RECENT TRENDS IN DIABETIC FOOT MANAGEMENT

An Essay
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Summary

Diabetic foot is the most common complication of diabetes mellitus which may lead to lower extremity amputation which consider as major problem for the patient as it leaves him handicapped.

Diabetic patient should respect this risk as one of the major diabetes complication which is usually starts by ulceration, infection and may ends by gangrene. So it is important for every diabetic patient to know and to learn how to make a good foot care which can reduce the incidence of foot ulceration through modification of self-care practices, appropriate evaluation of risk factors, and formulation of treatment protocols aimed at early intervention, limb preservation, and prevention of new lesions.

Mostly all diabetic foot patients start with medical treatment for fear of spreading of infection and also they need surgical intervention which are drainage and debridement.

Studies were done in this subject to prevent the patient from the cost of amputation which is not just physically but also emotionally and financially.

New trends of management of diabetic foot start to appear, stem cells therapy is one of those new trends which is very successful and starts to be more world wild management as it

List of Contents

List of Tables

List of Figures

List of Figures

List of Figures

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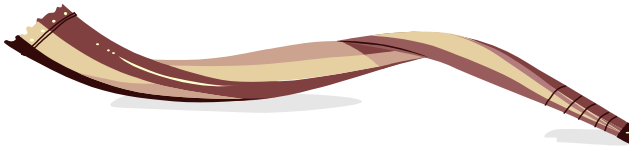

Introduction

The incidence of diabetes mellitus is increasing globally ***(Reiber, 2001)*** and elder diabetics had twice the risk of developing a foot ulcer, three times the risk of developing a foot abscess and four times the risk of developing osteomyelitis ***(Reed, 2004).***

Diabetic foot ulcers precede 85% of non traumatic lower extremity amputations. Approximately 3-4% of individuals with diabetes currently have foot ulcers or deep infections. Among persons with diabetes, 15% develop foot ulcers during their lifetime ***(Lipsky, 2006)***.

Infections in the diabetic foot are regularly the consequence of neuropathic, ischemic, or combined neuropathic-ischemic ulcerations which cause substantial morbidity including a high rate of major amputations ***(Lipsky, 2005)***. Diabetic foot infections are responsible for substantially high costs of diabetic treatment and induce an increased rate of mortality. An early diagnosis on the basis of clinical presentation, laboratory results, and radiologic imaging together with an adequate classification of the severity of infection represents the key for a successful intervention strategy. Severe infections in diabetic feet have a poorer prognosis than mild or moderate infections ***(Lipsky, 2006).***

Management of diabetic ulcers includes cleansing of the wound, debridement of any necrotic or gangrenous foreign bodies or exposed bone ***(Grayson et al., 1995)***, to reach a healthy base that will support granulation tissue and allow healing by secondary intention ***(Chen et al., 2005)***. Lower extremity amputation, a devastating consequence of diabetes, remains a very common outcome of diabetic foot complications ***(Johannesson, 2009)***.

Indeed, people with diabetes are 10–15 times more likely to require lower extremity amputation than non-diabetic individuals, with a 30%–50% higher risk of undergoing a second amputation. Furthermore, the mortality rate for patients undergoing amputation is 6%. Amputation is not only a costly outcome for patients, but also expensive for the health care system. In one estimate, managing one patient with an amputation will cost around $40,000 to $75,000 ***(King, 2008).***

New treatments for diabetic foot ulcers continue to be introduced ***(Eldor et al., 2004)***, including the use of negative pressure dressings ***(Armstrong, 2005)***, hyperbaric oxygen treatment, bioengineered skin equivalents, growth-factor therapy and bone-marrow-derived stem cells ***(Badiavas et al., 2003).***

1908 - The term "stem cell" was proposed for scientific use by the Russian histologist Alexander Maksimov (1874–1928)

at congress of hematologic society in Berlin. It postulated existence of haematopoietic stem cells. 1978 heamopoitic stem cells are discovered in human cord blood ***(Bethesda, 2006).***

Stem cells have the remarkable potential to develop into many different cell types in the body during early life and growth. In addition, in many tissues they serve as a sort of internal repair system, dividing essentially without limit to replenish other cells as long as the person or animal is still alive ***(Bethesda, 2006).***

Stem cells however are relatively undifferentiated and still have the ability to develop into different types of cells to exert different functions. A stem cell's most notable characteristic is its ability to reproduce a completely normal and even younger cell. As a result people can use their own or someone elses stem cells or stem cell-derived tissues or organs to replace ill or aging tissues or organs ***(Bethesda, 2006).***

In treatment of diabetic foot ulcers the transplanted stem cells have the ability to migrate to the damaged tissue sites and stimulate repairs by differentiating into skin specific cells ***(Mendonca et al., 2005).***

Negative pressure wound therapy has been found to facilitate healing of the stagnant pedal wound. The vacuum-

assisted closure system (VAC) uses continuous or intermittent sub-atmospheric pressure over the surgical wound, applied with a polyurethane sponge sealed with adhesive transparent plastic. This system came into clinical use ten years ago. It has been stated that treatment with negative pressure dressing can accelerate the healing of diabetic foot lesions ***(Venturi et al., 2005).***

The action mechanism for this system has multiple factors and consists of evacuating excess fluid and reducing oedema in neighbouring tissues to therefore improve microvascular perfusion and decrease bacterial colonisation, while simultaneously protecting the lesion from external contamination ***(Venturi et al., 2005)***.

HBOT is an established technology that has been in use for more than 40 years. For wound healing treatment, a person is placed in a compression chamber under pressure greater than one atmosphere absolute (ATA) of 100% oxygen. The pressure increases the level of oxygen dissolved in the blood plasma affecting the immune system, wound healing, and vascular tone. It has been suggested that the use of adjunctive HBOT will improve the healing of diabetic lower leg ulcers, and decrease the risk of lower extremity amputations ***(Kessler et al., 2003).***

Aim of the work

The aim of the work is to review the lecture about the recent trends in diabetic foot management.

Anatomy of the Foot

Knowledge of the anatomy of the foot is essential so that progression of disease in the diabetic foot can be understood and proper surgical treatment applied. Effective clinical evaluation and effective surgery are based on an understanding of the gross anatomy and of alterations produced by disease ***(Klenerman et al., 2006).***

I. Bones

There are three groups of bones in the foot:

- The seven tarsal bones, which form the skeletal framework for the ankle;
- Metatarsals (I to V), which are the bones of the metatarsus;
- The phalanges, which are the bones of the toes-each toe has three phalanges, except for the great toe, which has two. (figure 1)

1. Tarsal bones

The tarsal bones are arranged in a proximal group and a distal group with an intermediate bone between the two groups on the medial side of the foot ***(Drake et al., 2004).***

- **Proximal group**

The proximal group consists of two large bones, the talus (Latin for ankle) and the calcaneus (Latin for heel).