



Original Article

Management and Outcome of Diabetic Foot-A Study of Hundred Cases

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ABSTRACT

Background: Diabetes mellitus is a complex metabolic disorder that affect 1-2 percent of the population. It can give rise to many tissue complications among which foot is particularly vulnerable to circulatory and neurological disorder, so that even minor trauma can lead to ulceration and infection.

Methods: Between September 2008 and August 2009, 100 patients were undergone treatment for diabetic foot at department of Surgery, Shaheed Ziaur Rahman Medical College Hospital, Bogra. This study included all the cases of diabetic foot irrespective of age, sex and diabetic status.

Results: After 12 weeks treatment 84% of patient were completely recovered, 2% developed abscess, 8% developed ulceration and 6% developed gangrene. Mean age of diabetic patients with foot ulcer is 50-60 years. Out of 100 cases 64% male and 36% female. Maximum number of patient (64%) had foot problems after suffering from diabetes mellitus for a period of 6-10 years.

Conclusion: The modalities of treatment of diabetic foot should be selected for each type of pathology depending on the pattern of presentations of diabetic foot. Careful selection of treatment modalities can reduce the rate of diabetic foot complications and improve the quality of life of diabetic patients.

Keywords: Diabetic foot; management; outcome

Introduction

Diabetes mellitus is a chronic debilitating disease which has become a health-care problem world-wide, with the rise in disease prevalence it not only affects the developed world but also developing nations.¹ In Bangladesh the current prevalence rate of diabetes

(among the people of 20-79 years of age) is 4.8%. Diabetic foot is the important complication of diabetes and the most likely cause of morbidity and mortality related to diabetes.² Approximately 10-25% of all diabetics develop some foot problems, ranging from simple cellulitis to major abscesses, osteomyelitis, localized and gangrene of whole foot. The consequence of these problems are not only important to the individual patients and their families, but to every health-care system in the world.³ The Oxford Community Diabetes study found that the prevalence of nephropathy in diabetic patients was 23% and incidence of peripheral disease was 14.6% per year. The same study found a 7% prevalence of active ulceration and a 3% prevalence of amputation of all or part of a foot.

Etiology of diabetic foot is truly multifactorial. It includes nephropathy, macro & microvascular disease, infection, connective tissue abnormalities and

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hematological disturbances. Identification of causative factors in each case is essential in planning treatment. In general diabetic foot ulcers result from abnormal mechanical loading of the foot, such as repetitive moderate pressure applied to the plantar aspect of the foot while walking.⁴ Diabetic neuropathy is associated with abnormal sympathetic nervous function in the affected limbs.⁵ Diabetic peripheral neuropathy causes change in foot structure, affecting foot function and subsequently leading to increased plantar foot pressure, which is a predicted risk factor for the development of foot ulceration.⁴

With strict glycaemic control minor wound is treated with dressing and foot rest. Infected lesion and more severe lesions need intensive therapy at hospital, use of appropriate antibiotics, surgical drainage and debridement and amputation if necessary. Patient education is central to management of the diabetic foot with the emphasis on prevention.³ The importance of daily self-examination and careful hygiene along with the need for well fitting shoes is vital. The great tragedy of diabetic foot problem is that they are probably the most preventable of all long-term complications. In the future it is to be hoped that the preventive measures discussed can be taken one step further with successful prevention of neuropathy would greatly reduce the burden of diabetic foot disease.

Materials and Methods

Hundred patients of diabetic foot were enrolled in this prospective study carried out between September 2008 to August 2009 at department of Surgery, Shaheed Ziaur Rahman Medical College Hospital, Bogra. This study included all the cases of diabetic foot irrespective of age, sex and diabetic status. Diabetic patients with other pathology like crush injury, malignant ulcer of the foot and associated severe medical diseases were excluded here.

A self administered structural questionnaire was prepared for this study. All the data was collected by a structural protocol from the records. Results were summarized and analyzed. The results were then compared and discussed with the similar standard study. Finally the study was concluded with specific findings, ideas and highlights.

Results

Age of the patients varied from 30-70 years. The maximum incidence was noted in the 5th and 6th decades of life (*Table 1*). The maximum number of patients (64%) developed diabetic foot after 6-10 years of suffering from diabetes mellitus. The blood sugar level of the maximum number of patients (94%) on

admission was in the range of 7-20 mmol/L. The maximum 44 % of the patients presented with ulceration of foot. Out of 100 patients, 84% were completely recovered; 2% developed abscess; 8% developed ulceration and 6% developed gangrene (*Table 7*).

