

 **Case Report** 

Reimplantation of a Stenotic Inferior Mesenteric Artery for Chronic Visceral Artery Occlusion after Failed Bypass to the Superior Mesenteric Artery

Wakako Fukuda, MD, PhD, Ikuo Fukuda, MD, PhD, Takeshi Murakami, MD, Yoshiaki Saito, MD, PhD, Satoshi Taniguchi, MD, PhD, and Masahito Minakawa, MD, PhD

The patient was a 71-year-old man complaining of postprandial abdominal pain and weight loss. Computed tomography angiography showed occlusion of the superior mesenteric artery and the celiac axis. The inferior mesenteric artery, supplying the mesenteric circulation, was stenotic at its origin. The patient had portal vein thrombosis and was diagnosed as having antiphospholipid antibody syndrome. The reimplantation of the inferior mesenteric artery was successfully performed after failed bypass grafting to the superior mesenteric artery from the abdominal aorta.


Keywords: mesenteric ischemia, abdominal angina, inferior mesenteric artery

Introduction

Chronic occlusion of the superior mesenteric artery (SMA) may cause abdominal angina. In such a situation, a collateral network develops from the celiac axis and the inferior mesenteric artery (IMA) via a marginal artery. Surgical intervention for chronic SMA occlusion involves bypass grafting using a saphenous vein and endarterectomy. A case of chronic intestinal ischemia caused by the chronic occlusion of the SMA and the celiac axis (CA)

Department of Cardiovascular Surgery, Hirosaki University Graduate School of Medicine, Hirosaki, Aomori, Japan

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Corresponding author: Ikuo Fukuda, MD, PhD. Department of Cardiovascular Surgery, Hirosaki University Graduate School of Medicine, 5 Zaifu-cho, Hirosaki, Aomori 036-8562, Japan
Tel: +81-172-39-5073, Fax: +81-172-37-8340
E-mail: ikuofuku@hirosaki-u.ac.jp

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with critical stenosis of the IMA is reported.

Case Report

The patient was a 71-year-old man admitted to our hospital in April 2014 for treatment of postprandial abdominal pain due to chronic mesenteric ischemia. Computed tomography (CT) showed total occlusion of the SMA and CA. An ostial stenosis of the IMA was also demonstrated (Fig. 1). In addition, partial thrombosis of the portal vein was noted. The patient was cachexic, with a height of 161 cm and a weight of 45 kg. His blood pressure was normal, and his pulse was regular. Blood examinations demonstrated normal white blood cell count ($5.54 \times 10^3/\text{mm}^3$), C-reactive protein (0.052 mg/dl), total cholesterol (176 mg/dl), and normal liver function. Hematological analysis showed prolonged activated partial thromboplastin time (42 sec), elevated d-dimer to 1.3 $\mu\text{g}/\text{ml}$ (normal range: 0.0–0.4), slightly increased fibrinogen (475 mg/dl) and fibrinogen degraded product (6.7 $\mu\text{g}/\text{ml}$), positive lupus anticoagulant, and elevated anti-cardiolipin antibody (25.6 U/ml), leading to the diagnosis of anti-phospholipid antibody syndrome (APS) by a hematologist. The major collateral tract to the intestine was supplied from the IMA. The administration of unfractionated heparin was started to keep partial thromboplastin time at 1.5 times of the normal value. Given that the postprandial abdominal pain continued, the open reconstruction of the mesenteric arteries was indicated. We planned making bypass grafting to the SMA. In addition, given that the CA and its major proximal branches were not visible in the CT, bypass grafting to the CA was not indicated.

Initially, bypass grafting to the SMA was conducted. However, intraoperative angiography showed that the main trunk of the SMA was totally occluded and not suitable for grafting. Because the ileocecal branch was patent, bypass grafting from the abdominal aorta to the SMA

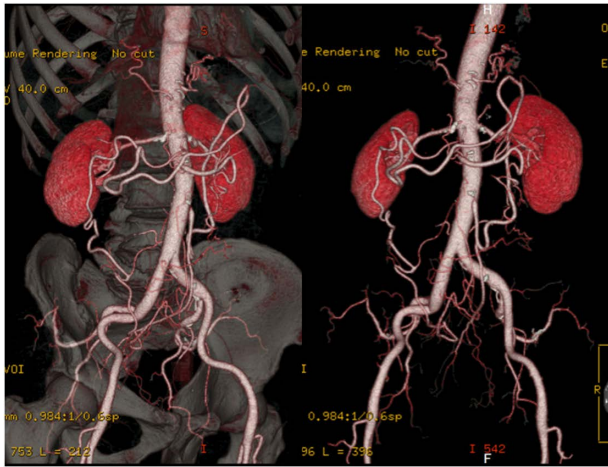


Fig. 1 Preoperative angiography shows total occlusion of the celiac axis and the superior mesenteric artery. The inferior mesenteric artery is also stenotic at the origin.

branch using an auto-saphenous vein was performed. Flowmetry of the graft using a transit time flowmeter showed a mean flow volume of 60 ml/min. Intraoperative aortography demonstrated limited supply via the bypass graft to the mesenteric circulation. Therefore, an additional bypass from the abdominal aorta to the IMA was made. Although flowmetry showed a flow of 240ml/min, the visualization of the SMA was not satisfactory on intraoperative angiography. No stenosis emerged on the anastomotic sites on completion of angiography. The right gastroepiploic artery was anastomosed to the saphenous vein graft to obtain additional flow through the celiac circulation to the mesenteric region.

