Management of Acute Lower Gastrointestinal Bleeding: Principles and Current Practice in the United Kingdom

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ABSTRACT

Acute lower gastrointestinal bleeding (ALGIB) is a common cause for hospital admission that results in significant morbidity and mortality. The major objectives of all involved in the management of ALGBI patients are to reduce mortality and the need for major surgery. A secondary objective is to prevent unnecessary hospital admission for patients presenting with bleeding that is not life-threatening. The management of ALGBI has evolved over last decade with the changing modalities of diagnostic facilities. On review of the published literature, there is paucity of randomised control trials in relation to the diagnostic tools and management of ALGBI. The aim of this review is to summarise the principles and current methods available for the diagnosis and treatment of ALGIB and based on the available evidence and the current practice in the United Kingdom, outline an algorithm for the management of ALGIB.

Keywords: *Lower gastrointestinal bleeding; aetiology; prognosis; management algorithm.*

INTRODUCTION

Acute lower gastrointestinal bleeding (ALGIB) is a common cause for hospital admission that results in significant morbidity and mortality. The bleeding emanates from a source distal to the ligament of Treitz; that is of recent duration, arbitrarily defined as less than three days' duration, which may range from trivial to massive, life-threatening blood loss resulting in instability of vital signs, anaemia, and/or the need for blood transfusion.[1] Bleeding from the lower gastrointestinal (GI) tract may account for up to 25% of all acute GI bleeding and one third of GI bleed-related hospital admissions. Although 80-85% of patients have a self-limiting lower ALGIB and an uncomplicated hospitalization, the reported mortality rate ranges from 2% to 4%.[2]

The major objectives of all involved in the management of bleeding patients are to reduce mortality and the need for major surgery. A secondary objective is to prevent unnecessary hospital admission for patients presenting with bleeding that is not life threatening.[3] After initial resuscitation of the patient, the diagnosis

and treatment of lower gastrointestinal bleeding remains a challenge for acute care surgeons. Identifying the source of bleeding can be difficult since many patients bleed intermittently or stop bleeding spontaneously. It is therefore important for the acute care surgeon to be familiar with the different diagnostic and therapeutic modalities and their advantages and disadvantages in order to guide the management of the acutely bleeding patient.[4]

The aim of this review is to summarise the principles and current methods available for the diagnosis and treatment of ALGIB and based on the available evidence and the current practice in the United Kingdom, outline an algorithm on the management of ALGIB.

LITERATURE SEARCH STRATEGY

In our review, we searched articles in PubMed using

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the MeSH words "lower gastrointestinal bleeding" in combination with " management", "CT angiography", "colonoscopy", "enteroscopy", "capsule endoscopy", "embolization" and "surgery". Relevant references were compiled using the EndNote software (X 7.4; Thomson Reuters, Philadelphia, PA, USA).

AETIOLOGY OF ALGIB

The incidence of ALGIB is estimated to be 20.5 cases per 100 000 across both genders with a male incidence of 24.2 compared with a female incidence of 17.2. There is an increased incidence of 200-fold amongst individuals in their 9th decade compared to those in their 3rd decade of life.[5] The Table 1 summarises the causes of ALGIB from studies with n > 100, based on a review by Zuckerman and Prakesh.[6] Rectal examination in patients presenting with haematochezia is essential to detect ongoing bleeding and enable diagnosis of local anorectal conditions (accounting for 14% of acute ALGIB).[3] ALGIB is more common than upper among patients on dual antiplatelet therapy (74% lower vs. 26% upper).[7] Small bowel sources account for 0.7-9.0% of cases of severe haematochezia.[2]

