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## Case Report

# Clinical efficacy of a stent-in-stent procedure for stent fracture in a narrowing anastomosis of femoral-popliteal bypass represented repetitive acute limb ischemia

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## ABSTRACT

A 72-year-old male with sudden onset pain and coldness in his left lower limb was referred to our hospital. An emergency angiography of the lower limbs demonstrated the cause of acute limb ischemia as a subsequent acute thromboembolism at the site of a narrowing anastomosis of femoral-popliteal bypass (FPB). In particular, the site of the narrowing anastomosis had already been fixed using a nitinol stent 4 years previously. We confirmed that the severe stent fracture resulted from misalignment. After local lysis therapy, we decided to deploy another nitinol stent to in-stent restenosis (ISR) lesion of the stent fracture. Final angiography confirmed full patency in FPB without flow delay. Additionally, to maintain the patency of arterial flow, we prescribed aspirin and warfarin. After 2 years of operation, his follow-up ankle-brachial pressure index on the left side remained 0.86 and no ischemic leg pain was observed to date. Stent-in-stent procedure using another nitinol stent for ISR treatment for the narrowing anastomosis in FPB indicated feasible and effective results.

**<Learning objective:** Endovascular intervention for acute limb ischemia (ALI) is one of the most challenging cases. Physicians often come up against a problem as no-flow phenomenon after revascularization. Local lysis therapy has established its own position in ALI treatment. However, the effectiveness of various interventional treatments for ALI has not been clarified. This report highlights the potential of a combination of local lysis and intervention in achieving good outcomes in represented repetitive ALI.>

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## Introduction

Acute limb ischemia (ALI) is a severe condition that needs the release of ischemia and reperfusion as soon as possible because a significant reduction in arterial perfusion can result in severe manifestations, such as injury to the limbs, possibly necessitating amputation, and life-threatening complications. The therapeutic management of ALI has established two major procedures: local lysis and vascular intervention, including Fogarty maneuver, mechanical thrombectomy, endovascular intervention, and endarterectomy. Therapeutic recommendations, such as local lysis,

based on large randomized studies have been reported [1]. However, the effectiveness of various interventional treatments for ALI has not been clarified. Additionally, the efficacy of stent-in-stent procedure for stent fracture remains unknown. To the best of our knowledge, there is no report about treating stent fracture in a narrowing anastomosis of femoral-popliteal bypass (FPB) using stent-in-stent technique. Here, we report a rare case with ALI which resulted from repetitive occlusion of the anastomosis site in FPB that was treated with a combination therapy, including local lysis and endovascular intervention.

## Case report

A 72-year-old male with a sudden onset pain and coldness in his left lower limb was transferred to our hospital 1 week after the onset of these symptoms in 2015. The patient presented a clinical

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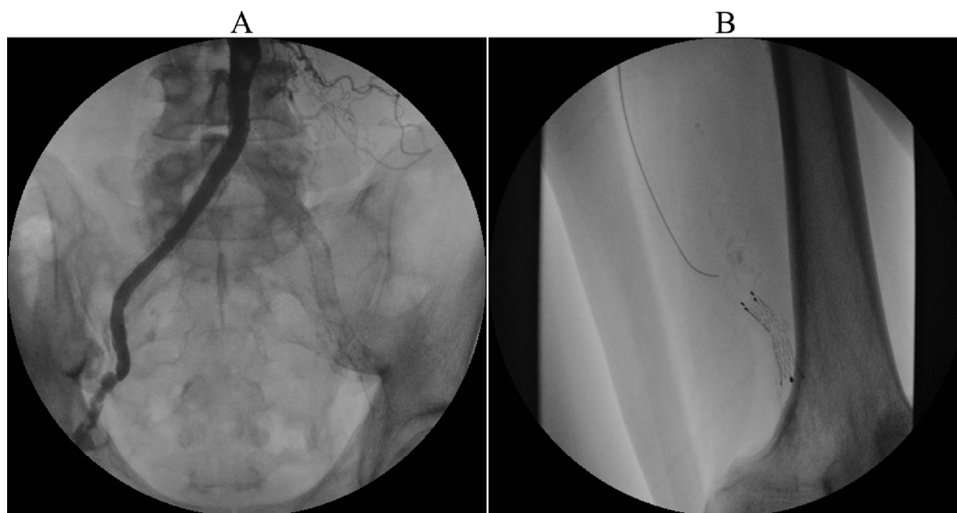


Fig. 1.

