



Case Report

Retrograde Trans-Femoral Approach for Successful Percutaneous Angioplasty in a Diabetic Patient with Ischemic Hand Ulcer: A Case Report

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Abstract

Hand ischemia is a rare complication of diabetes and some other chronic vascular diseases. Critical hand ischemia causes painful limbs and disability and requires urgent revascularization.

There have been a few reports of successful trans-brachial percutaneous angioplasty in the upper extremity in the radial or ulnar artery. Herein, we report the results of the endovascular treatment of a 68-year-old diabetic patient with an ischemic hand ulcer due to the severe stenotic lesions of the infra-brachial arteries. The patient underwent successful angioplasty via the retrograde trans-femoral technique to avoid the drawbacks. At the first week of post-procedural follow-up, the patient's finger was warm with a well-healing wound and reduced pain. In the next two months, he had no complaint of pain or active ulceration; the ulcer was well healed, and the hand was warm.

The present case shows that history taking and physical examination should be followed by upper-extremity arteriography for the evaluation of hand ischemia. The trans-femoral approach enabled us to perform percutaneous catheterization for both diagnostic and interventional purposes. Not only is this strategy useful even for the severe stenotic disease of the distal parts of below-the-elbow arteries but also it avoids the unpleasant complications of antegrade brachial cannulation.

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Introduction

Hand ischemia is a rare complication of diabetes and some other chronic vascular diseases.¹ Critical hand ischemia causes painful limbs and disability and requires urgent revascularization. Patients with a critically ischemic hand usually suffer from pain, discoloration, necrotic tissue, and / or gangrene of fingers, which generally starts at the tips of fingers.²

There have been a few reports of successful percutaneous angioplasty in the upper extremity in the radial or ulnar artery.^{3,4} Herein, we report the results of the endovascular treatment of a diabetic patient with an ischemic hand ulcer due to the severe stenotic lesions of the infra-brachial arteries. To the best of our knowledge, this is the first report of successful angioplasty via the retrograde trans-femoral approach for a patient with critical hand ischemia.

Case Report

A 68-year-old man presented with pain and an ulcer in the second finger of his left hand (Figures 1A and 1B). The patient had a two-year history of ulcerations and ischemic disease of the lower extremity and had been experiencing left upper-extremity ischemic symptoms over the previous month. In addition, he had a two-year history of diabetes, five-year history of hemodialysis, and a history of two angioplasty procedures in the right and left lower-extremity limbs due to ischemic foot ulcer in both feet. He had no history of smoking and heart disease.

On first examination, both hands of the patient were considerably cold but all his fingers were normal in appearance, except for the second finger of the left hand,

which was painful and had local swelling and infection signs.

The first choice of treatment was debridement of the necrotic tissues using hydrogel. In the next step, left subclavian angiography via the digital subtraction method was performed on the patient in order to evaluate the cause of the ischemia and poor healing. The left subclavian axillary and brachial arteries were patent; however, significant diffuse atherosclerotic narrowing at the proximal and mid parts of the left radial artery (Figure 2 A) was present. At the distal part of the radial artery, there was a severe (90%), eccentric, and calcified long stenosis (Figure 2 B). The left ulnar artery and an arteriovenous fistula were patent, and the deep and superficial palmar arches were not complete. Additionally, palmar circulation was interrupted, so that radial and ulnar arteries were not connected to each other.

All the aspects of radial artery balloon angioplasty, as the best possible modality for healing the wound and preventing finger amputation, were explained to the patient, who consented to the procedure.

After local anesthesia, the left common femoral artery was punctured, and a short 5-French sheath was inserted before the cannulation of the left brachial artery using a 4-French, 150-cm long slip catheter (Cook Inc. Bloomington, In, US) and a 260-cm hydrophilic guide wire (Terumo Corp., Japan). Then using a 300-cm floppy 0.035-inch superstiff guide wire with floppy "tip" (Boston Scientific, Natick, MA, USA), a long 90-cm, and 6-French sheath was inserted (Arrow Super Flex sheath [Arrow International, Reading, PA, USA]) and the lesion was crossed with a 0.014-inch, 300-cm long guidewire (PT2; Boston Scientific, Natick, MA, USA) under road mapping. Thereafter, a 4-200 mm angioplasty balloon (EverCross 0.035 PTA balloon catheter; ev3, Plymouth, MN, USA, shaft length = 135 cm) was advanced over the wire into the region of the stenosis for the proximal and distal parts of

