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A clinical study of 50 cases of diabetic foot and its management

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Abstract

Background: Diabetes mellitus is a metabolic disorder causing a major global problem in whom 20 % of individuals presents with foot complications and require hospitalisation for the same. In such populations, 50% of individuals goes through either minor or major amputations. Hence diabetic foot needs a major attention which in turn reflects the quality of life of the patient.

Methods: The study was conducted among 50 cases presented with diabetic foot in a rural medical college during the period of October 2018- October 2020 as a prospective study.

Results: Majority of patients in the study presented in the age group of 41-50 years with male preponderance, 35 cases. The commonest cause for the development of diabetic foot ulcer is neuropathy (29 cases) and the most common mode of presentation is gangrene, 30 cases. Grade 4 lesions of Wagner's grading are more common (20 cases) and the most common site of lesion is dorsal aspect, 16 cases. The most common microorganism isolated was MRSA (13 cases) and sensitive to piperacillin and tazobactam. The Ankle Brachial Pressure Index (ABPI) is normal in most of the patients, 34 cases. The most common procedure performed is Ray's amputation, 16 cases and post-operatively the wound was healthy in majority of individuals due to strict glycaemic and sepsis control.

Conclusion: Since the diabetic patients are at high risk of foot complications, I would like to evaluate these patients as my study group which is more common in our rural setup.

Keywords: diabetes mellitus, neuropathy, amputation

Introduction

There is an increasing trend in the patients with Diabetes mellitus in the world, from 30 million people in 1985 to 285 million people in 2010, and estimated to be 360 million people by 2030 [1, 2].

India, is considered to be the second largest among the diabetic population in the world which has about 73 million diabetic people. This roaring uptake of diabetic population gets hospitalized majorly for foot complications. About 20% of diabetic people presents with foot complications and requires hospitalisation and management. Due to these complications, these diabetic foot cases are attributed to improve the diagnostic techniques, to increase the quality of life, to modify the diet and life style in the present era [3].

Diabetes is the major cause for lower extremity amputations (LEA) [2]. Among 5% of individuals with diabetes who develop foot ulcers every year, 1% undergoes amputation [4].

Diabetic Foot Ulcers (DFU) plays a major role in patient's family both physically and financially, places a significant burden among health care professionals and hospitals in managing the foot ulcers and salvaging the limb [5, 6].

Early and effective management of Diabetic Foot Ulcers like proper education, tight control of blood sugar levels, wound debridement, dressing, off loading, and surgical management like amputations, can reduce the severity of disease and its complications, and improves the quality of life of patient and hence these individuals need a multi-disciplinary approach to achieve this [7].

Aims and Objectives

1. To study the various causes that lead to the development of diabetic foot
2. To analyse the distribution of age and sex, presentation of the wound, location of ulcers on

3. The involved foot, Wagner’s grading of lesions, commonest organism and its sensitivity to antibiotics.
4. To analyse the effective methodology of management of diabetic foot.

Materials and Methods

The study was conducted among 50 cases presented with diabetic foot in a rural medical college during the period of October 2018- October 2020 as a prospective study. The cases were thoroughly evaluated by collecting a detailed history, physical examination, routine and specific investigations, management and follow up.

Inclusion Criteria

- Known cases of diabetes mellitus suffering from foot ulcer, gangrene or infections.
- Age above 12 years.
- Willing to participate in the study.

Exclusion Criteria

- Age below 12 years.
- Pregnant females.
- Patients who are not willing for the study.

Results

This study which was conducted among 50 patients who presented with diabetic foot ulcers were evaluated and analysed in reference to age, sex, mode of presentation, etiopathogenesis, location of ulcers, Wagner’s grading, Ankle Brachial Pressure Index (ABPI), pus culture and sensitivity, management and its complications.

In my study table 1 shows the distribution of age among my study group. Highest number of cases with foot infection in diabetic population were in age group of 41-50 years of age, 23 cases (46%) followed by 61-70 years of age, 10 cases (20%).

Table 1: Age distribution

Age (in years)	No.of cases	Percentage (%)
12-20	0	0
21-30	2	4
31-40	4	8
41-50	23	46
51-60	9	18
61-70	10	20
71-80	2	4

Out of 50 patients, 35 cases (70%) were males and 15 cases (30%) were females. Therefore, in my study diabetic foot ulcers are predominantly present among males.

