



“Clinical Study of Diabetic Foot with Different Treatment Modalities”

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ABSTRACT

Background: Diabetes mellitus is a worldwide problem. The incidence of diabetes mellitus is increasing globally.¹ Patients with diabetes have a 12% to 25% life time risk of developing a foot ulcer.² In the diabetic patient, the foot is the cross road for many pathological processes, in which almost all components of the lower extremity involved; from skin, subcutaneous tissue, muscles, bones and joints, to blood vessels and nerves. India alone, diabetes is expected to increase from 40.6 million in 2006 to 79.4 million by 2030.⁴ India presently has the largest number of diabetic patients in the world and India is thus designated to become the diabetes capital of the world. Diabetic foot ulcers occur mostly among elderly people, and elderly diabetics have twice the risk of developing foot ulcers, Quite often diabetic patients persistent with uncontrolled infection, and ulcerations leading to compromise of a part of foot or whole, thus there was a need to study various treatment modalities for management of diabetic foot and its complication.

Methods: This study was conducted comprising of, 50 patients of diabetic foot in the department of Burns and Plastic Surgery at B. J. Medical College and Civil Hospital, Ahmedabad during the period of June 2021 to May 2023.

Results: Most of the diabetic patients with foot lesions were in the age group of 51-60 (32%) followed by 41-50 (28%). There was a marked male predominance in occurrence of diabetic foot lesion. 36 (72%) were male patients and 14 (28 %) cases female patients. Ratio of Male: Female is 2.57: 1. Out of 50 cases, 27 (54%) cases presented with ulcers, 11 (22%) cases with cellulitis, 3 (6%) of cases abscess, 5 (10%) of cases gangrene and 4 (8%) of cases Neuropathic ulcer. The most common site of lesion in the diabetic foot was

dorsum of foot which was in about 31 patients (62%). Then whole foot which comprised about 4 cases (8%). The heel which was about 12 (24%) patients and Toes which was about 16 (32%) patients.

Conclusions: This study consists of 50 cases of diabetic foot patients with emphasis on surgical management and its complications over a period of 23 months. The highest number of patients was seen in the age group of 51-60 years. The male to female ratio was approximately 2.57 : 1. Commonest presenting lesion was ulcers, followed by cellulitis and gangrene. Commonest site of lesion was dorsum of foot followed by plantar foot and toes. Trivial trauma (prior to diabetic foot lesion) is the initiating factor in more than half of the cases. Minimum duration of stay in hospital was 14 days and maximum 74 days. Most common microorganisms grown from culture was staphylococcus aureus followed by pseudomonas.

Keywords: Diabetes mellitus, diabetic foot, ulcers, gangrene, trivial trauma

I. INTRODUCTION

Diabetes mellitus is a worldwide problem. The incidence of diabetes mellitus is increasing globally.¹ Patients with diabetes have a 12% to 25% life time risk of developing a foot ulcer.² In the diabetic patient, the foot is the cross road for many pathological processes, in which almost all components of the lower extremity involved; from skin, subcutaneous tissue, muscles, bones and joints, to blood vessels and nerves. Foot disorders are a major source of morbidity and a leading cause of hospitalization for persons with diabetes. Ulceration, infection, gangrene, and amputation are significant complication of the disease, estimated to cost billions of dollars each year. Every 30 seconds, a lower limb or a part of a lower limb is



lost somewhere in the worlds as a consequence of diabetes. Up to 70% of all lower-limb amputations are performed on people with diabetes. Every year, approximately 4 million people develop a new diabetic foot ulcer. The diabetes mellitus is the fourth to fifth leading cause of death in developed countries.

Diabetes has been the disease affecting younger age to old age causing significant burden in their lifestyle, thus making a need to study on the age pattern and occupation of the patients. Diabetes is one of the commonest diseases in the society in which no medical specialty is exempt from knowing the disease and its complications, so also for the surgeons during the management of diabetic foot, because the diabetic complications of the foot are very common.

In 1908, Benedict introduced Benedict's test for urinary sugar in diabetes. Frederick Banting, a young surgeon; John Macleod, a professor of physiology; Charles Best, a graduate student; a J.B. Collip, a skilled chemist, succeeded during the years 1921 and 1922 in fulfilling all of the criteria for a therapeutically active insulin and produced the first useful and consistently successful insulin preparation for the treatment of human diabetes. Thus, the pancreatic etiology of diabetes was finally established. The First successful pancreas transplants were performed in 1960s. The first serious islet transplants were carried out in the 1990s, with few of the recipients becoming insulin independent.¹¹

Diabetes mellitus is characterized by a chronic hyperglycemia with disturbances of carbohydrate, fat, and protein metabolism resulting from defects in insulin secretion, insulin action, or both. When fully expressed, diabetes is characterized by fasting hyperglycemia, but the disease can also be recognized during less overt stages, most usually by the presence of glucose intolerance. The effects of diabetes mellitus include long-term damage, dysfunction, and a failure of various organs, especially the eyes, kidneys, heart, and blood vessels. Diabetes may present with characteristic symptoms such as thirst, polyuria, blurring of vision, weight loss, and polyphagia, and in its most severe forms, with ketoacidosis or hyperosmolarity, which in the absence of effective treatment, leads to stupor, coma, and death.

