Case report

Embolisation of gastroduodenal artery aneurysm caused by chronic pancreatitis

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SUMMARY Chronic pancreatitis is known to cause vascular lesions, which produce gastrointestinal haemorrhage. Visceral vessel aneurysms are an unexpectedly common finding in arteriograms of patients with chronic pancreatitis. Gastrointestinal bleeding from these aneurysms carries a high mortality, making early diagnosis and treatment essential. Coeliac and mesenteric arteriography readily confirm the diagnosis. Surgical ligation or resection of the aneurysm entails a high mortality. Cessation of such gastrointestinal haemorrhage may be achieved by transcatheter embolisation under radiological control. This report describes a case in which bleeding from a gastroduodenal artery aneurysm, caused by chronic pancreatitis, was successfully treated by embolisation using a Gianturco coil.

Gastrointestinal haemorrhage is a recognised complication of chronic pancreatitis and has been reported to occur in up to 9% of cases.¹ Several aetiological factors such as local venous hypertension secondary to splenoportal thrombosis, erosion of vessels in the walls of neighbouring viscera, formation of visceral vessel aneurysms and bleeding from a pseudocyst into the pancreatic duct, have been described to account for the gastrointestinal haemorrhage.¹ The incidence of visceral vessel aneurysms, detected by coeliac arteriography, in cases of chronic pancreatitis has been reported to be as high as 10%.² Erosion and weakening of the arterial wall, responsible for aneurysm formation, is primarily because of the enzymatic actions of elastase and trypsin, which are released in large amounts in pancreatitis.³ The majority of such aneurysms occur on the splenic artery and a few occur on the common hepatic, gastroduodenal and pancreaticoduodenal arteries. Half of these aneurysms rupture and cause gastrointestinal bleeding,⁴ which has a high mortality. Often surgical ligation or resection of the bleeding aneurysm is hazardous or not possible.⁵⁻⁷ Selective embolisation of the aneurysm by delivering an occluding agent

such as a Gianturco steel coil *via* a catheter under radiological control is an effective alternative to surgery involving little risk.⁴ This report describes a case of chronic pancreatitis in which bleeding from a gastro-duodenal artery aneurysm, was successfully treated by transcatheter embolisation using a Gianturco steel spring coil.

Case report

A 51 year old, previously fit man, presented in 1980 with a two year history of epigastric pain radiating to the back. His alcohol consumption was moderate (less than 100 g/week) and he denied having had any haematemesis or melaena. Examination revealed epigastric tenderness. The haemoglobin was 15.6 g/100 ml and serum amylase 234 IU/l. Plain abdominal radiograph and ultrasonography revealed calcification in the head of the pancreas. Endoscopic retrograde cholangiopancreatography (ERCP) together with pancreatic parenchymography, confirmed the presence of calcification in the head of the pancreas and showed a patchy pattern of acinar filling (Fig. 1). Chronic pancreatitis has been reported to be a cause of such patchy acinar filling seen at pancreatic parenchymography.^{8,9} The common bile and pancreatic ducts were normal. His symptoms improved with conservative management.

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Received for publication 3 February 1983

Fig. 1 *Pancreatic parenchymogram performed at ERCP using metrizamide illustrating patchy acinar filling and calcification.*

In February 1982, he was admitted with severe epigastric pain and tenderness associated with vomiting altered blood. The haemoglobin was 14.2 g/100 ml and serum amylase rose from 260 IU/l to 780 IU/l on day 3. Plain abdominal radiograph, ERCP, and ultrasound scan remained unchanged from 1980, and in particular there was no evidence of pseudocyst formation. The patient recovered rapidly from this episode but was re-admitted one month later with haematemesis and melaena in addition to epigastric pain. He was anaemic, haemoglobin 10.0 g/100 ml, with a normal amylase of 250

IU/l. Upper gastrointestinal endoscopy and barium enema were entirely normal and failed to reveal the source of bleeding. Over the next week the melaena continued and he required transfusion with 8 units of blood to maintain a haemoglobin of 12.4 g/100 ml.

Coeliac arteriography revealed a 2.0 cm $\times$ 1.5 cm aneurysm of the gastroduodenal artery (Fig. 2). The remaining arteries appeared normal, and in particular did not show evidence of arteriosclerotic change; the aneurysm was attributed to the chronic pancreatitis.

Fig. 2 *Coeliac arteriogram. 2.0 cm $\times$ 1.5 cm aneurysm (arrow) of the gastroduodenal artery lying to the right of L2/L3 disc space is shown.*

Transcatheter embolisation of the aneurysm was carried out by selectively catheterising the common hepatic artery. The catheter tip was advanced to the origin of the gastroduodenal artery and a single Gianturco coil was placed, *via* the catheter, at the bifurcation of the gastroduodenal artery (Fig. 3). Immediate postembolisation coeliac arteriograms showed a marked reduction in flow to the aneurysm. The patient experienced no further epigastric pain, and over the following week, the serum amylase did not rise over 250 IU/l. Two weeks postembolisation the patient was asymptomatic with a haemoglobin of 12.8 g/100 ml and stools were negative to testing for occult blood. Repeat coeliac and superior mesenteric arteriography showed that (Fig. 4) the coil had remained *in situ* and totally occluded the gastroduodenal artery, causing a complete cessation of distal flow to the aneurysm. Furthermore, no filling of the aneurysm from retrograde flow or a collateral source was shown. The patient remains well and pain free six months after the procedure.

