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Case Report

Endovascular Stenting for Critical Limb Ischemia Patient with Superficial Femoral Artery Occlusive Disease: A Case Report

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ABSTRACT

Background: Critical limb ischemia (CLI) is a terminal stage of peripheral arterial disease (PAD), in the absence of intervention, may lead to lower extremity amputation or death. In cases where medical management is not effective or severe cases of PAD, endovascular and surgical interventions are indicated. Endovascular interventions have become the first-line approach of CLI management and advanced considerably within the past decade.
Case Description: A smoker hypertensive 73-years old female complained left leg pain accompanied with necrotic wound since 6 months ago. Duplex ultrasound showed no-flow from proximal to distal left superficial femoral artery (SFA). CT-Angiography showed total occlusion from proximal left SFA to proximal popliteal artery about 7,2 cm in length with collateral vessels. She was diagnosed with CLI left inferior extremity Fontaine IV Rutherford 5. Angiography also confirmed the total occlusion from proximal to distal left SFA with collateral vessels. A 6mmx100mmx120cm self-expanding stent deployed at proximal-mid SFA. The patient showed clinically improvement and discharged on the day 5 observation
Conclusion: Favorable result could be achieved by endovascular stenting approach in patients with CLI, where close follow-up treatment afterward could save limb loss.

1. Introduction

Peripheral arterial disease (PAD) is defined as a process of atherosclerosis that occurs in arteries from the distal arteries to aortic bifurcation with or without symptoms.[1] Atherosclerosis is the most common cause of Critical Limb Ischemia (CLI) with the incidence reaching 4% of the population over 40 years-old. CLI is characterized by ischemic pain at rest or gangrene caused by occlusive artery disease for more than 2 weeks.[2,3]

The prevalence of amputation and death increased every year, aggressive therapy and immediate revascularization were needed to restore blood flow to the injured area.[4,5] For CLI patients without revascularization, they usually ended up with an amputation. Open revascularization has slowly been replaced by endovascular intervention in the last two decades. The advantages of endovascular percutaneous procedures included could be done under local anesthesia, the better healing of incision wounds, earlier recovery, and easier reintervention when was required.[5,6]

2. Case Presentation

A 73-years old female complained of left leg pain since 6 months ago. Amputation was performed 4 months ago on the digit V left leg due to infection wound. Complaints of the left leg aching like sliced-up appeared since last 2 months prior to admission, especially when resting at night and more comfortable with the left leg on hanging position. History of hypertension since 5 years ago, smoking 2 packs/-day for last 50 years.

Physical examination showed blood pressure 140/90mmHg, regular heart rate 97 beats/minute, respiratory rate 18 times/minute, and oxygen saturation of 98% with room air. Examination of the head, neck, and abdomen were within normal limits, while thorax showed a shifting in ictus cordis to intercostal-space VI left midclavicula-line. Electrocardiography suggested sinus tachycardia, heart rate of 103 beats/minutes with LVH. Laboratory tests showed an increase in leukocytes to 14,200 103/mcL, while others within normal limits.

Vascular examination of the left inferior limb found blackening wound 11x7 cm in size on the back of the left foot, decreased

