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Review

Making decisions using radiology in lower GI hemorrhage

Assad Zahid [a, 1], Christopher John Young [a, b, *, 1]

[a] University of Sydney, Sydney, New South Wales, Australia
[b] Department of Colorectal Surgery, Royal Prince Alfred Hospital, Sydney, New South Wales, Australia

HIGHLIGHTS

- Shift from extensive operative intervention to minimally invasive radiological techniques.
- Newer modalities offer more accurate localisation and management.
- We aim to review and discuss approach, decision making and application of radiology to GI bleeding.

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ABSTRACT

Acute lower gastrointestinal bleeding (LGIB) is a common diagnosis in current practice that may warrant hospitalization and invasive management. There is a shift in the paradigm in the management of this condition away from traditional extensive operative intervention to minimally invasive radiological techniques. These newer modalities offer an opportunity to provide more accurate information on location of bleeding and subsequent management. The increased ease of access to interventional radiology units in major teaching hospitals represents an opportunity to adopt its use in the management of gastrointestinal bleeding. Further, with technological improvements, it is becoming an increasingly favoured option. Traditional endoscopic techniques have been fraught with poor vision in the acute setting, requiring the colon to be purged to aide in better visualization. The use of these newer technologies have been the subject of many reviews which highlight their efficacy in providing a road map to the bleeding site and eventual intervention. We aim to review the literature regarding the use of radiology in the management of LGIB, to provide surgeons with a discourse with regards to the approach in synthesizing the data and applying it when deciding its use.

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1. Introduction

Acute lower gastrointestinal hemorrhage is a common diagnosis in current practice, which usually requires hospitalization and subsequent invasive intervention. There are many tools in the armamentarium of the modern day physician; however the access to these can be limited by the resources of the health care facility. Traditional colonoscopic intervention has been fraught with poor vision leading to inability to effectively diagnose and treat the bleeding site in addition to the risk of complications such as perforation. Of late the use of invasive mesenteric angiography and embolization has proven to be an effective tool in the management of lower GI hemorrhage. This procedure complemented with modern day diagnostic technologies provides a valuable tool in redefining the management options for treating lower GI hemorrhage, reducing the need for laparotomy and subtotal colectomy and its associated morbidity and mortality. This review takes an approach to review the primary and secondary outcomes established in the literature regarding the use of radiology in the management of lower GI hemorrhage, and then create discourse and a structured approach in regards to synthesizing the data and applying it when deciding the appropriate application of these modalities. Fig. 1

Most patients diagnosed with lower gastrointestinal bleeding (LGIB) can be managed conservatively with good outcomes [1]. Many of these patients may not experience lower GI bleeding again. However it is the patients who require intervention in the management of this condition that are the subject of this review. Mortality rates from LGIB have been reported from 3.6 to 18% [2]. In

* Corresponding author. RPAH Medical Centre, Suite 415/100 Carillon Ave, Newtown, Sydney, New South Wales, 2110, Australia.
E-mail address: cyoungnsw@aol.com (C.J. Young).
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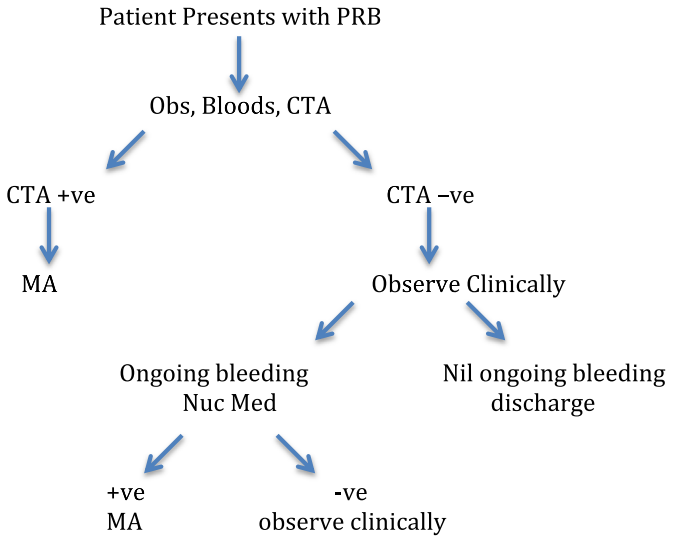

Fig. 1. Management algorithm.

the cases of massive bleeding with gross hemodynamic instability and/or requiring greater that 4U packed red blood cells (PRBC) in 24 hrs, mortality increases to 21–40% [3,4]. The general principle in the management of LGIB include resuscitation, diagnosis, treatment of bleeding and monitoring and management of any expectant complications.

