Mesenteric revascularisation for acute-on-chronic intestinal ischaemia

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Summary

Eleven patients (eight women) underwent urgent revascularisation for acute-on-chronic mesenteric ischaemia. Four patients had dual vessel and seven single vessel reconstructions. Two patients underwent simultaneous bowel resection and one patient has had three separate grafts to the superior mesenteric artery. There were two peri-operative deaths and three have died in the late follow-up period after 18, 24 and 36 months. The remainder have survived for between five and 63 months. Revascularisation for acute-on-chronic mesenteric ischaemia has been shown to be technically possible and of substantial benefit to patients who would otherwise be treated as terminal cases.

Keywords: mesenteric revascularisation, surgery, ischaemic colitis, vascular patency

Chronic intestinal ischaemia is a relatively uncommon, but probably under-diagnosed condition. The term 'abdominal angina' for the syndrome of post-prandial abdominal pain is usually attributed to Bacelli.¹ Patients have pain severe enough to avoid food, marked weight loss and sometimes diarrhoea, nausea or vomiting. Other important factors in the patient's history include smoking and peripheral vascular disease.^{1,2} It has also been suggested that women are affected more frequently than men. The natural progression of this condition is a gradual reduction in blood supply to the abdominal viscera. Frequently, this is complicated by an acute thrombotic episode leading to bowel infarction which has a persistently high mortality rate.^{3–5} We present a series of patients who underwent revascularisation procedures for acute-on-chronic mesenteric ischaemia.

Patients

Eleven patients (eight women and three men) underwent urgent mesenteric revascularisation for acute-on-chronic ischaemia between 1990 and 1995. The average age was 64 years (range 46–76). Ten patients were heavy smokers (more than 20 cigarettes per day) up to the time of operation and one patient had previously been a heavy smoker. Ten patients had peripheral vascular disease with symptoms of intermittent claudication present for between two and 18 years. All patients had a history of

intermittent abdominal pain which had lasted from two weeks to nine years and all patients had a recent acute deterioration in symptoms. In three patients, the abdominal pain had become constant, one had diarrhoea, one had vomiting and seven patients had both diarrhoea and vomiting.

Surgical management

A summary of our 11 patients and their outcome is shown in the table. The median follow-up period was 30 months (range 5–60 months). All the revascularisation procedures were carried out as urgent or emergency procedures. Seven patients had a single vessel revascularisation, five superior mesenteric artery (SMA), one coeliac and one inferior mesenteric artery (IMA). The remaining four patients had dual-vessel reconstructions, three SMA/coeliac and one an SMA/IMA revascularisation.

Two patients died within 30 days of surgery, one from a gastrointestinal anastomotic dehiscence (day 12) and one from a cerebrovascular accident (day seven). Three other deaths occurred at 18, 24 and 36 months, due to a myocardial infarction, an aorto-enteric fistula and hypovolaemic shock from a ruptured femoro-popliteal bypass graft, respectively. One patient has had three separate procedures carried out on the SMA. This patient initially had an emergency aorto-SMA vein graft which blocked at 22 months. This was revised with a similar vein graft which blocked after a further 13 months. At a third emergency operation, a 6 mm PTFE graft was inserted and the proximal jejunum was resected for full-thickness bowel gangrene. One other patient had an occluded graft at 13 days (PTFE) and underwent a major bowel resection, necessitating total parenteral nutrition indefinitely. All the other patients became asymptomatic.

Discussion

The diagnosis of chronic mesenteric ischaemia is frequently overlooked. Patients are often subjected to a large series of investigations which may be both uncomfortable and complex, until either a diagnosis of mesenteric ischaemia is considered by exclusion⁶ or acute deterioration occurs. All clinicians should therefore maintain a high index of suspicion of this disease in patients with atherosclerosis because acceptable surgical morbidity can only be achieved if it is treated early.

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Accepted 29 January 1997

Table 1 Summary of the outcome of 11 patients undergoing revascularisation for acute-on-chronic mesenteric ischaemia

