CASE REPORT

Staged retroperitoneal mesenteric revascularisation and aortobifemoral bypass after endovascular rescue for acute mesenteric ischaemia

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SUMMARY

Visceral artery revascularisation through a retroperitoneal approach provides an infrequent yet viable, alternative means of managing mesenteric ischaemia in patients with previous abdominal operations. We present a unique case implementing this surgical approach in a 55-year-old man in which we performed a retroperitoneal aortobifemoral bypass with concomitant retrograde jump graft from the aortic prosthesis to the superior mesenteric artery (SMA) for bilateral lower extremity rest pain and chronic mesenteric ischaemia. Three months previously, the patient had presented with acute mesenteric ischaemia and colonic perforation. He underwent emergent celiac artery stenting followed by an exploratory laparotomy with total abdominal colectomy and diverting loop ileostomy. Given the patient's hostile abdomen, a retroperitoneal approach to SMA revascularisation was elected over a transabdominal approach during concomitant lower extremity revascularisation for critical limb ischaemia. We achieved an excellent technical result with resolution of limb ischaemia and abdominal symptoms.

BACKGROUND

Revascularisation of the superior mesenteric artery (SMA) through a retroperitoneal approach is a rarely performed but effective operation for treating chronic mesenteric ischaemia.[1–4] This operative technique is useful in patients with previous abdominal operations where a transabdominal approach may be prohibitive. We present a retroperitoneal approach in performing an aortobifemoral bypass and concomitant retrograde SMA jump graft to address lower extremity rest pain and chronic mesenteric ischaemia. This case demonstrates the use of an alternative surgical approach to perform a complex mesenteric revascularisation in a patient with a hostile abdomen, severe arterial occlusive disease burden and a tenuous blood supply to his intra-abdominal viscera.

CASE PRESENTATION

A 55-year-old male tobacco user with chronic postprandial abdominal pain, resulting in a 23 kg weight loss over 6 months, presented with peritonitis. CT angiography demonstrated proximal superior and inferior mesenteric artery (IMA) occlusions, high-grade stenosis of the celiac artery, colonic wall thickening and pneumoperitoneum. He was diagnosed with acute on chronic mesenteric ischaemia with colonic perforation requiring emergent intervention.

The patient was haemodynamically stable, thus permitting initial endovascular management with placement of a stent graft (iCAST 6 mm×16 mm) across a 75% stenosis of the celiac artery orifice (figure 1). Following revascularisation, the patient underwent an emergent exploratory laparotomy and subtotal colectomy for colonic ischaemic necrosis and transverse colon perforation. Unfortunately, the patient's postoperative course was complicated by abdominal sepsis requiring re-exploration, primary repair of an anastomotic leak and a proximal diverting loop ileostomy.

After a 3-month recovery, the patient had resolution of his mesenteric ischaemia symptoms and he ceased tobacco use but complained of new onset bilateral lower extremity rest pain affecting his quality of life. Diagnostic angiography demonstrated a severely diseased right and left iliac arterial system (figure 2). To address the critical limb ischaemia, we elected to perform an aortobifemoral bypass. Given his recent abdominal catastrophe and diverting loop ileostomy, we chose a retroperitoneal approach. Additionally, a jump graft from the body of the aortobifemoral prosthesis to the SMA was performed to provide a more robust blood supply to his abdominal viscera, which was solely dependent on a stented celiac artery.

TREATMENT

Operative technique

The surgery was performed through an oblique retroperitoneal incision from the 11th rib to the medial border of the rectus abdominis muscle. After subcutaneous dissection and retroperitoneal access, the left kidney was retracted up (preserving the ureter and renal vein), the left crus of the diaphragm was divided and approximately 6 cm of the superior mesenteric artery was easily dissected and exposed. An aortobifemoral bypass was then performed using a 16 mm × 8 mm Gelsoft tube in a standard fashion, end-to-end with long hoods onto both common femoral arteries (groin incisions were used to complete the distal anastomoses).

