

Splanchnic aneurysms

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Splanchnic aneurysms are rare but lethal events. Three cases demonstrating different types of splanchnic aneurysms are presented. The natural history, clinical presentation, investigations, and modalities of treatment for splenic artery aneurysm, hepatic artery aneurysm, superior mesenteric artery aneurysm, and pancreaticoduodenal artery aneurysm are discussed.

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Key words: Splanchnic circulation; Aneurysm; Splenic artery; Hepatic artery; Superior mesenteric artery; Pancreaticoduodenal artery; Embolisation; Ligation

Introduction

Splanchnic aneurysms are rare, with an incidence of 0.1% in autopsy series. However, they are lethal once complications arise, such as rupture and thromboembolism. These patients invariably have high mortality. The stated incidence may be an underestimation. Many present as abdominal apoplexy and the aneurysms may not be found even at post-mortem. Special precautions and preparations with resin cast injection into vessels are needed in order to locate them. Splanchnic aneurysms are commonly found in the splenic artery (58%), hepatic artery (20%), superior mesenteric artery (8%), and elsewhere.¹ This is in accordance with the frequency of occurrence. Angiography with embolisation is indicated with both diagnostic and therapeutic intentions. Surgical intervention should be considered in the case of symptomatic patients and also women of child-bearing age.²

Case Studies

Case study 1

A 56-year-old woman presented with epigastric pain of one day's duration. She was known to be hyperten-

sive and diabetic. On admission, her vital signs were stable and abdominal X-ray showed a 3 x 2.5 cm opacity in the left upper quadrant of the abdomen. However, this lesion was not demonstrated in the ultrasound of the abdomen. Laparotomy was performed with a left subcostal incision and a 3 cm splenic artery aneurysm was found. The afferent and efferent vessels were controlled and ligated. She was well on follow up three months later.

Case study 2

An 11-year-old boy presented to our accident and emergency department with left upper quadrant pain of one day's duration. He slipped and fell two months before attendance and this resulted in a splenic laceration.

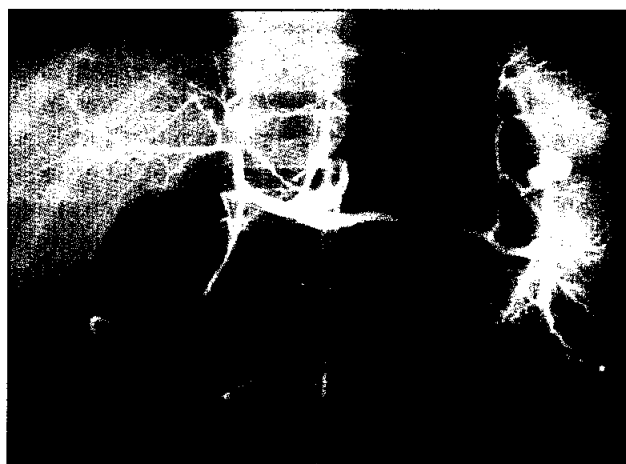


Fig 1. Angiogram showing post-traumatic splenic artery aneurysm in an 11-year-old boy with left upper quadrant injury of the abdomen

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Fig 2. Successful embolisation of the splenic artery aneurysm

Splenorrhaphy was performed at that time. One month before attendance, he had a fight with his younger brother and was hit in the left upper quadrant of the abdomen. Ultrasound of the abdomen at that time showed a subcapsular haematoma and responded to conservative treatment.

On attendance at our hospital, the patient was found to have tenderness in the left upper quadrant with stable vital signs. Ultrasound of the abdomen revealed a false aneurysm in the splenic artery and doppler ultrasound confirmed the turbulent flow.

The patient underwent an arteriogram (Fig 1) which revealed the aneurysm at the splenic hilum. Embolisation using microcoils was successfully performed (Fig 2). The procedure was uneventful and the boy responded to conservative treatment. He was well on follow up six months later.

Case study 3

A 61-year-old man presented with right lower quadrant pain of one day's duration. He had been well until five days prior to admission. The patient suffered from gradual onset of lower abdominal pain that localised in the right lower quadrant on the day of admission. On physical examination, he was afebrile with stable vital signs, but with severe tenderness in the right lower quadrant. Blood tests showed leukocytosis and normal haemoglobin and haematocrit counts.

With a provisional diagnosis of acute appendicitis, a laparotomy was performed which revealed a haemoperitoneum containing 500 ml of blood and a large haematoma at the retroperitoneum and at the small bowel mesentery. This was a case of abdominal apoplexy.³ The haematoma was left alone and an appendectomy was performed, which showed serositis only.



Fig 3. Selective visceral angiogram showing the superior mesenteric artery aneurysm presenting with abdominal apoplexy

The patient was stable postoperatively and showed no sign of further bleeding. Four days after operation, a selective visceral angiogram was performed (Fig 3). This showed a tortuous anomalous artery which arose at 3 cm distal to the origin of the superior mesenteric artery. An aneurysm was present at the bifurcation of this artery and the main trunk. Embolisation was attempted, but later abandoned, due to difficulty in cannulating the vessels.