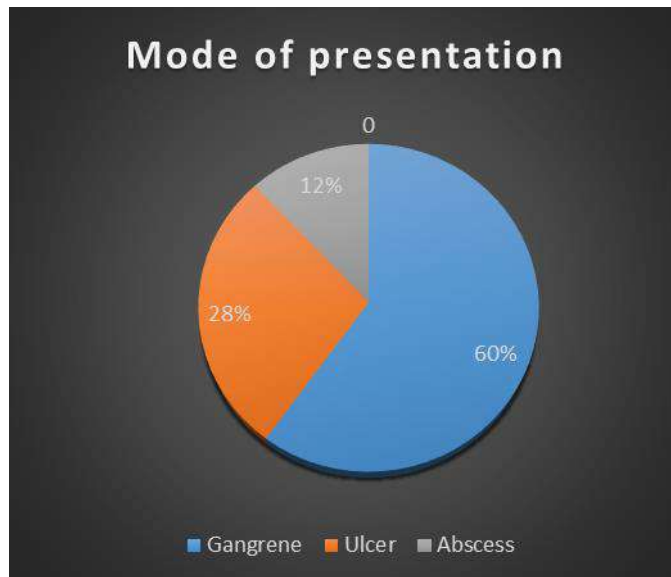
Table 2: Sex distribution

Sex	No. of cases	Percentage (%)
Male	35	70
Female	15	30

In the present study, the commonest mode of presentation was gangrene, 30 cases (60%) followed by ulcer, 14 cases (28%) and abscess, 6 cases (12%). Therefore, commonest mode of presentation in case of diabetic foot is gangrene.

Table 3: Mode of presentation

Mode of presentation	No. of cases	Percentage (%)
Gangrene	30	60
Ulcer	14	28
Abscess	6	12



Graph 1: Mode of presentation

In the present study, the most common cause of development of diabetic foot ulcers are neuropathy, 29 cases (58%), followed by ischemia 13 cases (26%) and the neuro ischemia in 8 cases (16%). Therefore, neuropathy is the most common cause for development of ulcers in diabetic patients.

Table 4: Cause of development of diabetic foot ulcers

Causes	No. of cases	Percentage (%)
Neuropathy	29	58
Ischemia	13	26
Neuro ischemia	8	16

On studying the lesions using Wagner’s grading among the study population, 20 cases (40%) presented with Grade 4 lesion, 12 cases (24%) presented with Grade 3 and 10 cases (20%) with Grade 2.

Table 5: Wagner’s grading

Wagner’s grading	No. of cases	Percentage (%)
1	6	12
2	10	20
3	12	24
4	20	40
5	2	4

On comparing the incidence of ulcers in right and left foot, ulcers are commonly seen in right foot, 29 cases and the left foot was infected in 21 cases. The commonly affected toe was the great toe (12 cases), followed by 2nd toe (10 cases).



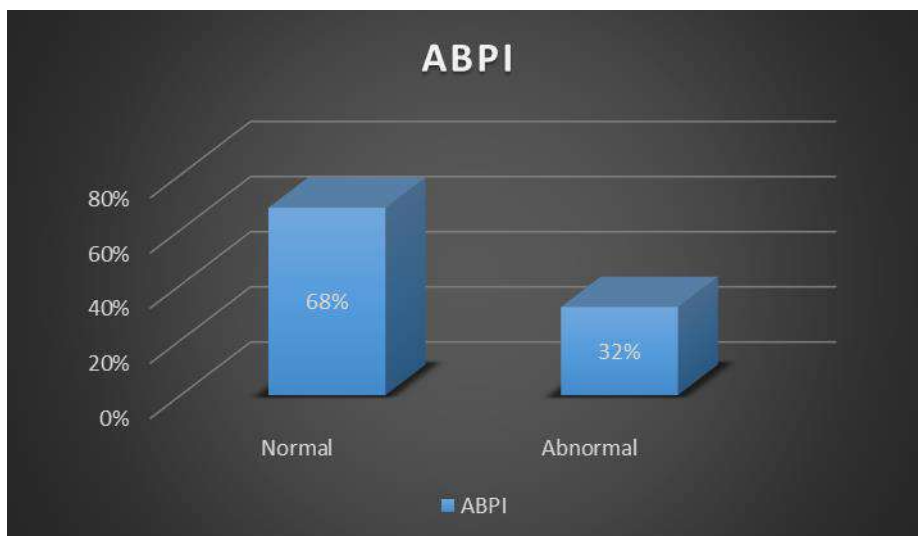
Graph 2: Commonly involved leg in Foot Ulcer

In my present study, the ulcer/gangrene/abscess is commonly located in dorsal aspect of foot 16 cases (32%) followed by plantar aspect 12 cases (24%) and complete involvement in 10 cases (20%).

