Avoiding Amputations: Percutaneous, Catheter Based Options for Limb Salvage

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Citation

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Abstract

A significant proportion of patients with peripheral arterial disease (PAD) develop critical limb ischemia. Treatment options for these patients is often limited. Percutaneous, catheter directed treatment is emerging as an effective modality for limb salvage. For chronic limb ischemia, percutaneous, catheter based interventions has a substantial limb salvage rate. Prior to amputation, patients with critical limb ischemia should be evaluated for percutaneous revascularization options.

INTRODUCTION

Peripheral arterial disease (PAD), secondary to atherosclerosis, affects almost 10% of the population over 65 years of age and close to 30% above the age of 70.[1] 25% of patients with systolic hypertension over 60 years of age have ankle-brachial indices (ABI) <0.9.[2] Patients with Fontaine III and IV PAD (i.e. those with rest pain, ischemic ulcerations or, gangrene) are at significant risk for progression of their disease and may ultimately require an amputation. Many of these patients are not candidates for traditional surgical revascularization, however, an emerging therapy for patients with critical limb ischemia is percutaneous revascularization.

CASE

A 72 year old man with a history of coronary artery disease, s/p coronary artery bypass grafting, hypertensin, dyslipidemia, obesity, deep venous thrombosis complicated by pulmonary embolus, and tobacco abuse presented with a three month history of a non-healing right leg ulcer.

Figure 1

Figure 1: Initial angiogram: Early Phase showing occluded right common iliac artery at the ostium

Figure 2

Figure 2: Angiogram in late phase showing reconstitution of the distal external iliac artery via collaterals

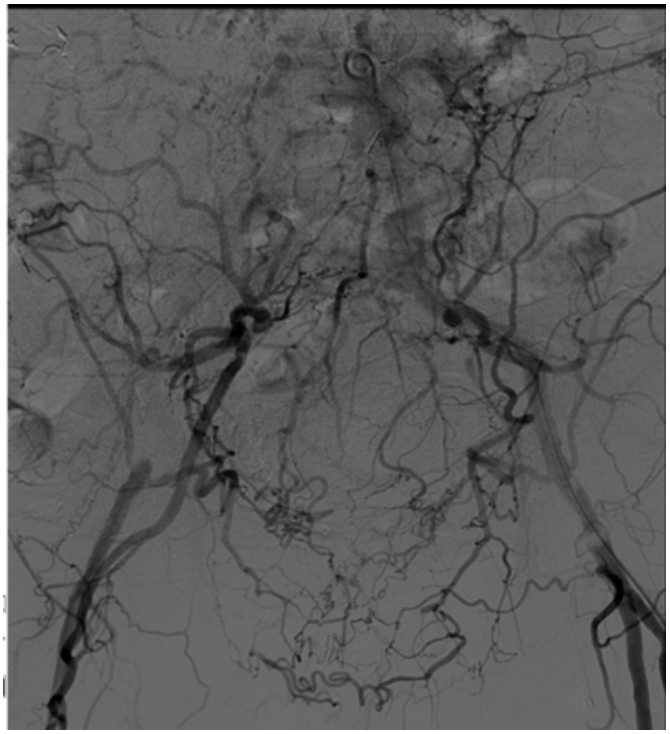


Figure 3

Figure 3: Procedural approach (bilateral 25 cm Brite Tip sheaths in the common femoral artery. Pre-dilatation with 9 x 40 balloon followed by 9 x 59 mm Balloon expandable stents

