

MANAGEMENT OF DIABETIC FOOT - TWO YEARS EXPERIENCE

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Background: Diabetic foot is a serious complication of diabetes mellitus and may be the initial presentation of undiagnosed diabetes mellitus. A study of 48 patients with diabetic foot admitted in Surgical B Unit of Ayub Teaching Hospital over a period of two years is presented here. **Methods:** This study was done to identify the risk factors and causative organisms in diabetic foot. This will help to lay down important principles of management of diabetic foot and highlight problems faced in the management of diabetic foot in our set up. **Results:** There were 32 (66.6%) males and 16 (33.3%) females. The age incidence ranged from 30-70 years. Average length of hospital stay was 26 days. 2 patients had cellulitis. 6 patients had gangrene. 10 patients had ulcers and 15 patients had abscesses. 31 (64%) patients were cured by drainage of abscess and debridements alone. 17(36%) patients needed amputations. Peripheral neuropathy was the commonest risk factor. Staphylococcus aureus was the most common organism isolated from cultures (54%). **Conclusions:** Early hospitalization, effective glycaemic control, aggressive debridements and patient education in foot care can minimize diabetic foot diseases.

INTRODUCTION

Diabetes mellitus is a serious and chronic disease that is one of the major health problems of our country. Over 12% of Pakistani population in the age group of 25 years and above suffers from the disease and about 10% suffer from impaired glucose tolerance. Diabetic foot is a serious complication of diabetes mellitus and may be the initial presentation of undiagnosed diabetes mellitus. Diabetic foot is a common reason for hospitalization among the diabetic patients.² Diabetic foot disease includes infection, ulcers and gangrene. Abnormal carbohydrate and collagen metabolism, atherosclerosis, microangiopathy, neuropathy, altered immunity and insulin resistance are the pathological factors underlying the development of diabetic foot^{3,4,5}.

The present study was performed to identify the risk factors and causative organisms in diabetic foot, to lay down important principles of management of diabetic foot and highlight problems faced by us in the management of diabetic foot in our set up.

MATERIALS AND METHODS

This prospective study on the management of diabetic foot was carried in Surgical "B" unit, Ayub Teaching Hospital Abbottabad from July, 1998 to June, 2000. 48 patients were managed during the period of two years. There were 32 male patients and 16 female patients including one pregnant female. The age incidence varied from 25 to 70 years in males and 35 to 70 years in females. 18 patients were referred from the medical units and 30 patients were admitted directly from OPD or emergency. After admission, history was taken of the age, sex, occupation, history

of present illness, risk factors like trauma, boil, insect bite, dermatosis, duration of diabetes, type of diabetes control, claudication, foot anaesthesia, smoking, alcoholism, past history of admission for diabetic foot and family history of diabetes.

Local examination of feet was done including hygiene, ulcers, gangrene, infections, hair loss, trophic changes in skin and nails. Complete neurological examination was done to detect sensory and motor neuropathy. All the peripheral pulses were examined. Palpable posterior tibial artery was an indicator of vascular integrity. Other clinical tests included capillary filling test and Buerger test of vascular insufficiency.

Investigations included haemoglobin, total leucocyte count, daily blood glucose (fasting and random), blood urea and urine R/E. X-ray chest and ECG were also done. X-rays of foot were taken to detect osteomyelitis. CT scan of leg was done in one patient with compartment syndrome due to pyomyositis of calf muscles following diabetic foot. A detailed proforma was designed containing all the required details essential for the study.

Once the patient was admitted, previous oral antidiabetic treatment was stopped and patient was put on soluble insulin. Swabs were taken from the infected foot for culture and sensitivity and intravenous Metronidazole and Amoxicillin + Clavulanic acid was started. The patients were prepared for surgery where needed. The surgery was done in theatre, under general anaesthesia and local blocks and tourniquet were not used. The surgical procedures included:

1. Drainage of abscesses by generous incisions,
2. Aggressive debridement of all necrotic tissues till skin edges were bleeding.
3. Fasciotomies.
4. Minor and major amputations.

After drainage of abscesses and debridement, all wounds were left open. The foot was immersed in Hydrogen-peroxide and Povidone-iodine solutions diluted in normal saline for one hour twice daily and then dressing was done. Debridement was also done at the time of dressings in the ward. Minor amputations included toes and ray amputations. Amputations of toes were done through the base of phalanx preserving

the insertion of short muscles or toes for adequate weight bearing. Major amputations included trans-metatarsal and tarso-metatarsal

amputations only. Secondary suturing was done after amputations. In the post-operative period, blood glucose was monitored serially by fasting and random glucose levels. All the patients were given soluble insulin to control blood sugar after consultation with the physicians. The patients were discharged only after blood sugar was controlled by insulin or oral antidiabetic drugs. On discharge, the patients were given written instructions about foot care.

RESULTS

During the study period of two years, 48 patients with diabetic foot were managed. There were 32 (66.6%) males and 16 (33.3%) females. Age incidence varied from 20 to 70 years in males and 30 to 70 years in females (Table-1). 18 (37.5%) patients were referred from medical units. 18 (37.5%) patients were admitted from emergency and 12 (25%) patients were admitted from OPD (Table-2).

