RADIOLOGICAL CASE

CLINICS IN DIAGNOSTIC IMAGING (16)

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CASE REPORT

A 38-year-old Chinese man presented with melaena of four days duration. There was no abdominal pain or haematemesis. The patient had no significant past medical history. On physical examination, he was noted to be pale and melaena was confirmed on rectal examination. His initial haemoglobin level was only 6.8 g/dL, necessitating transfusion of 4 units of blood. Subsequently performed gastroduodenoscopic and sigmoidoscopic examinations were negative.

The patient bled again during hospitalisation, and an urgent arteriogram was arranged. What do the anteroposterior (AP) (Fig 1) and right anterior oblique (RAO) views (Fig 2) of the superior mesenteric arteriogram show? What is the likely diagnosis?

Fig 1 - Superior mesenteric angiogram - AP abdominal projection (4 seconds delay).

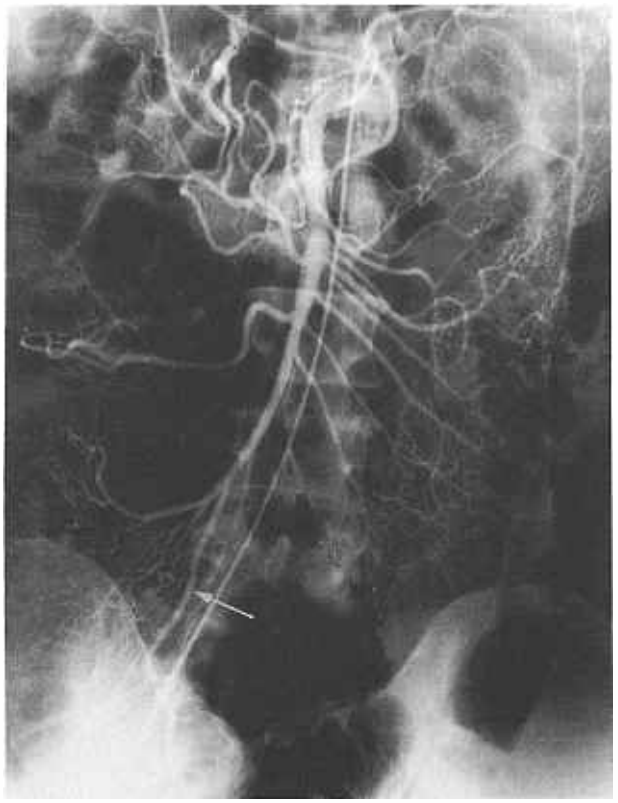

Fig 2 - Superior mesenteric angiogram - RAO pelvic projection (4 seconds delay).

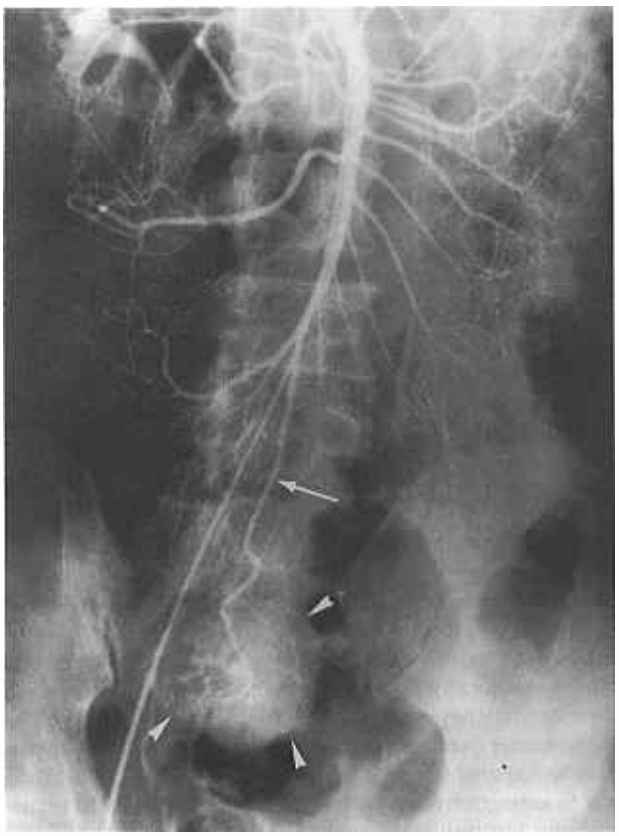

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IMAGE INTERPRETATION

Initial superior mesenteric anteriogram in the conventional AP projection shows an enlarged ileal branch (arrowed), possibly supplying a vascular mass (Fig 1). Repeat arteriogram performed in the RAO projection with inclusion of the upper pelvic cavity confirmed the presence of a well-defined vascular mass (arrowheads) being supplied by an ileal branch of the superior mesenteric artery (Fig 2). The mass had dense capillary staining, but no irregular neovascularity of a malignant lesion. No intraluminal extravasation of contrast to suggest active bleeding was demonstrated at the time of angiography.

