Superior mesenteric artery dissection as a complication of an endovascular attempt to treat aneurysms of the pancreaticoduodenal arteries

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INTRODUCTION

Visceral artery aneurysms (VAAs) are rare but a potentially life-threatening condition. The mortality rate in patients with ruptured VAAs varies from 8.5 to 36%. Aneurysms of the pancreaticoduodenal artery (PDAAs) represent about 3% of all visceral artery aneurysms (VAAs) and knowledge of their treatment is based mainly on casuistry. One of the therapeutic options of PDAAs is an endovascular treatment [1]. The aim of this report was to present a rare case of the superior mesenteric artery (SMA) dissection that occurred during an attempt of endovascular treatment of multiple PDAAs and required a surgical treatment [2].

CASE REPORT

A 42-year old otherwise healthy woman was admitted to the Vascular Surgery Department because of multiple visceral aneurysms: two of the anterior pancreaticoduodenal artery (10 and 11 mm in diameter) and one of the posterior pancreaticoduodenal artery (19.5 mm in diameter) and stenosis of the coeliac trunk. The diameters of the SMA and the posterior pancreaticoduodenal artery were 6.7 and 4.3 mm, respectively. No atherosclerotic lesions at the orifice or proximal portion of the SMA were present (Fig. 1). An endovascular attempt to exclude the largest aneurysm by implanting a covered stent was undertaken. From the femoral access after intra-arterial administration of 5000 U of unfractionated heparin, a 7-Fr Ansell introducer sheath was placed in the initial section of the SMA. When the introducer sheath was inserted into the SMA, the patient experienced sudden, intense abdominal pain, which resolved spontaneously after a few seconds. An angiography, performed immediately after the onset of pain, confirmed the position of the introducer sheath in the lumen of the SMA, distal to the take-off of the pancreaticoduodenal artery and patency of the distal part of the SMA. The introducer sheath was withdrawn in order to show the origin of the pancreaticoduodenal artery. Despite numerous attempts, due to the tortuosity of the pancreaticoduodenal artery, crossing the neck of the aneurysm proved impossible and the endovascular attempt was abandoned. A completion angiography from the sheath inserted in the proximal portion of the SMA revealed its occlusion. All SMA angiograms were performed by manual injection from a 10-cc syringe.

The patient was haemodynamically stable and awake, and reported no pain, emesis or nausea. She did not defaecate at the onset of pain nor afterwards. An emergency laparotomy under general anaesthesia was performed. Through a mid-abdominal incision the SMA was isolated at the root of the mesentery.
Unfractionated heparin was administered (a dose of 100 U per kilogram). At the initial section of the SMA, a longitudinal incision was performed and a dissection of the intima with thrombosis was found. A thrombendarterectomy of the proximal segment of the SMA was carried out and a distal intimal flap was fixed with a continuous 7-0 vascular suture. The arteriotomy was closed with a Dacron patch. The two aneurysms of the anterior pancreaticoduodenal artery were excised and end-to-end anastomosis of the artery with a 7-0 vascular suture was performed. The Kocher manoeuvre was performed to isolate and excise the aneurysm of the posterior pancreaticoduodenal artery. Further postoperative hospitalization was uneventful. During the 30-month follow-up period, the patient remained asymptomatic. A magnetic resonance angiography confirmed patency of the SMA and occlusion of the initial section of the coeliac trunk (Fig. 2).

DISCUSSION

A case of poorly symptomatic acute intestinal ischaemia caused by the dissection of the SMA during an endovascular attempt to exclude PDAAs with a covered stent is presented. Although embolization is currently a standard method of treatment of VAAs, we decided, due to the size of one of the aneurysms and large diameters of the SMA and the posterior pancreaticoduodenal artery and also in the light of the fact that the coeliac trunk was occluded, in order to maintain the patency of at least one of the pancreaticoduodenal arteries, to treat the PDAAs with a covered stent [1]. In contrast to embolization, which requires the use of microcatheters, implantation of a stent into the pancreaticoduodenal artery requires an introducer sheath to be placed in the SMA. However, iatrogenic dissection of the coeliac artery even after coil embolization of a pancreatic pseudoaneurysm has been described [4]. In our case, the SMA dissection occurred most probably when introducing the Ansell sheath, which was manifested by the acute, severe abdominal pain. Considerable stress associated with an acute angle between the aorta and SMA may have been the reason for the damage and the dissection of the arterial wall. Perhaps this complication could have been avoided by using a more flexible introducer sheath or guiding catheter or by conducting this procedure through the brachial access. It should be underlined, however, that the SMA is a delicate artery and its dissection may occur even after selective arteriography and passage of the guidewire through its occlusion [3].

The angiography, performed immediately after the occurrence of abdominal pain did not demonstrate any occlusion of the SMA. It is possible that the introducer sheath placed distally to the origin of the pancreaticoduodenal arteries was compressing the dissected flap in the SMA and not until its removal was the channel of the dissection formed, finally causing the obstruction of the SMA. It is worth underlining that further stages of dissection and the initial period of acute small bowel ischaemia were asymptomatic. The possible bail-out options are bare or covered stent implantation or surgical repair. There have been reports of both conservative and endovascular treatments of acute SMA dissection; however, these attempts have been undertaken in patients only with the stenosis of the arterial lumen or dissecting pseudoaneurysm and not with total occlusion [2, 3, 5]. We believe that, in a case of acute SMA dissection and occlusion, surgery was the best option. A failure of the endovascular approach would have prolonged the time of acute intestinal ischaemia. With prompt surgical intervention, we managed to restore blood supply to the small intestine and prevent the development of necrosis of the intestinal wall. Moreover, an open repair is more likely to preserve all SMA branches that would have been occluded with covered stent implantation; it allows assessing the viability of the small intestine and is more probable to yield good long-term results that we believe is important in a young patient. The open surgery also allowed to excise PDAAs, which was indicated due to the size of one of them and also due to a planned pregnancy, which is a risk factor for rupture of VAAs. A simultaneous treatment of the obstruction of the coeliac trunk was abandoned because the patient had not had any symptoms of chronic intestinal ischaemia, the patency of the anterior pancreaticoduodenal artery was maintained and until now the recurrence of PDAAs after

Figure 1: A 3D reconstruction of the coeliac trunk (black bold arrow), superior mesenteric artery (white bold arrow) and posterior inferior pancreaticoduodenal artery (black thin arrow), and three pancreaticoduodenal aneurysms (white thin arrows).

Figure 2: Magnetic resonance angiography performed 30 months after the index procedure showing patency of the superior mesenteric artery (white arrow) and occlusion of the origin of the coeliac trunk (black arrow).
embolization with coexisting coeliac trunk occlusion has not been reported [1].

CONCLUSIONS

(i) Endovascular procedures within the SMA are associated with a risk of its dissection and acute occlusion.
(ii) If abdominal pain is reported during the procedure, a patency of the SMA should be assessed on completion angiogram because the initial course of acute ischaemia of the small intestine may be asymptomatic.

Conflict of interest: none declared.

REFERENCES