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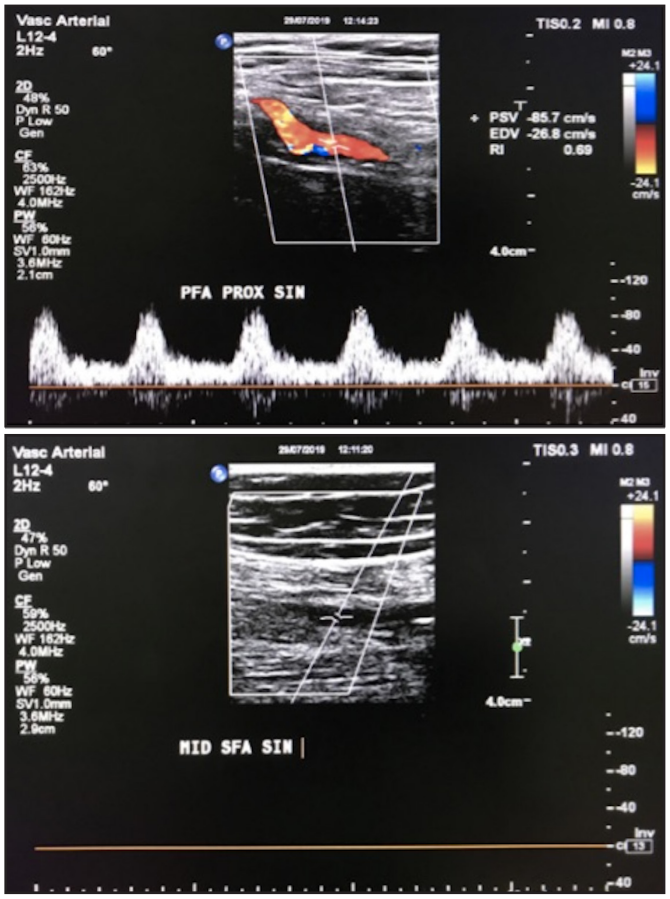
pulsation starting from left common femoral artery till popliteal artery (+1) and pulseless from the tibialis anterior artery to distal part (Figure 1). There was no muscle atrophy, motor impairment, but a decrease of sensory response around the wound was observed. Right ankle-brachial index (ABI) was 0.9 while the left one was immeasurable. From the clinical stage of the lower extremity, this patient was classified as Fontaine stage IV, Rutherford category 5.

Figure 1. Blackening wound at left foot

Duplex ultrasound (DUS) examination for left leg showed monophasic spectral doppler at the common femoral artery (CFA), profundus femoral artery (PFA), popliteal artery levels. No flow in the proximal to distal of the superficial femoral artery (SFA) and no flow from tibialis anterior artery to distal were observed. CT-angiography was performed with result suggested a total occlusion of left SFA 1/3 of distal to the proximal side of popliteal artery 7.2cm in length with surrounding collaterals. The moderate stenosis of the SFA 1/3 of the middle with collaterals was shown as seen in Figure 2.

The patient was performed arteriography of the left inferior extremity that showed stenosis 60% in external Iliac artery, multiple stenosis with maximal stenosis 70% in the CFA, total occlusion from proximal to distal SFA, 80% stenosis in the PFA. The popliteal artery to distal of the left leg was not evaluated.

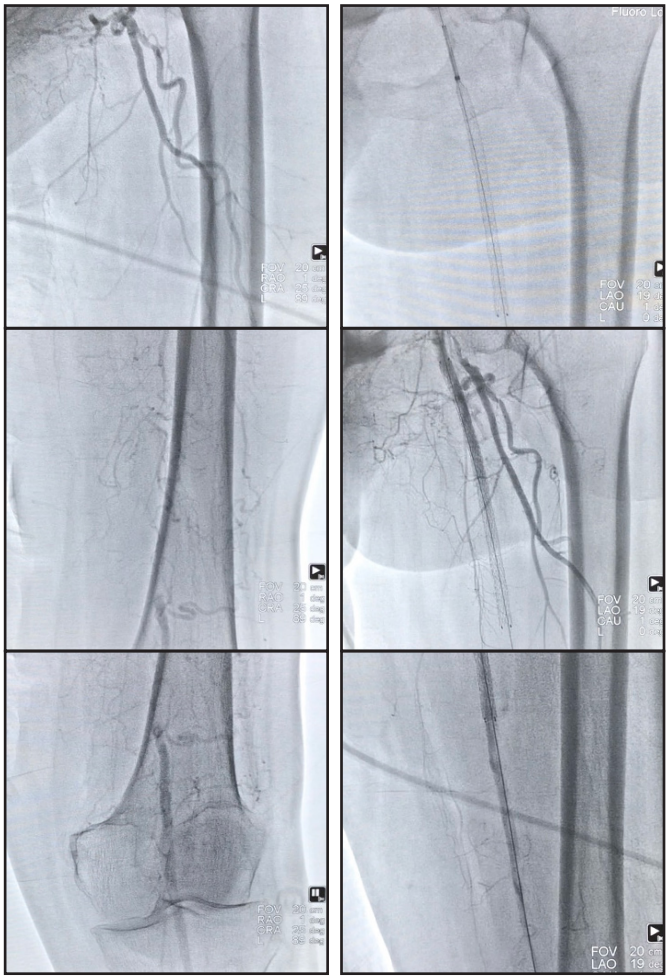


(A)

(B)

Figure 2. (A) Duplex Ultrasounds for left inferior extremity that showed no flow at SFA; (B) CT Angiography of bilateral inferior extrimities.

