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Case Report

Successful hybrid treatment with endovascular aorto-iliac revascularization and coronary bypass surgery in a patient with an advanced complex polyvascular disease

Yukako Ogoyama (MD), Nobuhiko Ogata (MD PhD)*, Shinichi Toriumi (MD), Kazuomi Kario (MD PhD FJCC)

Division of Cardiovascular Medicine, Department of Internal Medicine, Jichi Medical University School of Medicine, Tochigi, Japan

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ABSTRACT

A 72-year-old Japanese man was admitted to our hospital for effort chest pain and bilateral claudication. He was diagnosed as having severe ischemic heart disease and chronic bilateral aorto-iliac occlusions (Leriche syndrome) by a diagnostic angiography. Manifest collaterals via bilateral internal thoracic arteries (ITA) supplied sufficient blood flow for his lower limbs. We planned a two-stage operation for both the severe coronary artery disease and peripheral artery occlusive disease. He first underwent endovascular therapy (EVT) for bilateral aorto-iliac occlusion. One month later he underwent coronary artery bypass grafting (CABG) that was carried out for three coronary arteries with bilateral ITAs, also known as the internal thoracic artery, and the gastroepiploic artery. His chest symptoms and claudication were completely relieved and he was discharged uneventfully. We hereby suggest that EVT can be a safe, effective, and minimally invasive treatment to enable the patient to undergo CABG with all arterial grafts. <**Learning objective:** Patients with polyvascular disease are at a high risk for major vascular events. The priority among the revascularizations should be considered based on the less-invasiveness and better long-term patency. Hybrid treatment of EVT and CABG could be one of the choices among such patients.>

Introduction

Leriche syndrome in patients with complex coronary artery disease deemed them to be unfavorable candidates for surgical treatment. Minimally invasive endovascular angioplasty and percutaneous coronary intervention (PCI) should be considered as an alternative to surgery. Although the usefulness of the latest strategy for complex PCI has been indicated, that of coronary artery bypass grafting (CABG) for some lesion forms and patient backgrounds has also been firmly established. In CABG procedures, the use of the ITAs has been demonstrated to provide better long-term patency and survival rates [1]. However, in Leriche syndrome, the ITA sometimes supplies the collateral blood flow through the inferior epigastric artery (IEA), and cannot be used for a graft conduit for CABG [2,3]. It was demonstrated that the procedural success rate and long-term patency of endovascular therapy (EVT) was non-inferior to those of surgical bypass surgeries, including the non-anatomical bypass operation in patients with aorto-iliac occlusive disease [4–7]. It has been thought that the use of the ITA for CABG could be possible once after resolving the iliac artery occlusion by EVT. Here we describe the case of a patient with advanced complex polyvascular disease in whom hybrid treatment with endovascular aorto-iliac revascularization and CABG surgery was successful.

Case report

A 72-year-old man was admitted due to angina pectoris and bilateral claudication. Myocardial perfusion scintigraphy using (Tl-201thallium) showed significant myocardial ischemia, and his ankle-brachial index values had declined to 0.53 (right) and 0.51 (left). It suggested the presence of severe peripheral artery occlusive disease. His history included diabetes mellitus treatment and bilateral carotid stenosis. Contrast-enhanced computed tomography (CT) showed total occlusion of the infra-renal abdominal aorta and bilateral common iliac arteries (Fig. 1A, B),

* Corresponding author at: Division of Cardiovascular Medicine, Department of Internal Medicine, Jichi Medical University School of Medicine, 3311-1 Yakushiji, Shimotsuke, Tochigi 329-0498, Japan. Fax: +81 285 44 5317.
E-mail address: ogatan@jichi.ac.jp (N. Ogata).