Table 1. Causes of acute lower gastrointestinal bleeding	
Cause	Mean (range) (%)
Diverticulosis	35.33 (15-55)
Angiodysplasia	6.50 (3-12)
Neoplasia (Cancer/Polyp)	17.33 (8-36)
Colitis (Chronic inflammatory bowel disease, ischaemic, infectious, radiation-induced, vasculitis and idiopathic)	15.00 (6-22)
Anorectal (haemorrhoids, anal fissure, rectal ulcers).	4.17 (0-9)
Other (post-polypectomy bleeding, aortocolonic fistula, faecal impaction trauma and anastomotic bleeding)	7.17 (3-14)
Unknown	14.67(1-25)

RISK FACTORS FOR ALGIB

The available evidence identifies the following factors are associated with uncontrolled bleeding and/or death. Acute haemodynamic disturbance (OR 3 to 4.3) and gross rectal bleeding on initial examination (OR 2.3 to 3) are important predictors of subsequent severe bleeding.[8] The presence of two co-morbid conditions doubles the chance of a severe bleed (OR 1.9). Patients taking aspirin or non-steroidal anti-inflammatory drugs are at increased risk of severe lower ALGIB (OR 1.8 to 2.7).[9,10] Patients hospitalised for another condition and who subsequently bleed after admission have a mortality

rate of 23% compared with 3.6% in those admitted to hospital because of rectal bleeding (p < 0.001).[2,9,11]

PRINCIPLES OF MANAGEMENT OF ALGIB

A. INITIAL RESUSCITATION AND APPRAISAL

In the majority of UK hospitals patients with upper GI bleeds are admitted to general medical wards and patients with ALGIB are admitted to surgical units. As in any emergency, attention should be paid to maintain oxygenation to vital organs by maintaining normovolaemia by infusions and blood transfusions followed by investigations to localise the site of bleeding. All patients with rectal bleeding should have a full history taken, abdominal examination and should undergo digital rectal examination, proctoscopy and rigid sigmoidoscopy initially to exclude anorectal disease such as haemorrhoids or anal fissure. Table 2 shows a commonly adopted general guidance for triage of patients with ALGIB.[3]

Table 2. Initial assessment protocol
Consider for discharge or non-admission with outpatient follow up if:
• age < 60 years, and;   • no evidence of haemodynamic compromise, and;   • no evidence of gross rectal bleeding, and;   • an obvious anorectal source of bleeding on rectal examination/sigmoidoscopy.
Consider for admission if:
• age ≥ 60 years, or;   • haemodynamic disturbance, or;   • evidence of gross rectal bleeding, or;   • taking aspirin or an NSAID, or;   • significant comorbidity.

LOCALISATION OF THE SOURCE OF BLEEDING

It is important to establish the location of ALGIB, although in up to 10% of cases, the origin of the bleed, despite rigorous investigations, is not identifiable.[12] The insertion of a nasogastric tube and aspirating for the presence of blood is a simple way of excluding a high upper gastrointestinal bleed.[13] With conservative management, ALGIB stops spontaneously in 80% of cases, and re-bleeding occurs in 25% of cases supporting the requirement for active intervention.[14]

In haemodynamically stable patients, an urgent oesophagogastroduodenoscopy (OGD) is performed to exclude an upper GI source of bleeding. On the other hand in actively bleeding and haemodynamically unstable patients, in conjunction with resuscitation

and blood transfusion, an emergency computerised tomographic (CT) angiography is performed to localise the site of bleeding. If extravasation of contrast is visualised in the bowel lumen, either embolization of the bleeding artery or a surgical resection is undertaken. In patients, where bleeding has stopped, a colonoscopy is performed after adequate bowel preparation, which may identify a possible source of bleeding. Failing to localise the source of bleeding on above-mentioned investigations, mandates investigation of the small intestine with capsule endoscopy, nuclear scintigraphy or enteroscopy in an elective basis. The quantity of evidence on which this practice is based is limited. Few studies have compared diagnostic modalities, which are discussed individually.