DIAGNOSIS

Lower gastrointestinal bleeding caused by ileal tumour

CLINICAL COURSE

At laparotomy, a 7.5cm x 4.0cm submucosal ileal tumour was identified 140cm from the ileo-caecal valve. Tumour resection and small bowel re-anastomosis were performed. Histological diagnosis of a stromal tumour, with no evidence of malignancy, was made. The patient made a good post-operative recovery and remains well to date.

DISCUSSION

Gastrointestinal bleeding (GIB) is a common emergency requiring hospital admission and prompt assessment. Restoration of cardiovascular stability remains the first priority in management, followed by identification of the source of bleeding. Endoscopy is the initial investigation of choice in patients with GIB, especially in the upper tract where therapeutic intervention may be performed for bleeding lesions (Tables I and II)[1-3]. There are, however, situations where the site of bleeding is not within reach of endoscopy and where bleeding is torrential (>1 mL/min) such that endoscopic visualisation is obscured by blood. The former point is particularly applicable to lower GI tract bleeding (20% of GIB), defined as bleeding arising distal to the ligament of Treitz. In such cases, imaging is required to establish the diagnosis[1-4].

Selective visceral angiography is accurate in identifying the site of bleeding if the rate of blood loss exceeds 1 mL/min, and should be performed during active bleeding[3-6]. Extravasation of contrast into the bowel lumen is demonstrated (Fig 3). The superior mesenteric arteriogram is generally performed first, having statistically the highest diagnostic yield. The inferior mesenteric arteries are then studied if no bleeding source is visible in the former examination. More than one injection of contrast may be required since the field of view on conventional film-screen angiography may not be wide enough to include the whole vascular territory to be studied. Additional projections are sometimes performed to distinguish superimposed lesions on the conventional AP projection. The coeliac arteriogram is usually performed only if both the superior and inferior mesenteric arterial studies are negative[6]. Systemic heparinisation, selective intra-arterial tolazoline vasodilatation and/or thrombolytic agents like streptokinase or urokinase, have been used to provoke bleeding in apparently-normal initial angiograms in order to further identify the bleeding source. Because of the associated inherent risks, these pharmacological manoeuvres are justifiable only if resuscitation facilities are readily available and should only be considered in carefully selected patients[5,6].

Besides providing a surgical road map in order to avoid blind resection of the bowel, angiography may be combined with an interventional procedure for control of bleeding. Selective intra-arterial infusion of vasopressin into the mesenteric circulation has been widely employed to arrest GIB. It has been shown to be effective in controlling bleeding from gastric mucosa in about 80% of cases, from small bowel haemorrhage in 71%, and in as high as 90% of patients with bleeding colonic diverticula. Vasopressin is usually infused at a rate of 0.2 μg units/min, with vasoconstriction being evident 20 to 30 minutes post-infusion, after which another angiogram is performed to assess the effectiveness of therapy[3,5,6]. Embolisation via super-selective catheterisation is an alternative interventional technique to control lower GI bleeding. While requiring considerable expertise, the

Table I – Causes of upper GI bleeding

Common causes	
Peptic ulcer	
Gastroesophageal varices	
Acute haemorrhagic gastritis	
Less frequent causes	
Dieulafoy lesion	Gastric tumour
Haemobilia	Bleeding diathesis
Aorto-duodenal fistula	Anti-coagulant treatment
Gastric antral vascular ectasia	Osler-Rendu-Weber syndrome
Mallory-Weiss tear	Pancreatic bleeding
Gastroduodenal arteriovenous malformation (AVM)	

[Table adapted from reference no. 3]

Table II – Causes of lower GI bleeding

Common causes	
Caecal angiodysplasia	
Diverticular disease	
Colorectal carcinoma and polyps	
Inflammatory bowel disease	
Haemorrhoids	
Less frequent causes	
Solitary rectal ulcer	Mesenteric vascular insufficiency
Haemorrhoids	Small bowel diverticula
Meckel's diverticulum	Small intestinal AVM
Intussusception	Small intestinal tumour
Small intestinal ulceration	Endometriosis
Radiation-induced injury	

[Table adapted from reference no. 3]

Fig 3 – A 78-year-old Chinese man presenting with shock due to massive bleeding per rectum. Superior mesenteric angiogram shows persistent pooling of contrast (arrow) in the proximal transverse colon. Active bleeding was from the middle colic branch of the superior mesenteric artery.

success rate is comparable to, or even better than, vasopressin in lower GIB. The major complication is irreversible small intestinal and colonic ischaemia and/or infarction due to poor anatomosis of the intramural arterial network[3,5,6].