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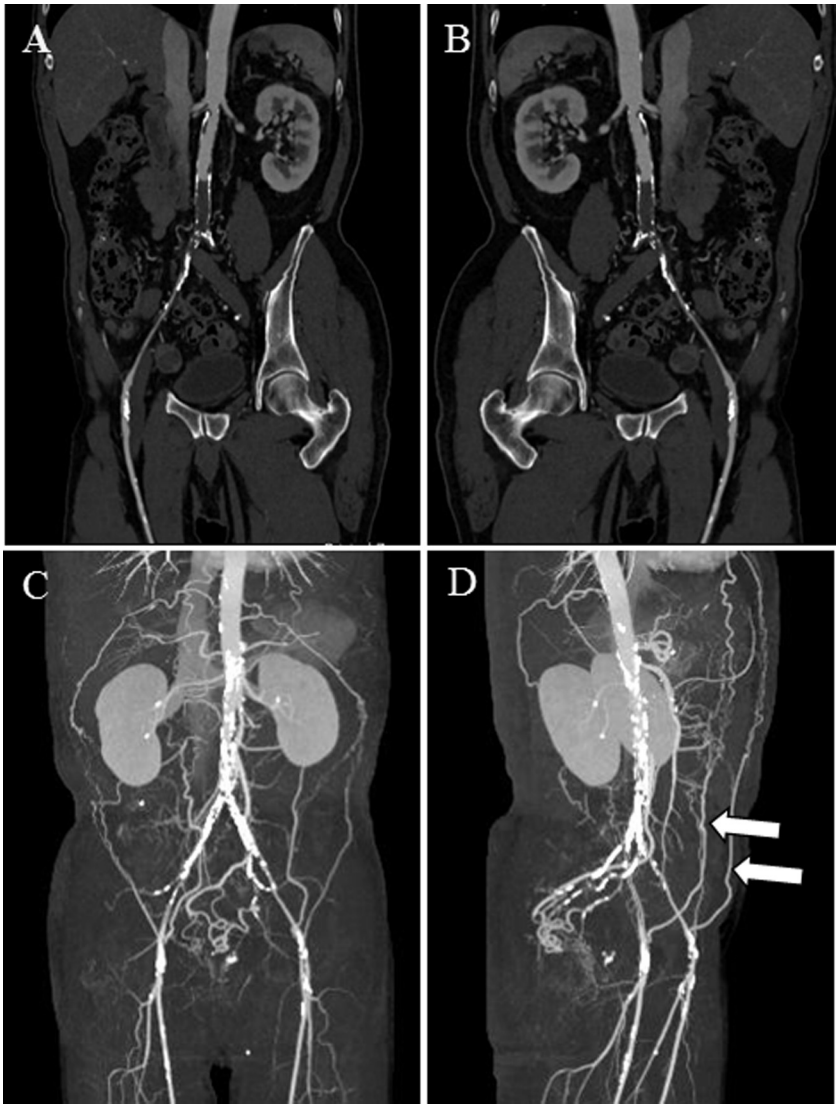

Fig. 1. Contrast-enhancement on computed tomography (CT) (A, right side; B, left side) in the common iliac arteries. Three-dimensional CT angiography (C, D) showing aortobiliac occlusion with collaterals to the lower extremities (*arrows*).

indicating Leriche syndrome. Both femoral arteries were perfused via the IEA from bilateral ITAs (Fig. 1C, D).

Catheter-based coronary angiography was carried out, and it revealed that the patient had severe coronary artery disease (CAD) (left main coronary artery stenosis with multivessel coronary artery disease). He had 90% stenosis of the right coronary artery (RCA), 90% stenosis of the left main trunk, 75% stenosis of the left anterior descending artery (LAD), and 90% stenosis of the left circumflex artery (LCX). Both the ITAs and IEAs were good collaterals to the lower extremities. The SYNTAX score of his coronary artery was 40 points from the results of angiography. We diagnosed severe ischemic heart disease and Leriche syndrome.

The anatomy and morphology of his CAD indicated that he was an unfavorable candidate for PCI, and we sent him for CABG. However, due to the risk of limb-threatening ischemia, we could not use the bilateral ITAs for bypass conduits. We planned a two-stage revascularization for both the severe CAD and peripheral artery occlusive disease.

We first administered EVT for the aorto-iliac occlusion to enable the CABG using bilateral ITAs.

EVT for Leriche syndrome

Since a long segment occlusion of aorto-iliac disease seems to be at high risk for vessel perforation, the intravascular ultrasound (IVUS) imaging could be a powerful solution to optimize the route of the guidewire and the device sizing. A bidirectional approach for the occluded segment could also be one of the solutions to enable the safe and successful guidewire-crossing, therefore we made punctures to provide three access sites for this patient, at the bilateral femoral arteries and a left brachial artery.

Along with local anesthesia and oral diazepam, heparin was administered intra-arterially at 5000 IU after the insertion of a 90-cm length 4.5 Fr guiding sheath (Parent Plus45 PTRA, MediKit, Tokyo, Japan) from his left brachial artery. Abdominal aortography was performed using a 4 Fr pigtail catheter and the finding showed the complete occlusion of the terminal abdominal aorta.

After the insertion of 9 Fr sheaths with a balloon catheter-based embolic protection (Optimo Temporary Occlusion Balloon, Tokai Medical Products, Aichi, Japan) to prevent peripheral thrombo-embolism to superficial femoral arteries, we attempted to cross the