Computerised Tomographic angiography

Multidetector computed tomographic (CT) angiography with its speed, resolution, multiplanar techniques, and angiographic capabilities allows excellent visualization of both the small and large bowel.[15] It is particularly useful in the investigation of angiodysplasia, with a sensitivity of 70% and specificity of 100%.[16] It is widely considered to be a sensitive, specific, well tolerated and minimally invasive investigation and has replaced conventional angiography for diagnosis of an acute massive bleed (Figure 1).[17]
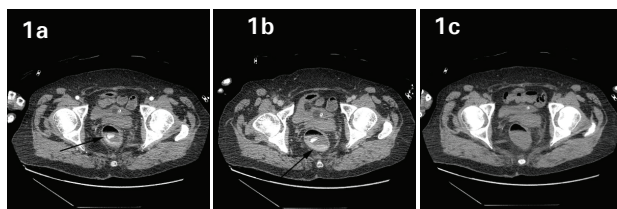

Figure 1. Acute bleeding into the rectum is seen on CT angiography as high density contrast in the lumen of the rectum in the arterial phase (arrow) in figure 1-a. There is progressive accumulation of contrast in the dependent part of the rectum in the venous phase (arrow) in figure 1-b. No contrast was seen in the lumen on the pre-contrast scan, figure 1-c.

Conventional Angiography

Conventional angiography through femoral artery still has a role to play in diagnosis of ALGIB in haemodynamically unstable patients.[18] Angiography examines the superior and inferior mesenteric arteries and coeliac trunks and their branches to exclude the source of bleeding. Angiography has a sensitivity of 47-65% in an acute haemorrhage and a specificity of 100%.[19,20] The extravasation of contrast into the lumen of the intestine corresponds to the site of bleeding. At present, conventional angiography is used for embolization of the bleeding artery, after a bleeding is
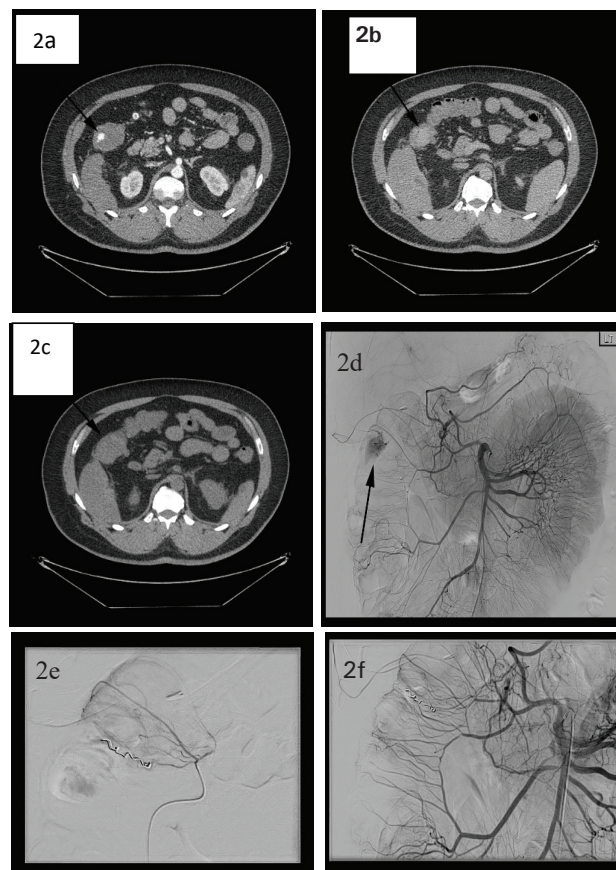
demonstrated in CT angiography[21] (Figure 2).

Figure 2. CT angiogram showing acute bleeding the hepatic flexure of the colonic lumen on the arterial phase scan (arrow, figure 2-a). There remains some slightly high density contrast in the lumen on the venous phase scan (arrow, figure 2-b). No abnormality was seen in the same area on the pre-contrast scan (figure 2-c). The patient was transferred to the angiography suite, where active bleeding was demonstrated as contrast extravasation into the bowel lumen (arrows, figures 2-d). No bleeding was seen following coil embolization and the patient's condition stabilised (figures 2-e, f).

