Ileocolic to Right Iliac Arterial Transposition for the Treatment of Chronic Mesenteric Ischemia

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Abstract

Keywords

- mesenteric ischemia
- endovascular
- arterial bypass
- arterial transposition

The treatment of chronic mesenteric ischemia remains challenging and controversy exists over the best interventional option. Endovascular treatment has emerged as first-line management due to its associated lower morbidity and mortality than surgical reconstruction. However, open mesenteric reconstructions continue to play an important role in patients with lesions that are unsuitable for an endovascular option. Mesenteric operations utilize the aorta or iliac artery as the inflow source for a vein or prosthetic bypass to the celiac artery or superior mesenteric artery. We describe an exceptional case of chronic mesenteric ischemia due to atherosclerosis that was treated successfully with a novel ileocolic to right iliac arterial transposition.

Chronic mesenteric ischemia (CMI) is a serious vascular condition that if left untreated may progress to acute ischemia resulting in bowel infarction and high surgical morbidity and mortality rates. The condition mostly occurs in the elderly population and is associated with atherosclerosis affecting at least two of the three mesenteric arteries.¹ Revascularization is indicated in symptomatic patients to reverse weight loss and prevent bowel infarction.² A recent report on 22,413 patients treated for mesenteric ischemia in the United States showed that the number of revascularizations has increased over time, from approximately 180 cases per year in 1988 to > 1,300 cases per year in 2006.³ The same report revealed that endovascular intervention surpassed surgical bypass as the treatment of choice in the last decade due to lower mortality rate of 4% compared with 15% for the latter.³ However, open mesenteric revascularization has a crucial role in patients unsuitable for endovascular treatment such as those with long segments or flush occlusions, small vessel size, multiple tandem lesions, and severe calcifications.⁴

Surgical treatment involves revascularization in the form of bypass or (rarely) endarterectomy of the stenotic or occluded mesenteric vessels. Inflow may be from the supraceliac aorta (antegrade reconstruction) or from the infrarenal aorta or the common iliac artery (retrograde reconstruc-

tion).⁵ Outflow may be to the celiac artery (CA) or more commonly to the superior mesenteric artery (SMA) (single-vessel repair) or to a combination of CA, SMA, and rarely inferior mesenteric artery (IMA) (multivessel repair).⁵ We present a case of symptomatic chronic mesenteric ischemia in a patient with extensive long segment multivessel disease in which endovascular options or bypass to the main mesenteric vessels were not feasible. A novel ileocolic to right iliac arterial transposition was utilized successfully with good result. We have only located one previous report of this operation, from 1966.⁶

Case Report

An 86-year-old woman presented with 2-month history of postprandial abdominal pain, weight loss, and vomiting. Her past medical history included chronic kidney disease (stage III), gastric ulcers, congestive cardiac failure, and osteoarthritis. Her vascular risk factors included type II diabetes mellitus, hypertension, and previous smoking. On examination, she had stable vital signs and her abdomen was soft except for moderate epigastric tenderness. She was admitted to the hospital initially under the medical team and treated for gastric ulcers with proton pump inhibitors.

Fig. 1 Sagittal reconstruction of MR angiogram showing long occlusion of the origin of SMA. MR, magnetic resonance; SMA, superior mesenteric artery.

However, because of her ongoing symptoms, an abdominal computed tomography (CT) scan was arranged and revealed calcified aorta, generalized atherosclerotic disease particularly affecting CA and SMA. This prompted a review by the vascular surgeons who requested a magnetic resonance angiography (MRA). The latter confirmed CA occlusion with a long occlusion of the SMA and the IMA (**Fig. 1**). Because of the ongoing food avoidance and weight loss, a diagnosis of mesenteric angina was established and the patient was commenced total parenteral nutrition.

The vascular multidisciplinary team meeting concluded that the lesions were not amenable to stenting or angioplasty, but surgical revascularization was possible. Despite classification as American Society of Anesthesiologists grade 4, the patient and her family were keen to proceed with surgery due to the severity of the symptoms and poor outlook. As she had

a recent admission for left ventricular failure and poor systolic left ventricular function on echocardiography, it was considered high risk to plan surgery, which involved clamping the aorta, particularly the supraceliac segment. The surgical plan was therefore modified to perform an ileocolic to right iliac arterial transposition.