Although temporary improvement of the postprandial abdominal pain was obtained after the operation, the abdominal pain recurred several days after the operation. CT and angiography demonstrated the occlusion of the vein graft to the IMA (Fig. 2). The patient was reoperated on the 7th postoperative day, and reimplantation of the IMA was conducted. After the meticulous dissection of the proximal portion of the IMA, it was divided and the stump was ligated. Subsequently, a partial clamp was applied to the caudal side of the abdominal aorta. The IMA was anastomosed in a side-to-end fashion with interrupted 5-0 polypropylene sutures to avoid anastomotic stenosis by a surgeon who was familiar with radial artery anastomosis to the aorta in coronary artery bypass grafting. Intraoperative angiography demonstrated the satisfactory flow of the IMA. The postoperative course of the patient was uneventful, and his abdominal pain disappeared. A vitamin K antagonist and Cilostazol were given. Postoperative CT angiography showed that the IMA and the saphenous vein graft to the ileocecal artery were patent (Fig. 3). The patient has been free from abdominal symptoms for four years after the operation.



Fig. 2 Left: Postoperative computed tomography angiogram shows the patent saphenous vein graft to the ileocecal artery. The bypass graft from the abdominal aorta to the inferior mesenteric artery is occluded. Right: Selective angiography of the graft anastomosing to the ileocecal artery.

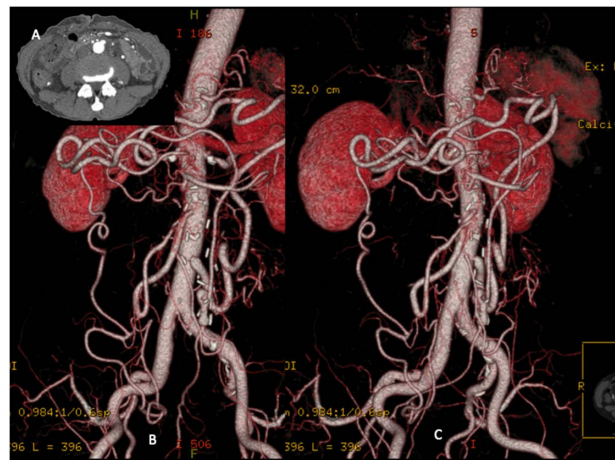


Fig. 3 Postoperative computed tomography angiogram shows the widely open anastomotic site (A) and the patent graft to the ileocecal artery and the right gastroepiploic artery (B, C).

Discussion

Although the arterial stenosis of the mesenteric circulation is not infrequent, symptomatic chronic mesenteric ischemia is uncommon and challenging. Given that the mesenteric circulation has extensive collaterals, the majority of patients with mesenteric arterial occlusive disease do not develop clinical manifestations unless progression to a multivessel disease emerges. However, once patients develop ischemic symptoms, they usually develop malnutrition and cachexia. Aorto-mesenteric bypass and transaortic mesenteric endarterectomy are the established methods of revascularization, with a five-year patency rate of over 85%.¹⁾ Recent progress in endovascular treatment makes the approach for visceral arterial revascularization secure.²⁾ The short-term outcome of endovascular treatment

was successful; however, long-term patency was limited due to restenosis.^{3,4)}

In patients with combined CA and SMA stenoses, the collateral circulation was mainly facilitated from the IMA through the arcade of Riolan or Drummond.⁵⁾ In the present case, the endovascular repair of the IMA was difficult due to the acute angle of takeoff from the abdominal aorta. Because it was a short segmental ostial stenosis, stent placement on the ostium of the IMA may fail due to elastic recoiling. In the case of the subacute thrombosis of the IMA, a tragic outcome with extensive intestinal necrosis will occur.

If a patient has chronic mesenteric ischemia due to occlusion of the CA and SMA with stenosis of the IMA, bypass grafting to the IMA is the most efficacious and safe treatment. The present patient initially underwent bypass grafting to the SMA branch and the IMA using a saphenous vein. Although the flow volume was satisfactory, the saphenous vein graft to the IMA was occluded early after the operation. The reason for the occlusion was not fully understood, but a hypercoagulable state due to APS might have been responsible. APS affects both the arterial and the venous systems.⁶⁾ Kojima et al. reported the coexistence of acute SMA thrombosis with stenosis due to smooth muscle hyperplasia in a patient with APS.⁷⁾

Conclusion

Reimplantation of the IMA was a sure and effective method of revascularization in the present case. Anticoagulation combined with antiplatelet therapy might be effective to prevent recurrent thrombosis.

Disclosure Statement

Nothing to disclose.

Author Contributions

Data Collection: WF, IF, TM, ST

Writing: WF, IF

Study conception: IF

Analysis: WF, YS

Investigation: WF, IF, ST

Critical review and revision: all authors

Final approval of the article: all authors

Accountability for all aspects of the work: all authors

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