age over 60 years, elevated creatinine and anaemia [21]. In cohort studies, predictors of mortality from GI bleeding are those with significant comorbidities and those requiring urgent surgery [17,22,23].

Failure of other interventions

The re-bleeding rate for lower GI bleeding is best estimated from the randomised controlled trials of timing of colonoscopy – bleeding while an inpatient is approximately 20–30% and following discharge from hospital 16% [24,25]. In these trials, 2/72 (2.7%) [24] and 13/100 (13%) [25] of patients ultimately had surgical intervention. In the first trial, surgery was for a non-endoscopic related perforation and resection of a tumour [24]. In the latter trial [25], superselective embolization was not performed and therefore, the surgical intervention rate may be higher than in current clinical practice.

The re-bleeding rate after transcatheter embolization intervention is 33% for UGI sources and 24% for LGI sources [26].

If the patient with a further bleed is haemodynamically stable, then another attempt at colonoscopic localisation or embolization may be pursued after discussion with the relevant service, single centre series indicate localisation and control of bleeding occurs in about 20% of second colonoscopies [27]. For patients with UGI source who re-bleed after endoscopic treatment and are haemodynamically stable, repeat endoscopy is safe [28]. Interventional radiology should be used in patients who re-bleed after endoscopic treatment for an UGI source and are haemodynamically unstable provided this resource is immediately available [29].

There is a 1–4% risk of bowel ischaemia after embolization of a bleeding vessel to the lower GI tract. This risk is increased in cases where there is an inability to perform superselective catheterisation of the vessel, embolization of arteries of greater than 1 mm diameter, or distal embolization of particles when polyvinyl alcohol particles of <250 μm or Gelfoam agents are used for the embolization.

Surgery locally or transfer?

Transport of critically ill patients between hospitals or to interventional radiology is not without risk. Factors associated with adverse events include equipment related issues, human factors, factors relating to transport indication and organisation and patient factors such as degree of clinical instability. Recent studies, report that once a patient has been stabilised prior to transfer, adverse events related to patient factors are rare [30]. Communication between transferring units, aided by checklists, can mitigate some of the other risks for adverse transport events and in the absence of data demonstrating safety, transfers of stabilised patients to other centres for more specialised endoscopic or radiologic interventions in likely safe.

Surgical approach to upper gastrointestinal bleeding

Variceal haemorrhage

Treatment now relies on effective correction of coagulation disorders, endoscopic banding which can be repeated and medical measures to reduce portal venous pressure [31]. Surgical strategies to reduce portal venous pressure by shunting has mostly been replaced by TIPSS using interventional radiological techniques. Massive uncontrolled haemorrhage can rarely necessitate a Sengstaken- Blakemore balloon as a temporising method but high risk high mortality operations, such as oesophageal transection, are for the most part historical procedures. Shunt procedures may be considered, if local expertise permits, in the setting of a failed TIPSS procedure [31], although data on outcomes from these procedures in this setting are lacking. Surgery has a role in the longer-term management of some of these patients through appropriately selected liver transplantation [32].

Peptic ulcer disease

Peptic ulcer disease remains the most common cause of upper gastrointestinal bleeding [33]. Early endoscopy following resuscitation by an experienced endoscopist will both localise the source and allow intervention by injection, energy application or clip application in the majority of cases. This in conjunction with correction of coagulopathy and high dose proton pump inhibition is effective in most cases. Rebleeding is also managed endoscopically for reapplication of treatment or with interventional radiology with embolization [29].

These are highly effective treatments either alone or in combination but there will be occasions when initial therapy or repeated therapy is unsuccessful and in those circumstances surgery may be the only remaining option. Outcomes are inevitably worse after prolonged and repeated attempts at haemostasis with massive

blood transfusion so an effective clinical decision needs to be made and early recognition of failing therapies identified. Historically, limited surgery with oversewing of bleeding vessels without definitive anti-ulcer surgery was associated with an increased risk of re-bleeding [34,35]. However, more effective medical treatment and H pylori eradication, now mean that in the modern era, surgery is always aimed solely at haemostasis rather than any definitive anti-ulcer procedures, such as vagotomy or antrectomy. There are rare occasions when bleeding and perforation coexist and here, surgery is determined by the need to treat the perforation. The range of surgical options that might be employed range from simple under-running of the bleeding vessel to some form of partial gastrectomy.

A national audit study published in 2012 [36] looked at the clinical characteristics and outcomes of patients undergoing salvage surgery or embolization after experiencing further bleeding. Of a total of 4478 patients 533 (11.9%) experienced further bleeding after endoscopic therapy. 163 of these proceeded to salvage surgery, 60 to embolization and 6 had both interventions. 9% of patients undergoing embolization went on to have further bleeding and delayed surgical intervention. The mortality following surgical intervention was 29% and following embolization was 23%. The mortality amongst the group with further bleeding managed solely with endoscopic therapies was 23%.

Surgical approach to lower gastrointestinal bleeding

Localisation of a bleeding source is a key component of its surgical management. In a patient with persistent haemodynamic instability and ongoing blood loss and presumed to have a lower GI source of loss, an upper endoscopy ideally with push enteroscopy should be performed to exclude an upper GI source as 15% of patients will have bleeding from this source [24]. Endoscopy can be performed in the operating theatre, with or without general anaesthesia, where ongoing resuscitation and monitoring occur in tandem.

Approach to the patient with massive lower Gi haemorrhage of uncertain origin.

Small case series of a “blind” subtotal colectomy for patients with massive GI bleeding and diverticular disease reported high rates of persistent GI bleeding and mortality using this approach [37,38]. These data were reported before the advent of routine emergent colonoscopy and CT angiography and with advances in critical care may now be less morbid but nevertheless are a cautionary reminder. On table enteroendoscopy using a mid-small bowel enterotomy may identify occult source of GI blood loss [39,40] and prevent a non-therapeutic colectomy.

Practice points

- Surgery for GI bleeding is required rarely, occurring in approximately 2–4% of cases admitted.
- Localisation of the bleeding source prior to surgery or use of on table endoscopy can limit non-therapeutic resections and recurrent bleeding

Research agenda

The management approach to GI bleeds has evolved over time, however, data from large scale studies on the sequencing of investigations for localisation and treatment of bleeding and the current outcomes of surgery for GI bleeding do not reflect current practice.

Summary

Patients with massive GI haemorrhage or recurrent bleeding which has not been adequately controlled by other therapeutic measures such as endoscopy or interventional radiology. Various scoring systems can help identify those patients at higher risk of re-bleeding or morbidity, and may act as proxy measures of those who require close monitoring and surgical input. Timely identification of patients who require surgery may be challenging given the relatively low incidence of requirement for surgery compared to the numbers of patients requiring admission. Localisation of a bleeding source either pre-operatively or intra-operatively using imaging or endoscopy will direct the surgical approach to haemostasis.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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