Total Ankle Replacement (TAR): There is No Patient Too Old or Too Sick

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Abstract

Background. Critical limb ischemia (CLI) patients pose a challenge to both physicians and surgeons alike. Patients may complain of claudication pain that may or may not resolve at rest and always need their lower extremities in a dependent position. CLI is a progressive disease that increases the chances of tissue loss, gangrenous changes, or limb loss. Multiple staged procedures are needed in treating this disease. There are new, innovative approaches in treating CLI patients through open or endovascular means. CLI patients are typically not surgical candidates due to the multiple complications that may occur. Major joint reconstruction places stress on the body and needs blood flow optimized in order to result in healing and mobility. The following case report follows a 78-year-old male with CLI who underwent invasive total ankle joint replacement.

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Key words: angioplasty, ischemia, PVD, Rutherford classification

Peripheral artery disease (PAD) is one of the most common manifestations of atherosclerosis in the United States.[1] Critical limb ischemia (CLI) is an end-stage subset of PAD characterized by rest pain, tissue loss, and gangrenous changes. It has been estimated that CLI develops in about 10% of patients with PAD.[2] CLI patients are more complex and typically have multiple affected segments, including severe tibial and pedal arteries.[3,4] The more advanced the disease, the higher the risk for limb loss. Risk factors include tobacco use, diabetes, renal failure, hypertension, and other comorbidities. In the presence of diabetes, the risk for major limb loss is increased by 10- to 30-fold.[5] Goals of limb salvage in symptomatic PAD patients are to relieve pain, maintain ambulatory status, heal wounds, preserve a functional extremity, and improve health-related quality of life.[4] With atherosclerotic disease, there are multiple approaches in treating the disease, such as endovascular and open surgical procedures.[6] Patients with severe to end-stage PAD are inadequate surgical candidates for nonvascular cases, which may result in postoperative complications that could lead to failure of the surgical site.

End-stage ankle arthritis is a progressive deformity that causes functional impairment with decreased quality of life. The most common etiology of arthritis is typically post traumatic; other etiologies may include rheumatoid arthritis, gout, or osteonecrosis.[7] Current studies suggest that either ankle arthroplasty or ankle arthrodesis is the preferred surgical treatment.[8] It is up to the surgeon's discretion to decide which procedure they elect to do. Thus, the following case report describes a multidisciplinary approach to a patient with severe ankle arthritis and end-stage PAD who failed multiple revascularization attempts. The goal was to perform a total ankle replacement (TAR) for end-stage arthritis following lower extremity revascularization.

Case Description

A 78-year-old Caucasian male presented with end-stage ankle osteoarthritis. He has a significant past medical history of type II diabetes mellitus, coronary artery disease, peripheral arterial disease, and new onset of depression. He had a past surgical history of triple bypass done in 2004. He had recently retired and was a long-time golfer, but could no longer play the game he loved due to his ankle arthritis and ischemic rest pain. He also had recently lost his wife, which put him in a state of depression. Prior to his first visit with us, he had seen a podiatrist who gave over-the-counter ankle bracing and multiple steroid injections, all of which had failed. He had also seen a vascular surgeon who attempted revascularization of his posterior tibial (PT) artery, which had stenosed and failed. His options moving forward were limited.

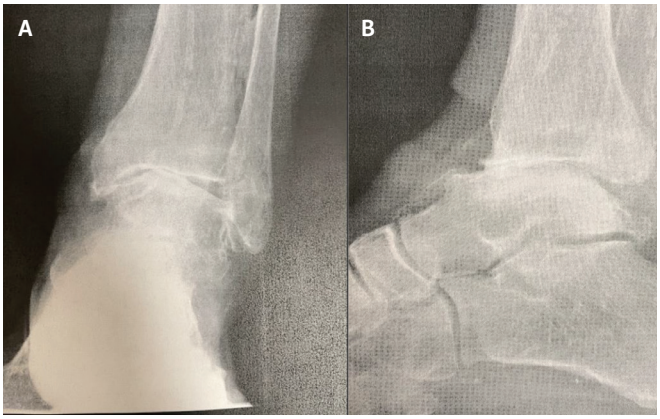

FIGURE 1. Angiogram showing calcification of the (A) anterior and (B) posterior vessels at the level of the ankle joint.

On examination, he had nonpalpable pedal pulses, admitted to intermittent rest pain, and was relieved when the foot was in a dependent position. He had tenderness along the ankle joint and <10° of ankle range of motion with an antalgic gait. Radiographs demonstrated decreased cartilage within the ankle joint as well as osteophyte formation along the joint. Imaging also demonstrated calcification of the anterior and posterior vessels at the level of the ankle joint (**Figure 1**).

