Diabetic foot

Presentation and treatment

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ABSTRACT

Objective: The aim of this study is to determine the mode of presentation, medical and surgical treatment in diabetic foot.

Method: Medical notes of 34 diabetic patients admitted to King Abdulaziz University Hospital in Jeddah from June 1997 to June 1999 with diabetic foot were studied retrospectively. Collection of demographic data, mode of presentation, investigations, medical treatment (antibiotics cover) and surgical treatment has been studied. Data of those patients were collected for gender, age, duration of diabetes, mode of presentation, presence of peripheral neuropathy, peripheral vascular disease and other complications, precipitating factors, concurrent medical illness (ischemic heart disease, hypertension, chronic renal failure, and retinopathy), microbial flora, medical treatment by antibiotics, surgical treatment, and duration of hospital stay.

Results: Majority of patients were male above 50 years, mean age 59 +\- 9.6, 29 male, 47% Saudi, 65% diabetic patients, their blood sugar were controlled by oral hypoglycemic drugs. However only 29% were on insulin. History of trauma preceding infection was present in 20%. Peripheral neuropathy was the main precipitating factor in 94%, as well the presence of peripheral vascular disease in 50%. Smoking was found in 44% patients. Foot ulcer was the most common type of presentation in 59% of patients, 65% of these patients need deberidement. However 8 patients had major amputation. Proteus and pseudomonas were the most common organisms isolated. The mean hospital stay was 21.44 +\- 17.7 days.

Conclusion: Diabetic foot sepsis is a common health problem presented in Saudi Arabia particularly among men, peripheral neuropathy, as well poor glycemic control are the most common precipitating factors. Foot infection is usually poly-microbial. Most of these patients required deberidement, however 8 (23.5%) of them, ended up having major limb amputation.

Keywords: Diabetic foot, amputation, debridement.

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Diabetes mellitus is a major health problem in Saudi Arabia.[1,2] It remains the most common reason for hospital admission in diabetics. The cost of hospital care of diabetic foot and related problems is immense.[3,4] The best predicators' of lower limb amputation are history of previous foot ulcers, the presence of neuropathy, peripheral vascular disease and poor glycemic control. The presentation of diabetic foot is variable ranging from cellulities, abscess and ulcers, to gangrene. Surgical management depends on the presentation and varies from minor deberidement, incision and drainage to amputation. Therefore diabetic foot and related problems are important causes of morbidity in diabetic patients especially if they end up with amputation. They not only cause major financial burden on medical health care but also cause extensive human suffering, prolong functional disability and associated mortality.[5] Diabetic foot is a common clinical problem and the most common

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cause of amputation in the hospital practice in Saudi Arabia. However there are few epidemiological studies of diabetic foot from Riyadh Medical Complex and Dammam Central hospital.[6,7] The aim of our study is to report various mode of presentation, medical and surgical management in King Abdulaziz University Hospital (KAUH) in Jeddah (Western part of Saudi Arabia).

Methods. It is a retrospective study in which the medical records of all diabetic patients admitted with foot infection to KAUH, Jeddah, Saudi Arabia in the period between 1997 and 1999 were analyzed.

Patients' age, sex, nationality, duration of diabetes and mode of treatment were recorded, as well as the presence of diabetic complications like retinopathy, peripheral neuropathy, peripheral vascular disease and chronic renal failure. Peripheral neuropathy is considered to be present if there is history of numbness in the feet, absence of pain in the foot or altered fine touch sensation and proprioception. Peripheral vascular disease was defined as the presence of ischemic symptoms such as intermittent claudication, rest pain and/or absence of pedal pulses. History of smoking, ischemic heart disease and hypertension were recorded. Different clinical presentation were classified as: cellulitis, ulcer, gangrene of foot or toe, or mixed lesions. History of trauma prior to presentation was also recorded.

All affected feet had x-ray to exclude osteomyelitis and in suspected cases bone scan was carried out. For confirmation for patients with absent foot pulses who were considered for reconstructive surgery by vascular surgeon, underwent arteriography.

Type of organisms isolated from the foot lesion and antibiotics given were recorded, as well as the type of intervention whether debridement or amputation. Any vascular reconstruction was noted. Duration of hospital stay was recorded. Statistical analysis was carried out using the Statistical Package for Social Sciences (SPSS 7.5). T-test and Chi-square was used appropriately. Results were considered significant if the p value is less than 0.05.

Results. A total of 34 patients were analyzed with male:female ratio of 29:5 and mean age of 59.6+/-9.6 years. Saudi patients were 16 of 34 (47%) and non-Saudi 18 of 34 (53%). The mean duration of diabetes was 17+/-5.7 years. One of the patients (3%) was on diet for his diabetes while 22 of 34 (65%) were on oral hypoglycemic agents, 10 of 34 (29%) on insulin and 1 of 34 (3%) on combination therapy (oral hypoglycemic agents and insulin).

Diabetic complications like retinopathy was present in 16 of 34 (47%) patients while peripheral neuropathy in 32 of 34 (94%), peripheral vascular disease in 50% of the patients and chronic renal failure in 11 of 34 (32%). Fifty percent of the patients had concomitant ischemic heart disease and 12 of 34 (35%) had high blood pressure. History of smoking was present in 15 of 34 (44%) and history of trauma in 6 of 34 (18%).

Table 1 - Different modes of presentation.

