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다발성 구축 환자의 허혈성 괴사 병변에 대한 구제 목적 말초동맥 중재시술

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Peripheral Transluminal Angioplasty for Limb Salvage in Critical Limb Ischemia in an Old Cerebral Infarction with Multiple Contractures

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Percutaneous transluminal angioplasty is being used to treat peripheral artery disease increasingly in place of conventional peripheral vascular surgery. Critical limb ischemia is the most severe form of peripheral artery disease and presents with ischemic resting pain and non-healing foot wounds or gangrene. It can result in amputation and increased mortality if aggressive revascularization to obtain sufficient blood is not performed as soon as possible. Generally, both femoral arteries are used for vascular access. However, we could not use the femoral artery for vascular access in a patient with multiple contractures of the extremities due to an old cerebral infarction. Consequently, we used the left brachial artery to perform successful revascularization of the left foot in critical limb ischemia. (Korean J Med 2014;87:471-476)

Keywords: Peripheral Artery Disease; Percutaneous Transluminal Angioplasty; Ischemic Contractures

INTRODUCTION

The symptoms of critical limb ischemia (CLI), the most severe form of peripheral artery disease, are ischemic resting pain and non-healing foot wounds or gangrene. Delayed performance of revascularization can result in amputation and increased mortality. Generally, both femoral arteries are used for vascular access via an antegrade or retrograde route. However, we could not use either femoral artery in a paraplegic patient who had multiple contractures of the extremities originating from an old cerebral infarction. Consequently, we used the left brachial artery to manage the critical limb ischemia that was causing a ne-

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Figure 1. The initial critical limb ischemia (CLI) lesion. (A) Multiple left foot necrotic lesions due to CLI. (B) Necrotic lesions of the left first and second toes due to CLI.

crotic left foot lesion.

CASE REPORT

An 81-year-old male with critical limb ischemia of the left foot was transferred to Cardiology for cardiovascular assessment and treatment (Fig. 1). He was bed-ridden with multiple contractures involving both hip and knee joints and the left elbow joint following repeated cerebral infarctions of the right frontal lobe and left cerebellum starting in 1999. He patient has been undergoing physiotherapy (Fig. 2).

The patient had previously been diagnosed with peripheral artery and ischemic heart disease. In November 2012, 8 × 120- and 7 × 150-mm stents were inserted in the left common iliac artery (CIA) and superficial femoral artery (SFA). In December 2012, 2.75 × 18-mm BioMatrix stents were inserted in the left circumflex and proximal left anterior descending arteries. Since then, he had been on triple anti-platelet pharmacotherapy with aspirin, clopidogrel, and cilostazol. However, the acrocontractures due to the cerebral infarction had worsened.

To evaluation the lower extremity circulation, the ankle-brachial index (ABI) was evaluated: the right side measured 0.39 and the left side was not measurable. As the patient could not maintain posture due to the multiple contractures, computed tomography (CT) for anatomical assessment was impracticable. Using duplex lower-extremity ultrasonography, in-stent restenosis (ISR) in the left superficial femoral artery, resulting in a decreasing systolic peak velocity, was detected. Percutaneous transluminal angiography (PTA) for limb salvage was performed for critical limb ischemia of the patient's left limb via ISR.

Figure 2. Multiple contractures of the extremities: both hips have flexion-adduction contractures, and are flexed at less than 90 degrees and adducted beyond the neural position; both knees are flexed to 45 degrees due to contractures; and the left elbow is flexed to less than 90 degrees by a contracture.

