Maggot Therapy for Treating Diabetic Foot Ulcers

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Presentation of Process/Signs and Symptoms

An important factor to be of is that 96% of patients with diabetic foot ulcers present with diabetic neuropathy (Ko, Santos, & Gambä, 2013, p. 36). According to the American Podiatric Medical Association (2010), diabetic neuropathy is a condition that can affect the entire body. The signs and symptoms of an infected diabetic foot ulcer are:

- Fever
- Swelling
- Rapid or slow pulse
- Redness
- Increased pain
- Increased redness
- Swelling
- Infection
- Ulceration
- Change in color
- Change in consistency
- Odor

Due to the nature of these wounds the risk of infection is high, so understanding the signs and symptoms that diabetic foot ulcers present with is crucial. The signs and symptoms of an infected diabetic foot ulcer are:

- Increased pain
- Increased redness
- Increased swelling
- Persistent pain
- Temperature changes
- Change in color
- Change in consistency
- Odor

Underlying Pathophysiology

Diabetic foot ulcers form as a consequence of two of the negative mechanisms associated with diabetes: neuroathy, peripheral vascular disease, and reduced infection to tissue (Dinh et al., 2012, p. 2977).

- Hyperglycemia, a result of the oxidative stress on nerve cells secondary to hyperglycemia, has a key role in the development of diabetic ulcers.
- Sensory nerve dysfunction leads to decrease ability to feel bruise or notice wounds on foot that may result in a bigger issue.
- Motor nerve dysfunction to the muscle of the foot can lead to deformities, which may cause areas of increased pressure and ultimately reduces perfusion.
- Autonomic nervous dysfunction impacts sweat glands, decreasing foot’s ability to moisture, leading to cracks and skin breakdown (Aumiller, 2015, p. 29).

Besides, there is an increase in vascular changes by providing alterations of endothelial cells in the peripheral arterioles. Hypertension results in higher oxidative stress (ROS) and decreases nitric oxide (NO). Endothelial dysfunction results from inflammation and cellular injury by promoting pro-inflammatory cytokines, increasing adhesion molecules, and increased expression of cell adhesion molecules (Kobayashi, 2011, p. 1-2).

Clinical symptoms regarding the delayed healing in diabetic foot ulcers were linked to microbiome colonizing. Wound healing (excretions or secretions promote fibroblast motility through remodeling and stimulating cellular responses)

- Microbiological burden has a key role in vascular changes by providing alterations of endothelial cells in the peripheral arterioles pathogenic (Staphylococcus, Streptococcus, Proteus, and enterococci, and aerobic and anaerobic bacteria)
- Hyperglycemia, a result of the oxidative stress on nerve cells secondary to hyperglycemia, has a key role in the development of diabetic infections, adding to the slowdown in the healing process.
- Individuals with poor glycemic control had a higher abundance of Staphylococcus and Streptococcus (Hillman, Heilmann, Segre, & Grice, 2013, p. 927-928).

Maggot Debridement Therapy (MDT)

Maggot therapy is “an application of live fly larvae to wounds in order to aid in wound debridement (cleaning), disinfection, and/or healing (Okerson, 2014)”. MDT is used to treat severe, infected acute, and chronic wounds (Czerny et al., 2012, p. 897). It is used as a combination with conventional treatments including systemic antibiotics and chemotherapy (Peck & Kirkland, 2012, p. 1137).

MDT was approved by the US Food and Drug Administration (FDA) in 2004 for physicians to prescribe for wound debridement (Czerny et al., 2012, p. 876). Therefore, health care providers must be cognizant of the following:

- The importance of doing a thorough assessment on all patients, but particularly known diabetics and those with severe chronic conditions.
- The likelihood of the patient being able to observe a diabetic foot ulcer, or the early signs of one, are very good.
- That neuropathy, vascular changes, and immune impairment are only a few of the ramifications of diabetes.
- The primary goal would be prevention or reversal of the ulcer.
- The patient, unable or unwilling to meet that goal, must be educated on the importance of glucose control and good foot care for the prevention of diabetic foot ulcers.

Significance of Pathophysiology

- The pathophysiology of the development of diabetic foot ulcers points to the need for a critical evaluation of our current practices.
- Understanding the underlying pathophysiology will help in formulating new and innovative strategies to promote healing and decrease the risk of infection for diabetic patients.
- Hypertension, hyperglycemia, chronic wounds, uncontrolled glucose, has detrimental effects on numerous systems of the body. The significance of knowing what those effects are and how they originated gives the medical professional a knowledge base to make better patient care decisions.
- Knowing what facilitated a particular ulcer may possibly warrant different types of treatment, education, prevention measures, and/or future considerations.

Implications for Nursing Care

Dietetic foot ulcers do not only compromise the quality of life, they can be an omen for death. Combating DFUs requires “multidisciplinary management, patient education, control, debridement, offloading, infection control, and adequate perfusion (Brown, Fish, Lev, Kronen, & Isseroff, 2014, p. 267). Therefore, health care providers must be cognizant of the following:

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References


Additional Resources

http://www.btmcl.com/eng/cases2.html