A 15-cm right iliac fossa transverse incision was utilized. Examination of the abdominal contents revealed healthy, pink, small intestine and colon; however, signs of chronic ischemia were evident with absent pulsation along the SMA and its branches including the marginal arteries. Dissection of the ileocolic mesentery mobilized a 7-cm segment of ileocolic artery that would reach the right common iliac artery. After ligation and division, the artery could be approximated comfortably to a dissected right CIA and an end-to-side anastomosis was performed (**Fig. 2**).

Postoperatively, the patient had a prolonged recovery period including 10 days in intensive care unit, complicated by heart failure. She was commenced oral diet after 14 days. Although her abdominal pain resolved, she continued to avoid food, and a diagnosis of postoperative depression was made. A postoperative MRA at 3 weeks revealed a patent ileocolic artery fed from the right CIA (**Fig. 3**). The patient recovered from her depression, reestablished oral intake, and maintained her weight. She was discharged on day 46 following the operation.

Discussion

CMI is a debilitating disease resulting from progressive occlusion of the mesenteric vessels, most commonly the result of atherosclerosis. The typical patient presentation includes postprandial abdominal pain with resulting sitophobia (food fear) and weight loss.⁷ Left untreated, CMI can result in severe malnutrition and may progress to acute intestinal ischemia, a condition with a high (> 50%) mortality rate despite clinical recognition and prompt surgical intervention.⁸ Therefore, once recognized, symptomatic CMI is best treated with revascularization. The options of reconstitution of mesenteric flow range from endovascular stenting or angioplasty to surgical bypass or endarterectomy.

Fig. 2 End-to-side anastomosis of transacted ileocolic artery to right common iliac artery (CIA) (A) and completed anastomosis (B). Bottom red sling (right CIA), white sling (right IIA), top red sling (right EIA). IIA, internal iliac artery; EIA, external iliac artery.

Fig. 3 Various views of right common iliac artery from postoperative MR angiogram demonstrating patency of the ileocolic anastomosis. MR, magnetic resonance.

Our patient presented with typical symptoms of mesenteric angina due to occlusive disease involving the CA, SMA, and IMA. In 85% of CMI cases, the CA and SMA are involved,⁹ with the most common cause being advanced atherosclerosis at the origin of these vessels.

The management of patients with CMI has evolved over the years. Currently, > 70% of patients are treated endovascularly.⁴ This option is preferred, particularly that this condition is common in the elderly population who have multiple comorbidities. However, open surgical revascularization continues to play an important role in patients with endovascularly unfavorable lesions. There has been debate regarding the best surgical procedure and the number of vessels to be revascularized in these patients. The choice should be individualized to the patient.

Our patient presented us with several challenges. First, the SMA occlusive lesion was long and not suitable for an endovascular option. Second, the patient was considered a poor surgical candidate. Hence, a limited open surgical option was considered that would avoid a laparotomy incision and aortic cross clamping. Because of the proximity of the ileocolic artery to the right common iliac artery, a side-to-side or end-to-side bypass was planned. A limited right abdominal incision was used for the procedure. However, it became evident intraoperatively that this was not feasible due to the depth of retroperitoneal fat, which demanded extensive ileocolic mobilization, with sacrifice of important branches. Therefore, the ileocolic artery was ligated proximally and mobilized to reach the right CIA. The surgical access was good, and the operation

was relatively simple and quick. The completed reconstruction lay naturally without kinks or long, curved pathways, which are described in aorto-mesenteric vein and prosthetic grafts. Only one arterial-to-arterial anastomosis was involved, with theoretical advantages for longevity and infection resistance. We believe that despite the small caliber of the ileocolic artery, the widely anastomotic network distally would provide a free outflow arterial bed. The postoperative radiological evidence of flow in the ileocolic artery and the subsequent course of the patient with alleviation of symptoms proved that this revascularization option could be both technically and clinically successful, respectively.

Conclusion

Surgical treatment options are still necessary for CMI. Compared with the conventional surgical revascularization procedures, ileocolic to right iliac arterial transposition can be considered as a quicker and less traumatic alternative that avoids aortic cross clamping. Such an option might benefit selected patients, particularly those of doubtful surgical fitness who are anatomically unsuitable for endovascular revascularization.

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