Colonoscopy

The role of urgent colonoscopy in ALGIB remains controversial. Although some studies have shown that examinations performed within 12-24 h of admission improve diagnostic yield and reduce re-bleeding and surgery, others have not. A source of bleeding can be identified in 8 – 34 % of patients who undergo urgent colonoscopy for management of ALGIB.[22,23] Cleansing the colon rapidly can be achieved either by hydrofulsh or through-the scope purge preparation methods.[24,25]

Laine and Shah had reported a randomized trial of urgent (<12 h from admission) vs. elective (36-60 h from admission) colonoscopy in 72 patients with

ALGIB. A total of 15% of patients with presumed ALGIB were found to have upper gastrointestinal bleeding, highlighting the importance of excluding a gastroduodenal source in patients with severe haematochezia. The majority of patients with ALGIB (72%) stopped bleeding spontaneously, and there were no differences in re-bleeding, blood transfusions, diagnostic or therapeutic interventions, length of hospital stay, or hospital charges in patients undergoing urgent vs. elective colonoscopy.[23]

Enteroscopy

Double balloon enteroscopy (DBE) enables visualisation of the entire small bowel and provides biopsy and therapeutic intervention opportunities is considered to be a useful investigation in the diagnosis of gastrointestinal bleeds of obscure origin.[26] [27,28] It has been reported to have a diagnostic yield of 64% in one study and 74% in another, and the latter reported a treatment success rate of 91%.[26,29] The completion rate of DBE has been reported as 16–86%.[30,31]

Video Capsule Endoscopy

Video Capsule endoscopy is mainly indicated in cases of obscure gastrointestinal bleeding, particularly to locate bleeding from small intestine; however it has also been used for investigation of Crohn's disease, Coeliac disease and small intestine tumours and in up to 80% of cases the entire small bowel can be examined.[32]

Barium enema

The role of barium enema in the management of acute ALGIB is limited to the diagnosis of diverticular disease or neoplasia in an elective setting but by no means would confirm the source of bleeding.[33]

Nuclear scintigraphy

Nuclear scintigraphy by utilising red blood cells labelled with Technetium-99m is helpful in the localisation of the source of bleeding in cases where other modalities of investigations have failed. In one study the diagnosis of the source of bleeding by nuclear imaging was confirmed in 75% of patients who went on to have surgery, of which 86% had a positive scan within 2 hours.[34]

A. TREATMENT OF ALGIB

Endoscopic methods

Bleeding lesions accessible through endoscopes are dealt with employing following techniques:

Mechanical devices

For haemorrhage from haemorrhoids and rectal varices, the use of rubber bands is effective. It is important however to ensure that the amount of tissue suctioned prior to band ligation is checked to prevent full thickness tissue entrapment increasing perforation risk.[33]

Thermal coagulation

Haemostasis may be achieved by simple monopolar or bipolar cautery where a low potential difference enables a current to flow through an angiodysplastic lesions. However, thermal coagulation carries a perforation risk of 2.5% in the thinnest section, the right hemicolon, where angiodysplasia is common.[35,36]

Argon plasma coagulation

The argon plasma coagulator (APC) delivers monopolar energy without touching the luminal wall using argon gas. APC is found to be safe and effective in treating bleeding vascular lesions in the intestine. The key advantage is that the perforation risk reported is virtually 0%.[35,37,38]

Laser coagulation

Laser coagulation works by high energy leading to tissue vaporisation, however confining the penetration of the laser is difficult, in particular with the Nd:YAG laser and thus there is higher perforation risk, but has higher efficacy compared to other endoscopic treatment methods.[38,39]

Sclerotherapy

In lower gastrointestinal bleeds, sclerotherapy only currently involves the injection of 1:10000 adrenaline into the submucosa over several locations. In diverticula, injection is done around the orifice. The vasoconstrictive effect with possibly also an effect of tamponade, usually successfully achieves only a temporary haemostasis.[35]

Interventional angiography
Intra-arterial vasopressin injection

Intra-arterial vasopressin into selective mesenteric arteries has an initial bleed control of 62-100%, but this seems to be only an effective short-term solution as the re-bleed rates are 16-50%. Minor complications such as fluid retention and hyponatraemia occur in up to 41%, and major complications such as pulmonary oedema and myocardial ischaemia in 21% of patients are reported.[40] As a result of the high complication rate, this therapy is now only used in exceptional circumstances.