Age (years)	Sex	Operation	Graft type	Inflow of graft	Graft complication	Outcome
76	F	aorto-SMA bypass	Vein	supra-renal aorta	Second-look laparotomy at 24 h Cholecystectomy for acalculous gangrenous cholecystitis	Died at 12 days due to intra-abdominal sepsis. Anastomotic dehiscence of duodeno-jejunal flexure
46	M	aorto-SMA bypass	6 mm PTFE	infra-renal aorta	Graft occlusion at 13 days Extensive small bowel resection	Died at 24 months due to aorto-enteric fistula and sepsis
75	F	aorto-coeliac bypass	6 mm PTFE	infra-renal aorta	None	Died at 18 months due to cardiac arrest
68	F	aorto-SMA bypass	Vein	infra-renal aorta	None	Alive at 14 months
65	F	aorto-coeliac bypass	Vein	infra-renal aorta	None	
65	F	aorto-bifemoral bypass	14 × 7 Dacron	infra-renal aorta	None	Died at 36 months due to multi-organ failure
51	F	aorto-bifemoral bypass	7 mm Dacron			Alive at 20 months
51	F	aorto-SMA bypass	14 × 7 Dacron	infra-renal aorta	Second-look laparotomy at 24 h Two areas of bowel necrosis surgically invaginated	
61	M	IMA reimplantation	6 mm PTFE		None	Alive at 40 months
61	M	aorto-bifemoral bypass				
73	F	SMA endarterectomy				
73	F	aorto-coeliac bypass	14 × 7 Dacron	supra-renal aorta	None	Alive at 63 months
71	F	aorto-SMA bypass	(bifurcated)		None	
71	F	IMA endarterectomy				Died at 7 days due to cerebrovascular accident
54	M	(1) aorto-SMA bypass	Vein	infra-renal aorta	Graft occlusion at 22 months, revised	Alive at 12 months from last operation (47 months from presentation)
		(2) aorto-SMA bypass	Vein	infra-renal aorta	Graft occlusion at 13 months, revised	
		(3) aorto-SMA bypass, resection of jejunum	6 mm PTFE	infra-renal aorta	None	
68	F	aorto-coeliac bypass	12 × 6 Dacron	infra-renal aorta	None	Alive at 5 months
		aorto-SMA bypass	(bifurcated)			

Mesenteric ischaemia: clinical features

- post-prandial abdominal pain
- marked weight loss
- history suggestive of gastrointestinal malignancy
- normal gastrointestinal investigation
- may have anaemia, renal impairment, claudication, history of stroke, or positive faecal occult blood

Box 1

When a patient presents with mesenteric ischaemia, it is often as a result of an acute deterioration due either to mesenteric embolisation or an acute-on-chronic thrombotic occlusion. If the whole of the bowel is gangrenous there is little that can be done. However, in the event of the bowel having areas of patchy necrosis, a surgeon is faced with the difficult decision of how much bowel to resect and whether to undertake an anastomosis or bring out the ends individually. If it has been an embolic event and the embolus is lodged distally, a limited bowel resection may be possible. In a situation where there is long-standing mesenteric ischaemia and an acute-on-chronic deterioration occurs, bowel resection is a hazardous procedure if it is not accompanied by mesenteric revascularisation.

It is of interest to note that, in two of our patients, full-thickness bowel necrosis occurred at the duodeno-jejunal flexure which necessitated bowel resection. It appears that this is a watershed area between the coeliac and SMA vessels. Detailed descriptions of the blood supply to this area are unfortunately hard to

Mesenteric ischaemia: therapeutic options

- if acute deterioration occurs, it may be too late to salvage the bowel
- segmental bowel resection is very hazardous
- revascularisation offers the only satisfactory treatment
- patchy necrosis at laparotomy is an indication for revascularisation
- in an emergency, aorto-SMA bypass is the best option
- undertake second-look laparotomy after 24 hours

Box 2

find. Nevertheless, it is an area where any anastomosis is notoriously difficult and exteriorization of the bowel is not a possible alternative strategy to primary anastomosis. In this situation, mesenteric revascularisation may be particularly beneficial.

Mesenteric ischaemia is relatively rare compared to other manifestations of atherosclerosis. The rich collateral network between the three mesenteric vessels is usually sufficient to allow for normal bowel function despite occlusive disease. Severe disease of at least two of the bowel vessels is usually necessary for a patient to be symptomatic.^{6,7} Although some authors advocate multivessel revascularisations,^{1,8,9} revascularisation of one vessel is usually sufficient for the patient's symptoms to cease.¹⁰

The occlusive disease in visceral vessels is usually limited to the origin and revascularisation can easily be performed in the proximal portion of the vessel. The principal surgical risk

Summary/learning points

- try to identify patients with chronic mesenteric ischaemia before acute deterioration occurs
- suspect in any patient with excess weight loss, normal gastrointestinal investigation and unexplained post-prandial pain
- mesenteric angiography is the next logical investigation
- despite a relatively high operative mortality, mesenteric revascularisation offers the only hope of survival and can return the gastrointestinal tract to normal

Box 3

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Medical Anniversary**REGINALD HALL, 1 October 1931**

Reginald Hall (1931–94) was born and educated at Durham, where he qualified in 1956. He became an endocrinologist with a particular interest in the thyroid. He became a professor of medicine in Newcastle and then at the University of Wales, Cardiff (1979–89). He suffered cardiac amyloidosis for which he was given a cardiac transplant which kept him well for over 10 years. He died in Cardiff on 20 July 1994. — *DG James*