The Effectiveness of a Team Approach in Treating Critical Limb Ischemia

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Dr. Tursi and Dr. Walker share a case study that demonstrates the effectiveness of a team approach to treating critical limb ischemia (CLI).

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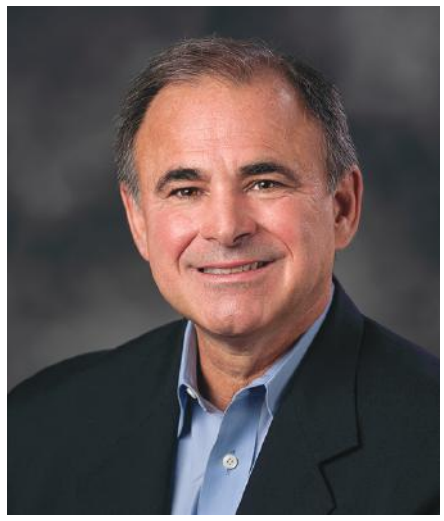

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Peripheral arterial disease (PAD) is a highly prevalent, substantially under-diagnosed global disease that carries a significant risk of morbidity and mortality.[1] As of 2009, PAD was estimated to afflict 8 to 12 million people, but more recent numbers approach 18 million in the United States.[2] Mortality rates associated with this devastating disease rival or exceed those associated with most lethal cancers and coronary conditions, including breast cancer, colon cancer, and congestive heart failure.[3,4] Fowkes et al noted in Lancet that PAD afflicts > 202 million people worldwide, and as such, PAD has been stated to be both more prevalent and more lethal than HIV.[5] In regard to prognosis, one year following the diagnosis of PAD/CLI, 25% of these patients will be dead, while 30% will have undergone an amputation. At year 5, over 60% of those diagnosed with CLI will be dead. Additionally, within 5 years of the diagnosis of PAD/CLI, 20% will have sustained a non-fatal myocardial infarction (MI) or cerebrovascular accident (CVA), while 30% will have a fatal MI or CVA.[6]

Unfortunately, many patients presenting with PAD are not diagnosed until they exhibit severe ischemic symptomatology or advanced non-healing wounds of the lower extremities. During initial examination, it is vital that the PAD risk factors of each patient are identified. These include diabetics over the age of 50, diabetics under the age of 50 with comorbidities of hypertension or hyperlipidemia, renal disease patients, past or current smokers, patients with a past history of cardiovascular disease such as MI or CVA, patients over the age of 65, and all chronic wound patients.[7] Complicating the diagnosis of this devastating disease is the fact that 50–60% of PAD patients present without symptomatology [8] As we are aware, diabetic patients with severe neuropathy can undergo pedal amputations without the use of any anesthesia. With this profoundly impaired sense, is it realistic for us to believe that they will be able to recognize the symptoms of PAD, such as claudication?

The PARTNERS Study was conducted from June 1999 to October 1999 and reported in JAMA in 2001.[1] This study accumulated data from 27 sites, located within 25 cities, and looked at nearly 7,000 patients of 350 primary care physicians. Patients were identified as being at risk for having PAD, and a detailed history and ABI vascular test was performed. Those patents with an ABI of 0.9 or less, or those with a history of recent or prior interventions, were considered to be positive for PAD. Peripheral arterial disease was found in 29% of this group, with only 11% having any symptomatology. Another concerning finding of the PARTNERS study was that while nearly 83% of patients with PAD were aware that they had PAD, less than 50% of their own treating primary care physicians were aware that they did indeed have PAD.

Economic costs associated with PAD are astronomical, with estimates of $58 billion in annual hospital costs and associated costs of all vascular events and interventions in 2004. Annual outpatient medication costs and in-patient interventions were estimated to exceed $290 billion in 2010.[9,10] To illustrate the enormous benefits of limb salvage, not only must we consider the untoward psychological, personal, and financial effects of primary amputation, but the unfortunate fact that, typically, a patient undergoing a below-the-knee amputation (BKA) loses their contralateral limb in 2 years and dies within 5 years of this amputation. From an economic standpoint, the rehabilitative costs following major primary amputation are $500,000–$600,000 during the first 5 years, not including the costs of home renovations such as ramps, shower and bath grab bars, etc.[11] The following case history is an illustration of all the aforementioned data and statements.

A 75-year-old Caucasian male presented to my podiatry practice as an out-of-state referral from a revascularization specialist. The patient had presented initially with severe bilateral ischemic peripheral arterial disease and severely calcified vessel disease below the knee. His primary complaint was a painful, non-healing, gangrenous second digit of the left foot. The patient was a nonsmoker, lived an active lifestyle with no history of diabetes mellitus, cardiac, or renal dysfunction.

Prior to presentation to the referring physician and following the development of gangrenous changes of his left second toe, he had undergone an unsuccessful endovascular revascularization procedure and was referred to the referring revascularization specialist. Unfortunately, at that time, the patient sought a second opinion at a large academic hospital. Following an extensive work-up and additional unsuccessful endovascular work at that center, he was advised that his best option would be below-the-knee (BTK) amputation. In fact, he was given psychological counseling to prepare for BTK amputation. At this point, he decided to travel to the referring revascularization specialist for a third opinion.

It was there that he was diagnosed with severe PAD and extensive infra-popliteal calcified vessel disease. The patient underwent CO_2 angiography and drug eluting stent placement in the peroneal artery followed by crossing of a long calcified anterior tibial occlusion and treatment of the dorsalis pedis with percutaneous transluminal angioplasty.

Figure 1. Initial presentation to podiatrist.

Disclosure: Dr. Tursi reports that he is a Speaker/Consultant for Kerecis. Dr. Walker has no relevant disclosures.

