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Original Research Article

A study of clinical pathological lesions and different modalities of treatment for diabetic foot

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ABSTRACT

Background: Diabetes Mellitus is a heterogeneous primary disorder of carbohydrate metabolism characterized by chronic state of hyperglycaemia with multi-etiological factors that generally involve absolute or relative insulin deficiency or both. Diabetic foot is defined as the foot of diabetic patients with ulceration, infection and/or destruction of the deep tissues, associated with neurological abnormalities and various degrees of peripheral vascular disease in the lower limb. So, the aim of the study was to evaluate the role of various surgical interventions like debridement, minor/major amputations in the management of diabetic foot.
Methods: We have included the study of total 60 patients with foot lesion. Patients with Diabetes mellitus with lesions of foot i.e. ulcer, blister. cellulites, abscess and gangrene, presenting to the department of Surgery were treated by different types of treatment. Data analysis was done by appropriate statistical tests (descriptive analysis, chi-square test).
Results: 13.33% patients underwent toe amputation, 8.88% patients had below knee amputation, 33.33% patients had debridement followed by dressing, 31.12% patients had skin grafting and 13.33% patients had incision and drainage.
Conclusions: This underlines the importance of patient education regarding prophylactic foot care. Patient mortality and morbidity can be reduced by prophylactic foot care, sugar control, proper surgical treatment, regular follow-up of high risk patient, suitable administration of antibiotics.

Keywords: Clinical pathological lesions, Diabetic foot, Modalities of treatment

INTRODUCTION

Diabetes Mellitus is a heterogeneous primary disorder of carbohydrate metabolism characterized by chronic state of hyperglycemia with multi-etiological factors that generally involve absolute or relative insulin deficiency or both.[1,2] Even in today's space of internet and information technology with improved healthcare services and knowledge of patho-physiology of disease, numbers of cases of diabetes mellitus are increasing in India and other countries because of changes in lifestyle and food habit adopting the western lifestyle.[3] As healthcare facilities are gradually improving more and more number of the patients are presenting with chronic complications of diabetes like nephropathy, foot lesion, retinopathy etc. According to the World Health Organization and to the International Working Group on the Diabetic Foot, diabetic foot is defined as the foot of diabetic patients with ulceration, infection and/or destruction of the deep tissues, associated with neurological abnormalities and various degrees of peripheral vascular disease in the lower limb.[4]

Moreover, various deformities subsequent to intrinsic motor neuropathy result in abnormal load distribution in certain region of the foot. This in turn leads to destruction

of the skin integrity with time providing a favorable base for bacterial inoculation. This is one of the reasons for high morbidity and mortality rates in patients with diabetic foot.

In Surgical ward, operative patients admitted with known case of diabetes requires a special care, even after that there are comparatively higher rate of postoperative complications such as wound infection is more common as compared to non-diabetic patients because of higher tissue concentration of glucose as well as overall reduction in resistance power of body against infection and micro-angiopathy that does not allow rapid neovascularization and delays wound healing and increases chances of infection.

The operative stress also can disturb well-controlled blood sugar level and make the tissue more prone to infection.[5] The comorbidity of major depression and anxiety disorders is often associated with barriers to seeking treatment and a greater chance of the recurrence of mental disorders. Among people with diabetes, anxiety, depression and low subjective well-being are suggested to be of concern because these conditions may negatively affect self-management, glycemic control and diabetes related complications. So, the aim of the study was to evaluate the role of various surgical interventions like debridement, minor/major amputations in the management of diabetic foot.

METHODS

In this dissertation, we have included the study of total 60 patients with foot lesion. This observational study was conducted in our institute patients admitted to the surgical wards. All the patients were investigated and treated by available facilities in the hospital. Some investigations, like arteriography, which were considered necessary, were not done due to lack of facilities at the hospital and inability of the patients to afford. These investigations are not included in the study.

Diabetic foot ulcer was operationally defined as breach on the normal occurring as induration, ulceration or change of color on the foot for skin duration ≥ 2 weeks. Detailed history and physical examination was done Investigations including blood sugar profile, renal function, swab from wound ulcer and X-ray of the foot.

The diabetic foot was graded according to Wegner's classification in osier to describe the type of foot ulcers. Both feet were examined for the presence or absence of peripheral pulse or sensation. It was an observational study. All diabetic patients presenting to the Department of General surgery at our institute with complains of lesions in foot were included in the study.

Patients with Diabetes mellitus with lesions of foot i.e. ulcer, blister. cellulites, abscess and gangrene, presenting to the department of Surgery at our institute, patients aged more than 20 years with diabetic foot ulcer, all patients who gave consent for the undertaken study were included in the study.

Patients with chronic foot ulcers due to cause other than DM such as traumatic, arterial, venous, trophic, TB, syphilitic, malignant ulcer, patients with severe medical illness, too old and the patients unfit for surgery, congenital skin disorder which affects keratinocytes, elastin, or collagen, at risk of keloid or hypertrophic scar formation, patients receiving corticosteroids, immunosuppressive agents, radiation or chemotherapy are also excluded.

X-ray showing osteomyelitis. Doppler showing gross Atherosclerotic arterial changes and venous abnormalities like varicosities were excluded from the study. Informed written consent was obtained from the diabetic patients coming to the Department of Surgery with lesions in the foot region. Data collection was done by using a structured pre-prepared case proforma to enter the patient details, detailed clinical history including presenting complaints, history of diabetes, history of anti-diabetic medications, past and family history of diabetes, and physical examination of patients who meet the inclusion criteria. Data entry was done in Microsoft Excel. Data analysis was done by appropriate statistical tests (descriptive analysis, chi-square test.