Radionuclide scanning utilising ^{99m} technetium (Tc)-labelled sulphur colloid or red blood cells (RBC) has also been employed for detection of GIB (Fig 4). ^{99m} Tc labelled sulphur colloid is rapidly cleared from the intravascular compartment by the reticuloendothelial system, hence any extravasated sulphur colloid in the abdomen should be clearly demonstrated. This investigation detects bleeding rates of about 0.1 mL/min and is therefore considered more sensitive than arteriography. However, like arteriography, accurate diagnosis depends on active bleeding at the time of the radionuclide study. Another disadvantage of the sulphur colloid scan is that bleeding at the upper abdomen can be obscured by the hepatic and splenic activity. The ^{99m} Tc-labelled RBC scan is now the preferred radionuclide in most centres as it has a much longer intravascular half-life, thereby permitting re-imaging over a 24-hour period and hence increasing the chances of detecting intermittent bleeding[3-5]. The high sensitivities of radionuclide scans in the detection of GIB reported in earlier studies have recently been questioned and this modality is now not recommended as a screening tool prior to angiography[5,6]. Radionuclide scanning has a limited role in the following circumstances: diagnosis of intermittent bleeding, slow rate of bleeding (<1 mL/min), and where endoscopy and arteriography are unavailable. A suggested algorithm for the diagnostic workup of acute GIB is shown in Table III[1,5].

Primary tumours of the small bowel are rare, constituting 5% of all GI tract tumours. However, these tumours account for 5% to 10% of GI haemorrhage, with bleeding being the presenting complaint in 25% to 50% of all patients with such tumours. Leiomyomas and leiomyosarcomas are the common small bowel tumours that bleed. Other presentations include crampy abdominal pain, anaemia, obstructive symptoms or a palpable mass. Radiologically, leiomyomas usually appear as rounded or semilunar filling defects on barium studies (Fig 5). The larger intraluminal lesions can cause intussusception giving rise to the classical coiled-spring appearance. Subserosal tumours may produce a mass effect outside the intestinal wall, with displacement or indentation upon an intestinal loop. Dumb-bell tumours have

Fig 4 – A 71-year-old Chinese man presenting with sudden onset of fresh bleeding per rectum. No bleeding source was identified at laparotomy and on-table endoscopy, as well as the subsequent triple vessel abdominal angiography. Static images from the ^{99m}Tc-RBC scan, taken at (a) 22-25 minutes and (b) 34-37 minutes, show persistent isotope activity in the descending colon (arrows) from active bleeding. Increased stomach uptake (arrowheads) is artefactual, a result of poor radiopharmaceutical labelling. (L=liver; H=heart]