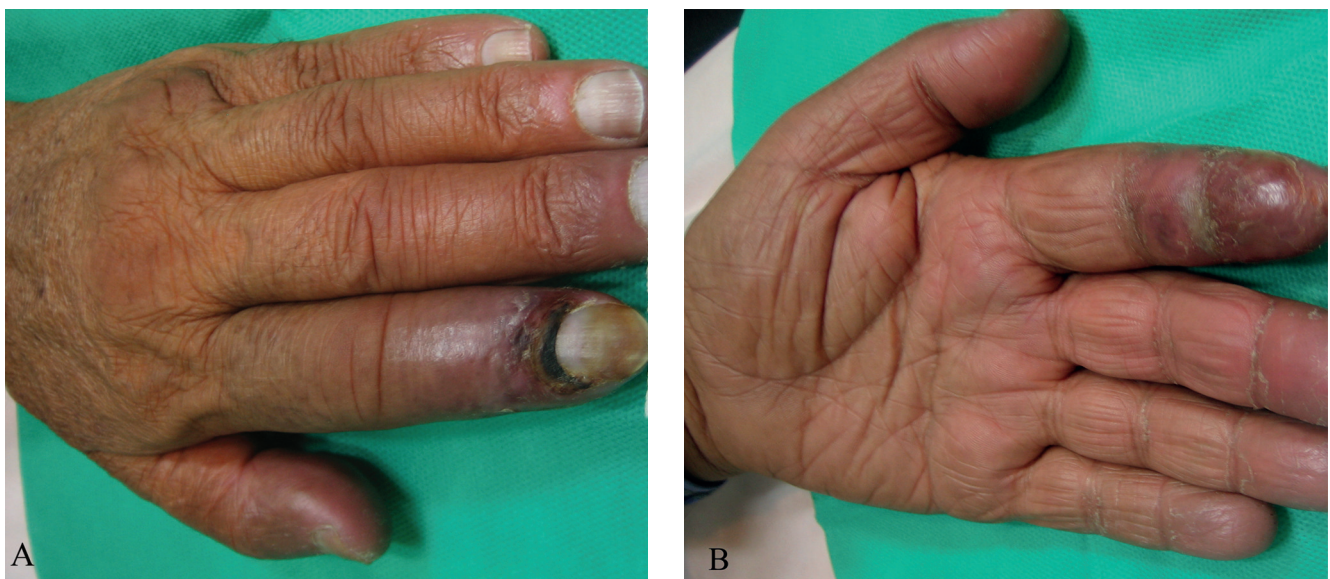


Figure 1. A) & B): The ulcer before angioplasty (critical ischemia of the left hand with a necrotic skin lesion on the distal part of the second finger)

