

SURGICAL TECHNIQUE

INTRA-OPERATIVE ENTEROSCOPY IN THE MANAGEMENT OF BLEEDING SMALL BOWEL LESIONS

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This paper reviews the use of intra-operative enteroscopy at St Vincent's Hospital, Melbourne between 1982 and 1990 in the management of presumed small bowel bleeding. Intra-operative enteroscopy was found to be a moderately technically demanding procedure. The diagnostic yield in this small series of nine patients was 100%. When solitary small bowel lesions are identified, resultant directed therapy should prevent further bleeding. When multiple widespread angiodysplastic lesions are identified as occurred in three cases, the bleeding is difficult to cure.

Key words: intra-operative enteroscopy, small bowel lesions.

Introduction

Localization of the source and definition of the cause of gastrointestinal bleeding can be achieved by conventional oesophagogastroduodenoscopy and colonoscopy in 80–90% of cases.¹ The site of bleeding may be defined in some of the remainder by contrast radiology, arteriography, and nuclear imaging techniques. Unfortunately, with small bowel bleeding these techniques rarely define, with pinpoint accuracy, the site or nature of a bleeding lesion. Laparotomy with external inspection and palpation of the small bowel will fail to detect a large percentage of bleeding small bowel lesions.² Pre-operative small bowel enteroscopy is possible but difficult using prototype instruments which are not generally available.³ Small bowel endoscopy at laparotomy using the long colonoscope is a diagnostic method which overcomes some, but not all of the limitations of other imaging techniques. In spite of the fact that the technique is not new, reported experience remains limited.⁴

This paper reports the authors' recent experience with intra-operative enteroscopy in patients coming to laparotomy for suspected small bowel bleeding.

Methods

The case records of patients who had small bowel enteroscopy for suspected small bowel haemorrhage at St Vincent's Hospital, Melbourne between

1982 and 1990 were reviewed. There were nine patients (seven males and two females) with a median age of 66 years (range 41–87). The median duration of bleeding was 18 months (range 1–60) and the median blood loss as assessed by transfusion requirements was 18 units (5–60 units). Bleeding was classified as chronic in seven patients who did not require rapid replacement (tricklers) and acute in two patients who did require rapid replacement (spurters). The tricklers were also maintained on parenteral oral or iron replacement therapy. No patient with significant small bowel bleeding as the major symptom underwent laparotomy without enteroscopy during this period of review.

The group as a whole were frail: three had had aortic valve replacement, one had had an aortic aneurysm repaired, three were on long-term anticoagulation, four had chronic obstructive airways disease, two had chronic renal failure, one was crippled with rheumatoid arthritis, one had congenital factor XII deficiency and one was extremely old. As a group, they were considered to be at significant risk for major surgery, and yet limited in their ability to tolerate acute or chronic blood loss.

All patients had good evidence of gastrointestinal bleeding. This included macroscopic evidence in two cases and either positive faecal occult blood tests and/or positive chromium labelled faecal blood studies in the remainder. Prior investigations to localize the site of bleeding are summarized in Table 1. Six patients had normal oesophagogastroduodenoscopy and three had minor pathology (hiatus hernia in two, gastritis in one) that was considered unlikely to be the cause of blood loss. Colonoscopy had failed to define a causative lesion in any of the nine patients. Prolonged scanning to demonstrate

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Table 1. Pre-operative investigations in patients with small bowel bleeding

	Positive
Gastroscopy	3/9
Colonoscopy	0/9
Technetium red cell scan	5/6
Angiography	1/5
Small bowel enema	0/4

pooling of technetium labelled red cells was performed in six patients. In five of the six, appearances suggestive of small bowel bleeding were recorded. To achieve this result, multiple scans were required in two patients. Localization of the source of bleeding by this technique was approximate at best. Five patients had mesenteric angiograms. Bleeding was localized to a particular jejunal branch in one spurter. In the remainder, neither the causative pathology nor evidence of bleeding was defined. In all four who had a small bowel enema, the examination was normal.

TECHNIQUE OF INTRA-OPERATIVE ENTEROSCOPY

On each occasion, the team included an experienced endoscopist in addition to the surgeon. The initial step was to examine all organs thoroughly at laparotomy. A long colonoscope was passed *per oram* under direct vision to the second part of the duodenum, after which surgical guidance was usually required. With the external lights dimmed, distal passage continued while the surgeon examined the external surface of the small bowel for vascular abnormalities highlighted by transillumination. At the same time the endoscopist inspected the mucosa. Abnormalities were marked serosally with a suture for subsequent re-evaluation and therapy. On two occasions distal progression to the ileocaecal sphincter by the 170 cm colonoscope was prevented by the physical bulk of the small bowel mesentery. In these two instances, the distal limit of proximal inspection was marked by a serosal suture, the instrument withdrawn and re-inserted *per rectum* to complete the enteroscopy from below.