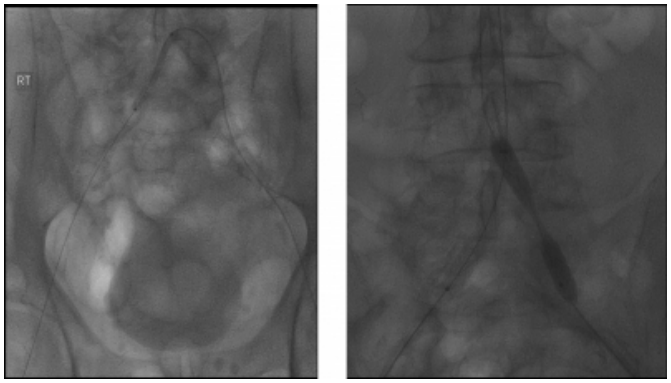
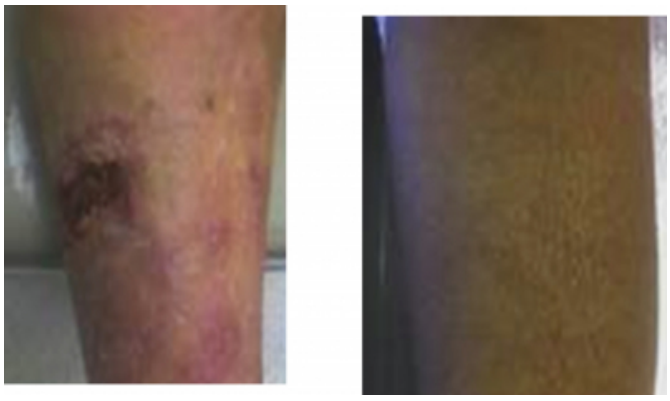


Figure 4

Figure 4: Final angiogram showing widely patent common iliac artery bilaterally

Figure 5

Figure 5: Ulcer at (a)Baseline and (b) 3 months post angioplasty plus stenting of the bilateral iliac artery



DISCUSSION

Lower extremity peripheral arterial disease is a significant health concern.[3] Beyond being a marker of overall cardiovascular risk, PAD results in significant morbidity and mortality. The estimated five year mortality in patients with PAD is 30%. An estimated 7% of patients with intermittent claudication will require bypass surgery for the limb and 4% of patients with intermittent claudication will develop

critical limb ischemia and require a major amputation over a five year period.(4)

Historically, a significant proportion of patients with critical limb ischemia, will face the prospect of an amputation. Amputees suffer from both physical and psychological limitations and avoiding an amputation, without sacrificing overall health, should be of the utmost concern.

Patients with critical limb ischemia have an even higher morbidity and mortality than claudicants- 20% die and 35% have an amputation over a one year period.(5) Indications for amputation include non-healing ulcerations, gangrene, and uncontrolled infections in patients who do not have surgical revascularization options.

Patients who develop critical limb ischemia, rest pain or non-healing ulcerations frequently have multi-level lower extremity occlusive disease. Frequently, there is severe occlusive disease of all three tibial arteries and the ankle-brachial index is less than 0.4. Historically, only 20-30% of patients had anatomy suitable for endovascular treatment.

Percutaneous treatment of critical limb ischemia is emerging as an effective modality to treat these patients. Limb salvage- avoiding amputation and healing of critically ischemic limbs is the goal of percutaneous revascularization- not necessarily long-term vessel patency. Indeed, often short-term re-establishment of flow into ischemic limbs results in long-term healing. The amount of tissue oxygen required to heal an ulcer is much greater than that which is required to maintain tissue integrity. Thus, although long-term patency of tibial interventions is low, the rate of wound healing and limb salvage is high.

Dorros, et al studied the efficacy of percutaneous angioplasty of tibioperoneal (outflow) disease in 235 patients with critical limb ischemia over a five year period.(6) There was a 95% clinical success rate with percutaneous treatment. Over the five year period, the limb salvage rate was 91%.(6) Only 9% of the patients underwent significant amputation; furthermore, only 8% underwent bypass surgery.(6) Fontaine III patients (ischemic rest pain) fared better than Fontaine IV patients (ischemic ulcerations and gangrene), though the rate of amputation was very low for Fontaine IV's (above knee- 4%, below knee 12%, transmetatarsal 21%).(6)

Randomized data is available comparing the outcomes of an initial surgical approach to an initial endovascular approach in patients with critical limb ischemia. The BASIL trial randomized 452 patients with infrainguinal critical limb ischemia to either surgery or percutaneous revascularization; the major endpoint was amputation free survival.(7) The patients had to be amenable to either strategy for randomization. The 30 day mortality was equivalent, however complications were significantly less in the angioplasty arm. At one year, clinical success was equivalent between the two arms. Surgery was found to be about a third more expensive at one year compared to angioplasty. Furthermore, there was no compromise in future surgical procedures if an initial angioplasty approach was taken.

CONCLUSIONS

PAD results in significant morbidity and mortality. Patients with critical limb ischemia have significant rates of amputation. Fortunately, percutaneous options exist for these patients. Prior to amputation, patients should be evaluated for and treated with percutaneous revascularization if possible.

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