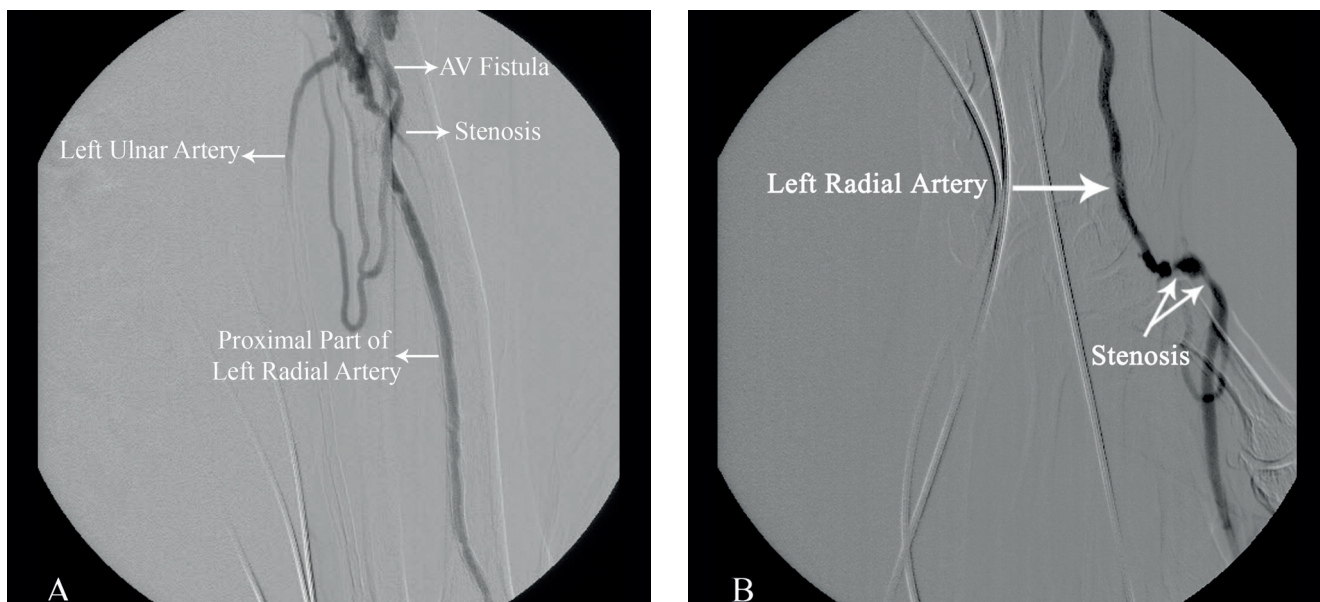


Figure 2. Pre-operative angiograms, demonstrating A) Significant diffuse atherosclerotic narrowing at the proximal parts of the left radial artery B) A severe (90%), eccentric, and calcified long stenosis at the distal part of the left radial artery



Figure 3. Percutaneous transluminal angioplasty of the proximal (A) and distal (B) parts of the left radial artery by a 4-200 mm angioplasty balloon inflated out to 3 atm

the radial artery, and balloon inflation was carried out to 3 atm (Figure 3A & 3B). Another balloon (3-40 mm, SLEEK; Cordis corporation, Miami, FL, USA, shaft length = 150 cm) was subsequently passed through the distal part of the radial artery, and inflation was done up to 16 atm (Figures 4).

Angiography after percutaneous transluminal angioplasty showed a small residual plaque at the distal part of the radial artery and restoration of a rapid flow into the digital arteries (Figures 5A and 5B). The patient was discharged the day after the procedure and referred to our Diabetic Foot Clinic for further evaluations and treatments such as repeated

debridement and use of advanced dressing. At the first week of post-procedural follow-up, the patient's finger was warm with a well-healing wound and reduced pain. In the next two months, he had no complaint of pain or active ulceration; the ulcer was well healed, and the hand was warm (Figures 6 and 7).

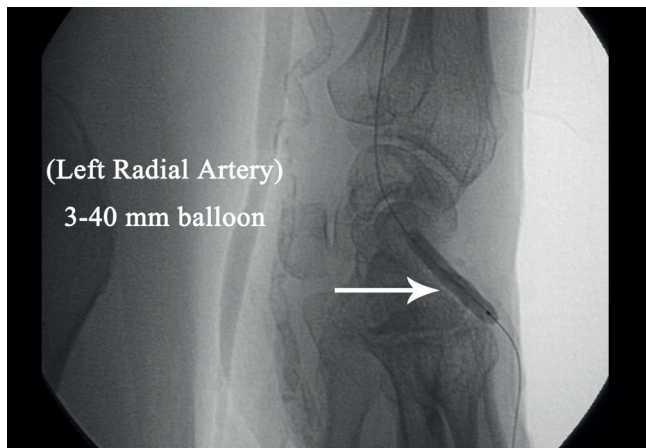


Figure 4. Percutaneous transluminal angioplasty of the distal part of the left radial artery with a 3-40 mm angioplasty balloon