Describes the foot of a diabetic patient that has the potential risk of pathologic consequences, including infection, ulceration, and destruction of deep tissues associated with neurologic abnormalities, various degrees of peripheral arterial disease and metabolic complications of diabetes in the lower limb. The

global burden of diabetes is projected to increase from the current 246 million people to over 380 million people by the year 2025.

It is now appreciated that 15-20% of patients with such foot ulcers go on to need an amputation, especially major lower extremity amputation. Similarly 85% of major lower limb amputation are preceded by a foot ulcer.

Once one limb has been amputated, there is an increased risk that the other limb will also require amputation. Since they are the major cause of lower limb amputations in these people they should be treated aggressively in order to have a better outcome.

II. MATERIALS AND METHODS

This study was conducted comprising of, 50 patients of diabetic foot in the department of Burns and Plastic Surgery at B. J. Medical College and Civil Hospital, Ahmedabad during the period of June 2021 to May 2023.

METHOD OF COLLECTION OF DATA

Detailed history taking. Thorough physical examination. Routine investigations. ●●●

Relevant special investigations. ●

Choosing the appropriate line of treatment. ●

Assessment of patients following treatment at regular intervals in comparison to his/her pre-treatment with regards to symptoms. ●

All patients are studied and clinical findings are recorded as per proforma case sheet data analyzed and necessary investigations done as per required and treatment given. predisposing factors, complications, treatment and sequel are studied, analyzed Stand discussed.

INCLUSION CRITERIA

All patients with diabetes mellitus suffering from foot ulcers and infections are included in the study. ●

Age group of the patients: all age groups are included in the study. ●

- Patients with known past history of diabetes are also included and Incidental diagnosis of diabetes on admission are also included.
- Patients with gangrenous foot, complicated by diabetes are included in the study.

EXCLUSION CRITERIA

- Patients with foot infections without diabetes mellitus are excluded.
- Patients with gangrene foot of etiology other than infection of foot complicated by diabetes are excluded.



- Patients whose treatment could not be completed due to non compliance are excluded. ■

III. RESULTS

An analysis of 50 cases of diabetic foot were done. These cases were treated in Plastic Surgery department in B. J. Medical College and Civil Hospital, Ahmedabad during the period of June 2021 to May 2023.

TABLE 1 : AGE DISTRIBUTION

Age (Years)	No. of Patients	Percentage
21-30	0	0
31-40	7	14
41-50	14	28
51-60	16	32
61-70	12	24
71-80	1	2
Total	50	50

Of 50 cases studied, most of the diabetic patients with foot lesions were in the age group of 51-60 (32%) followed by 41-50 (28%).

The youngest has 37 years came with complaints of ulcer over Dorsum of Left foot and the oldest was 71 years admitted for cellulitis over whole left foot.

TABLE 2: SEX DISTRIBUTION

Sex	No. of Patients	Percentage
Male	36	72
Female	14	28

Out of 50 cases studied, there was a marked male predominance in occurrence of diabetic foot lesion. 36 (72%) were male patients and 14 (28 %) cases female patients. Ratio of Male: Female is 2.57: 1.

TABLE 3: CLINICAL PRESENTATION

Clinical Presentation	No. of Patients	Percentage
Ulcer	27	54
Cellulitis	11	22
Abscess	3	6
Gangrene	5	10
Neuropathic Ulcer	4	8

Out of 50 cases, 27 (54%) cases presented with ulcers, 11 (22%) cases with cellulitis, 3 (6%) of cases abscess, 5 (10%) of cases gangrene and 4 (8%) of cases Neuropathic ulcer.

TABLE 4: SITE OF LESION

Site of Lesion	No. of Patients	Percentage
Toes	16	32
Heel	12	24
Dorsum of foot	31	62
Plantar foot	26	52
Whole foot	4	8

The most common site of lesion in the diabetic foot was dorsum of foot which was in about 31 patients (62%). Then whole foot which comprised about 4 cases (8%). The heel which was about 12 (24%) patients and Toes which was about 16 (32%) patients. In this study many patients had more than one sites were involved on the foot.