28 (58.3%) patients were known diabetics. 12 patients were controlled by diet alone, 15 patients were taking oral antidiabetic drugs and one was controlled by insulin. 20 (41.5%) were diagnosed for the first time having diabetes.

Peripheral vascular disease indicated by absent posterior tibial artery was present in 4 (8.3%) patients. Neuropathy was present in 20 (41.6%) patients. There was history of trauma in 15 (31%) patients, dermatosis in 3 (6.2%), insect bite in 2 (4.1%) and in-growing toenail in 2 (4.1%) patients. The onset was spontaneous in rest of the patients except high blood sugar levels. By examining the feet, it was concluded that poor foot hygiene was an important risk factor in this study.

Cellulitis alone was present in 2 (4.1%) patients, ulcers alone in 10 (21%), abscess alone in 15 (31.2%) and gangrene alone in 6 (12.5%) patients.

1 (2.1%) patient had spreading abscess of calf muscles resulting in pyomyonecrosis. Rest of patients had a combination of ulcers, abscesses and gangrene. The forefoot (toes) were involved in 30 (62.3%) patients. Planter surface of foot was involved more frequently than the dorsal surface.

All patients admitted from OPD or emergency had uncontrolled diabetes with random blood glucose levels above 200 mg %. Two patients with cellulitis needed only i.v. Antibiotics and insulin. Toe and ray amputations were done in 15 (32%) patients. I (2.1%) patient needed trans metatarsal amputation and I (2.1%) patient needed tarsometatarsal amputation. The rest needed only debridement and drainage of abscess. The hospital stay varied from 3 days to 40 days and average 26 days.

Staphylococcus aureus was the most common organism cultured in 25 (52%) patients (Table-3). Osteomyelitis of foot, detected by x-rays, was present in 6 (12.5%) patients. Only 20 (42%) patients returned for follow up. 2 (4.2%) patients had recurrence of diabetic foot disease after complete healing during the study period. 10 (21%) patients needed multiple admission for the control of diabetic foot.

Table-1: Age and Sex distribution (n=48).

Age (Yrs)	Males	Females
21-30	2	0
31-40	4	%
41-50	6	2
51-60	12	8
61-70	8	4
Total	32 (66.6%)	16(33.4%)

Table-2: Mode of admission (n=48)

Mode	Males	Females
Emergency	12	6
O.P.D.	10	2
Referred by Physicians	10	8

Table-3: Organisms cultured (n=46)

Organism	No	%
Staph. Aureus	25	54%
Streptococcus	6	13 %
Klebsiella	5	11 %
Pseudomonas	4	8.6%
E.Coli	4	8.6%
Proteus	2	4.3 %

DISCUSSION

Diabetes mellitus is a metabolic disease with serious long-term complications. Diabetic foot is common and results in prolonged hospitalization, repeated surgeries, permanent disability and diminished quality of life.⁶

There were 48 patients in this study. There were more male than female patients. This is in contrast to the west.⁷⁻⁸ This is due to the fact that more males in our society work barefoot outdoors and are prone to trauma. 18 patients were referred from medical units late with fairly advanced disease. Physician related delay in referral was an important factor highlighted in this study. 70d'o of patients were above 50 years of age and had non-insulin dependent diabetes mellitus. 20 patients were diagnosed for the first time having diabetes. So diabetic foot may be the initial

presentation of undiagnosed diabetes mellitus and may be considered as a "diabetic marker".

Diabetic neuropathy was present in a high 20 (41.6%) patients. The same has been noted in other studies.^{9,10} Sensory motor and autonomic nerves are affected in various combinations in diabetes.' Vasculopathy, including macro and microangiopathy accounts for many cases of diabetic foot.' In this study 4 patients had clinical evidence of Vasculopathy indicated by skin atrophy, hair loss, Berger's test and impalpable posterior tibial artery. Doppler studies were not done.

Diabetic foot is polymicrobial and Staph. Aureus was the most common organism cultured. Anaerobic culture facilities were not available. The results are comparable with other studies.^{10,12} Osteomyelitis of foot was present in 6 patients. Osteomyelitis develops by spread from contiguous soft tissue infection to underlying bone. CT scan, MR1 scan and scintigraphy are helpful in early detection of osteomyelitis¹³ but were not done in this study.

Generous incisions were used for drainage of pus, opening up planter spaces where needed. Early, aggressive and frequent debridement was responsible for decreased number of amputations in this study. Many studies suggest that amputation rate could be reduced by aggressive debridement.

Early debridement prevented infection from spreading proximally and to important pressure bearing areas restoring maximum function of the foot. In this study all wounds were left open after surgery and this also prevented spread of infection. All surgeries were done under general anaesthesia without a tourniquet. This allowed adequate time for debridement. Local blocks were avoided because they compromise blood supply to foot.

It is concluded that early referral, aggressive debridement and glycaemic control result in less microbially complex infection which can be controlled with less expensive antibiotics, reduced amputation rates and shorter hospital stay. Regular evaluation of foot and patient education in foot care is also recommended.

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