

Original Article

The outcome of diabetic foot infection in Jordanian cohort

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ABSTRACT

Objective

To study results of diabetic foot infection treatment in a general surgery clinic and diabetes clinic.

Patients and Methods

Sixty patients with diabetic foot infection were enrolled in this prospective study during the September 2005 through August 2007. Statistical analysis was preformed. X² test used to test for significance of differences.

Results

Ten patients out of 60 (17%) had below knee amputation after failure of local foot debridement.

Conclusion

Foot infection is a serious medical problem. Establishment of specialized diabetic foot care clinic is necessary for early intervention to prevent further deterioration that may lead to amputation.

Key words

Diabetic foot, amputation, diabetes mellitus.

INTRODUCTION

Diabetes mellitus is the most common metabolic disorder affecting humans. Of the estimated 21 million Americans with this disorder, approximately 90% have type 2 diabetes, which is caused by the dual defects of insulin resistance and beta-cell

secretory dysfunction, both of which are aggravated by glucose toxicity and lipotoxicity .less than 40% of people with diabetes achieve recommended therapeutic goals. In the UK Prospective Diabetes Study (UKPDS), a 1% difference in A1C between "intensively" and "conventionally" treated subjects with type 2 diabetes (A1C 7.8% vs 8.8%) led to a 25% relative risk reduction for the onset or progression of microvascular complications (1). the typical patient with new-onset type 2 diabetes has had diabetes for at least 4-7 years before it is diagnosed (2). The diabetic foot may be defined as a group of syndromes in which neuropathy, ischemia, and infection lead to tissue breakdown resulting in morbidity and possible amputation (World Health Organization, 1995) (3). Foot disease is the most common complication of diabetes mellitus leading to hospitalization (4). It is also the leading cause of lower extremity amputation in USA. It was estimated that diabetics are 12 times more likely to undergo amputation than non –diabetic (4) .As far as we know .clinics specializing in diabetic foot care are not yet available in Jordan. The establishment of such clinic and team management of foot infection has yielded an improved outcome for these patients.

PATIENTS AND METHODS

This is prospective study carried out at King Hussein Medical Center during the period between September 2005 through August 2007. The diagnosis of "diabetic foot" was made by endocrinologist and Surgeon. Sixty patients with diabetic foot infection were treated at medical and surgical wards during this period and all patients were seen by both physician and surgeon and both agreed management protocol .Information regarding diabetic history and its control, concomitant neuropathy or vascular insufficiency (absent pedal pulse) were also recorded.

According to Rancho Los Amigos Hospital classification, cases were classified into: a- cellulites with or without abscess formation, b-infected ulcer, c-infected gangrene. On admission, all patients, included in the study, were started on antibiotic treatment covering aerobic and anaerobic organisms whilst awaiting the result of pus culture and sensitivity. Table 1 shows indications for admissions to the hospital, while table 2 shows the management options for patients. Control of diabetes with insulin and oral hypoglycemic agents was provided together with local care of the foot by pus drainage and debridement for cellulites and infected ulcer. The wounds were left open

for daily dressing. Amputation of one toe or more was performed with excision of part of the metatarsal bone if involved. Below- knee amputation was performed for cases of extensive involvement of the foot bones and as a second procedure when local debridement failed to control the infection. Many patients were not admitted to hospital and treated at outpatient clinics with close observation and frequent visits. Statistical analysis was performed using SPSS for windows, the Chi – square test used to test

RESULTS

There were 29 (48%) males and 31 (52%) females, with a mean age of 60 years (41-80).

Table 1. Presentation and duration of diabetic foot infection and neuropathy.

	Infected Foot		
	Cellulites	Infected ulcer	Gangrene
NO of cases	17	25	15
Duration of DM (years)	12	13	15
Duration of DF (days)	10	20	25
Neuropathy (41 cases)	5	15	21
Oral drugs	7 (20%)	16 (47%)	12 (33%)
Insulin	5 (24%)	9 (41%)	8 (35%)
New cases	1	1	1

Thirty five (58%) patients were controlled by oral hypoglycemic drugs, while 22 (37%) were insulin-dependent. Three (5%) were discovered on admission to have diabetes.