Figure 2A. Post-operative repair.

Figure 2B. Post-operative repair.

Figure 3. Application of Kerecis™ Omega3 acellular fish skin graft.

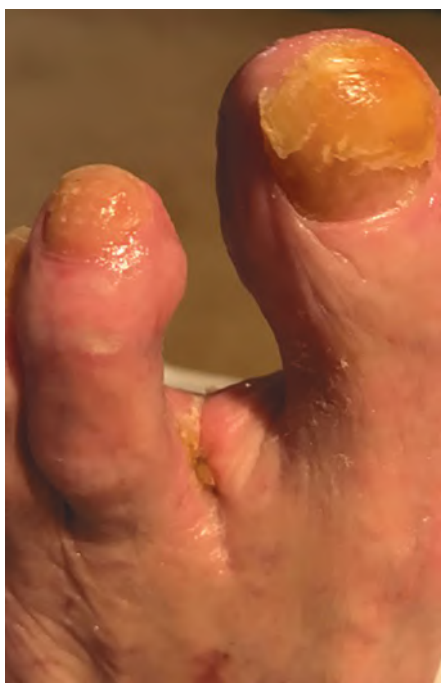

Figure 4. Healing 10 months after initial presentation to Podiatrist.

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He was then referred to my office for advanced wound healing treatment of his gangrenous 2nd digit (Figure 1). Following comprehensive history and physical examination, he was scheduled for a second digit amputation with exploration of the left second metatarsal phalangeal (MTP) joint. He also required an incision and drainage of the left second MTP, as he had developed a deeply seated abscess in that region. One of the most reassuring signs that he exhibited prior to incision was a visibly bounding dorsalis pedis (DP) artery pulse. The surgery was performed as described and his operative site was left open with local wound care performed while he was an inpatient. Prior to discharge, he was taken back to the operating room for delayed primary repair, which was performed following light wound debridement and extensive pulsatile lavage. (Figures 2 and 3).

Active surveillance in the outpatient setting ensued over the next 2 weeks, where he did encounter a small dehiscence of his dorsal incision site. This was treated with wound care visits, debriding necrotic tissues, and twice-daily Santyl dressing changes. Once the wound bed was clean and granular, we began using a Kerecis (Isafjordur, Iceland) Omega3 acellular fish skin graft as a skin substitute. A consultation with orthotics and prosthetics was also arranged for off-loading techniques and custom molded shoe implementation. He returned to his home state and wound care was continued by a local podiatrist with weekly application of the Kerecis Omega3 acellular fish skin graft (Figure 4).

One application of Kerecis had been performed prior to his transfer home, and 11 additional Kerecis grafts were applied over the following 2 months. Healing progressed nicely. Unfortunately, he developed a septic knee. He had a history of a total knee implant arthroplasty and apparently seeded infection to this region. The infection was treated with IV antibiotics, incision and drainage of the knee joint, and extensive pulsatile lavage. Once the septic arthritis was eradicated, treatment resumed on the left forefoot wound, which had regressed slightly. Sorbact with hypochlorous solution was initiated and with local wound care was continued until full wound healing had been achieved, approximately 10 months following surgery (Figures 5 and 6).

In conclusion, as physicians treating exclusively the foot, ankle, and lower extremities, podiatrists are often referred to as the gatekeepers of PAD. Podiatrists are typically the first physicians to have the chance to recognize and diagnose PAD, and with such an enormous opportunity, must be well versed in the risk factors, subjective complaints, clinical presentation, vascular testing, and treatment options. The earlier a patient can be referred to a revascularization specialist, the more likely that not only their limb may be saved, but their life as well. ■

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Figure 5. Healed at 10 months.

REFERENCES

1. Hirsch AT, Criqui MH, Treat-Jacobson D, et al. Peripheral arterial disease detection, awareness, and treatment in primary care. *JAMA*. 2001;286(11):1317–1324.
2. Yost ML. Diabetic Foot Ulcers, peripheral arterial disease and critical limb ischemia. *The SAGE Group*. 2010.
3. Howlader N, et al. *SEER Cancer Statistics Review, 1975–2010*. Accessed April 17, 2014.
4. Dolor RJ, et al. *Comparative Effectiveness Reviews,* No. 66. 2012 Aug.
5. Fowkes FG, Rudan D, Rudan I, et al. Comparison of global estimates of prevalence and risk factors for peripheral artery disease in 2000 and 2010: a systematic review and analysis. *Lancet*. 2013; 382(9901):1329–1340. doi: 10.1016/S0140-6736(13)61249-0.
6. Davies MG. Critical Limb Ischemia: Epidemiology. Methodist Debakey *Cardiovasc J*. 2012;8(4):10–14.
7. "Who Is at Risk for Peripheral Artery Disease?" National Heart, Lung, and Blood Institute. Updated June 22, 2016. https://www.nhlbi.nih.gov/health/health-topics/topics/pad/atrisk.
8. Fowkes FG, Housley E, Cawood EH, Macintyre CC, Ruckley CV, Prescott RJ. Edinburgh Artery Study: prevalence of asymptomatic and symptomatic peripheral arterial disease in the general population. *Int J Epidemiol*. 1991;20(2):384–392.
9. Ruiz J. Peripheral Vascular Disease (PVD). Obesity and Diabetes: Epidemic Proportions in Puerto Rico and its Financial Impact. Report from PREHCO Project data, Governor's Office for Elderly Affairs of the Commonwealth of Puerto Rico (OGAVE), January 2005.
10. Yost ML. The real cost of peripheral artery disease. The SAGE Group. 2011.
11. Allie D. Costs of Bypass vs PTA vs. Amputation. Presented at the New Cardiovascular Horizons Symposium, 2009