We decided to revascularize by opening up the left CFA stenosis and total occlusion of SFA. The lesion was treated with a 5.0x100 mm drug-coated balloon (DCB) inflation in the proximal-mid SFA by applying pressure of 10atm for 2 minutes. Cineangiographic-evaluation showed TIMI 1 flow to the distal left SFA and dissection was found at proximal left SFA. A 6mm x 100mm x 120cm self expanding stent was deployed from proximal to mid left SFA resulting in TIMI flow 2 to the distal part (Figure 3). The anticoagulant then administered to gain a better flow.



(A) (B)

Figure 3. (A) Angiography of left inferior extremity that showed total occlusion at SFA with collateral vessel; (B) Deploying Self Expanding Stent in superficialis femoral artery

The clinical evaluation showed an improvement as shown by reduction of leg pain. The pulsation of left dorsal pedis artery also improved (+1) but still weak, the ABI score was 0,3. DUS examination showed the blood flow in the left inferior limb filling the left superficial femoral artery through a stent that reached to the left popliteal artery. The patient went home with dual antiplatelet and oral anticoagulant for a certain period until the next flow evaluation was performed.

3. Discussion

Epidemiology of PAD was reported from several studies in various European countries. TASC II study noted that 5-10% of asymptomatic PAD.[1,4] In most asymptomatic PAD, the diagnosis is made on clinical examination (arterial pulses) or from the ABI score. The symptomatic PAD obtained in the form of typical clinical picture of intermittent claudication are pain in the thigh increases when walking and disappears at rest. PAD patients with claudication would be suffered from CLI within the next 5 years.[4] CLI is characterized by chronic conditions (more than 2 weeks) ischemic rest pain, wounds or ulcer that does not heal, or gangrene in one or both legs that have been objectively proven to have occlusion in the arteries.[1,2,8]

Several noninvasive examinations helpful in diagnosis PAD including ABI score, duplex ultrasound, and ultrasound CW Doppler. ABI is an easy and inexpensive examination but had a sensitivity, specificity approaching the gold-standard diagnostic for PAD. ABI value <0.90 is an indicator of the presence of significant stenosis lesions. Based on clinical condition and ABI score, we can predict the prognosis of CLI according to the Society for Vascular Surgery Lower Extremity Threatened Limb (SVS WifI) Classification System (Figure 4).[1,11]

The revascularization strategy must consider of anatomic, comorbid compatibility, availability of resources, operator expertise, and patient preferences.[1,9] This patient was sufferred from CLI with Fontaine classification stage IV and Rutherford category 5, with WIFi score 7, which was considered to a high-risk for amputation. From the examination we found that there was sufficient flow to the distal, therefore revascularization of occluded SFA expected could improve distal flow and revascularized the distal tissues. According to the 2017 ESC Guideline for PAD, endovascular strategy for femoropopliteal occlusive lesion was class-I recommendations (Figure 5) in this case, an elderly with risk factor heart failure and hypertension with short occlusion at SFA, where revascularization strategy more recommended for endovascular than surgery.

Several factors are predicted that could affect the patency of action PTA include: (1) the nature and severity of lesions, (2) the anatomy of the affected limb, (3) clinical manifestations of the extremities, (4) systemic factors such as DM or smoker.[9,11] She had a short occlusion of less than 25 cm, the guideline suggested class IIB recommendation of the drug-eluting balloon or drug-eluting stent revascularization strategy with an DCB inflation, unfortunelty the slow flow observed to distal part and accompanied by dissection at SFA.

The objective of endovascular stenting is to improve the conditions of primary insufficiency such as residual stenosis and extensive recoil flow. Stenting also minimizes the risk of dissection and improves long-term patency.[1,3,7] Comparing to other endovascular procedures, stenting provides effective results with patency within 3 years reaching to 88%, besides that it rarely occurs acute or subacute occlusion. However, stent fracture could occur resulting in restenosis or thrombosis.[7,8] In the case presented above, self-expanding stent was implanted from proximal-mid of left SFA to reserve the flow caused by dissection resulting in TIMI 1-2 flow to the distal. The clinical evaluation showed symptom improvement including leg pain was subsided, pulsation of left dorsal pedis artery improved and ABI score become 0,3.