Discussion

This is the first report in the British literature to describe the successful treatment of a bleeding

visceral vessel aneurysm, secondary to chronic pancreatitis, by interventional radiology. Transcatheter embolisation was used in preference to surgery to stop the haemorrhage from this aneurysm, as previous results of surgical management have been associated with a high mortality.⁵⁻⁷ In a recent report, Hall *et al.*⁶ described the outcome of the surgical management of four cases of gastrointestinal bleeding secondary to chronic pancreatitis. In two out of these four cases haemorrhage was due to visceral vessel aneurysms. Case 1 had a splenic artery aneurysm, which was successfully resected, but Case 2 had a large superior mesenteric artery aneurysm, which despite major surgery, proved too hazardous to resect and was left *in situ*. Unfortunately, the patient died two months later from a gastrointestinal bleed. The experience of other workers has been similar.^{5,7} Eckhauser *et al* reported that three out of seven cases of gastroduodenal and pancreatoduodenal artery aneurysms secondary to pancreatitis died in the postoperative period after aneurysmal ligation. On surveying surgical reports in the literature, these authors found that surgical ligation or resection of the aneurysm was beneficial in only eight out of 17 cases, the remaining nine cases died postoper-

Fig. 3 Plain radiograph showing the Gianturco steel coil lodged in position. Inset shows actual appearance of steel coil with attached strands of dacron.

Fig. 4 Postembolisation coeliac arteriogram. Gianturco coil (arrow) occluding the gastroduodenal artery with no filling of the aneurysm.

actively.⁵ Owing to the anatomical inaccessibility of these aneurysms and associated inflammatory reaction, surgery can be difficult and disappointing. Transcatheter embolisation, however, is not hampered by these factors and has been successfully used by Knight *et al* to treat small aneurysms in a poor surgical risk case.⁴ Our patient was not a poor surgical risk case, but in view of the disappointingly high surgical mortality, range 25% to 47%,⁵⁻⁷ it was decided to electively treat this case of gastroduodenal artery aneurysm by transcatheter embolisation.

Transarterial embolisation has been used to stop haemorrhage from various sources such as peptic ulceration, oesophageal varices, epistaxis, haemoptysis, and arterio-venous malformations.¹⁰⁻¹² A detailed review of embolic materials and their therapeutic applications is provided by Amplatz and Castaneda,¹⁰ and it is clear that the choice of embolic agent is dependent on the vessel to be embolised and the underlying pathological process. Vasopressin infusions, which act by direct vasoconstriction of arterial and intestinal smooth muscle are of use only in the temporary control of acute gastrointestinal bleeds and are unsuitable for occlusion of aneurysms. Gelfoam and autologous clot were used unsuccessfully by Lina *et al* to embolise such visceral vessel aneurysms caused by chronic pancreatitis.¹³ Gelfoam powder, which consists of particles of 40 μ to 60 μ in size and promotes clot formation with propagation of thrombosis distal to the site of occlusion, suffers from two disadvantages. First the high pressures, which are required to inject gelfoam with its carrier fluid may

rupture the wall of the aneurysm,¹³ and second the recanalisation which occurs within four weeks^{10 11} precludes any permanent occlusion. To occlude a major vessel (in this case the gastroduodenal artery 3 mm in diameter) and to ensure that the occlusion is permanent, a Gianturco coil which consists of a steel spring coil with attached dacron strands (Fig. 3) is a readily available suitable option that is reasonably easy to use. The Gianturco coil has been effectively and safely used for producing permanent vascular occlusions of major arteries in a variety of clinical circumstances,¹² and was an effective choice in permanently controlling the haemorrhage from this gastroduodenal artery aneurysm, without complication. This was shown, two weeks post-embolisation, by a repeat coeliac and superior mesenteric arteriogram which revealed a totally occluded gastroduodenal artery with no filling of the aneurysm from either a collateral source or retrograde flow. No complication from transcatheter embolisation occurred in this case.

Complications from transcatheter embolisation include pain, fever, inadvertent embolisation, and infarction of normal structures, abscess formation and aneurysmal rupture.^{11 14 15} Aneurysmal rupture is a hazard associated with the high pressures necessary to inject gelfoam,¹³ and is not seen to occur from embolisation with the Gianturco coil. The risk of inadvertent embolisation of the Gianturco coil can be minimised by selecting the correct size of coil and by using an appropriate delivering system.¹⁰ Ischaemic pancreatitis, duodenal infarction and perforation have been reported following experimental occlusion of gastro-

duodenal arteries with Isobutyl 2-cyanoacrylate in dogs.¹⁶ This serious complication did not occur during the treatment of either our patient or in the case report of Knight *et al.*⁴ Such potentially serious complications, which may occur with transcatheter embolisation, will need further assessment.

Gastrointestinal bleeding from a visceral vessel aneurysm caused by chronic pancreatitis may be more common than previously suspected. Coeliac arteriography is not only the most useful investigation in making the diagnosis but is also useful in carrying out treatment by transcatheter embolisation. A greater awareness of this grave condition is required and transcatheter embolisation should be attempted in preference to surgery.

Following the submission of this paper another communication describing the embolisation of an intra-pancreatic aneurysm using particles of human dura mater, without complication, has been reported.

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