An approach to acute lower gastrointestinal bleeding

John Frost,¹ Faye Sheldon,¹ Arun Kurup,¹ Benjamin R Disney,¹ Sherif Latif,² Sauid Ishaq¹

¹Gastroenterology Department, Russells Hall Hospital, Dudley, UK
²Radiology Department, Russells Hall Hospital, Dudley, UK

Correspondence to

Professor Sauid Ishaq,
 Department of Gastroenterology,
 Birmingham City University, The
 Dudley Group NHS Foundation
 Trust, Dudley DY1 2HQ, UK;
 Sauid.ishaq@dgh.nhs.uk

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ABSTRACT

Lower gastrointestinal bleeding (LGIB) is a common problem that can be treated via a number of endoscopic, radiological and surgical approaches. Although traditionally managed by the colorectal surgeons, surgery should be considered a last resort given the variety of endoscopic and radiological approaches available. This article provides an overview on the common causes of acute LGIB and the various techniques at our disposal to control it.

INTRODUCTION

Lower gastrointestinal (GI) bleeding (LGIB) is common and accounts for 20%–25% of all patients presenting with major GI bleeding.¹ The incidence is approximately 20–30 per 100 000 adults in the USA and is more common with advancing age.² Although this is in contrast to an incidence of between 100 and 200 per 100 000 adults for upper GI bleeding (UGIB),³ it still represents a significant proportion of patients admitted to hospital, and given that the Bowel Disease Research Foundation estimates that around 19 000 patients require hospitalisation each year in the UK, we should have some experience in managing this condition.

LGIB is defined historically as blood loss originating distal to the ligament of Treitz, and typically presents as haematochezia. In practice, around 80%–85% of LGIB actually originates distal to the ileocaecal valve, with only 0.7%–9% originating from the small intestine.^{3 4} The remaining 10%–15% of cases actually start in the upper GI tract, with brisk bleeding presenting as haematochezia rather than melaena stool.^{4 5}

It can range from trivial, scanty bleeding to life-threatening haemorrhage. Fortunately, up to 80%–85% of true LGIBs

will stop spontaneously and so the overall mortality ranges between 2% and 4%.⁶

This review aims to provide an overview on the causes of acute LGIB, outline the methods available for investigation and management and will aim to cover some of the competencies outlined in the 2010 gastroenterology curriculum section 2c, 'Rectal Bleeding and Perianal Disorders' (figure 1).

ASSESSMENT OF LGIB

When approaching the patient with LGIB, symptoms and signs may vary therefore a thorough history is essential. The nature of blood loss can often help ascertain the source of bleeding and the history should identify whether this is a recurrent or sporadic bleed, whether there are associated symptoms, and establish the presence of any relevant comorbidities. A drug history is also important as antiplatelets, anticoagulants and non-steroidal anti-inflammatory drugs (NSAIDs) all exacerbate bleeding and a family history of inflammatory bowel disease (IBD) or colorectal cancer may also provide clues to the cause.

Abdominal examination and digital rectal examination (DRE) should be undertaken in all patients presenting with LGIB with consideration given to proctoscopy if available. Abdominal examination may reveal tenderness, distension or a mass depending on the cause. DRE allows the clinician to directly inspect for haematochezia and anorectal pathology. Left colonic bleeding tends to be bright red, whereas right colonic is usually maroon and may be accompanied with clots.

Regular checks of the patients' vital signs are paramount and will reflect the severity of the bleed. A third of patients

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Rectal Bleeding and Perianal Conditions

Know the causes of rectal bleeding and their management.		
Knowledge	Assessment Methods	GMP
Understands the clinical anatomy of the rectum and anus	SCE	1
Knows the causes of rectal bleeding and the methods of investigation to determine the cause	SCE	1
Has awareness of the range of perianal conditions (which includes abscesses and fistula), their clinical presentation and their complications	CbD, mini-CEX, SCE	1
Knows the techniques of investigation and the possible medical and surgical treatments	CbD, SCE	1
Is aware of the treatment options for radiation proctitis	CbD, SCE	1
Skills		
Take a history and appropriately examines the anus and rectum	CbD, mini-CEX	1,3
Refers the patient for the appropriate endoscopic and radiological investigations	CbD, mini-CEX	1,3
Behaviours		
Manages patients with anorectal disease in a sympathetic manner, recognising and addressing the concerns caused by such conditions	mini-CEX, MSF, PS	2,3,4

