Original Research Article

New Indian Journal of Surgery
Volume 11 Number 3 / July–September 2020
DOI: https://dx.doi.org/10.21088/nijs.0976.4747.11320.18

Clinicopathological Study and Management of Diabetic Foot

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How to cite this article:

S Kumaraswamy, Sekar A, Vishnu Kumar S et. al., Clinicopathological Study and Management of Diabetic Foot. New Indian J Surg. 2020;11(3):369–372.

Abstract

*Background***:** Diabetes mellitus is an iceberg disease. It is a worldwide problem. The incidence of diabetes mellitus is increasing globally. Patients with diabetes have a 12% to 25% life time risk of developing a foot ulcer.A majority of diabetic patients develop foot ulcers in one point of time or other during the course of their illness. A significant number of such patients will require long-term hospital treatment and amputations.

*Methods***:** This prospective observational study was conducted by the Department of General Surgery at Mahatma Gandhi medical college and research institute from Jan 2017 to Jan 2018. A total of 50 patients were included in the study.The clinical examination was done and all patients underwent routine laboratory investigations and few with relevant special investigations (Doppler study) if necessary. Wound culture and sensitivity was done in all cases.

*Results***:** The maximum 28(56%) were in the age group of 41-60 years followed by 16 (32%) from the age group 61-80 years. The mean age of the patients was 54.73 (SD12.81).The most common site of lesion in the diabetic foot was dorsum of foot which was in about 18 patients (36%) followed by whole fore foot.Most of the patients(34%) were managed conservatively by slough excision ,regular dressing and antibiotics with diabetic control.

Keywords: Amputation; Diabetic foot; Ulcer**.**

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Introduction

Diabetes mellitus is an iceberg disease. It 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] A majority of diabetic patients develop foot ulcers in one point of time or other during the course of their illness. A significant number of such patients will require long-term hospital treatment and amputations. The etiopathogenesis of diabetic foot lesions are multifactorial. Diabetic neuropathies, vasculopathy, poor control of diabetes and bacterial infection are some of them.Diabetic neuropathy is the common presenting factor in almost 90% of diabetic foot ulcers. Peripheral arterial disease is 2-8 times more common in patients with diabetes. Other risk factors include visual impairment, diabetic nephropathy, poor glycemic control and cigarette smoking.[3,4] The infections of diabetic foot are polymicrobial in nature that involves both aerobes and anaerobes. The common are E. coli, S. aureus, P. aeruginosa, Enterococcus species.[5] Long standing uncontrolled diabetes causes peripheral vascular changes and neurological changes which aggravates the disease course through ulceration, infections, deformities, and other systemic complications making impetus to study the mode of presentation and prevent the complications.

Materials and Methods

Source of Data

This prospective observational study was conducted by the Department of General Surgery at Mahatma Gandhi medical college and research institute from Jan 2017 to Jan 2018. A total of 50 patients were included in the study on the basis of inclusion criteria.All patients were studied and clinical findings were recorded and necessary investigations done as per required and treatment given.The predisposing factors, complications, treatment and sequel were studied, analyzed and discussed.

Inclusion Criteria:-

Patients with diabetes mellitus suffering from foot ulcers and infections

All age groups were included in the study.

Patients with known past history of diabetes

Patients with gangrenous foot, complicated by diabetes.

Exclusion Criteria:-

Patients with foot infections without diabetes mellitus

Patients with gangrene foot of etiology other than infection of foot complicated by diabetes

Patients whose treatment could not be completed due to non compliance

Incidental diagnosis of diabetes on admission.

Patients who were lost on follow up

Procedure:-

The detailed history and proper clinical findings were entered in a proforma case sheet. The clinical examination was done and all patients underwent routine laboratory investigations and few with relevant special investigations (Doppler study) if necessary. Wound culture and sensitivity was done in all cases. All the findings were recorded in the pre-designed profoma and analyzed.

Statistical Analysis:

The data was analyzed using SPSS software version 16. Descriptive statistics like mean and percentages were used to interpret the results.

Results

An analysis of 50 cases of diabetic foot was done. These cases were admitted and treated in different surgical units in our hospital during the period of Jan 2017 to Jan 2018.

Table 1: Age Wise Distribution of Study Subjects.

Age	No of Patients	Total
<20	0	
21-40	4	8%
41-60	28	56%
61-80	16	32%
>80	2	4%
Total	50	100

Out of 50 subjects enrolled into the study, maximum 28 (56%) were in the age group of 41-60 years followed by 16 (32%) from the age group 61-80 years. The mean age of the patients was 54.73 (SD12.81).

Table 2: Sex Wise Distribution of Study Subjects.

Sex	No of Patients	Total
Male	36	72%
Female	14	28%
Total	50	100

Majority of the subjects were male 36 (72%) compared to females 14 (28%).

Table 3: Clinical Presentation.

Lesion	No of Patients	Percentage
Ulcer	26	52%
Cellulitis	17	34%
Abscess	3	6%
Gangrene	3	6%
Neuropathic Ulcer	1	2%
Total	50	100

The most commonest clinical presentation seen in our study were ulcer (52%) followed by cellulitis (34%). Gangrene was present in 6% of cases.

Table 4: Distribution according to site of lesion.

