
Diabetic Foot Management; A 10-Year Study.

Issam Merdan* & Safwan A Taha[#]

*FICMS, Lecturer, Dept. of Surgery; [#]Professor, Dept. of Surgery, College of Medicine, University of Basrah, Iraq

Abstract

The medical records of 324 diabetic patients admitted to Al-Sader Teaching Hospital (Saddam Teaching Hospital previously) with foot lesions between April 1994 and April 2004 were studied retrospectively. Data were collected for various parameters, both personal and medical. The majority of patients were males, over fifty years of age and known diabetics. Peripheral neuropathy was the main predisposing factor while infected ulcer and gangrene of toe / toes were the most common forms of presentation. Wound swabs were positive for bacterial culture in 215 pts. (66.3%), 97.2% of which were polymicrobial. Debridement was the most common surgical procedure. There were 6 deaths (1.85%) in the study group mainly due to uncontrolled sepsis with concurrent medical illnesses. It is concluded that foot complication is a common problem in elderly Iraqi diabetics, particularly males, peripheral neuropathy is the most common predisposing factor, foot infections are usually poly microbial and that the majority will need some form of surgical intervention that is mostly conservative rather than a major amputation. We suggest a team approach in the care for these patients which can be provided by establishing foot care clinic in large hospital.

Introduction

Foot infections are a common and potentially serious problem for diabetic patients¹. Nearly one half of all lower extremity amputations in diabetic patients occur as a result of uncontrolled infection even in the presence of adequate blood supply².

If amputation results, the contralateral limb is placed at greater risk for future disease and amputation³. In addition to major financial cost for medical care of this problem, the consequences include extensive human suffering, prolonged functional disability, risk of limb loss and associated mortality. When infection of the lower extremity develops in a diabetic patient, a team approach to the management must be employed. Optimal management of diabetes, aggressive local care, systemic antibiotics and surgery play important roles in determining its outcome⁴.

Correspondence to:

Dr. Issam Merdan
Department of Surgery, College Of Medicine
University of Basrah, Basrah: IRAQ.

Foot complications in diabetic patients are common clinical problems in hospital practice in Iraq. This retrospective analysis was undertaken to study the epidemiology of foot complications in diabetics' attending Al-Sader Teaching Hospital, with a view in adding to the local data and comparing our results with other local & international studies.

Material&Methods

Medical records of all diabetic patients with foot lesions admitted to Al-Sader teaching hospital between April 1994 and April 2004 were analyzed. Data were collected for sex, age, duration of diabetes mellitus, nature of foot lesions, presence of peripheral vascular disease and or peripheral neuropathy, predisposing factors, concurrent medical illness, microbial flora of the foot lesions, types and numbers of surgical procedures, duration of hospital stay, morbidity and mortality.

All patients, on admission, underwent history taking and clinical examination including the examination of lower limb for ischemia, peripheral neuropathy and the foot lesion itself.

Peripheral vascular disease was defined as the presence of ischemic symptoms such as intermittent claudication or rest pain and/or the absence of pedal pulses (pedal pulses were assessed by palpation in all patients). Peripheral neuropathy was considered to be present in the absence of pain in the foot lesion. Complete blood count, fasting blood glucose level, blood urea, serum creatinine and electrolytes, urine analysis and radiological studies were all done for each patient on. Specimens for microbial cultures were collected from the depths of the wounds. In some patients, wound swabs were also

collected at the time of surgical debridement. Insulin treatment was commenced in consultation with a physician. Antibiotics were generally given after collection of swabs from the foot lesions. Ampicilline, Gentamycine, and Metranidazole or a third generation Cephalosporin with Metranidazole were the usual combination used. Antibiotics were subsequently changed according to culture and sensitivity reports. Antibiotics were usually given for 10-14 days in most patients; however, they were used for longer periods in patients with persistent sepsis. Further management included daily wound dressing with povidone-iodine solution, normal saline soaks and occasionally hydrogen peroxide solution, surgical drainage of abscess, wound debridement and amputation.

Results

Three hundred and twenty four patients were admitted with foot problems during the ten-year period of the study (1994 - 2004). The majority (254 pts.; 78.35%) were males. Those over fifty years of age were 289 pts. (89.15%) and only 19 pts. (5.85%) were under forty years of age (Table I). Two hundred and ninety one patients (89.8%) were known diabetics while 33(10.1%) were discovered to have diabetes on admission to hospital. In 282 pts. (87.03%) random and fasting blood glucose levels on admission were >12 mmol/L (normal level up to 10 mmol/L) and >7 mmol/L (normal level up to 6 mmol/L) respectively. History of trauma preceding foot lesions was present in 92 pts. (28.3%) while features of peripheral neuropathy were documented in 213 pts.

Age	No. of patients	Percent
Below 40 years	19	5.8%
40 – 49 years	16	4.9%
≥50 yrs	289	89.1%

Table I: Age distribution of diabetic patients with foot infection

(65.7%). In addition, distal pulses were not palpable in 114 pts. (35.1%), however 95 pts. (29.3%) had features of poly-neuropathy and ischemia at the same time. Moreover, previous history of foot complications was found in 137 pts. (42.2%). There were other concurrent medical illnesses like hypertension in 161 pts. (49.6%), ischemic heart diseases 158 pts. (24.07%) and diabetic nephropathy {significant albuminuria and/or serum creatinine of more than 133 mmol/L (normal level of serum creatinine up to 124mmol/L) in 42 pts. (12.9%)}.