After demonstrating excellent antegrade flow in the aortobifemoral prosthesis, the SMA bypass was created with a short, ringed 8 mm Propaten graft. The jump graft was positioned parallel to

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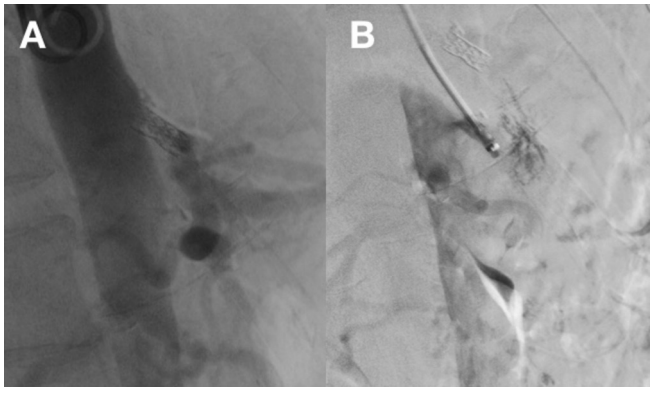

Figure 1 Angiograms demonstrating (A) a patent celiac stent graft and (B) an occluded superior mesenteric artery.

the axis of the SMA and laid in a C-shape configuration in an oblique plane (figure 3). The graft coursed anterior to the renal hilum and rest flush with the left lateral aspect of the aortic prosthesis where the proximal anastomosis was completed. At the conclusion of the case, the patient had palpable posterior tibial pulses.

OUTCOME AND FOLLOW-UP

The patient recovered from the operation without complication. He had significant improvement in his bilateral lower extremity pain, has not experienced recurrence of chronic mesenteric ischaemia symptoms and the jump graft remains patent (figure 4). Three months following the operation, he had an ileostomy take down without complication (figure 5).

Figure 2 Diagnostic angiogram showing severe bilateral iliac artery occlusive disease prohibiting endovascular management.

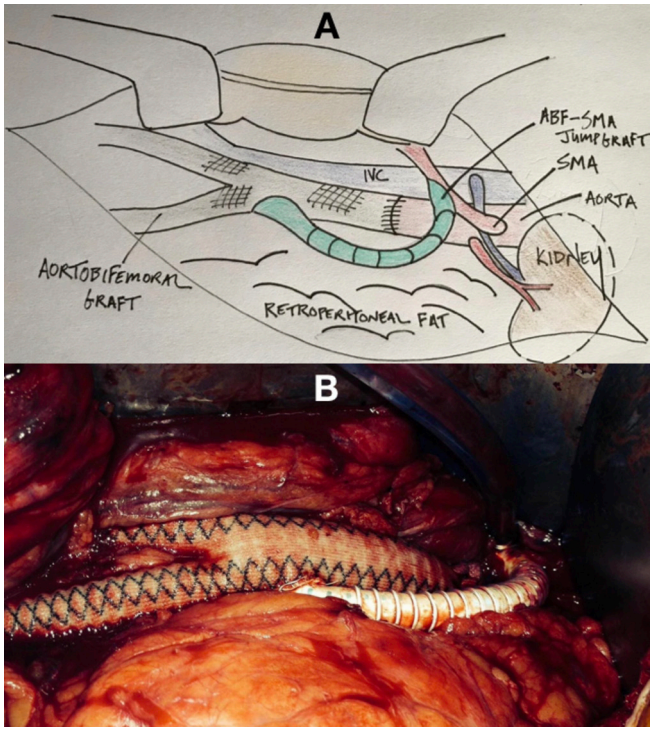

Figure 3 (A) Illustration and (B) intraoperative image of the aortobifemoral prosthesis with a retrograde superior mesenteric artery bypass graft. ABF, aortobifemoral prosthesis; SMA, superior mesenteric artery.

DISCUSSION

Although the left retroperitoneal exposure has gained widespread use in treating infrarenal aortic aneurysms and aortoiliac occlusive disease, it is rarely used for visceral artery revascularisation.[5–7] In this case, a retroperitoneal approach for mesenteric vascular reconstruction was elected over a transabdominal approach because of our patient's recent abdominal surgical history and the presence of a loop ileostomy. We performed an aortobifemoral bypass to address new onset lower extremity rest pain, and given that perfusion of the patient's abdominal visceral was dependent on a celiac artery stent, a concomitant visceral revascularisation was deemed prudent. This provided collateral mesenteric blood supply (and a better long-term revascularisation strategy) to protect against disastrous ischaemic consequences in the event of an occluded celiac stent.

