Type A aortic dissection involving the superior mesenteric artery with peripheral malperfusion managed with a hybrid approach: a case report

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Case report

A 62-year-old man presented to Queen Elizabeth Hospital in November 2015 with sudden-onset chest pain radiating to his back and left lower limb numbness for 3 hours. He had previously suffered a stroke from which he had made a good recovery and could walked unaided. There was decreased sensation of the entire left lower limb that was cooler than the right. All pulses over the left lower limb were absent but motor power was intact. He did not complain of abdominal pain and his abdomen was neither distended nor tender. He was haemodynamically stable, and auscultation revealed normal heart sounds.

Contrast-enhanced computed tomography (CT) scan revealed a type A dissection from the aortic root down to the left external iliac artery. No haemopericardium or pericardial effusion was noted. Celiac artery and superior mesenteric artery (SMA) originated from both a true and false lumen. The origin and proximal segment of the SMA and celiac artery were compressed by the thrombosed false lumen (Fig 1). Bowel wall was well enhanced. There was cranial extension of the dissection into the right common and internal carotid arteries. The cerebral arteries were still opacified. Computed tomography brain showed early ischaemic change in the right cerebellar hemisphere.

Arterial blood gas analysis and serum lactate level were normal. Transthoracic echocardiography detected an intimal flap at the aortic root. Mild aortic regurgitation was present. Left ventricular function was good.

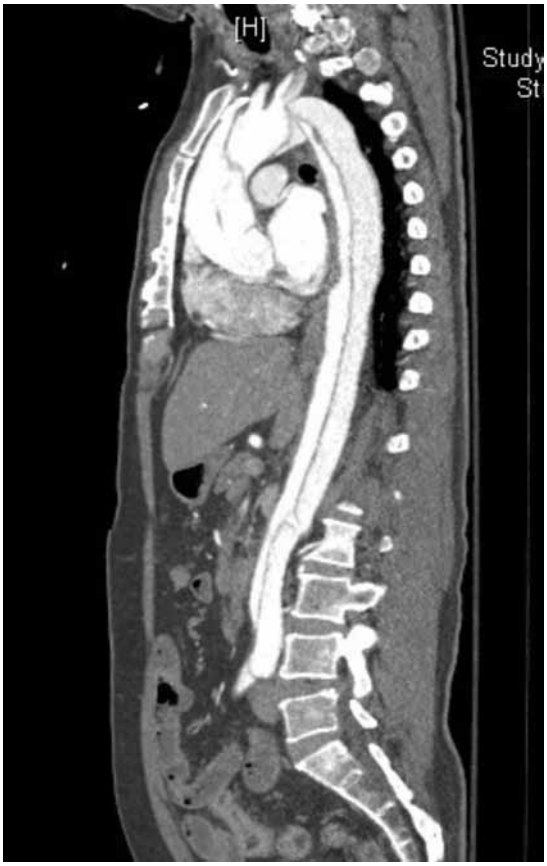

FIG 1. Contrast-enhanced computed tomography scan showing a type A dissection from the aortic root down to the left external iliac artery

The patient had a type A aortic dissection with left lower limb acute ischaemia. Emergency interpositional ascending aortic grafting was performed to close the entry site of the ascending aorta dissection and to re-expand the true lumen. Postoperatively, the patient was haemodynamically stable and all left lower limb pulses reappeared.

A new CT scan of the abdomen revealed improved perfusion to the celiac artery. Nonetheless, the SMA remained severely stenotic with only a thin line of contrast enhancement evident in the true lumen. Enhancement of the jejunal wall was decreased. The SMA had both restricted inflow at the orifice and outflow due to compression by the thrombosed false lumen.

Emergency endovascular stenting and open fenestration of the SMA was performed in the hybrid operation theatre. A 5-French arterial sheath was inserted into the right common femoral artery. The true lumen orifice of the SMA was cannulated with a 5-French Yashiro Glidecath catheter (Terumo,

Japan) and a 0.035-inch hydrophilic guidewire (Terumo, Japan). The 0.035-inch hydrophilic guidewire (Terumo, Japan) was exchanged for a Rosen guidewire (Cordis, US). The 5-French arterial sheath was exchanged for an 8-French Arrow-Flex guiding sheath (Arrow International, US). A 10-mm × 12-mm Genesis balloon expandable stent (Cordis, US) was deployed at the SMA orifice. Arteriogram showed improvement of flow at the SMA orifice only (Fig 2). Laparotomy was performed. The small and large bowel were not infarcted but lacked peristalsis. The SMA distal to the middle colic artery was bluish in appearance due to thrombosis. Longitudinal arteriotomy was made. All the thrombus in the false lumen was removed. Longitudinal fenestration was made at the dissection flap. The true lumen circulation was re-established with thrombectomy using a 3-French Fogarty catheter. The arteriotomy was closed with a saphenous vein patch. The small bowel appeared healthy after revascularisation. On-table duplex ultrasonography revealed good flow along the SMA.