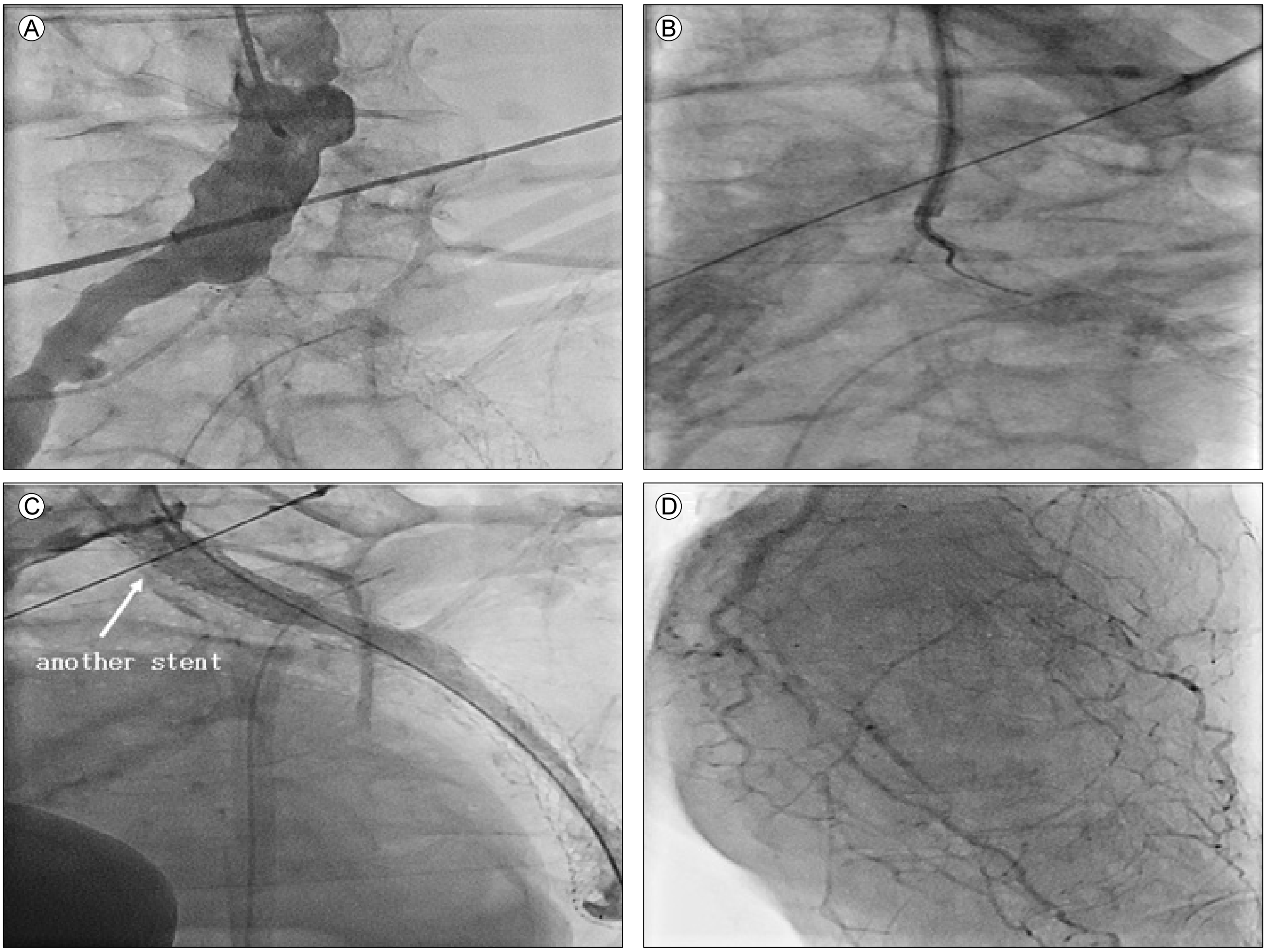

Figure 3. Peripheral transluminal angioplasty. (A) Total occlusion of the previous stent at the left common iliac artery. (B) Wiring using the mother and child technique. (C) Angiography after inserting another stent at the iliac bifurcation. (D) Adequate blood supply to the left foot after peripheral transluminal angioplasty.