Figure 1 2010 Gastroenterology Curriculum: rectal bleeding and perianal conditions.

with ‘presumed’ LGIB will present with signs of heavy bleeding, and acute UGIB should be considered in these cases, particularly if the patient presents with symptoms and signs suggestive of peptic ulcer disease, or recent NSAID use.⁷ In those patients where there is uncertainty, thought should be given to nasogastric (NG) tube placement to help with risk stratification.² Although there is a lack of prospective or current data, a few studies have revealed a correlation with bloody aspirates and positive upper GI findings. Although a clear aspirate does not necessarily exclude UGIB, the presence of bile suggests that the source may be distal to the ligament of Treitz, and that lower GI investigations should come first. However, the sensitivity and specificity of using NG lavage in this way is relatively low at 79% and 55%, respectively, and therefore any decision on whether to perform gastroscopy should not be based on this alone.⁸

Blood tests should be performed on all patients presenting with LGIB and should include a FBC, renal profile, LFTs, clotting profile and a group and save where appropriate. Lactate levels can also be helpful in assessing the degree of shock and intravascular volume depletion.

CAUSES

There are a wide range of causes of LGIB. Many of the conditions listed are associated with increasing age, male gender, chronic constipation, haematological disorders and anticoagulant or NSAID use. We have summarised key points on the more common

forms of LGIB. Although we have not gone into details on the rarer causes, these are considered in table 1.

DIVERTICULAR DISEASE

Diverticulosis is the commonest cause of acute LGIB and accounts for nearly 40% of cases.⁹

The prevalence of diverticular disease increases with age, particularly in association with chronic constipation and altered colonic motility, occurring in as many as two thirds of patients aged >80 years. The left colon is more commonly affected being the source of 50%–60% of diverticular bleeds when diagnosed at colonoscopy.^{2 10} It often presents acutely with painless

Table 1 Causes of LGIB

Common causes of LGIB	Rare causes of LGIB
Colonic diverticulosis	Colonic polyps*
Vascular ectasias	Rectal varices
Ischaemic colitis	Stercoral ulceration
Radiation enteropathy	Intussusception
NSAID-induced colopathy	HHT
Post polypectomy	Meckel’s diverticulum
Anorectal abnormalities	Aortoenteric fistula
Colorectal malignancies	
Inflammatory bowel disease	

*Colonic polyps are a rare cause of acute haematochezia. They are more commonly associated with occult GI blood loss.

GI, gastrointestinal; LGIB, lower gastrointestinal bleeding; NSAID, non-steroidal anti-inflammatory drugs.

haematochezia. As most cases stop spontaneously, the diagnosis is often presumptive and made once other causes have been excluded. It is important to remember, however, that diverticular bleeding can recur in up to 14%–38% of patients,² and therefore early identification and management can often be helpful.

VASCULAR ECTASIAS

Vascular ectasias (otherwise known as angiodysplasia or angioectasia) account for approximately 11% of cases of LGIB.⁷ They often appear as flat red mucosal lesions endoscopically and are most frequently found in the caecum or ascending colon (see figure 2).

In the majority bleeding is not life threatening; however, patients can present with acute bleeds resulting in massive haemorrhage, often indistinguishable from diverticular bleeding.

ISCHAEMIC COLITIS

Ischaemic colitis is a relatively common cause of haematochezia in the elderly, and is seen in up to 20% of patients with LGIB.⁹ It occurs in response to reduced mesenteric blood flow to the colon, usually as a result of reduced cardiac output, underlying atherosclerotic disease or vasospasm of the mesenteric vasculature.

In non-occlusive disease the areas typically affected are the ‘watershed areas’ of the bowel, at the splenic flexure or rectosigmoid junction. It often settles through conservative management with intravenous rehydration and treatment of precipitating factors. Occlusive disease resulting from thromboembolism, however, can affect much larger areas of bowel and when suspected should be investigated promptly with the use of mesenteric angiography, as it unlikely to settle without radiological or surgical intervention and can often herald concomitant small bowel ischaemia.

COLORECTAL NEOPLASIA

Acute LGIB with haematochezia can be seen in patients with left-sided colorectal cancer, particularly when advanced, and is usually due to ulceration at the

surface of the lesion. Patients rarely require endoscopic haemostatic intervention as most bleeds are slow and settle with conservative treatments.