1.1. Sites and causes of bleeding

LGIB is defined as bleeding beyond the ligament of Trietz, thus including the small bowel, colon, rectum and anus [5–7]. Numerous studies have logged their findings of common sites of LGIB. However predicting exactly the location and severity of bleeding can be extremely difficult. Further, 10–20% of hematochezia can be due to an upper GI source of bleeding [8]. In a review by Strate et al., in 2010, the most common site of LGIB was noted as diverticular in origin (30–65%), followed by angiodysplasia (4–15%), hemorrhoids (4–12%), ischemic colitis (4–11%), other colitis (3–15%), neoplasia (2–11%), post-polypectomy (2–7%), rectal ulcer (0–8%), with rarer causes noted as Deulafoy lesions and rectal varices [9]. In a retrospective review of records by Tan et al., in 2013, he noted results with diverticular origin accounting for 33%, post-surgical hemorrhage 22%, neoplasm 19%, ulcer 15% and angiodysplasia at 11% [10]. In children and adolescents, most common sources of bleeding will be from a Meckel's diverticulum, inflammatory bowel disease and polyps (usually juvenile polyps) [11].

With such varied distribution of bleeding sites, exact diagnosis with traditional endoscopic techniques are fraught with inaccuracy due to poor vision in an unpurged colon [12]. With the trend towards utility of elective colonoscopy in a purged colon once bleeding is settled in the case of diverticular bleeds, the validity of this tool in an acute bleed is limited [13,14]. Hence the utility of radiological techniques in the diagnosis and management of acute lower GI hemorrhage. This shift towards radiological management represents an acceptance towards a tested modality. Traditionally a patient who presents with lower GI hemorrhage will undergo a computed tomography scan with contrast to aide in the identification of bleeding. This may be complemented with radionuclide scanning if the bleeding is not too brisk. Finally, once identified, invasive imaging with angiography allows for the utility of therapeutic modalities if the source of bleeding has been localized. This allows management with minimally invasive techniques such as superselective embolization, where one day a large surgical incision and resection of colon used to be an imminent option.

1.2. MDCTA

Multidetector CT Angiography (MDCTA) provides a first line diagnostic tool in the detection of the site of lower GI hemorrhage. As opposed to nuclear imaging techniques, MDCT allows for greater anatomical assessment of LGIB, allowing for planning of more invasive treatment. In the setting of acute LGIB, its sensitivity has been reported at 91–92% [15]. In a retrospective review of 99 patients with LGIB who had 115 CT angiograms, 37 (32%) were positive and 78 (68%) negative [16]. In the positive group 33/37 (89%) had an intervention to achieve hemostasis while one settled and 3/37 past away due to cardiac arrest. Further 48/62 (74%) patients with a negative MDCTA did not have further rebleed ($p = 0.04$) in the lower GI bleed group. In a study by Yoon et al. CTA success rate was noted at 88.5% (22/26) for acute GI hemorrhage. This number is expected to remain high and improve with further technological advancement with submillimeter slices and improved temporal and spatial resolution with multiplanar reconstructive imaging of modern day scanners [17]. On MDCTA, the extravasation of contrast material may demonstrate a linear, jet like, swirled or a pooled configuration. MDCTA provides a validated road map for ongoing invasive intervention for hemostasis in patients with positive blush, however a negative first CTA is a good predictor that patients presenting with LGIB will settle spontaneously not necessitating further intervention [17].

1.3. Nuclear scintigraphy

The use of nuclear scintigraphy (Tc99m) in the detection of LGIB is largely dependent on the institutional resources of the treating physician. In most tertiary centers it is accessible in assessing LGIB. Its use may be appropriate in patients with ongoing per rectal bleeding, which has not been able to be detected on endoscopic examination or CTA. Detection rate for bleeding can be as low as 0.1–0.5 ml/min [18]. Radionuclide scanning is more sensitive than angiography but less specific than endoscopic or angiographic studies [19]. Radionuclide imaging is well tolerated by patients but is limited by highly variable accuracy rates for localizing bleeding, ranging from 24 to 91% [19] (Table 1) Localization is optimal when the scan is positive within two hours of injection (95–100%) as opposed to later (55–65%) [20]. This may reflect the spread of blood in the colon in both the antegrade and retrograde fashion [9]. A positive scan usually also required a secondary intervention in the form of an endoscopy or angiogram to confirm and treat a bleeding site.

1.4. Mesenteric angiography to evaluate bleeding site

After localization of bleeding with diagnostic radiological modalities (i.e. CTA, radionuclide scanning), therapeutic intervention with invasive mesenteric angiogram aids in achieving hemostasis (Table 2). Tan et al. in demonstrated a 100% efficacy rate in the utility of superselective mesenteric embolization in the treatment of LGIB [10]. In an earlier retrospective series by the same author, this rate was 97% [13]. Other series have also reported a very high technical success rate [10,21]. But it must be noted that the value of invasive mesenteric angiography best achieved after performing localizing diagnostic tests to confirm bleeding. Koh et al. emphasized that the chance of detecting a blush on an invasive mesenteric angiogram without prior CTA is abysmal [22].

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