Site	No of patients	Percentage
Toes	11	22
Heel	1	2%
Dorsum of foot	18	36%
Plantar foot	8	16%
Whole fore foot	12	24%
Total	50	100

The most common site of lesion in the diabetic foot was dorsum of foot which was in about 18 patients (36%) followed by whole fore foot which comprised about 12 cases (24%).

Table 5: Distribution according to complication.

Complication	No of patients	Total
Neuropathy	32	64%
Ischaemia	28	56%
Infection	42	84%

Majority of the subjects had infection (84%), neuropathy (64%) followed by ischaemia (56%). The above table confers that multiple complications can be presented in a single patient with diabetic foot.

Table 6: Distribution according to culture and sensitivity.

Organism	No of patients	Total
Staphyococcus	27	54%
Streptococcus	4	8%
Psuedomonas	18	36%
Ecoli	1	2%
Total	50	100

The most common microorganism grown on culture of pus was staphylococcus aureus in 27 (54%) patients followed by pseudomonas 18 (36%)

Table 7: Distribution according to treatment.

Organism	No of patients	Total
Slough excision & regular dressing	17	34%
Wound debridement	14	28%
Amputation	2	4%
Stsg	1	2%
Inscision & drainage	16	32%
Total	50	100

Out of 50 patients treated, 17 (34%) patients were managed conservatively by slough excision and regular dressing with antibiotics with diabetic control. 14 (28%) patients were treated with wound debridement and 2 patients (4%) underwent amputation.

Discussion

Diabetes is a worldwide problem. A good number of diabetic patients develop wound at one point of time or other during the course of their illness. The patients with DM are more prone to infection than normal individual.Age groups of the present study shows that the age range of 41-60 years (56%) were at higher risk group. The results are in accordance with Ahmed et. al.[6] and Tyagi A et. al.[7] who noted that 74.48% and 50 % of patients belonged to the same age group.Majority of the subjects were male (72%) which was similiar to study by Ali SM[8] et. al. where in 65% of males contributed to the study. The incidence is more among males probably as they are the head of the family who mostly working outdoor, which makes them more vulnerable for trauma and sequelae.The most commonest clinical presentation seen in our study were ulcer (52%) followed by cellulitis (34%) which was in consistent with the study done by Tyagi A[7] et. al. The most common site of lesion in the diabetic foot was dorsum of foot (36%) which was in contrast to the study done by Mummidi DS[9] et. al. who noted in 64% of cases where as in studies done by Apelquist et. al.[10]and Reiber et. al.[11] the common site was toes which was 51% and 52% respectively. The most common microorganism grown on culture of pus was staphylococcus aureus (54%) which was similiar to studies done by Mummidi DS[9] et. al. and Chetan L[5] et. al. who recorded the growth of organism staphylococcus aureus in 30% and 36% respectively.Most of the patients (34%) were managed conservatively by slough excision, regular dressing and antibiotics with diabetic control where as few patients(4%) underwent amputation.

Conclusion

From this study, we can conclude that Diabetes is a lifelong problem and the incidence of diabetic foot complications increases with age and duration of the disease. 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. Diabetic patients at risk for foot lesions must be educated about risk factors and the importance of foot care, including the need for self-inspection and surveillance, monitoring foot temperatures, appropriate daily foot hygiene, use of proper footwear, good diabetes control, and prompt recognition and professional treatment of newly discovered lesions. 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.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

References

1. Reiber GE. Epidemiology of foot ulcers and amputation in the diabetic foot. Bowker JH, Pfeifer MA, eds. The diabetic foot, 6th ed. st. Louis, Mo:Mosby Inc;2001:13-32.
2. Ramsey SD, Newton K, Blough D, McCulloch DK, Sandhy N, Reiber GE, et. al. Incidence, outcomes and cost of foot ulcers in patients with diabetes.diabetes care 2009; 22:382-7.
3. Prompers L, Huijberts M, Apelqvist J, Jude E, Piaggesi A, Bakker K, et. al. High prevalence of ischaemia, infection and serious comorbidity in patients with diabetic foot disease in Europe. Baseline results from the Eurodiale study. Diabetologia. 2007;50:18–25.
4. Boulton AJ. The diabetic foot—an update. Foot Ankle Surg. 2008;14:120–4. 9.
5. Chethan L, Amith KM. Clinicopathological study and management of diabetic foot. Int Surg J 2017;4:3928-32.
6. Ahmad W, Khan IA, Ghaffar S, Al-Swailmi FK, Khan I. Risk factors for diabetic foot ulcer. J Ayub Med Coll Abbottabad, 2013; 25(7):16-18.
7. Tyagi A, G. Hari Prasad. Our experience of diabetic foot, evaluation and management according to Wagner's classification. International Journal of Contemporary Medicine Surgery and Radiology. 2018;3(1):88-90.
8. Ali SM, Basit A, Sheikh T, Mumtaz S, Hydrie MZ. Diabetic foot ulcer--a prospective study. J Pak Med Assoc, 2001; 51(5):78-81.
9. Mummidi DS,Dugar D,Mishra RK, Mohapatra JS, Houghton T. Clinicopathological study: management Of diabetic foot and its Complications. J Pharm Biomed Sci. 2015; 05(04):308-311.
10. Apelqvist J, Larsson J, Agard C. Long term prognosis for diabetic patients with foot ulcers. JInt Med 1993; 233:485-491
11. Reiber GE, Lipsky BA, Gibbons GW. The burden of diabetic foot ulcers. Am J Surg 1998; 176:5S-10S.