Table 1. Age incidence (n=100)

Age group (years)	Number of patients	Percentage
30-40	6	6.0
41-50	22	22.0
51-60	60	60.0
61-70	12	12.0

Table 2. Sex incidence (n=100)

Sex	Number of patients	Percentage
Male	64	64.0
Female	36	36.0

Table 3. Duration of diabetes mellitus before the onset of diabetic foot (n=100)

Duration of diabetes (Years)	Number of patient	Percentage
>5	20	20.0
6 - 10	64	64.0
11 - 15	10	10.0
Newly detected	6	6.0

Table 4. Blood sugar level of patients on admission (n=100)

Blood sugar level (2 hours after breakfast) (mmol/l)	Number of patients	Percentage
<7	2	2.0
7-10	44	44.0
11-20	50	50.0
>20	4	4.0

Table 5. Distribution of patients with various presentations of diabetic foot (n=100)

Presenting feature	Number of patients	Percentage
Cellulitis	18	18.0
Abscess	22	22.0
Ulceration	44	44.0
Gangrene	16	16.0

Table 6. Modalities of treatment and outcome of diabetic foot (n=100)

Indication	Treatment modality (no. of patients)	Outcome after initial treatment		
		Cured (no. of patients)	Not-cured, developed complication (no. of patients)	Type of complication (no. of patients)
Cellulitis	Conservative (18)	14	4	abscess (2)ulcer (2)
Abscess	Incision, drainage & dressing (22)	16	6	ulcer (6)
Ulceration	Debridement, dressing & reconstruction (44)	40	4	gangrene (4)
Gangrene	Amputation (16)	14	2	spreading gangrene (2)

Table 7. Outcome after initial treatment of diabetic foot (n=100)

Outcome after initial treatment	No of patients	Percentage
Complete recovery	84	84
Abscess	2	2
Ulceration	8	8
Gangrene	6	6

Discussion

Diabetes mellitus is a complex metabolic disorder that affects 1-2 percent of the population. It can give rise to many tissue complications, among which foot is particularly vulnerable. A multi-disciplinary team-approach is the key to the successful management of diabetic foot.⁶

It is seen in our study that the mean age of the diabetic patients with foot problems is 50-60 years. Steffen *et al.*⁶ in their study showed that the average age of patients with diabetic foot was 60 years. Levin⁷ in his study carried in the USA concluded that most diabetic patients develop foot problems after 40 years of age. Out of 100 cases 64 (64%) male and 36 (36%) female patients were suffering from diabetic foot with different types of presentation. In a study carried out in Australia, out of 51 cases, 27 were male and 24 females.⁶

In our study maximum number (64%) of patients had foot problems after suffering from diabetes mellitus for a period of 6-10 years and the range of duration was 5-20 years. In one study the reported duration was 4-10 years,⁶ and yet in another, it was 10 years (mean).⁸ Six of the patients in our series did not know that they were suffering from diabetes mellitus. Others

were aware that they were diabetics. Any patient with hyperglycemia should be treated beforehand for normalization of blood glucose level. We found that the range of blood glucose level of 94 patients (94%) was 7-20 mmol/L. Some of the patients were on oral hypoglycemic agents and others were taking insulin. Litzelan *et al.*⁸ in a study on diabetic foot in the USA, reported blood glucose level of 11.4±4.6 mmol/L and none of the patients had their blood glucose level under control on admission at the hospital.

Patients of this series were managed by (a) diet and oral hyperglycemic agents, and (b) diet and insulin. In our study we saw that 78 (78%) cases were controlled their diabetes by diet and insulin and 22 (22%) cases were controlled their diabetes by diet and oral hypoglycemic agents. In a study in Japan done in 2006, Shigata *et al.*⁹ noted that 26.7% of the diabetics were controlled by insulin only.

In our series, we found that 44% of the patients had foot ulcer, which almost correlates with a study done by Steffen *et al.*⁶ in America, who found it to be 45.09 percent. They found cellulitis in 23.25%, abscess in 19.6%, which in our series were 18% and 22% respectively. We found gangrene in 12% cases. Good blood glucose level has been known to be beneficial in improving the outcome of diabetic foot infection.⁶ For all forms of foot infection, blood glucose level was brought to normal level by diet and oral hypoglycemic agent or by diet and insulin. The blood glucose level was monitored throughout the period of treatment. Antibiotics were used in each case empirically or in some patients by culture and sensitivity test.

In our study 78% patients with cellulitis were treated conservatively, that is, by controlling blood sugar level, antibiotic and elevation of the parts. A variety of surgical

procedures were performed, are which (a) incision, drainage and dressing, (b) debridement, dressing and reconstructions, (c) amputations. Abscesses were found in 22 % cases. Because of the poly-microbial nature of most foot infections, a broad-spectrum antibiotic should be used. Coverage should always include *Staphylococcus aureus*, the most common pathogen, until cultures are obtained. Once sensitivities are available, the antibiotic coverage should be narrowed as much as possible.¹⁰

We treated 44 % patients with foot ulcer. Secondary closure was done for 6(6%) of the patients and skin grafting done in 22(22%) patients, delayed healing occurred in 12 (12%) patients and proceeded to gangrene formation in 4 (4%) patients. In an Australian study¹¹ the treatment showed delayed healing in 16% and gangrene formation in 4% of cases. Amputation was done in 16 patients for feet gangrene. 10 patients had toe amputation and 6 had feet amputation. Another 4 patients admitted with ulceration developed gangrene during their course of treatment and also underwent amputation.

Conclusion

From this clinical study on diabetic foot, the modalities of treatment should be selected for each type of pathology depending on the pattern of presentations of diabetic foot, associated co-morbidities, neuropathy, macro and microvascular disease, infection, connective tissue abnormalities. Careful selection of treatment modalities can reduce the rate of diabetic foot complications and improve the quality of life of diabetic patients.

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