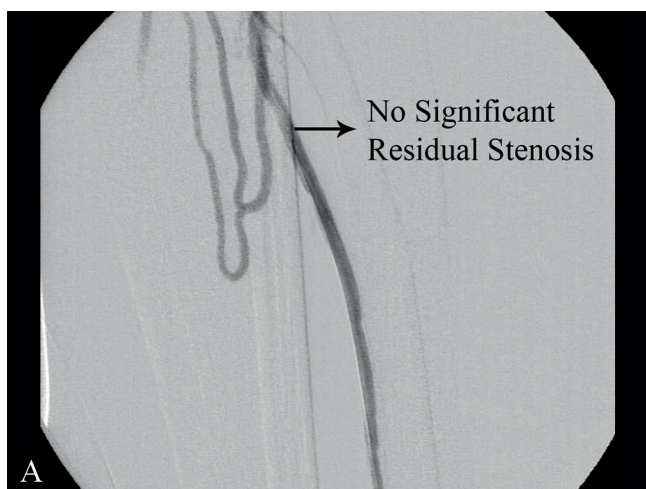


Figure 5. Post-angioplasty angiograms of the proximal part of the left radial artery (A) and distal part of the left radial artery (B), demonstrating no significant residual stenosis after angioplasty



Figure 6. The ulcer, 1 month after angioplasty



Figure 7. The ulcer, 2 months after angioplasty

Discussion

Embolic diseases and atherosclerotic stenotic lesions cause rest pain and tissue loss by markedly compromising the collateral circulation.^{5,6} As was the case of the present patient, diabetic patients on dialysis are more prone to develop upper-extremity ischemia and are, thus, at higher risk of death or considerable morbidity even after attempted amputation.

The efficacy of angioplasty in upper-extremity arterial stenotic disorders has been mostly reported in brachiocephalic vessels. With respect to percutaneous angioplasty in below-the-elbow arteries, most reports are from patients with hemodialysis access occlusion. There is a paucity of data in the existing literature on balloon angioplasty on lesions at the level of the distal forearm.⁷⁻¹⁰ In the field of infrapopliteal intervention, the establishment of straight-line flow to the “pedal arch” is crucial for limb salvage.^{11, 12} Although it



seems worthwhile to choose the same strategy to treat critical hand ischemia, it should be borne in mind that this condition is a heterogeneous disorder that can be affected by various factors - including type of failed previous fistula, severity of the "steal" phenomenon, and preexistence of ischemic monomelic neuropathy.^{2, 13-15}

In the present study, a successful catheter-based revascularization of the palmar arch conferred satisfactory clinical results. Therefore, the establishment of straight-line flow to the "palmar arch" may be important for hand salvage in the treatment of isolated distal upper-extremity artery disease.

Samaha et al.¹⁶ reported the use of arterial angioplasty for the treatment of hand ischemia in a radial-cephalic fistula. Technically, the authors utilized a 6-French sheath via the antegrade brachial approach and passed the stenosis with a 0.035-inch guidewire. The employment a 0.014-inch guide wire (as is the case in our report) allows the operator to take advantage of such low-profile devices as catheters, balloons, and stents. Kawarada et al.⁷ reported the treatment results of 5 critically ischemic hands in 4 patients undergoing catheter intervention for isolated distal upper-extremity artery disease. They performed balloon angioplasty via the antegrade brachial approach with a 3-French or 4-French sheath to achieve the principal endpoint of establishment of straight-line flow to the palmar arch. Also, Namdari et al.⁹ and Ferraresi et al.¹⁰ reported the use of the antegrade brachial approach to access the artery for percutaneous angioplasty. Namdari et al.⁹ achieved technical success in all their cases without complications by carrying out surgical arteriotomy to access the artery. It is, however, worthy of note that failed attempts at a brachial approach could lead to a devastating clinical course. Furthermore, variations in the upper-extremity arteries are not uncommon, with the incidence ranging from 9 to 18.5%. The high take-off of the radial or ulnar artery does not allow the antegrade brachial intervention.^{7, 17}

To the best of our knowledge, the present paper reports the first case to undergo successful angioplasty via the retrograde trans-femoral technique to avoid the above-mentioned drawbacks. The management approach to our patient with a critically ischemic hand included a thorough work-up to precisely diagnose the cause of the symptoms first. Thereafter, through a retrograde trans-femoral arterial access, angiography was conducted to study the arterial anatomy and assess the possibility of reaching the arterial stenotic lesions. The diagnosis having been made, the proximal and distal parts of the stenotic radial artery lesions were successfully dilated and the symptoms were resolved.

Conclusion

In the present case report, we showed that the trans-

femoral approach can allow us to perform percutaneous catheterization for both diagnostic and interventional purposes. Not only is this strategy useful for severe stenotic disease of the distal parts of below-the-elbow arteries but also it averts the unpleasant complications of antegrade brachial cannulation.

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