The diagnosis of proximal superior mesenteric aneurysm was confirmed. As the patient was haemodynamically stable throughout, the plan was to wait for the haematoma to organise and then reassess the patient for operability. Aneurysmectomy with intestinal revascularisation if necessary, was contemplated.

Four weeks later, a digital subtraction angiogram (Fig 4) was performed as a preoperative work-up. To our surprise, the aneurysm had disappeared. This was a case of spontaneous resolution of superior mesenteric aneurysm, probably due to thrombosis of the artery after bleeding, and is the first reported incidence in the literature.

Discussion

Splenic artery aneurysm

These have the most frequent occurrence (58%). The male to female ratio is 1:4. More than 50% of these patients are multigravida (parity more than six). The incidence of rupture is 2% and the mortality of rupture is 25%, with



Fig 4. Digital subtraction angiography four weeks later indicating spontaneous resolution of the superior mesenteric aneurysm

the mortality of rupture in pregnancy being 75%. Incidentally, 80% of these aneurysms are calcified.

Multiple causes for these aneurysms include degeneration of media, trauma, inflammation, atherosclerosis, mycosis, and congenital defects. Nowadays, degeneration as well as traumatic causes are increasing in incidence compared with mycotic and congenital causes which were previously more common.

These aneurysms may present with non-specific symptoms or may be totally asymptomatic. Some patients present with left upper quadrant or epigastric pain. There is the characteristic "double rupture phenomenon", whereby the initial rupture is contained in the lesser sac and gives rise to left upper quadrant pain. The blood exits via the foramen of Winslow and collects at the right paracolic gutter, causing subsequent right lower quadrant pain. Further haemorrhage then gives rise to shock. A less common presentation involves the X-ray finding of a signet ring-like calcification around the aneurysm.

Conservative treatment runs the risk of perforation. This has a high mortality rate, compared with the risk of operation of approximately 0.5%. Another option involves embolisation as shown in case study 2. This is a less invasive technique but its feasibility is determined by the availability of expertise. Choices of operation include splenectomy or ligation and excision of the aneurysm.

Hepatic artery aneurysm

This is the second most common type of splanchnic aneurysm (20%). The male population has double the incidence of the female. Eighty percent of the aneurysms are extrahepatic and the rupture rate is reported as ranging from 44% to 80%.⁴ Once the aneurysm ruptures, there is high mortality, which amounts to 35%.

Patients usually present with right upper quadrant pain. Classically, there is the triad of biliary colic, jaundice, and the gastrointestinal bleeding of haemobilia. Sometimes patients present with intraperitoneal bleeding. Hepatic artery aneurysms are caused by arteriosclerosis, degeneration of media, trauma, and mycotic connective tissue disease.

Treatment is according to the site of the aneurysm.⁵ For common hepatic artery aneurysm, an aneurysmectomy only will suffice. For proper hepatic artery aneurysm, vascular reconstruction in addition to aneurysmectomy is needed. For intrahepatic artery aneurysms,⁶ embolisation is probably a better option, but if it is not effective, then one may have to resort to hepatectomy.

Superior mesenteric artery aneurysm

This is the third most common splanchnic aneurysm (8%) and there is no sexual preponderance. The management of proximal and distal aneurysms should be different,⁷ although this is not emphasised in the literature. Congenital causes⁸ include fibromuscular dysplasia and cystic medial necrosis. Other aetiologies include trauma, degeneration, and mycosis, while some are idiopathic.

Patients may be asymptomatic or present with non-specific abdominal pain. Doctors should have a high index of suspicion, particularly in those who have a history of connective tissue disease. Occasionally, these aneurysms present with gastrointestinal bleeding or abdominal apoplexy, as demonstrated in our cases. Rarely, they may be found on physical examination as a mobile, pulsatile mass.

Embolisation is the treatment of choice. However, spontaneous resolution is a possibility as was demonstrated in case study 3. This may be attributed to the development of thrombosis after the bleeding episode. Aneurysmorrhaphy has been suggested, however, this is only applicable in the mycotic type of saccular aneurysm, which is rare nowadays.

The first reported case by DeBakey and Cooley was treated by resection without restoring continuity of the vessels.⁹ This actually depends on whether collaterals are established. The intestinal viability should be assessed after the resection has been performed. Usually, when the aneurysm is located distally, ligation will suffice and intestinal viability is not a problem. However, for those that are located proximally, the gut may suffer from ischaemia after the ligation and a vascular graft should be considered. Usually, an autologous saphenous vein graft is preferred because of the reduced risk of infection.

