

Pressure Points

Quality Solutions... Healthy Returns

Diabetic Wound of the Lower Extremity

Extent of the Problem

Ulcerations of the feet, wound infection, and progressive tissue loss represent a major source of morbidity and mortality in patients with diabetes. While data is incomplete, as many as 45 to 70 percent of all lower extremity amputations may be linked to underlying diabetes.

Foot infections represent a major reason for diabetic hospital admissions and health care expenditures. Recent literature suggests that if more attention is provided to foot care in this high risk patient population, serious morbidity and even mortality can be prevented.

The Hyperbaric Medicine Service at St. Joseph Medical Center has a thorough approach to evaluating and managing these difficult diabetic foot wounds. Healing is achieved in cooperation with referring physicians, surgeons, and podiatrists.

Causes of the Problem

Peripheral neuropathy and minor trauma are critical factors which lead to foot and leg wounds in patients with diabetes. Once an injury occurs, the faulty healing in patients with diabetes can lead to a chronic wound. **Ischemia** (tissue hypoxia) and **infection** play major roles in healing failure. Low periwound tissue oxygen levels are uniformly associated with initial wound healing failure and increased infection risk.

Treatment of the Problem

Many authors have demonstrated the importance of providing an aggressive multidisciplinary approach to the management of patients with diabetic wounds. Frequently the total care required for optimal outcome exceeds

the resources which any single physician can provide. The Hyperbaric Medicine Service provides a multidisciplinary approach to care and offers certain unique resources for patient

evaluation and treatment.

- Since periwound tissue hypoxia has been shown to be an important determinant of wound healing in diabetic patients, the Hyperbaric Medicine Service can perform transcutaneous oxygen measurements when necessary. Patients with demonstrated tissue hypoxia and an abnormal pulse examination go on to further peripheral vascular evaluation and possible surgical intervention. Adjunctive hyperbaric oxygen treatment can be used in combination with revascularization or as a primary treatment when no revascularization options exist. Adjunctive hyperbaric oxygen treatment also improves host response to local soft tissue and bone infection. Adjunctive hyperbaric oxygen treatment has been recommended in the

... as many as 45 to 70 percent of all lower extremity amputations may be linked to underlying diabetes.

Frequently the total resources required for optimal outcome exceed the resources which any single physician can bring to bear.

American Diabetes Association guidelines. The guidelines state that it is appropriate to use hyperbaric oxygen to treat severe wounds that are limb or life threatening, or if the wound has not responded to other treatments. This is particularly important if ischemia cannot be corrected by a vascular procedure.

- Aggressive wound debridement is also a mainstay in diabetic foot wound treatment. Initial surgical debridement, tissue cultures, and regular follow-up provide the best opportunity for healing.
- Pressure relief of plantar ulcers is provided utilizing orthotics, on an initial temporary basis for improving wound healing and subsequently for long term reinjury prevention.
- Topical human platelet derived growth factor (PDGF, Becaplermin), Bioengineered tissue products including Apligraf and Dermagraft, and negative pressure wound therapy (KCI wound vac) may be used to support and promote more rapid wound healing in selected cases.
- Patient education is vital to improve compliance with initial treatment requirements. Lifestyle modifications to prevent future wounding are also stressed.

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Pressure Points

While treatment of established wounds in patients with diabetes is a major emphasis of our program, reducing the overall risk of lower extremity amputations in these patients is equally important. Discharge education focuses on patient follow-up with their primary physician, endocrinologist, and podiatrist to maintain health, receive proper footwear, and undergo frequent foot examination.

Treatments can be scheduled on an inpatient or outpatient basis based on the patient's condition and requirements.

In this manner ulcer prevention will become a more significant aspect of the care of these patients. When coupled with early aggressive treatment of ulceration when it does occur, the rates of lower extremity amputation in patients with diabetes will be reduced.

References:

American Diabetes Association (April 7-8, 1999) Consensus Development Conference on Diabetic Foot Wound Care Diabetes Care 22(8) 1354-1360, 1999

Baroni G, Porro T, Faglia E, et al. Hyperbaric oxygen in diabetic gangrene treatment. Diabetes Care, 1987, 10(1):81-86.

Cianci P, Petrone G, Green B. Adjunctive hyperbaric oxygen in the salvage of the diabetic foot. Undersea Baromed Res, 1991; 18(Suppl): 108.

Epstein DA, Corson JD. Surgical perspective in treatment of diabetic foot ulcers. Wounds 2001; 13(2):59

Faglia E, et al. Adjunctive systemic hyperbaric oxygen therapy in the treatment of diabetic foot ulcer. A randomized study. Diabetes Care 1996;19:1338-43.

Oriani G, et al. Hyperbaric oxygen therapy I diabetic gangrene. J Hyperbaric Med, 1990, 5(3):171-175.

Stone JA, Scott RG, Brill LR, Levine BD. The role of hyperbaric oxygen therapy in the treatment of the diabetic foot. Diabetes, 1995, 44(Suppl 1): 71A.

Veves A (ed) Biology and treatment of diabetic foot ulcers. Wounds 2000; 12(4):79.

Wattel FE, Mathieu DM, et al. Hyperbaric oxygen in the treatment of diabetic foot lesions: Search for healing predictive factors. J Hyperbaric Med, 1991, 6(4):263-267.

Zamboni WA, Stephenson T. Evaluation of hyperbaric oxygen for diabetic wounds: A prospective study. Undersea Hyperbaric Med, 1995, 22(Suppl): 11.

Patients are referred to the Hyperbaric Medicine Service at St. Joseph Medical Center for aggressive, outcome based wound management. Our center is designed to compliment the attending physician's services by providing expert wound management consultation and care including the application of advanced wound care technology and hyperbaric oxygen treatment as indicated based on a comprehensive system of evidence based clinical practice guidelines. The referring physician will continue to treat comorbid conditions and provide for the patient's overall medical care. All etiologies of wound healing failure are accepted for evaluation and care.

Types of wounds treated include Diabetic, Venous Stasis, Ischemic, Pressure, Traumatic, Surgical and other wounds that resist healing.

Problem wound patients should be referred to the center when:

- The wound has failed to show significant progress in 4 weeks of standard care
- When the wound involves deep tissue structures or is limb or life threatening
- When the wound is complicated by significant comorbidities including peripheral vascular disease, persistent edema, persistent infection, prior radiation treatment to the area, or compromised immune status of the patient

† CATHOLIC HEALTH INITIATIVES

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