TABLE 5: DURATION OF DM

Duration of DM in Year	No. of Patients	Percentage
0-1 Year	4	8
2-5 Year	11	22
6-10 Year	14	28
11-15 Year	10	20
16-20 Year	8	16
> 20 Year	3	6

Most of the patients had diabetes duration for about 6-10 years (28%). Four patients were diagnosed incidentally at the time of hospital admission and a 68 years old male patient came with past history of diabetes with duration of 25 years.

TABLE 6: CULTURE AND SENSITIVITY

Organisms	No. of Patients	Percentage
Staph aureus	16	32
Streptococcus	2	4
Pseudomonas	9	18
E-Coli	3	6
Klebsiella	8	16
Proteus	2	4
No Growth	10	20

The most common microorganism grown on culture of pus was Staphylococcus Aureus in 16 (32%) patients followed by Pseudomonas 9 (18%), Klebsiella 8 (8%), E-coli 3 (6%), Streptococcus 2



(4%) and Proteus 2 (4%). In 10 (20%) patients there was no growth seen on culture.

TABLE 7: TREATMENT

Operative Procedure	No. of Patients	Percentage
Wound debridement & Saline Dressing	8	16
I&D	3	6
Amputation	8	16
STG	26	52
Flap	5	10

Out of 50 patients treated 8 (16%) patients were managed conservatively by wound debridement and regular saline dressing with antibiotics with diabetic control. 26 (52%) patients treated with STG, 3 (6%) patients underwent I & D for abscess and 3 (6%) patients presented with gangrene of toes and phalanges were treated with amputation of toes. 3(6%) patients underwent below knee amputation and 2 (4%) patients were above knee amputation. 5 (10%) cases were treated by flap coverage from which 2 cases were of Reverse sural artery flap for dorsum of foot defect, 2 cases were of Local Rotation flap for plantar foot ulcer and 1 case was of Propeller flap for the dorsum of the foot defect. In most of the cases, limb was salvaged by conservative treatment and timely surgical management.

IV. DISCUSSION

This study consists of 50 cases of diabetic foot patients with emphasis on surgical management and its complications over a period of 23 months. After analysis of the data the following are the conclusions. The youngest patient in present study series of 50 patients studied was 37 years, and the oldest 71 years. The highest number of patients was seen in the age group of 51-60 years. The male to female ratio was approximately 2.57 : 1. Surgical complications are more common in men due to their increased susceptibility to trauma, smoking, and alcoholism. Commonest presenting lesion was ulcers, followed by cellulitis and gangrene.

Commonest site of lesion was dorsum of foot followed by plantar foot and toes. Trivial trauma (prior to diabetic foot lesion) is the initiating factor in more than half of the cases. Duration of the diabetes varies from 1year to 25 years. More than half of the patients had infection in addition to ischemia or neuropathy. This study

indicates that all these three factors can be present in a patient with diabetic foot lesions. Minimum duration of stay in hospital was 14 days and maximum 74 days. Most common microorganisms grown from culture taken from the lesion was staphylococcus aureus followed by pseudomonas. Conservative treatment consists of control of diabetes with human insulin along with appropriate oral or iv antibiotics was effective in most of the cases. Wound debridement, slough excision, followed by saline dressing were resulted in healing of ulcers. Split skin grafting, Incision and drainage, bellow knee amputation, and above knee amputation, were the other modes of treatment.

V. CONCLUSION

Diabetes is a lifelong problem, and the incidence of diabetic foot complications increases with age and duration of the disease. Ulceration, infection, gangrene, and lower extremity amputation are complications often encountered in patients with diabetes mellitus. These complications frequently result in extensive morbidity, repeated hospitalizations, and mortality. They take a tremendous toll on the patient's physical and mental well-being as well as impose a substantial economic burden, often removing the patient from the workforce and placing a financial drain on the health care system. By identifying high- risk patient and tailoring a total foot care prevention program accordingly, the incidences of ulceration and lower extremity amputations can be reduced. Not all diabetic foot complications can be prevented, but it is possible to dramatically reduce their incidence through appropriate management and prevention programs. The multidisciplinary team approach to diabetic foot disorders has been demonstrated as the optimal method to achieve favorable rates of limb salvage in the high-risk diabetic patient. Good glycemic control will prevent acute complications such as DKA and hypoglycemia. Foot care programs emphasizing preventive management can reduce the incidence of foot ulceration through modification of self-care practices, appropriate evaluation of risk factors, and formulation of treatment protocols aimed at early intervention, limb preservation, and prevention of new lesions. A significant reduction in both major and minor diabetic limb amputations is certainly attainable if clinicians embrace these principles and incorporate them into daily patient care.

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