RESULTS

The Table 1 showed that in our study the maximum number of patients were in 50-69 years age group. In this study age of the patients ranged above 20 years. The mean age of the patients in study group was 58.02 ± 10.84 years. The minimum age was 30 years and the maximum age was 79 years. The age distribution was comparable in age group of 50 to 59 years with other below mentioned studies.

Table 1: Age Distribution.

Age group (years)	Percentage	Tanzanian diabetic foot study (2011)	Anand et al 2016
20-29	0.00	-	8%
30-39	5.0	1.5%	12%
40-49	13.33	36.8%	22%
50-59	36.67	44.1%	34%
60-69	30.00	8.3%	20%
≥ 70	15.00	9.3%	4%

Table 2: Gender wise distribution.

Gender	Percentage	Tanzanian gender diabetic foot study (2011)	Anand et al 2016
Male	73.33%	54.4%	78%
Female	26.67%	45.6%	22%

The Table 2 showed male preponderance i.e. male is more prone to develop diabetic foot same as was observed in Tanzanian study. In our observational study group, 73.33% were males and 26.67% were females. In both below mentioned study groups prevalence of diabetic foot lesions were more common in male than female. The percentage of patient gender wise statistically comparable with Anand et al 2016.

Table 3. Type of operations performed.

Type of operations	Percentage	Tanzanian diabetic foot study, 2011
Incision and drainage	13.33%	3.9%
Debridement	33.33%	34.7%
Lower limb amputation minor amputation	21.21%	56.7%
Toe/Rye's amputation Major amputation	13.33%	51.4%
Syme's amputation	8.88%	6.9%
Above knee amputation		34.7%
Below knee amputation		6.9%
Skin grafting	31.12%	4.7%

The Table 3 showed 13.33% patients underwent toe amputation, 8.88% patients had below knee amputation, 33.33% patients had debridement followed by dressing, 31.12% patients had skin grafting and 13.33%patients had incision and drainage. In the present study maximum number of patient that is 33.33% required debridement as presentation of patient was early that is grade II according to Wagner's classification. In contrast to Tanzanian group in which maximum number of patients underwent lower limb amputation that is 56.7%. In our study Debridement was followed by skin grafting that is 31.12 % which is significantly high than Tanzanian study.

DISCUSSION

Foot infections are the most common problems in persons with diabetes. These individuals are predisposed to foot infections because of a compromised vascular supply secondary to diabetes. Local trauma and/or pressure (often in association with lack of sensation because of neuropathy), in addition to microvascular disease, may result in various diabetic foot infections that run the spectrum from simple, superficial cellulitis to chronic osteomyelitis.[6-8]

The prevalence of diabetic foot ulcers amongst diabetic patients at tertiary care hospital of south Gujarat was 3.9% which is comparable to studies in Kenya and South Africa. Studies in Netherlands and Iran found high prevalence of 20.0% and 20.4% respectively. These differences in prevalence may be a reflection of regional variations in prevalence of diabetes mellitus and the local operating risk factors of diabetic foot ulcer disease. High prevalence of Diabetic Foot Ulcers in developing countries like Tanzania is due to illiteracy, poor socioeconomic status. bare-foot walking and inadequate facilities for diabetes care.[9,10]

The present observational study comprised of 60 cases of diabetic foot lesion admitted to the surgical wards of our institute from August 2015 to November 2016. In our study, 13.33% patients underwent toe amputation, 8.88% patients had below knee amputation, 33.33% patients had debridement and dressing, 31.12% patients had skin grafting and 13.33% patients had incision and drainage. In the Tanzanian study, 56.7% patients had minor/major amputations while in our study only 21.12% patients had minor/major amputations. This is due to presentation of the patients in very advanced stages i.e. Wagner's Grade IV or V. While in our study most of the patients presented with Grade II stage so rate of amputation was low and due to early presentation 33.33% patients were managed conservatively.[11,12]

Long standing diabetes affects all age groups and diabetic foot mainly manifest in the patients with age more than 50 years. Diabetic foot ulcers show gender predilection with males being more affected than females. Neuropathy, ischemia along with immunological disturbance is important predisposing factor in patho-physiology of diabetic foot ulcer. Both aerobic and anaerobic pathogens involve in diabetic wound infection but among them gram negative aerobic organism (mostly pseudomonas) was more common.[13-15]

Diabetic foot presents with spectrum of clinical manifestations. In our study the commonest presenting lesion in foot was ulcer, followed by cellulitis and gangrene. In the management of diabetic foot ulcers, the first requirement is strict control of diabetes, early detection and treatment of lesions.[16,17-20] Regular foot care is also important. The importance of identifying these risk factors is that such knowledge is useful for developing methods to detect them at an early stage and thus prevent limb amputation.[21-23]

In present study, the patients were treated with debridement (initial surgery), followed by STG/dressing (with Placentrax ointment). This resulted with a shorter duration a hospital stays than the patients who were treated only with betadine dressing and normal saline. In

present study, majority of the patients had a history of trauma. This underlines the importance of patient education regarding prophylactic foot care. Patient mortality and morbidity can be reduced by prophylactic foot care, sugar control, proper surgical treatment, regular follow-up of high risk patient, suitable administration of antibiotics (according to culture and sensitivity).

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