Type of presentation	Number of patients (%)
Ulcer	20 (59)
Cellulitis	13 (38)
Foot gangrene	13 (38)
Toe gangrene	12 (35)

Table 2 - Types of microorganism isolated.

Type of microorganism	Number of patients (%)
Proteus	7 (21)
Pseudomonas	7 (21)
Staphylococci	6 (18)
Klebsiella	5 (15)
Enterobacter	5 (15)
E-coli	4 (12)
Anaerobes	4 (12)
Streptococci	4 (12)

Table 3 - Type of surgical intervention.

Surgical intervention	Number of patients (%)
Debridement	22 (65)
Toe amputation	11 (32)
Above knee amputation	5 (15)
Below knee amputation	3 (9)

Mode of presentation (Table 1) showed that foot ulcer was the most common type of presentation 20 (59%). Osteomyelitis was documented by bone scan in 2 patients (6%) only. Arteriography was performed in 3 patients (9%) and none of the patients had by-pass surgery. Proteus and pseudomonas were the most common type of organisms isolated as shown in Table 2. Types of surgical interventions are shown in Table 3. Twenty two of 34 (65%) of the patients needed debridement only. The mean duration of hospital stay was 21.44 +/-17.7 days.

Discussion. Prevalence of diabetes mellitus among Saudis is reported to be 5%.[1,2] Diabetic foot infection is a major health problem accounting for long hospital stay, more than for any other compilations of diabetic.[3,4]

Diabetics who develop foot infections are usually above 50 years of age. The mean age in our study is 59.6 years with male predominance 29%. This could be attributed to their lack of awareness of the importance of diabetic foot care, as well as they are more subjected to trauma especially by slippers. Also the habit of heavy cigarette smoking in men predisposes them to peripheral vascular disease more than females.

The best predictors for the lower limb amputation were history of previous foot ulcer, presence of neuropathy, peripheral vascular disease and poor glycemic control. Ninety four of our patients had neuropathy, loss of sensation can result in skin breakdown on minor trauma. Due to unaware of trauma partial or complete loss of sensation, patients are unaware of their trauma only 18% of our were aware of sustaining trauma prior to their foot infection.[8]

Peripheral vascular disease is another major predictor factor for diabetic foot and was the cause 50% of our patients, (detected by palpating the pedal pulses). This method has been studied by Sulimani in King Khalid University Hospital who reported in 19% of their patients.[9] However it has been reported to be only 5.8% in a study from Riyadh Medical Complex[6] as they depend mainly on Doppler ultrasound. Only 2 patients in our study had doppler ultrasound and it was normal. Smoking is another important risk factor for peripheral vascular disease. Forty four percent of our patients were heavy cigarette smokers for more than 20 years. Two patients were referred to vascular surgeon for possible vascular reconstruction. However their angiogram revealed generalized atherosclosis which was not suitable for reconstruction by-pass.

Another poor predictor is poor glycemic control which was found in 79% of our patients. Sixty seven percent of our patients were on oral hypoglycemic drugs despite very high blood sugar and the presence of diabetic complications. Only 29% were on Insulin. This can be explained by unawareness of some health physicians about the importance of persuading their patients to use insulin for better sugar specially after failure of oral hypoglycemic drugs.

Also some patients consider insulin as a stigmata of poor health. Infections in diabetics are polymicrobial in nature.[10] Swab cultures were taken from diabetic foot and were positive in 78% in our patients, yielding wide range of microorganisms. Proetus and pseudomonas were the most common organisms isolated. MRSA positive staph-cocci were isolated from 3-swab cultures. Negative swab-culture were found in 5 patients (15%), this may be explained by inadequate sampling or delay in transfer of swab to laboratory or use of antibiotics before admission to the hospital. Most of the patients received a course of antibiotics during hospitalization, which covered both aerobic and anaerobic infections for a long period (3-4) weeks (Gentamaycin, metronidzole, and augmantin.[10] Foot ulcer was the most common type of presentation (59%), which was treated mainly by incision and drainage or debridement. Eight patients underwent major amputations (4 below knee, and 4 above knee). Two patients refused major amputations and discharged themselves against medical advice. Six patients were admitted twice and 3 patients admitted 3 times. These patients needed multiple debridement as conservative treatment. Although most of them underwent major knee amputations.[11,12]

One patient underwent bilateral above knee amputations in a 4 month duration. Aggressive approach to the management by early amputations has been recommended to shorted hospital stay. This is a good approach as most of the patients ended to have amputations irrespective of multiple admission to hospital and conservative treatment in the form of incision, drainage and debridement.[14,15] Long hospital stay had been noticed in our patients 21.44+/-17.7 days which is a common problem in management of diabetic foot because of difficulty to control ploy-microbial infection in diabetic compared with non-diabetic. Delayed in deciding amputations and trying conservative treatment is another factor. Some patients refused amputations and are refused to leave the hospital before complete healing of the wound.[16,17]

In conclusion, diabetic foot sepsis is a common health problem, presenting most commonly with gangrene. Therefore the most common surgical treatment is minor or major amputations. Care of diabetic foot includes preventive measures like foot care, good glycemic control either by insulin or oral hypoglycemic drug. Those measures could lead to dramatic reduction in amputations rate in our Kingdom.

Development of teamwork in care of those patients has been suggested. Developing diabetic centers in different areas of Saudi Arabia can provide such care or at least a diabetic foot care clinic in hospital.

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