(A) The initial angiogram showed complete occlusion from the abdominal aortic bifurcation to the distal end of left FPB without any collateral flows. (B) The stent previously deployed in the distal site of the narrowing anastomosis of left FPB was broken repeatedly. The type of stent fracture was classified as type 5, as advocated by Rocha-Singh et al. [5]. FPB, femoral-popliteal bypass.

medical history of coronary artery bypass graft in 2002, and bilateral FPB in 2003. Moreover, in 2005, he had a history of exacerbation of claudication in his right lower limb and at that time, his right FPB was already confirmed with occlusion. Previous cardiovascular surgeons performed profundaplasty for his right deep femoral artery and endarterectomy for his right common femoral artery to relieve the symptom of claudication. Subsequently, in 2011, he experienced ALI in his left leg while resting. He was transferred to the previous hospital and was diagnosed with acute thromboembolism of left FPB. Accordingly, a combination therapy of surgical embolectomy using a Fogarty catheter and endovascular intervention was administered. The details of the endovascular intervention were as follows: an  $8 \times 100$  mm Smart stent (Cordis Corp., Miami Lakes, FL, USA) deployed in his left common iliac artery (CIA), an  $8 \times 30$  mm Smart stent in the left external iliac artery (EIA), a  $6 \times 30$  mm Smart stent at the site of a narrowing anastomosis of FPB to distal superficial femoral artery (SFA), an  $8 \times 60$  mm Smart stent in right CIA; an  $8 \times 40$  mm Smart stent in right EIA. After this treatment, his legs were symptom-free

and he suddenly stopped visiting the hospital. Consequently, he discontinued the anticoagulant agent (warfarin) and dual anti-platelet therapy (DAPT). To make matters worse, he had untreated diabetes mellitus [HbA1c level was 7.4% (NGSP); reference value (RV) 4.6–6.2%] and was unable to quit smoking. Other laboratory studies revealed increased white blood cell count [9390/ $\mu$ L; RV 4000–8500/ $\mu$ L], lactate dehydrogenase (227 IU/L; RV 106–211 IU/L), and creatine phosphokinase (308 IU/L; RV 14–170 IU/L) levels. Physical examination on admission to our hospital revealed a well-palpable pulse in only the right brachial artery, and an impalpable pulse in the left brachial artery, both radial and femoral arteries. Ankle-brachial pressure index (ABI) was 0.62 on the right side and 0.35 on the left side. Further, he had coexisting congestive heart failure (CHF) that needed respiratory support. Severe rest ischemic pain in his foot indicated worsening CHF; therefore, we administered intubation and considered the necessity to release the ischemic symptoms. Therefore, 17 h after hospitalization, angiographic examination was performed under the intubation condition, and the angiogram showed complete occlusion from

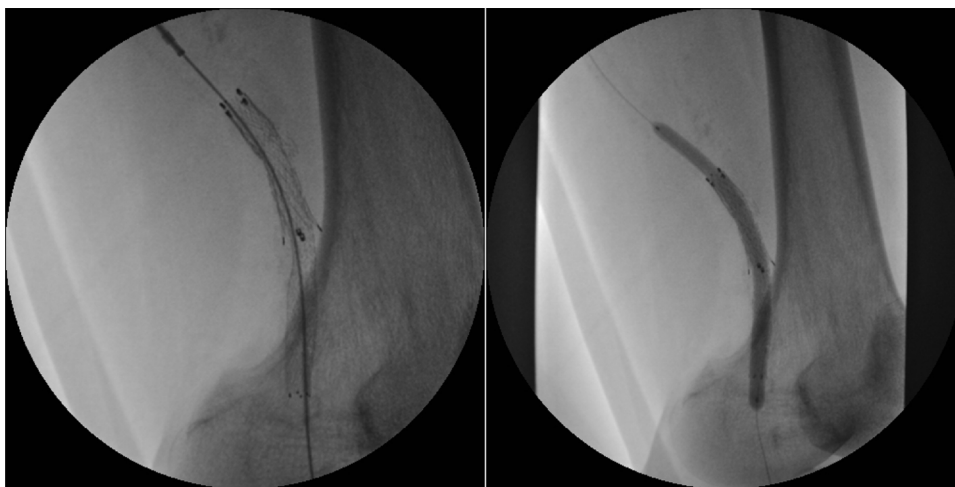


Fig. 2.

Endovascular intervention for distal stent fracture site using a  $6 \times 40$  mm Smart stent (Cordis Corp., Miami Lakes, FL, USA). The method is called stent-in-stent. Afterward, the stent was expanded using a  $5 \times 100$  mm balloon.

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