HAEMORRHOIDS AND ANORECTAL DISORDERS

Anorectal disorders account for 5%–10% of LGIB overall, but are the commonest causes of LGIB in patients aged <50 years.¹¹ They are found incidentally in up to 75% of patients with LGIB and therefore the finding of haemorrhoids, particularly in those >50 years, should not preclude investigations for other causes.¹²

POSTPOLYPECTOMY BLEEDS

LGIB is the most common complication following polypectomy, occurring in 2%–6% of patients.⁴ Those with polyps ≥1 cm, aged >65 years, requiring anticoagulants or antiplatelets, and with additional comorbidities, all have a higher chance of bleeding.¹³ Bleeding may be immediate or delayed. Using too much ‘cut’ or rapidly closing the snare without adequate ‘coagulation’ during snare polypectomy (guillotining) increases the risk of acute LGIB, so care should be taken when performing this procedure.¹⁴

In 1.5% of all polypectomies it occurs immediately; however, in up to 2% delayed bleeding can occur several hours, days or even weeks following the procedure.¹³ Postpolypectomy bleeding is usually of low volume and self-limiting, although it can be brisk if an underlying artery is involved or if there is inadequate coagulation of the polypectomy stalk. Although bleeding usually ceases spontaneously, endoscopic haemostasis may be required.

RADIATION ENTEROPATHY

Radiation enteropathy is thought to occur in around 2%–20% of patients undergoing radiotherapy for pelvic cancers.¹⁵ Radiation damage to the colonic epithelium leads to obliteration of end arterioles and chronic ischaemia. In order to improve perfusion, neovascularisation occurs, resulting in the formation

Figure 2 The endoscopic appearance of angiodysplasia with characteristic radiating capillaries.

Figure 3 The endoscopic appearance of radiation proctitis.

of telangiectatic vessels which are prone to bleeding (see [figure 3](#)).

Acute radiation enteropathy often occurs within 6 weeks of starting radiotherapy. Bleeding is relatively uncommon at this point as neovascularisation has not yet occurred. Chronic radiation enteropathy however is associated with LGIB, which at times is often heavy, and this commonly presents 9–14 months after the course of radiotherapy.

NON-STEROIDAL ANTI-INFLAMMATORY DRUGS

The colon and distal ileum are quite susceptible to damage from the use of NSAIDs. They are known precipitants for diverticular bleeding and are associated with exacerbations of IBD and the development of NSAID colopathy: a right-sided colitis presenting with ulcerations and diaphragm-like strictures.

INFLAMMATORY BOWEL DISEASE

IBD accounts for up to 6% of all patients with LGIB.^{16 17} Often associated with diarrhoea, it is one of the common causes of bleeding in Asian patients in whom the prevalence of diverticular disease is much lower.

DIAGNOSIS AND TREATMENT

Following initial management LGIB can be localised and treated with a variety of endoscopic, radiological and surgical techniques. Investigations should aim to identify the source of bleeding and where possible provide treatment to stop or reduce the risk of recurrent bleeding.

Endoscopy, radiological intervention and surgery all have advantages and disadvantages to their use. We suggest that the algorithm considered in [figure 4](#) should be used when evaluating a patient with acute LGIB. The reasons for this are given below.

ENDOSCOPY

Colonoscopy is an excellent tool when evaluating LGIB, as studies suggest that it can accurately identify the source of bleeding in 74%–82% of patients while additionally offering the opportunity for therapeutic intervention.⁵ The timing of colonoscopy, however, remains controversial with some studies advocating urgent colonoscopy due to better patient outcomes, and others revealing no significant improvement clinically or financially when compared with elective procedures.¹⁸ However, based on the data currently available, the ASGE suggest that where appropriate early colonoscopy should be performed within 24 h of admission when evaluating patients with severe haematochezia.² This should be done following rapid bowel preparation with polyethylene glycol (PEG) solution (1 L every 30–45 min) in order to improve the procedure's diagnostic yield. Once a bleeding source is then

identified, there are a number of different treatments that can be employed.

Treatments for diverticular bleeding are varied but most involve the injection of adrenaline (1:10 000) in 1–2 mL aliquots at the site. Any adherent clot can be removed carefully with a snare to identify underlying visible vessels which can then be treated with mild contact pressure using a heater probe (10J–15J). Higher settings or repeated applications should be avoided where possible, particularly in the right colon in order to prevent perforation.