Based on clinical and radiographic findings, a total ankle joint replacement was deemed necessary. Prior to his major ankle reconstruction surgery, he was referred to another vascular surgeon to optimize his vascular status and healing potential; his findings suggested that the patient had a Rutherford score of 4. The patient had undergone a staged procedure with revascularization and angioplasty of the superficial femoral artery (SFA), stent placement of the popliteal artery (PA) (**Figure 2**), angioplasty of the PT artery, and angioplasty of the peroneal artery, and had complete occlusion of the anterior tibial (AT) artery. This was followed a few weeks later by atherectomy and angioplasty of his PT and tibial arteries (**Figure 3**). Arterial duplex was then performed, which showed patency of his AT and dorsalis pedis as well as areas of occlusion in the PT, with distal flow in the common plantar arteries. After discussion with his vascular surgeon, the patient was allowed to undergo his major ankle reconstruction. He was instructed to continue with his dual-antiplatelet therapy and statin medication. Three months after revascularization of his lower extremity, the patient had undergone a total ankle replacement, which healed entirely (**Figure 4**). To date, he states that he has been able to ambulate with no complications and denies any ischemic rest pain.

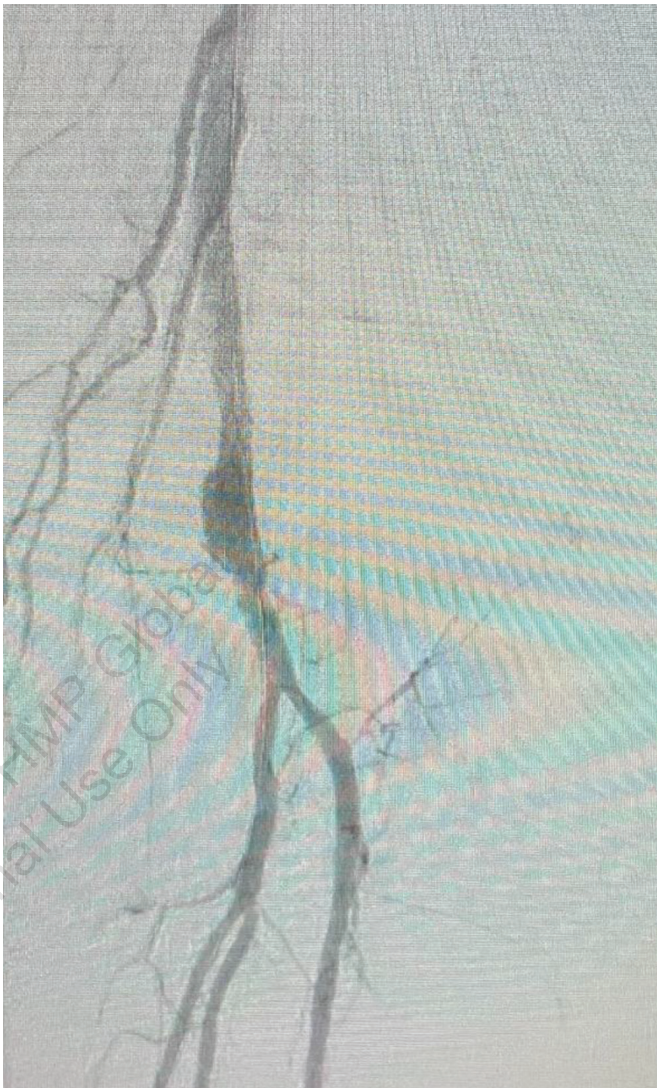

FIGURE 2. Stent placement in the popliteal artery is shown.

Discussion

There has been research in the past discussing revascularization for PAD and its effectiveness in leading to limb salvage. Smolderen et al[9] described the extensive vascular work-up, and progression of the disease may include multiple interventions that may include endovascular or open surgical treatments. There were no published articles demonstrating major reconstructive ankle surgery following revascularization of the lower extremity. As a result, we wanted to convey a team-based approach to limb salvage in a patient with CLI. With multiple staged procedures, the patient was given the opportunity to heal and gain his mobility. He lives on his own and is now able to live independently and carry on his day-to-day activities. Prior to seeing us, he was given the option to undergo a below-knee amputation. He was considered a high-risk patient due to his multiple comorbidities and was not considered a surgical candidate. At >1-year follow-up, the patient has reported no issues regarding his surgical site. As described above, the patient's plan of care was a team-based

FIGURE 3. Atherectomy and angioplasty of the posterior tibial artery and anterior tibial arteries was performed.

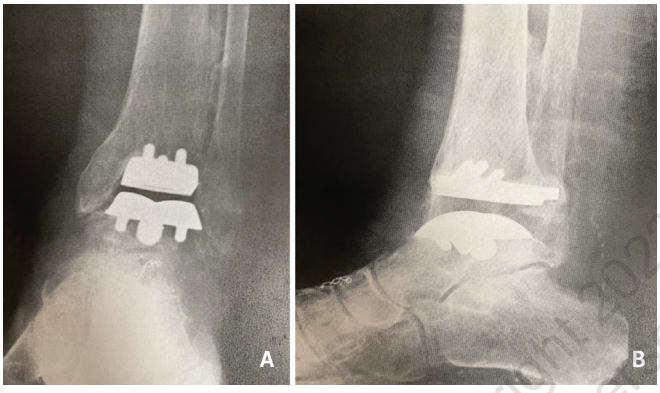

FIGURE 4. Three months after revascularization of the lower extremity, a total ankle replacement was performed. (B) Final result is shown.

approach; multiple specialties were involved in the continuity of care. In the future, we feel confident that a team-based approach will continue to optimize our success.

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