How Many Below-the-Knee (BTK) Should be Opened in Intervention?

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Infrapopliteal Disease

- When peripheral artery disease (PAD) affects the infrapopliteal vessels alone or in addition to the more proximal vessels, limb-threatening ischemia and tissue loss often occur.

- In the United States, between 150,000 and 300,000 cases of critical limb ischemia (CLI) are diagnosed each year.

- Within 1 year of diagnosis, 30% of CLI patients will have had a major amputation, and 25% will have died; at 3 years, the mortality rate is 60%, predominantly due to ischemic cardiovascular disease.

- Majority of patients who undergo amputation from CLI don’t have an adequate vascular workup
Rutherford Classification

- Stage 0 – Asymptomatic
- Stage 1 – Mild claudication
- Stage 2 – Moderate claudication
- Stage 3 – Severe claudication
- Stage 4 – Rest pain
- Stage 5 – Minor tissue loss with ischemic nonhealing ulcer or focal gangrene with diffuse pedal ischemia
- Stage 6 – Major tissue loss – extending above transmetatarsal level, functional foot no longer salvageable
Infrapopliteal Disease

Patient Characteristics

• Diabetes
• Smoking
• Sedentary lifestyle
• Advanced age
• Concurrent vascular issues (coronary disease, carotid disease)
• Co-morbid conditions (chronic renal failure, active infections, contractures, etc)
• Difficult anatomy with multiple levels of disease (multi-level CTOs)
Goals of Therapy

- Relieve symptoms of pain
- Propagate wound healing
- Limb salvage
- DO NO HARM
Original Studies

SCAI Expert Consensus Statement for Infrapopliteal Arterial Intervention Appropriate Use

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Intervention to treat infrapopliteal arterial disease can be challenging because the patients' comorbidities, the anatomic variables, and the limitations of our techniques. Clinical scenarios based on anatomic and clinical variables are presented. Recommendations regarding intervention (appropriate care, may be appropriate care, rarely appropriate care) are made based on best evidence. © 2014 Wiley Periodicals, Inc.

Key words: peripheral intervention; appropriate use; peripheral arterial disease
Patients with CLI typically have arterial disease at multiple levels. (i.e. aorto-iliac, femoral-popliteal (FP), and infrapopliteal (IP))

Strictly looking at infrainguinal disease, the vast majority of patients have disease at the FP and IP levels.

Isolated IP disease is often seen in the elderly (>80), diabetic, or dialysis dependent patient.

Patients with isolated IP disease typically have shorter amputation free survival than those with with FP and IP disease.

Terminology

- Angiographically severe IP disease is defined as luminal reduction of 70-99% or occlusion in at least one IP artery
- Moderate IP disease is defined as a luminal reduction of 50-69%
- Mild IP disease is defined as a luminal reduction of <50%
- Obstructive disease in the below-knee popliteal artery limits blood flow to the three tibial vessels (anterior, posterior and peroneal) and is equivalent to three vessel disease
- Narrowing of the tibioperoneal trunk affects two tibial arteries (peroneal and posterior tibial) and is considered two-vessel disease.
Procedural success is defined as the re-establishment of direct “in-line” pulsatile flow to the foot through at least one IP artery.

It is currently unknown whether healing rates are improved when in-line flow to the foot is established through more than one IP artery.

Maximizing blood flow through more than one artery is attractive in patients with inadequate collaterals, plantar arch vessels, or limb-threatening ischemia.

Consequently, the size, location, and extent of the necrosis may impact the necessity for multi-vessel revascularization.

Furthermore, revascularization of the angiosome (a three-dimensional vascular territory supplied by specific source artery), has been shown to improve healing rates, using either endovascular or surgical therapies, when compared to revascularization of the non-angiosome territory.
Problems with Angiosome Concept

• This concept was developed in healthy patients.

• CLI patients have markedly altered vascular beds.

• Collaterals play a huge role in perfusion.

• Microcirculatory problems that involve mismanagement of blood flow in the limb play a significant role, especially in patients with diabetes.
Novel Techniques

- Digital Subtraction Angiography “wound blush”
- Two-dimensional (2D) perfusion angiography
- Real-time imaging that can be performed pre and post
- Can be directed at the wound and determine pre and post blood flow
- Objective evidence of perfusion
Bottom Line

- I always approach BTK treatment with a mind set to do more good than harm.
- I want to establish as much in-line blood flow to the foot, regardless of the angiosome.
- I do NOT want to:
  - Cause renal failure
  - Create a perforation causing a complication such as a compartment syndrome
  - Disrupt preexisting collateral networks or make blood flow worse
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