Case Reports

Repair of an Abdominal Aortic Aneurysm with a Remarkably Dilated Meandering Artery: Report of a Case


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Abstract
A 73-year-old man on dialysis for chronic renal dysfunction was referred to our hospital for surgical treatment of an abdominal aortic aneurysm (AAA). Preoperative angiography showed a remarkably developed meandering artery branching from the inferior mesenteric artery (IMA). The superior mesenteric and celiac arteries were occluded at the origin, and all blood flow to the abdominal organs was apparently supplied by collateral circulation from the IMA. Considering the risk of mesenteric ischemia after aortic clamping in conjunction during surgery, we used a perfusion catheter with a 12-F balloon to create a shunt to the IMA from the subclavian artery. The operation was successful and the patient recovered uneventfully. We describe this surgical procedure for its effectiveness in preventing postoperative mesenteric ischemia in a rare case of an AAA with complex branching lesions.

Key words Abdominal aortic aneurysm · Meandering artery · Temporary shunt

Introduction
During surgery for abdominal aortic aneurysms (AAA), maintaining intraoperative and postoperative mesenteric circulation is crucial for preventing postoperative mesenteric ischemia and necrosis. We performed radical surgery utilizing a perfusion catheter as a temporary shunt from the subclavian artery to the IMA for a patient with an AAA, including a remarkably dilated and meandering anastomosis (arc of Riolan), and occlusion of the superior mesenteric artery (SMA) and celiac arteries. This treatment proved successful in preventing perioperative mesenteric ischemia.

Case Report
A 73-year-old man on dialysis for chronic renal dysfunction began to experience intermittent claudication. A few months later, abdominal three-dimensional computed tomography (3D-CT) imaging showed a large infrarenal abdominal aortic aneurysm (AAA) with a maximum diameter of 5.5 cm and a specific branching course from the dilated inferior mesenteric artery (IMA) beside the aneurysm wall. The patient was referred to our hospital and admitted 1 month later for surgical treatment. On admission, an aortogram showed a spindle-shaped AAA, with the IMA branching from the aneurysm and remarkably dilated, and the superior mesenteric (SMA) and celiac arteries demonstrated a retrograde course, passing through the meandering and middle colic arteries (Fig. 1). The SMA was completely occluded at its origin and the aneurysm had distorted it by 1.5 cm. The middle colic artery was dilated to the same point with evident branching. The celiac artery was 99% stenosed at its origin and completely occluded after the branching of the left gastric artery. The hepatic and splenic arteries were seen to branch from the SMA. About 5 cm of the left external iliac artery was completely occluded at the level of pelvis, and the periphery was imaged by the collateral circulation. Based on these findings, we decided that a Y-shaped graft replacement from the abdominal aorta to both external iliac arteries, with the IMA attached to the main graft was most desirable. However, the patient did not want to undergo a radical operation because of his concern about the atypical branch of the abdominal aorta. Therefore, we performed an arterial reconstruction, as a femoro-femoral bypass, only in the left lower extremity, in response to the primary complaint. The AAA was monitored for...
any change in diameter during subsequent outpatient visits. A CT scan done about 9 months later showed enlargement of the diameter of the aortic aneurysm to greater than 6 cm. Thus, 1 year after the first operation, the patient was readmitted for a radical operation.

On admission, the left forearm had an existing internal shunt used for dialysis. Abdominal palpation revealed a pulsatile tumor centered in the navel area. All the arterial pulses of both lower legs were palpable, and the ankle brachial pressure index was 0.92 on the left side and 0.70 on the right side. Before surgery, a radiologist attempted to perform an angioplasty at the origin of the SMA to ensure good anterograde blood flow to the SMA, but the calcification at the site was intense, and patency was not obtained. Moreover, the diameter of the celiac artery was narrow. Thus, an angioplasty was not performed. Pelvic imaging demonstrated a complete occlusion from the left common iliac artery peripherally to the internal and external iliac arteries.

A few weeks later, the patient underwent a graft replacement and revascularization of the IMA. We approached the aneurysm through a median laparotomy. First, we taped around the infrarenal abdominal aorta and the right internal and external arteries, then we taped around the IMA, which was dilated to 1 cm on the left side of the aneurysm (Fig. 2). The right subclavian artery was exposed and end-anastomosed with an 8-mm polytetrafluoroethylene (PTFE) (ringed) graft after injecting 1 mg/kg of heparin. We cut 20 cm of extracorporeal circuit tubing to the PTFE graft, and connected a 12-F perfusion catheter (Mera balloon catheter). After clamping the abdominal aorta, the wall of the aneurysm was incised and shunting was initiated immediately by

Fig. 1. Preoperative aortography (left panel) and three-dimensional computed tomography scan (right panel). A, meandering artery; B, middle colic artery; C, superior mesenteric artery

Fig. 2. Intraoperative view. A, inferior mesenteric artery; B, abdominal aortic aneurysm