The patient was transferred to the intensive care unit and extubated 4 days after surgery. He had no neurological deficits or abdominal symptoms. All distal pulses were normal. He recovered well and was discharged from hospital on aspirin 42 days after admission.

Serial follow-up CT scans after the operation showed a patent SMA and celiac artery. The patient remained asymptomatic at a follow-up examination 2 years later.

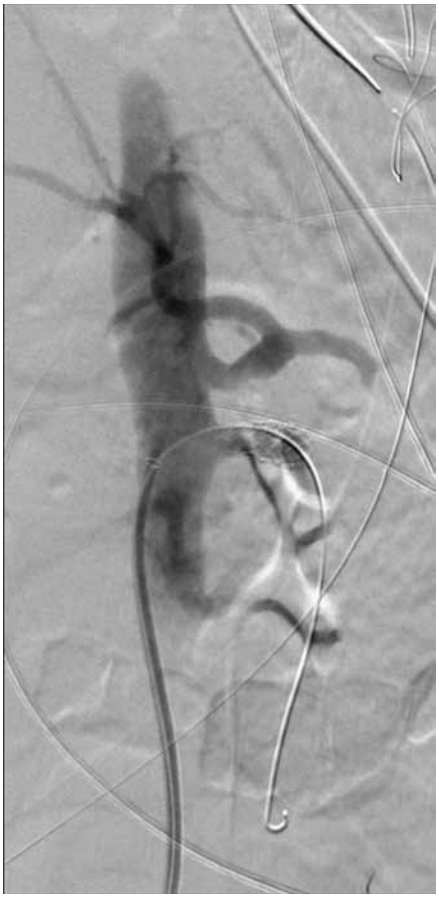

FIG 2. On-table arteriogram showing deployment of stent at the superior mesenteric artery orifice

Discussion

Acute dissection is one of the most lethal surgical emergencies of the aorta. It results from a tear in the aortic wall intima that extends into the media to create a false lumen and a dissection flap. It is categorised according to the Stanford classification. Visceral malperfusion occurs in 16% to 33% of cases[1] due to anterograde propagation of the dissection from the ascending aorta to the level of the aortic visceral branches. This leads to mesenteric ischaemia, organ dysfunction, and systemic metabolic abnormalities. Although the results of surgical treatment for acute type A aortic dissection have improved due to technical advances, mortality remains as high as 89% in the presence of visceral ischaemia.[2] It has been suggested that unless pericardial tamponade is present, restoration of visceral perfusion by endovascular techniques should take precedence, especially in cases with a high degree of mesenteric ischaemia and metabolic disturbance.[3] This can improve metabolic status and reduce the intra-operative risk of subsequent dissection repair. However, the extent of intestinal malperfusion is difficult to assess since clinical signs typically present late: 75% of patients have no clinical evidence at presentation, as in our patient. This can delay diagnosis and management contributing to the high mortality. The use of biomarkers such as serum lactate has been suggested as potentially useful indicators of mesenteric ischaemia.[4,5] If the initial lactate level is high with no other cause and radiological or clinical evidence of bowel ischaemia is present, revascularisation using percutaneous endovascular techniques should be performed first to alleviate intestinal ischaemia, followed by serial measurements of lactate level to look for improvement in peripheral perfusion.[3] If the lactate level is persistently high, surgical revascularisation must be considered.

Our patient had no clinical or biochemical signs suggestive of bowel ischaemia. Therefore, interpositional ascending aortic grafting was performed first, since proximal extension of the dissection would be dangerous and entry site closure may improve blood flow along the SMA. The left lower limb pulses reappeared after surgery. However, CT did not show similar improvement in the SMA; on the contrary, the jejunum showed decreased enhancement. Superior mesenteric artery revascularisation was indicated. An anterograde

approach was adopted for endovascular stenting of the SMA orifice, followed by open fenestration and closure with vein patch distally. No bowel resection was required. The successful outcome in this patient demonstrates good treatment prioritisation, prompt decision making, and multidisciplinary cooperation in the management of type A aortic dissection with peripheral malperfusion.

Author contributions

The authors have made substantial contributions to the concept or design of this study, acquisition of data, analysis or interpretation of data, drafting of the article, and critical revision for important intellectual content. The authors had full access to the data, contributed to the study, approved the final version for publication, and takes responsibility for its accuracy and integrity.

Conflicts of interest

The authors have disclosed no conflicts of interest.

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Ethics approval

The patient was treated in accordance with the Declaration of Helsinki. The patient provided informed consent for all procedures.

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