Because of the multiple contractures, the lesion was approached via the left brachial artery rather than the femoral artery. After inserting an 8-Fr sheath (Cordis, Miami Lakes, FL, USA), a 5-Fr JR4 catheter (Merit Medical Systems, South Jordan, UT, USA) was used for diagnostic angiography. This showed total occlusion of the previous stent in the left CIA (Fig. 3A). Consequently, we changed the diagnostic catheter to a 95-cm 8-Fr contra IG guiding catheter (Cordis). Then, the mother-and-child technique with a JR4 catheter was used to obtain sufficient back-up support. After placing the JR4 catheter at the proximal cap of the area of chronic total obstruction (CTO), the entry point was secured with an Approach® CTO-12 Micro-Wire guidewire (Cook, Bloomington, IN, USA) and a 0.035" 260-cm Aquatrack™ angled stiff guidewire (Cordis). Then, a 0.035" Terumo Radifocus® 260-cm small J-tip guidewire M (Terumo, Tokyo, Japan) was passed through the CTO guidewire (Fig. 3B). In addition, severe ISR was found in the left superficial femoral artery upon subsequent angiography (Fig. 4A). After the distal left superficial femoral artery was approached with a 0.035" Terumo Radifocus®, a 260-cm small J-tip guidewire, 3 × 40- and 5 × 150-mm Admiral Xtreme™ (Medtronic, Minneapolis, MN, USA) and 8 × 60-mm Powerflex® P3 balloon (Cordis Cashel, Tipperary, Ireland) were used for dilatation. Then, an 8 × 30-mm scuba stent (Invatec, Roncadelle, Italy) was inserted at the proximal ostium of the common iliac artery (Fig. 3C). Balloon dilatation with a 5 × 150-mm Admiral Xtreme™ Balloon

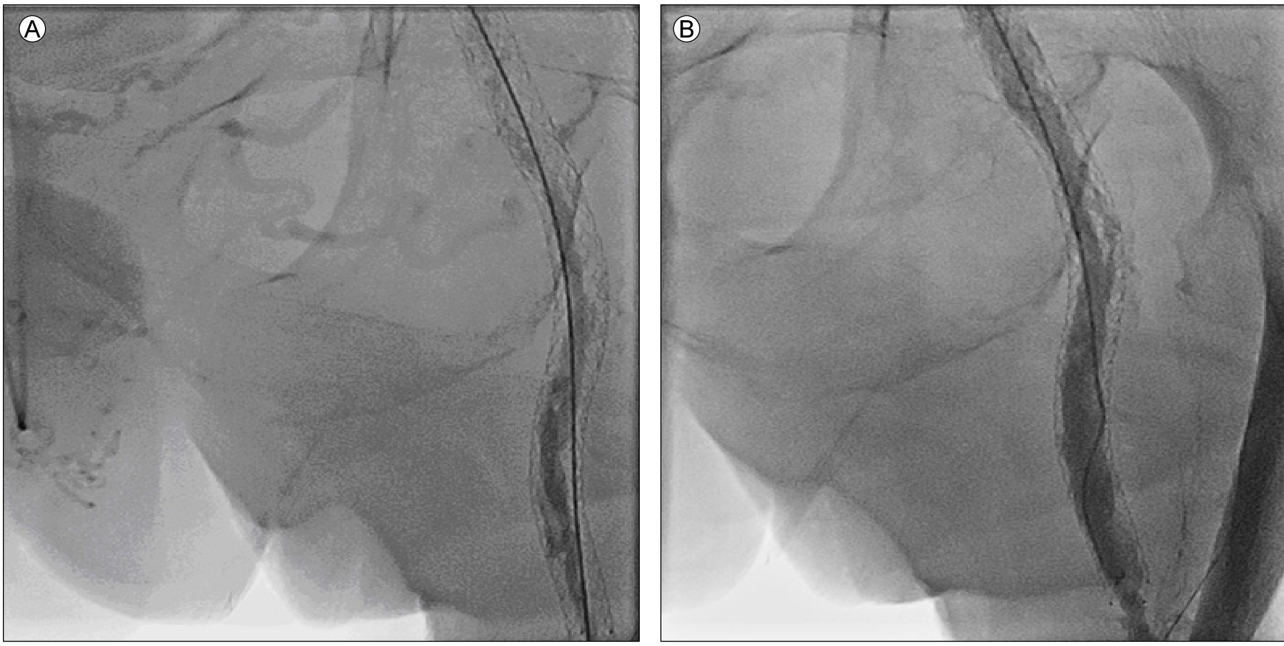

Figure 4. (A) Severe in-stent restenosis of the original left superficial femoral artery stent. (B) Angiography after balloon angioplasty at the left superficial artery in-stent restenosis lesion.