As an alternative to thermal coagulation, endoclips can be deployed over a bleeding vessel at the neck of the diverticulum, or as a means to close the orifice thereby tamponading the vessel within. As a way of getting better access to the vessel, an endocap can be placed onto the colonoscope and gentle suction can be applied in order to invert the diverticulum.¹⁹ This technique has also allowed other haemostatic interventions to be trialled, with band ligation having been described in a small series.²⁰ It is important to remember however that finding a visible vessel arising from diverticulae is difficult, since diverticulae are multiple and scattered and bleeding is often intermittent in nature. Therefore, once identified it is advisable to mark the site with a tattoo or clip to allow future intervention if the bleeding is unmanageable or recurs.

For vascular ectasias and radiation proctitis, argon plasma coagulation (APC) is an effective method of treatment. Although argon is safe and easy to use, other colonic gases can be combustible, and therefore full bowel preparation is advised when using APC to reduce the risk of explosive injury.²¹ APC delivers thermal energy up to a depth of 2–3 mm. With the majority of colonic angiodysplasia being located in the thin-walled right colon, care needs to be taken to avoid perforation by holding the probe 1–3 mm away from the mucosa and using lower power settings of 30 W/L/min of argon flow. Additionally, submucosal saline can be used to provide a protective cushion reducing the risk even further.

Pedicle bleeding post polypectomy can be controlled effectively by resnaring the base tightly for a few minutes. If unsuccessful then haemostasis can be achieved by injecting adrenaline (1:10 000) in combination with a heater probe, coag forceps or haemoclips fixed to the stalk or polyp base (see [figure 5](#)). Alternatively, endoloops can be applied if a reasonable length of the stalk remains.

Although endoscopy is undeniably useful it does have its limitations. In patients who are haemodynamically unstable with torrential bleeding or an inadequately prepared bowel, adequate visualisation can be close to impossible and therefore not helpful when trying to locate the bleed. Although blood acts as a cathartic the diagnostic yield in an unprepared bowel is poor,² and although PEG solution can be

Figure 4 Suggested algorithm for the investigation and management of acute lower gastrointestinal (GI) bleeding. UGIB, upper GI bleeding.

administered rapidly where necessary, its use may be relatively contraindicated in those patients with congestive cardiac failure or severe renal impairment. Endoscopy is also an invasive procedure and in compromised patients can be risky. The management of these patients also depends on the individual skills of the performing endoscopist, and there may not be the staff or resources available to facilitate an urgent ‘out of hours’ colonoscopy.

Given its diagnostic and therapeutic capabilities, colonoscopy should be used as a first-line procedure for evaluating LGIB if the resources are available and the patient is fit enough. If not, or if the endoscopy has been unsuccessful in identifying or controlling the bleed, the next step we suggest is to consider radiological intervention.

RADIOLOGY

CT angiography

The main advantage with CT angiography (CTA) is that it is a relatively non-invasive form of imaging which is fast and widely available. It is therefore a useful tool when evaluating GI bleeding (see figure 6).²² It can detect bleeding rates $>0.3\text{--}0.5\text{ mL/min}$ and is generally performed prior to catheter angiography which requires blood loss of at least 1 mL/min to pinpoint the source. If a bleeding point is identified a choice can then be made to proceed to mesenteric catheter angiography or to consider another mode of treatment.

Disadvantages to CTA include its relatively low sensitivity (85%), the need for radiation exposure and its use of intravenous contrast which is nephrotoxic.²³ It also lacks direct therapeutic capability.

Figure 5 A postpolypectomy bleed controlled with the application of haemoclips.

CTA is very useful and should be considered as a first-line investigation when colonoscopy is not appropriate, or the source of bleeding remains obscure.

Catheter angiography

Catheter angiography is usually reserved for those patients with haemodynamic instability in whom colonoscopy is not appropriate or those with persistent and recurrent bleeding.

Although most bleeds from diverticulae or angiodysplasia receive their blood supply from the superior mesenteric artery, when looking for a bleeding source many radiologists favour catheterising the inferior mesenteric artery first as to avoid a bladder full of contrast, which often obscures the inferior mesenteric branches (see [figure 7](#)). If the patient has already undergone CTA or has had the site marked with a clip at endoscopy, then localisation is made much easier.

In order to control the haemorrhage, embolisation therapy with gelfoam or coils is now the more definitive treatment of choice over intra-arterial vasopressin. Although effective, it does carry a risk of intestinal

Figure 6 Active extravasation of contrast into the sigmoid colon from one of the branches of the inferior mesenteric artery.