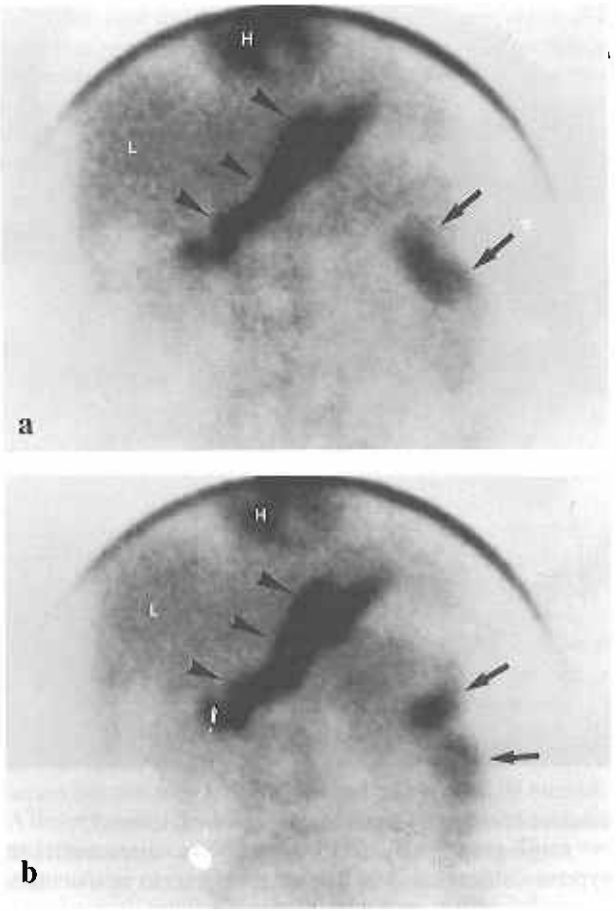

Table III – A suggested algorithm for the role of imaging in acute gastrointestinal bleeding (Adapted from reference nos. 1 & 5)

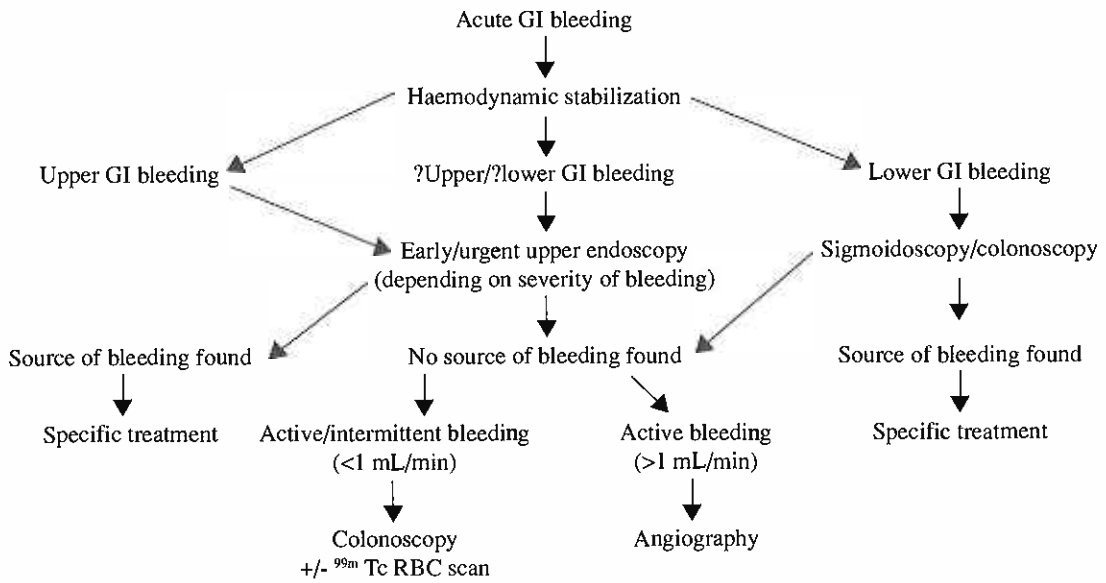

Fig 5 – A 56-year-old Chinese man presenting with abdominal pain and vomiting. Two views from the small bowel enema show a smooth oval filling defect in the distal jejunum (arrowheads). A benign stromal tumour of the jejunum was subsequently excised.

combined features of mucosal and subserosal lesions[7-9].

Angiographically, leiomyomas are circumscribed hypervascular masses with a dense homogeneous tumour blush corresponding to the actual size of the lesion. Other angiographic features are rapid filling by enlarged feeding arteries, dense capillary opacification and early venous drainage indicating arteriovenous shunting. Irregular neovascularisation within the tumour mass could indicate malignancy[4,7-9]. Histologically, mesenchymal gastrointestinal tumours have been termed leiomyomas or leiomyosarcomas, based mainly on previous studies of uterine lesions. The term 'stromal neoplasms' is now recommended, with categorisation of malignancy being based on criteria such as mitotic index, cytological atypia and necrosis[10].

Small bowel tumours are often overlooked as a cause of significant gastrointestinal bleeding. As demonstrated in this case, angiography may play an important role in making the diagnosis, especially if endoscopy, barium studies and scintigraphy are negative.

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ABSTRACT

A 38-year-old Chinese man presented with melaena and anaemia. Urgent superior mesenteric angiogram showed a well-circumscribed vascular mass in the ileum. A stromal tumour was surgically excised. The radiological approach to lower gastrointestinal bleeding is described, followed by a brief discussion on stromal tumours of the small bowel.

Keywords: *gastrointestinal bleeding, leiomyoma, mesenteric angiography, small bowel neoplasm, stromal tumour*