Infrapopliteal Angioplasty versus Bypass for Critical Limb Ischemia

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Critical limb ischemia (CLI), an advanced stage of peripheral arterial disease (PAD), is defined by the presence of ischemic rest pain, non-healing ulcers or gangrene for more than two weeks along with an objective evidence of ischemia [1,2,3]. The objective evidence includes ankle-brachial index (ABI, <0.5), toe systolic pressure (<30mmHg), or ankle systolic pressure (<50mmHg) [1,2,3]. The prevalence of PAD based on objective testing ranges from 3% to 10% in general population [1]. CLI occurs in 1-2% of PAD patients who are over 50 years [1] .CLI has a grave prognosis with a one-year mortality rate of 20% and a one-year amputation rate of 25% after the initial diagnosis [2]. Within six months of initial diagnosis, 40% of the patients with unreconstructable disease require a major amputation [2]. A major amputation is one in which a prosthesis is required to allow standing and walking; for example Syme's amputations, and all of the amputations above the ankle [3].

Interventions for the treatment of CLI include conservative therapy, revascularization, or amputation. According to TransAtlantic Inter-Society Consensus (TASC-II) guidelines [1], revascularization is the treatment of choice for patients with CLI, and a referral to a vascular specialist should be made early in the course of the disease to discuss revascularization options. Revascularization is cost-effective, usually leads to a better quality of life, and is associated with lower perioperative morbidity and mortality than amputation [1]. However, primary amputation should be considered in patients with extensive tissue necrosis, life-threatening infection, refractory rest pain, lesions not amenable to revascularization, or a very limited life expectancy [1,2]. The primary goals of revascularization are to relieve ischemic rest pain, heal ulcers, prevent amputation, improve patient's quality of life, and prolong survival. Endovascular techniques include balloon angioplasty, stents, stent-grafts, and plaque debulking procedures. Surgical options include autologous or synthetic bypass, endarterectomy, or an intraoperative hybrid procedure. The long-term results of the Bypass Versus Angioplasty in Severe Ischemia of the Leg (BASIL) trial favor surgery rather than angioplasty if there is a good vein, the patient is fit for surgery, and the expected survival is more than 2 years [4]. The optimal conduit for bypass is greater saphenous vein [1,2]. In its absence, another good quality vein from ipsilateral or contralateral leg, otherwise arm, should be used [2]. Autologous grafts are preferable due to significantly inferior patency rates of prosthetic grafts below the knee joint [1, 2]. Bypass remains the gold standard treatment in the presence of multilevel disease, which is usually present in most cases. For infrainguinal bypass, diabetes, smoking, and occlusive disease distal to the revascularization may affect patency rates, whereas cardiac, pulmonary, and renal status may influence operative and long-term mortality rates [3].

Due to its low mortality and morbidity, percutaneous transluminal angioplasty (PTA) is the desired treatment in certain situations such as the presence of limited disease with stenosis/occlusion up to 10 cm in length, patient with a significant comorbidity that increases risk for adverse perioperative events, life expectancy of less than 2 years, or the unavailability of bypass conduit [1,2,4]. If the expected outcome of endovascular and open surgical procedures is similar, PTA is preferred due to its lower cost [1]. In infrapopliteal angioplasty, technical success (defined by an improvement in hemodynamic status such as an increase in ABI of more than 0.10 after the procedure [3]) may approach 90%, with resultant clinical success (defined by improvement in Rutherford or Fontaine category AND hemodynamic improvement as evidenced by ABI improvement of >0.10 [3]) of approximately 70% in some series of patients [1]. Salvage rates (defined by prevention of amputation and complete and lasting healing of ischemic ulcers [3]) are slightly higher [1].The complication rate of PTA is 2.4%–17%, depending on the definition [1].

In the study by Ostotovan et al [5] in the current issue of the journal, 60 patients with below-the-knee CLI who underwent a total of 124 PTA (2 stents alone; 20 stents with balloon PTA and 102 balloon PTA alone) in 98 limbs were studied. Limb salvage, as defined by reduction in stenosis to less than 30%, was achieved in 96.6% patients immediately after the procedure and in 88.3% one-year after the procedure. This is comparable to the published literature [6]. One major procedure-related complication, three major arterial access site complications, and one fatality were seen. The major amputation rate was 11.7%; and ulcers healed completely in 64.3% and partially in 26.4%. Limitations of the study included a lack of comparison of pre-operative and post-operative Rutherford classification of patients, and the lack of control of patient's comorbid conditions, following the procedure, may have affected the patency and limb healing rates. Moreover, the enrolled patients had a baseline ABI of 0.43 to 0.59; part of thus, some of the patients may have had a higher ABI than the cut-off definition and could have led to falsely superior results. Additional studies comparing infrainguinal balloon angioplasty, primary stenting, and bypass are needed. CLI has a dismal prognosis for both life and limb outcomes no matter which treatment is used. This is because most patients have generalized atherosclerosis. Aggressive control of cardiovascular risk factors is recommended for all patients, while symptomatic treatment of limb has to to be individualized.

Optimal management of patients with CLI requires a multidisciplinary approach. At present, bypass surgery remains the gold standard for below-the-knee CLI. As the short- and long-term outcomes of endovascular interventions continue to improve, it is probable that these may be used in an extended range of patients presenting with CLI.

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