Figure 7 The super-selective catheterisation of a sigmoid branch of the inferior mesenteric artery, with the microcatheter demonstrating a bleeding vessel.

infarction though fortunately super-selective catheterisation minimises this risk to around 3%–4%.²³

When using super-selective catheterisation and embolisation, cessation of bleeding can be achieved in 85%–97% of patients.^{24 25} Given its success we therefore suggest that if available, it should be considered in cases of severe, uncontrollable haematochezia prior to any surgical intervention.

Radionuclide imaging

Radionuclide scanning uses Technetium (99mTc)-based tracers to tag red cells. Following injection, scans are performed to look for evidence of extravasation into the GI lumen. It detects rates of bleeding as low as 0.1–0.5 mL/min. Although more sensitive than CTA or catheter angiography, it can only localise bleeding to an area of the abdomen. As a result its accuracy varies and ranges across reports from 24% to 91%.²⁶

Where radionuclide imaging can be particularly helpful is in the evaluation of scanty intermittent bleeding, especially if endoscopy has been negative. 99mTc pertechnetate has a long half-life, which once injected allows sequential images to be taken several times over a 24 h period ([figure 4](#)).

Surgery

Although endoscopic and radiological interventions are helpful, the majority of patients with acute LGIB should be managed in conjunction with the colorectal surgeons, as surgery may be required if these treatments fail. They should be involved early on, particularly in patients requiring more than six units of blood within 24 h, or with haemodynamic instability not responding to resuscitation attempts as emergency segmental resection or subtotal colectomy may be required.²⁷

When considering surgery, localisation of the bleeding point remains important in order to avoid a subtotal colectomy where possible.²⁸ This can be done

via intraoperative colonoscopy and intraoperative angiography in an emergency provided the facilities are available. Some surgeons may opt to perform a laparoscopic diverting ileostomy prior to resection as it helps differentiate between small intestinal and colonic bleeds.

It is important to remember that the majority of patients presenting to hospital with LGIB are often older, take a number of medications and have concurrent illnesses. In this population, all forms of surgery are associated with high morbidity and mortality and should only be considered as a final option.

CONCLUSION

LGIB is a common problem accounting for 20%–25% of all GI bleeds. Fortunately, the vast majority of patients will settle with conservative management. However, for those with continued bleeding, endoscopic and radiological modalities should be used to diagnose and treat the cause, with surgery reserved as a last resort.

QUESTIONS

Question 1

A 72-year-old man undergoes urgent colonoscopy to investigate haematochezia. Examination reveals a bleeding diverticular vessel.

Which answer provides the most appropriate first-line treatment of diverticular bleeding for this scenario?

1. The bleeding should be treated with argon plasma coagulation (APC).
2. The diverticulum should be inverted and a band applied to the bleeding vessel.
3. A combination of adrenaline solution injections combined with thermal coagulation or endoscopic clip placement should be used.
4. The patient should be referred for radiological embolisation.
5. The patient should be referred for immediate surgery.

Correct answer 3

Endoscopic treatment with adrenaline solution injection combined with thermal coagulation or endoscopic clip placement is recommended as the preferred management in patients presenting with diverticular bleeding. APC is better for bleeding from flat lesions such as angiodysplasia or radiation enteropathy. Although radiological embolisation can be considered as a first-line treatment in patients with diverticular bleeding, in this scenario in which the bleeding point has been identified, attempts should be made endoscopically to achieve haemostasis.

Question 2

A 65-year-old man presents with massive rectal bleeding. After initial resuscitation he is referred for radiological intervention.

Which answer most accurately reflects current angiographic practice for GI bleeding?

1. Glue is the most commonly used embolisation material.
2. Coils should only be used when treating GI haemorrhage from the upper GI tract.
3. CTA should always be performed prior to embolisation for lower GI bleeding.
4. Gelfoam is safe to use for lower GI bleeding.
5. Intra-arterial vasopressin should be used first line.

Correct answer 4

Gelfoam is safe to use on all GI bleeds. It is in fact commonly used to treat most haemorrhages of any source in all interventional radiology techniques and is the cheapest and most commonly used embolisation material worldwide. Intra-arterial vasopressin is no longer recommended when performing angiography as it carries a significant risk of arrhythmias, myocardial infarction and pulmonary oedema.