Foot lesion	Number of patients	Percent
Infected ulcer	202	62.3
Gangrene of the toe or toes	40	12.3
Abscess	38	11.72
Cellulites	35	10.8
Gangrene of the foot and/or distal leg	9	2.77
Total	324	100

Table II: Presenting foot lesions in diabetic patients

The most common presenting lesion was infected ulcer (202pts; 62.3%) followed by the gangrene of a toe or toes (40 pts.; 12.3%). Other forms of presentation are shown in (Table II).

Wound swabs were positive in 215 pts. (66.3%) and the commonest isolates were *Proteus* (153 pts.), *Staphylococcus aureus* (109 pts.) and *Bacteriodes fragilis* (112 pts.) as shown in (Table III).

Types of bacteria	Number of isolates
<i>AEROBES: Gram negative:</i>	
<i>Proteus</i> sp.	153
<i>Pseudomonus</i>	53
<i>E. coli</i>	41
<i>AEROBES; Gram positive:</i>	
<i>Staph. aureus</i>	109
<i>B. heamolytic</i>	63
<i>ANAEROBES:</i>	
<i>B. fragilis</i>	112

Table III: Bacterial isolates in diabetic foot infection.

Cultures were polymicrobial in 209 patients (97.2%). The majority of patients needed surgical intervention (293 pts.; 90.4%) which was carried out under general anesthesia. On the other hand, 31 patients (9.5%) were treated conservatively. Debridement was the commonest surgical procedure performed (238 times). All surgical procedures performed on those patients are presented in (Table IV). More than 10% of patients had more than one surgical procedure performed on each of them (Table V).

There were 6 deaths (1.85%) in the study group; they died of uncontrolled

sepsis with concurrent medical illnesses. Mean hospital stay of the survivors was 22 days (range 8 – 32 days).

Type of procedure	times performed
Debridement	238
Incision & drainage	42
Amputations:	
Toe or toes	40
Distal partial foot	7
Below knee	2

Table IV: Surgical procedures performed.

Discussion

About 15% of all diabetic patients will develop foot complications during their life time⁵. Diabetics who develop foot infections are usually above fifty years which is in agreement with our findings.

It is generally agreed that neuropathy, angiopathy and immunopathy are, to various degrees, responsible for foot complications in diabetics. Neuropathy resulting in the loss of protective sensation and consequently minor trauma is the primary mechanism of skin breakdown. Usually patients are unaware of any trauma due to partial or complete loss of feeling in the foot⁶. Neuropathy was present in 65.7% of our patients and only 28.3% of them were aware of any trauma preceding their foot lesions.

Peripheral arterial disease is another major contributory factor. When present,

it tends to involve distal and smaller peripheral vessels. Diabetics with large vessel disease due to atherosclerosis present mainly with painful non-healing ulcers associated with history of intermittent claudication and rest pain⁷.

Number of procedures	Number of patients	percent
1	262	89.4
2 – 3	31	10.5

Table V: Frequency of surgical procedures

In our patients, palpation of pedal pulses was relied upon to diagnose the peripheral vascular insufficiency and we didn't verify the absence of pulsation by Doppler ultrasound, that is probably why, we found high rate of absence of pedal pulsation (35.1%) in spite of the fact that any inflammatory process which accompanies infections or other lesions causes local hyperemia and vasodilatations that is evident clinically by palpable pulses at that region. Another explanation would be the presence of significant foot edema which makes palpation difficult. Furthermore, all the information (history and examination) that was available in the data sheet was written by junior doctors who might have lacked the experience of palpation of pulses in difficult cases.

Infection in diabetics is usually polymicrobial in nature. Louie et al have isolated a mean of 5.8 microbes from each specimen⁸. The numbers of bacteria isolated per patient in the present study was (2.4) which is generally lower than other studies. This may possibly be due to inadequate sampling, delay in transfer of swabs to the laboratory or, in some patients who were under the care of

private practitioners, a course of antibiotics before admission to hospital. Staphylococci, Proteus and Bacteriodes fragilis were the most common gram positive, gram negative and anaerobe organisms isolated respectively in this study. This is consistent with the experience of others⁹.

More than 10% of patients treated surgically needed multiple operations. This was in part due to conservative approach towards major amputations and the difficulties in accurate assessment of the extent of infectious process at the time of initial surgery. The morbidity associated with major amputations is greater in diabetics than in non diabetics, thus every effort should be made to adopt a conservative approach and perform the lowest level of amputation possible that

permits walking without prosthesis even if it meant a longer hospital stay¹⁰.

The nature of disease process itself is the primary factor for slow recovery and prolonged hospital stay for our patients. Their refusal to agree for amputation was another contributory factor.

Care for diabetic foot complications put a heavy burden on the resources of health services. The application of preventive foot care and patient education can lead to dramatic reduction in amputation rates. Development of a team approach for the care of these patients is highly recommended. Such a team would ideally include a surgeon, physician, physio-therapist, dietitian and chiropodist. As such, care can be provided by establishing foot care clinics in large hospitals.

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