Transcatheter embolisation

Smaller microcatheters enabling more distal embolisation combined with new embolising agents such as microcoils, gelfoam and polyvinyl alcohol particles have resulted in major ischemic complication-free success rates of 70-90%.[41] The re-bleed rate is reported as being around 15%, however in angiodysplasia this can be as high as 40%. Generally the right colon and caecum are easier to embolise than the left colon. It is recommended that transcatheter embolisation is performed in haemodynamically unstable patients unsuitable for colonoscopy, or colonoscopy patients in whom no source was found.[33]

Surgical interventions

Surgery used to be the mainstay of treatment in the past, which is now indicated only in neoplastic causes and haemodynamically unstable patients with a persistent bleed that has failed to respond to transcatheter embolisation.[33,42] The approach is to perform a segmental resection of the bleeding area e.g. a left hemicolectomy.[42,43] Subtotal colectomy performed in cases of unidentified source of bleeding carries a re-bleed rate of up to 75% with a 50% mortality suggesting intraoperative colonoscopy would be beneficial to localise a source.[33] Segmental resections appear to have a varied mortality from 16-40% and morbidity of 6-60%.[44] However these are reduced when surgery follows a staged diagnostic approach on a localised bleed.[45]
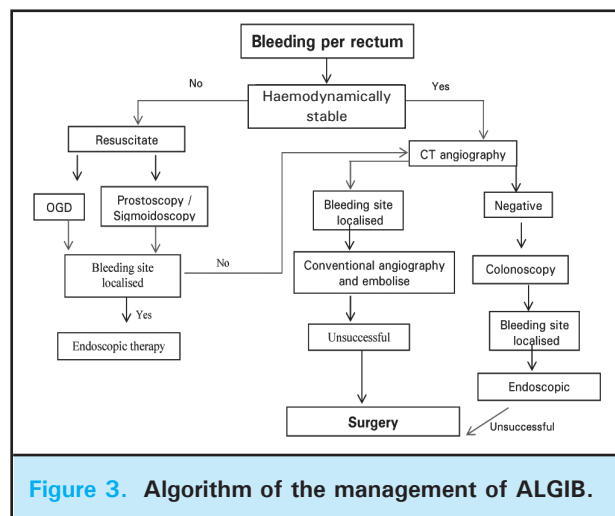
ALGORITHM OF THE MANAGEMENT OF ALGBI

Based on the available evidence, the following algorithm for the management of ALGBI is outlined (Figure 3).

PROGNOSIS OF ALGIB

The overall mortality in patients admitted to hospital with ALGIB is reported to be between 0.6-2.4%.[5,46] The diverticular aetiology is a poor prognostic predicting factor, particularly compared to angiodysplasia bleeds with a mortality of 4% at 3 years.[5,47]

Figure 3. Algorithm of the management of ALGIB.

Although GI events in the small bowel are less frequent than those in upper or lower GI tract, they are the most severe and are associated with higher risks of mortality and hospital readmissions.[48] Early colonoscopy to determine the appearance of the bleeding tissue has been identified as an accurate predictor of outcome. The presence of a visibly bleeding vessel or adherent clot is a reliable marker for differentiation between significant and insignificant haemorrhage ($p < 0.006$).[49,50]

CONCLUSION

ALGIB is a common surgical emergency, which mandates appropriate management because of associated mortality. Appreciation of the efficacy of individual modality of investigation and treatment is paramount, which should be tailed to individual patient's need. Organisation of a round the clock service and an effective protocol is vital in reducing the hospital stay and mortality.

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