Results

Intra-operative enteroscopy allowed identification of a gastrointestinal lesion in all nine cases. The results of endoscopy, the therapeutic approach and its efficacy are shown in Table 2.

The two acute bleeders were treated by small bowel resection and both have had no further bleeding. One patient had had a Meckel's diverticulum resected 8 years previously. He was found to have

Table 2. Operative enteroscopic findings and outcome in nine patients with presumed small bowel bleeding

Operative findings	Treatment	Outcome
Spurters		
Acute ileal ulcer	Resection	Cessation
Acute jejunal ulcer	Resection	Cessation
Tricklers		
Widespread angiodysplasia (n = 3)	Local resection	Diminished
	Multiple under-run	Continued
	Nil	Continued
Acute jejunal ulcer	Resection	Cessation
Acute jejunal ulcer	Nil	Continued
Acute ileal ulcers	Nil	Cessation
Gastritis	Vagotomy and antrectomy	Cessation

an acute ulcer at the site of resection next to ectopic gastric mucosa. In the other, there was an area of angiodysplasia in the base of an acute jejunal ulcer. This was the only case in which active bleeding was witnessed at laparotomy.

The endoscopic findings, treatment and outcome in the tricklers were varied. In one patient, a single acute jejunal ulcer was resected. This was suspected to be angiodysplastic, however subsequent histology revealed an area of acute ulceration only. Widespread angiodysplasia was observed endoscopically in three cases. In one of these, resection of the worst affected segment led to diminished bleeding. In the second, each obvious angiodysplastic lesion, was under-run from the serosal surface. In the third, numerous angiodysplastic lesions were observed but no specific treatment undertaken. In the latter two patients, bleeding continued unabated. In one patient, previous gastroscopy had shown gastritis which seemed minor and was not thought to be responsible for the chronic blood loss. At intra-operative endoscopy, the gastritis was thought to be more significant. Intra-operative enteroscopy failed to reveal another possible source and vagotomy and antrectomy was followed by cessation of bleeding. In a further two patients, intra-operative enteroscopy was performed without any therapeutic intervention. The first had several small ileal ulcers; the bleeding ceased spontaneously. The other, who had an acute jejunal ulcer, experienced further blood loss.

The complications of intra-operative enteroscopy included a moderate sized mesenteric haematoma (three cases) and a mesenteric tear (one case). These were produced in the process of compacting the small bowel onto the colonoscope to allow further distal passage. The treatment was expectant in all four. Mild pancreatitis occurred in the early postoperative period of one patient.

Discussion

Small bowel bleeding is a diagnosis that is initially made by exclusion. It is inferred in patients in whom oesophagogastroduodenoscopy and colonoscopy is negative by identification of blood in the stools. Positive localization is possible in most cases by technetium labelled red blood cell scanning but this may need to be repeated to achieve a positive result. Angiography was not helpful in this series except in the acute situation. A small bowel series should be performed in an attempt to define a small bowel tumour. This information however is usually insufficient to allow the surgeon to localize the likely source(s) of the bleeding at laparotomy without intra-operative enteroscopy. In this small series, one or more possible causative lesions were identified by intra-operative enteroscopy in each of the nine cases. Nevertheless, it is appropriate to complete this diagnostic work-up before operation in order to achieve such a high rate of identification at operation. The case for barium meal and barium enema is weaker because their sensitivity in the situation of bleeding is low. The case for routine angiography for tricklers was not obvious in this series yet it has been made by others.⁵

The technique is not simple and easy.¹ By comparison with flexible endoscopy of the proximal and distal gastrointestinal tract it is technically demanding. First, angiodysplastic lesions and acute ulcers, the most common findings in this series are commonly small and may be missed or dismissed as innocuous. The risk of missing the culprit lesion increases when the lesions are minor or multiple or scattered. Second, it is easy to produce minor mucosal haematomata especially in patients with coagulation disorders. Complete enteroscopy to the ileocaecal valve from above may be impeded by the bulk of the small bowel mesentery. The residual small bowel then needs to be examined by passage of the colonoscope *per rectum*.

Despite use of intra-operative enteroscopy, four of the nine patients continued to bleed. Three factors contributed to this result; multiple scattered lesions, frail patients and failure, on occasions, of the surgeon to appreciate the need for intervention. As might be expected, resection of a focal lesion gave the best control. Focal alternatives such as under-running of angiodysplastic lesions from the

serosa (or bipolar endoscopic coagulation which was not used in this series) had obvious appeal in this poor risk group, as compared with multiple resections which have been advocated by others.⁶ Failure to control bleeding by focal therapy of multiple lesions may result if the culprit lesion is missed or if it is not dealt with adequately. On the basis of the authors' experience innocuous looking acute ulcers must be either removed or under-run; one such ulcer in this series had an angiodysplastic lesion in its base. Similarly, relatively minor upper gastrointestinal lesions such as gastritis, hiatus herniation and water melon stomach deserve surgical attention if no other significant small bowel lesion is uncovered.⁷

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