Question 3

An 81-year-old man presents with haematochezia requiring six units of packed red cells in 24 h. His gastroscopy is normal and CTA fails to identify the source of bleeding. On day 2 he has a further episode of rectal bleeding and becomes haemodynamically unstable.

Which answer most accurately reflects current guidelines in managing a lower GI bleed?

1. Surgery should not be considered if the bleeding site is not identified on CTA.
2. This patient should proceed straight to angiography as CTA failed to identify the bleeding site.
3. Urgent colonoscopy should be considered.
4. Surgery should be considered with significant recurrent haematochezia that requires transfusion of more than six units of packed cells in 24 h.
5. Blind colectomy is the operation of choice.

Correct answer 4

Surgery should be considered with significant recurrent haematochezia that requires transfusion of more than six units of packed cells in 24 h. Although pre-operative localisation of LGIB is crucial for directed segmental resection, this can be done intraoperatively via an on the table colonoscopy, or alternatively a laparoscopic diverting ileostomy could be considered. A subtotal colectomy is usually performed if the bleeding site cannot be localised.

Question 4

A 53-year-old woman presents with brisk haematochezia and significant haemodynamic instability. She has no history of abdominal pain or previous peptic ulcer disease and does not take any NSAIDs. She has signs of prerenal failure with a urea of 15.0 and a creatinine of 140. A NG tube is inserted and a small volume of clear aspirate is obtained.

Which answer suggests the most appropriate next step in her management?

1. Rapid bowel preparation should be administered prior to performing urgent colonoscopy.
2. The patient should have an urgent CT angiogram to identify the source of bleeding.
3. The patient should undergo an urgent OGD.
4. She should be referred immediately for a subtotal colectomy.
5. She should be referred straight for angiography given the urgency of bleeding.

Correct answer 3

A clear NG aspirate is of little diagnostic value and may not appreciate duodenal bleeding beyond a closed pylorus. In this situation, an OGD should be performed urgently, with plans to proceed to a colonoscopy if the patient is stabilised haemodynamically. If the aspirate had been bilious, then an argument could be made to proceed to lower GI investigations in the first instance, and given the haemodynamic instability a CTA would be the most appropriate first-line investigation.

Question 5

A 72-year-old woman undergoes a colonoscopy for iron deficiency anaemia. A 12 mm pedunculated polyp is identified in the proximal descending colon and removed via snare polypectomy. There are no immediate complications; however, she is readmitted the same evening having had a large rectal bleed. She is haemodynamically stable but there is evidence of fresh blood on DRE.

Which answer suggests the most appropriate next step in her management?

1. She should undergo colonoscopy the following morning after overnight bowel preparation with PEG solution.
2. She should undergo colonoscopy that evening without PEG solution beforehand.
3. She should have radionuclide imaging due to its high sensitivity in detecting GI bleeds.
4. The patient should be reassured and sent home.
5. The patient should have an immediate OGD to look for a source of bleeding.

Correct answer 2

Although it may be normal to have spots of bleeding following a colonoscopy, large bleeds—particularly postpolypectomy should be managed promptly. In this situation, the colon has already been prepared, and therefore there is no need for a repeat purge with PEG solution. Radionuclide imaging could be helpful in localising the bleed to the left colon, but is unnecessary as we already know the likely source of bleeding.

Question 6

A 65-year-old man presents to clinic with a 4-month history of intermittent bloody diarrhoea. He is otherwise reasonably well but suffers with osteoarthritis for which he takes a number of painkillers. He undergoes a colonoscopy which reveals diverticular disease in the

sigmoid colon and patchy inflammation in the right colon with a diaphragm-like stricture.

Which piece of information is the most helpful in establishing a diagnosis?

1. A complete drug history.
2. The result of a faecal calprotectin test.
3. The biopsy results from the patchy inflammation in the right colon.
4. The results of a CTA.
5. The result of stool cultures.

Correct answer 1

The presence of a right-sided colitis with diaphragm-like strictures is characteristic of NSAID-induced colopathy, and therefore a complete drug history is extremely important here. NSAIDs can also exacerbate IBD and induce diverticular bleeding. However, given the intermittent nature of bleeding a CTA is unlikely to yield a positive result, and colonic biopsies are most likely to reveal a non-specific colitis which could easily be misinterpreted as IBD. A faecal calprotectin will be elevated in all forms of colonic inflammation.

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