- **Table 2. Management and hospital stay.**

Management	No of patients	Hospital Stay (days)
Debridement	29 (48%)	14 (03-55)
Toe amputation	21 (35%)	25 (05- 50)
Below knee amputation	10 (17%)	41 (14- 45)

A diabetic history as such had no major effect on the severity of presentation. However, it was found especially in the presence of concomitant neuropathy. There was no significant difference in presentation among patients controlled by oral hypoglycemic drugs as compared with those on insulin prior to admission (table 1). 10 patients had below-knee amputation after failure of local foot debridement (table 2).

DISCUSSION

Foot infections in diabetics necessitate hospitalization and energetic management. The aim is to salvage the patient's foot, and to keep it functioning. Loss of protective sensation, combined with recurrent trauma is the primary mechanism of foot breakdown⁵. Trauma provides a suitable opportunity of bacterial invasion and multiplication through the tissue planes of the foot. This contributes to the late (Table 1) of these patients who are unaware of the seriousness of their foot problems until major sign and symptoms appear.

Diabetic foot can be classified according to its stage ; cellulites with or without abscess formation ,infected wound or pre-existing tropic ulcer and the late presentation of infected gangrene with clinical and or radiological evidence of bone involvement⁶. The later the presentation the more sever is the extent of infection⁷.

The polymicrobial nature of these infections mandates antibiotic coverage for both anaerobic and aerobic organisms. Adequate cleaning and debridement with dependent drainage are the mainstay of treatment. This may necessitate amputating one or more toes together with excision of part of the related metatarsal bone. In advanced infection or when conservative amputation fails, below –or above- knee amputation might be needed to eradicate uncontrollable sepsis. Ten of our patients had below-knee amputation as a second procedure.

Limp vascularity and its relation to the pathophysiology of foot ulcers, infection and healing has been investigated^{9,10}. The presence of pedal pulses or maintained good Doppler pressure can predict good healing after control of infection⁴. The pressure 41 patients with diabetic nephropathy among our patients ,along with a positive history of trauma(25) ,clearly shows the importance of this factor . the need for proper foot care of diabetics can't be overemphasized. Specialized clinics dedicated to the care of diabetic patients have. been shown to improve the prognosis by early detection and

treatment of both potential and actual foot lesions ¹¹. In these clinics education of known as well as newly discovered diabetics can be stressed with regard to control of their diabetes and the daily care of their feet. Such a policy was shown by Griffith & Wieman to improve the prognosis and reduce the hospital stay of these patients ¹². We largely agree with the guidelines from the American Diabetes Association (ADA), which recommend the following with regard to foot care (16,17): 1. Perform a comprehensive foot examination annually on patients with diabetes to identify risk factors predictive of ulcers and amputation. Perform a visual inspection of the feet at each routine visit, 2. The comprehensive foot examination can be accomplished in the primary care setting and should include inspection of the skin for integrity, especially between the toes and under the metatarsal heads. The presence of erythema, warmth, or callus formation may indicate areas of tissue damage. Bony deformities, joint mobility, and gait and balance should also be assessed, 3. Test for loss of protective sensation using a Semmes-Weinstein 5.07 (10-g) monofilament at specific sites to detect loss of sensation in the foot (show figure 1), plus any one of the following: vibration using a 128-Hz tuning fork, pinprick sensation, ankle reflexes, or vibration perception threshold with a biothesiometer, 4. Screen for peripheral arterial disease by asking about a history of claudication and assessing the pedal pulses. Obtain an ankle brachial index in patients over 50 years of age and consider measurement in younger patients with multiple risk factors for peripheral arterial diseases, as many patients with peripheral arterial disease are asymptomatic, 5. Refer high risk patients (eg, those with any positive findings from the comprehensive examination) to a foot care specialist

CONCLUSION

According to our results, we strongly recommend a team approach in order to improve the outcome of management. This team should include general surgeon, the diabetologist, diabetic foot nurse, orthopedic surgeon, and radiologist as well as vascular surgeon. Reduction of the cost and length of hospital stay are not the only goals; but the more important goal is to get the most functional foot with good quality of life.

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