Pancreaticoduodenal artery aneurysm

These aneurysms are rare, but are the most lethal.¹⁰ They usually occur in elderly patients and normally, patients experience pain before the rupture of the aneurysm. Rupture of the aneurysm is the most common presentation and the operative mortality is 50%. A selective visceral angiogram is very important in identifying the anatomy as well as the presence of collaterals. Usually, one can proceed with an attempt at embolisation.

If a patient is asymptomatic, conservative treatment is indicated. The principle of treatment is to try embolisation first. If one has to resort to operation, extensive dissection of the pancreas must be avoided as much as is possible.

For management¹¹ of superior pancreaticoduodenal aneurysms, one has to kocherise the duodenum and dissect at the head of the pancreas. In complicated cases, pancreaticoduodenectomy may have to be performed. For inferior pancreaticoduodenal aneurysms, the vessels are usually embedded in the pancreas itself. Partial resection of the head and possibly the body of the pancreas is commonly required.

Angiography

Angiography can be diagnostic and therapeutic with a view to embolisation. Specific indicators for embolisation include splenic aneurysms larger than 2 cm in diameter, hepatic artery aneurysms associated with portal hypertension, and intrahepatic artery aneurysms. All of the splanchnic aneurysms are subjected to embolisation, provided the expertise is available.

There are two groups of commonly used embolising agents. The first group consists of the detachable balloons (Fig 5). These are microballoons fitted to microcatheters which are flow-directed. The second group consists of microcoils (Fig 6) made from steel,

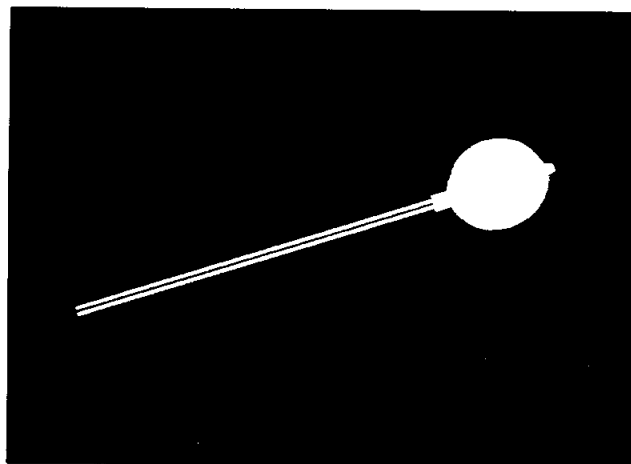


Fig 5. Detachable balloons for embolisation

platinum, or dacron wool fibres. Microcatheters and microguide wires are used for their placement. These are steerable and slightly flow-directed.

Embolisation¹² is a useful alternative to open operations to deal with the problem of splanchnic aneurysms, involves less risk, and may sometimes obviate a complicated operation. However, it is still an invasive procedure and has its own complications (Table 1).

Conclusion

Splanchnic aneurysms are rare, but have high mortality rates. They usually present with rupture as abdominal apoplexy.¹³ Their presentation is often non-specific, mimicking other causes of acute abdomen and we should have a high index of suspicion. Aetiologies are usually either congenital, the result of trauma, or degeneration. Mycotic aneurysms show a decreasing incidence.

Conservative treatment is indicated in selected cases, however, in view of the high mortality once an aneu-

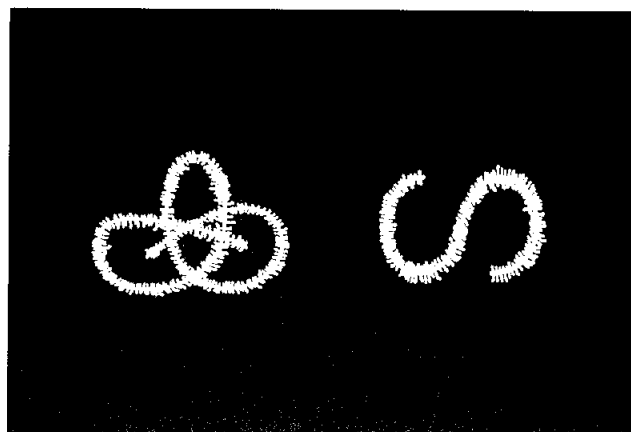


Fig 6. Metallic microcoils for embolisation

Table 1. Embolisation complications

Related to the procedure
Inability to catheterise the aneurysm
Contrast medium toxicity
Trauma to parent artery
Occlusion of parent artery
Premature detachment of balloons
Migration of embolising agents
Breakage of the catheter and guidewire
Inadvertent distal embolisation
Incomplete embolisation
Related to the aneurysm
Recanalisation
Pseudoaneurysm

rysm ruptures, definitive measures are usually necessary. Arteriography in view of embolisation is the treatment of choice. Sometimes, one may have to resort to operation¹⁴ in which ligation and aneurysmectomy with or without revascularisation may be needed, depending on the intestinal viability. Should a vascular graft be needed, the autologous saphenous vein graft is the best in view of the risk of infection.

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