Based on the International Society for Cardiovascular Surgery (ISCVS), the success of revascularization is assessed by anatomy, hemodynamics, and clinics, as follows: (i) technically successful if there is <30% residual stenosis (anatomy) (ii) increase in ABI value >0.10 is compared before the procedure (hemodynamics) (iii) improvement of at least 1 clinical symptom (clinics).[4,9,11] In this case the procedure fulfilled the revascularization success criteria since she improved clinically, ABI and the anatomy.

Component	Score	Description		
W (Wound)	0	No ulcer (ischaemic rest pain)		
	1	Small, shallow ulcer on distal leg or foot without gangrene		
	2	Deeper ulcer with exposed bone, joint or tendon ± gangrenous changes limited to toes		
	3	Extensive deep ulcer, full thickness heel ulcer ± calcaneal involvement ± extensive gangrene		
I (Ischaemia)		ABI	Ankle pressure (mmHg)	Toe pressure or $TcPO_2$
	0	≥0.80	> 100	≥60
	1	0.60–0.79	70–100	40–59
	2	0.40–0.59	50–70	30–39
	3	<0.40	<50	<30
fI (foot Infection)	0	No symptoms/signs of infection		
	1	Local infection involving only skin and subcutaneous tissue		
	2	Local infection involving deeper than skin/subcutaneous tissue		
	3	Systemic inflammatory response syndrome		
Example: A 65-year-old male diabetic patient with gangrene of the big toe and a <2 cm rim of cellulitis at the base of the toe, without any clinical/biological sign of general infection/inflammation, whose toe pressure is at 30 mmHg would be classified as Wound 2, Ischaemia 2, foot Infection 1 (WIfI 2-2-1). The clinical stage would be 4 (high risk of amputation). The benefit of revascularization (if feasible) is high, also depending on infection control.				

Figure 4. Clasification System Society for Vascular Surgery Lower Extremty Threatened Limb (SVS WifI)[1]

Recommendations on revascularization of femoro-popliteal occlusive lesions[c]

Recommendations	Class[a]	Level[b]
An endovascular-first strategy is recommended in short (i.e. <25 cm) lesions.[302,303]	I	C
Primary stent implantation should be considered in short (i.e. <25 cm) lesions.[304, 305]	IIa	A
Drug-eluting balloons may be considered in short (i.e. <25 cm) lesions.[77,306–310]	IIb	A
Drug-eluting stents may be considered for short (i.e. <25 cm) lesions.[302,303,311]	IIb	B
Drug-eluting balloons may be considered for the treatment of in-stent restenosis.[312,313]	IIb	B
In patients who are not at high risk for surgery, bypass surgery is indicated for long (i.e. >_25 cm) superficial femoral artery lesions when an autologous vein is available and life expectancy is > 2 years.[314]	I	B
The autologous saphenous vein is the conduit of choice for femoro-popliteal bypass.[284,315]	I	A
When above-the-knee bypass is indicated, the use of a prosthetic conduit should be considered in the absence of any autologous saphenous vein.[284]	IIa	A
In patients unfit for surgery, endovascular therapy may be considered in long (i.e. >_25 cm) femoro-popliteal lesions.[312]	IIb	C

[a]Class of recommendation.
[b]Level of evidence.
[c]These recommendations apply for patients with intermittent claudication and severe chronic limb ischaemia.

Figure 5. Recommendation on revascularization of femoro-popliteal occlusive lession[1]

4. Conclusion

It has been reported case of a hypertensive smoker 73 years-old female presenting with clinically Fontaine IV Rutherfords 5 caused by a total occlusion of SFA. The installation of self-expending percutaneous stent showed a good result a shown by the clinical improvement and ABI score. This case suggested that an appropriate revascularization strategy and good management after revascularization are very important in saving extremities in CLI patients.

5. Declarations

5.1. Ethics Approval and Consent to participate
Patient has provided informed consent prior to involve in the study.

5.2. Consent for publication
Not applicable.

5.3. Availability of data and materials
Data used in our study were presented in the main text.

5.4. Competing interests
Not applicable.

5.5. Funding source
Not applicable.

5.6. Authors contributions
Idea/concept: MRR. Design: MRR. Control/supervision: NK. Data collection/processing: MRR. Extraction/Analysis/interpretation: MRR, NK. Literature review: MRR, NK. Writing the article: MRR. Critical review: NK, DS, CTT. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

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