Figure 5. The healing wound after treatment. (A) The healed the left foot lesion. (B) The healed left first and second toes.

(Fig. 4B) partially improved the blood flow through the diffuse ISR at the left superficial femoral artery. Balloon dilatation was performed for the subsequently confirmed popliteal artery stenosis using a 3 × 160-mm Advance® 14LP balloon (Cook). The procedure was completed after confirmation by angiography of the blood supply to the left foot via the posterior tibial artery (Fig. 3D). Following the procedure, the patient was placed on the anti-platelet drugs aspirin, clopidogrel, and cilostazol. Low-molecular-weight heparin (enoxaparin sodium, 1 mg/kg bid; Sanofi-Aventis, Maison Alfort, France) was injected subcutaneously for 2 weeks. Since the patient was quadriplegic, prostaglandin (alprostadil α-cyclodextrin; 40 µg in 500 mL of 5%

dextrose in water, 10 ng/kg/min for 2 h) was used for 6 weeks to prevent restenosis. Then, a prostacyclin (PGI2) derivative (beraprost sodium, 0.02 mg, 2 tabs, tid; Shin Poong Pharma, Korea) was continued orally. The Orthopedics Department treated the area with continuous moist wound dressings (Mepilex®; C & C Medical, Mölnlycke Health Care, Sweden) three times per week for 2 months; limb salvage was then achieved without lower extremity amputation (Fig. 5).

DISCUSSION

Most peripheral artery disease involves atherosclerosis. The prevalence of peripheral arterial disease is 3% in those younger than 60 years and 20% in those older than 70 years [1]. It is characterized by intermittent claudication that occurs on ambulation because of stenosis or total obstruction of the blood supply to an upper or lower limb and improves at rest. The symptoms also include a cold sensation, numbness, and color change. As the disease progresses, tissue necrosis and critical limb ischemia with pain at rest due to total obstruction can occur. Lower extremity amputation may be required if immediate revascularization is not performed. According to Aulivola et al. [2] in 2004, the overall 30-day mortality of above-knee amputation was 16.5%, and that of below-knee amputation was 5.7%. Therefore, it is crucial to detect, treat, and manage this disease early. The treatment of peripheral artery disease consists of correcting risk factors, drug treatment, kinesitherapy, intervention, and surgery. However, in cases of critical limb ischemia after sufficient kinesitherapy and appropriate drug therapy for more than 3 months, intervention or reperfusion therapies should be considered to prevent amputation and tissue damage and to relieve the symptoms of patients who have difficulties with the activities of normal life because of intermittent claudication.

Reperfusion is classified by the morphology of the stenotic lesion using the Trans-Atlantic Inter-Society Consensus (TASC) II classification, revised in 2007. Based on this, either intervention or surgery is used for treatment. The TASC II classification ranges from A to D based on the degree, length, number, and position of stenosis. Intervention is preferred for TASC A and B lesions. For TASC C, intervention is used for patients at high risk for surgery, while those at low risk are managed surgically. TASC D is preferentially treated surgically, although intervention is currently performed in TASC C and D due to improvements in techniques and devices [3-6]. Surgery is the preferred treatment for TASC D due to chronic total obstruction and diffuse ISR at the left common iliac artery.

For bed-ridden patients such as ours, the slow blood flow and low demand in the lower extremities can facilitate ISR. Nevertheless, we chose intervention for the CLI lesion, as the risk of general anesthesia for vascular bypass surgery or lower limb amputation was too high considering the patient's clinical status. However, we could not use the femoral artery for vascular access because the patient was paraplegic and had multiple contractures of extremities originating from an old cerebral infarction. Consequently, we approached the lesion via the left brachial artery using a 95-cm 8-Fr contra IG guiding catheter and long-shaft balloon. Revascularization was successful. Although the patient is unable to walk, we report this case because amputation was prevented by aggressive intervention, continuous drug therapy, and use of moist wound dressings for critical limb ischemia.

중심 단어: 말초동맥 질환; 경피적 혈관성형술; 허혈성 구축

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