The retroperitoneal approach offers both technical and physiological advantages over transabdominal operations.[3 6 7] This surgery provides access to the suprarenal aorta, the left renal artery and the mesenteric vessels.[3 8] Furthermore, dividing the

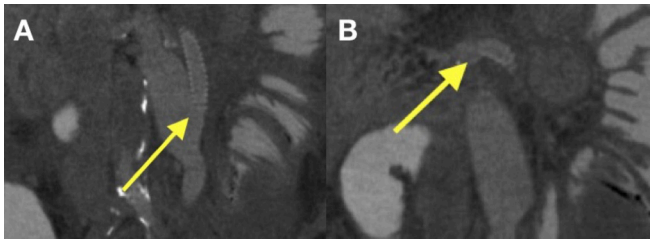

Figure 4 CT showing a patent superior mesenteric artery (SMA) jump graft from the aortobifemoral prosthesis. Coronal views of (A) the proximal anastomosis to the aortobifemoral prosthesis and (B) the distal anastomosis to the SMA.

Figure 5 Image shows well-healed midline incision, ileostomy takedown site, left retroperitoneal incision and groin incisions. Proximity of ileostomy to midline incision would have undoubtedly made a transabdominal approach challenging.

left crus of the diaphragm and elevating the left kidney provides superior exposure to the suprarenal and visceral aorta.[1–4 8 9] Literature on treating abdominal aorta aneurysmal disease shows that the retroperitoneal exposure, when compared with a transabdominal laparotomy, may be associated with improved physiological outcomes, including decrease in perioperative fluid requirement, intraoperative blood loss, postoperative pulmonary complications, gastrointestinal disturbances (including ileus) and shorter intensive care unit and hospital length of stay.[3 7]

Our operative technique for SMA bypass is unique, because we used a short segment graft that coursed from the main body of the aortic prosthesis to the native SMA (figure 2). Previous operative case reports by Papanicolaou *et al*, Leschi *et al* and Inoue *et al* describe coursing the SMA jump graft posterior to the left kidney hilum.[8–10] The authors justified a long, looping bypass graft to avoid kinking of the material. In our experience, we had no difficulties maintaining graft position or patency with a short segment prosthesis, the graft did not impede on the left kidney vessels, and we limited our dissection time. Lastly, the retroperitoneal approach is particularly advantageous as there is no contact between polytetrafluoroethylene (PTFE) and intra-abdominal viscera given the peritoneal coverage.

Visceral artery revascularisation through a retroperitoneal approach provides an alternative means of managing mesenteric ischaemia in patients with previous abdominal operations. This approach should be considered a viable option in performing SMA revascularisations in patients where a transabdominal approach is contraindicated. Additionally, in our experience a short segment jump graft from the aorta to the SMA provides the least intrusive reconstruction on the adjacent renal structures.

Learning points

- Visceral artery revascularisation through a retroperitoneal approach is an appropriate option for the surgical management of mesenteric ischaemia in patients with previous abdominal surgeries.
- This approach should be considered when performing visceral revascularisations in patients where a transabdominal approach is contraindicated.
- The retroperitoneal approach is particularly advantageous as there is no contact between graft (eg, PTFE) and intra-abdominal viscera given the peritoneal coverage.
- A retroperitoneal incision and approach has potential physiological advantages, including a decrease in perioperative fluid requirements, postoperative pulmonary complications and gastrointestinal disturbances (eg, ileus).
- In our case, a short segment jump graft from the aorta to the SMA provides the least intrusive reconstruction on the adjacent renal structures.

Contributors SPJ was the primary author and lead writer for this case report. ML provided assistance in writing the manuscript and performing background research on the subject matter. HLA was the corresponding author and provided manuscript editing, background research and oversight of the case report. AA provided specialty knowledge on the subject matter, reviewed the manuscript contents for accuracy, provided the final manuscript edits and served as the primary investigator.

Competing interests None declared.

Patient consent Obtained.

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