Table 6: Location of ulcers on the foot

Location of ulcer	No. of cases	Percentage (%)
Dorsal	16	32
Plantar	12	24
Dorsal and lateral	5	10
Plantar and lateral	7	14
Complete	10	20

In my study, the Ankle Brachial Pressure Index (ABPI) was measured and found to be normal (0.9-1.2) in 34 cases (68%) and abnormal (<0.9) in 16 cases (32%).



Graph 3: Ankle Brachial Pressure Index

In my study, the most common organism cultured from the wound collected using swab stick, MRSA (Methicillin Resistant Staphylococcal Aureus) 13 cases (26%) and sensitive to piperacillin and tazobactam and many responded well to this treatment. The 2nd commonest is Klebsiella 11 cases (22%) followed by E. coli, 9 cases (18%).

Table 7: Organisms isolated in culture

Organisms	No. of cases	Percentage (%)
MRSA	13	26
Pseudomonas	5	10
E. coli	9	18
Klebshiella	11	22
Proteus	4	8
Staphylococcal aureus	8	16

In this study, 16 cases (32%) underwent Ray's amputation, 12 cases (24%) underwent debridement, dressing and Split Skin Grafting (SSG) and 10 cases (20%) managed with debridement and dressing alone.

Table 8: Management of diabetic foot infections

Management	No. of cases	Percentage (%)
Conservative	5	10
Ray's amputation	16	32
Ray's amputation + SSG	7	14
Debridement and dressing	10	20
Debridement, dressing and SSG	12	24

Total duration of stay in hospital in the present study, most patients were discharged in 2 weeks, 17 cases (34%) after management.

Table 9: Duration of hospital stay

Duration	No. of cases	Percentage (%)
< 1 week	11	22
2 weeks	17	34
3 weeks	12	24
4 weeks	5	10
>4 weeks	5	10

After the management of diabetic foot, the post procedure complications were not seen in 50 % of the cases due to strict diabetic control and sepsis management, 13 cases present with poor wound healing due to uncontrolled diabetes and elderly age.

Table 10: Complications

Complications	No. of cases	Percentage (%)
Non healing	13	26
Infections	9	18
Skin necrosis	3	6
Nil	25	50

Discussion

Diabetic foot ulcers are common and serious problem in our country and their prevalence is expected to be 4%-27% [8]. They account for the large number of hospital admissions [9] and management. Therefore, a thorough knowledge regarding the aetiology, risk factors, diagnosis and management of diabetic foot infections are important. Early diagnosis and intervention can reduce the rate of amputation by 85% [10]. Hence as a surgeon's it is our duty to thoroughly evaluate the patients with diabetic foot ulcers for the better outcome and to improve the quality of life.

Age

The most common age group presenting with diabetic foot ulcers 41 – 50 years of age, 23 cases (46%) compared to Gunjan *et al.* (2015) in which, 26 patients (43%) were in 4th to 5th decade (n=60) [11].

Sex

In the present study, the sex was predominantly male, 35 cases (70%) compared to the study Pankaj D *et al.* (2015) study [12] with 74% since they are more exposed to injuries during work.

Mode of presentation

The most common mode of presentation in my study is gangrene which is 30 cases (60%) and such presentation occurs due to the underestimating of the seriousness of the diabetic foot infections and presenting at the stage of avascularity where the foot can't be salvaged.

Cause of diabetic foot ulcer

The commonest cause for the development of diabetic foot ulcer is neuropathy (58%) compared to study by Qari FA, Akbar D which shows 94% [13].

Wagner's grading

In the present study, according to Wagner's grading Grade 4 lesions were more common 40% compared to a standard study which showed grade 2 lesions are common (34.5%) [14].

Location of lesion in the foot

The most common site of lesion is dorsal aspect of the foot which is 32% compared to a standard study Venkata RM *et al.* (2020) which shows 36% [15]. The right foot is commonly involved, 29 cases and the great toe is commonly infected (12 cases).

ABPI

On comparing the Ankle Brachial Pressure Index, the present study shows normal ABPI in 68% and abnormal ABPI in 32% cases compared to Pilla EDP *et al.* (2019) showing 80% with normal and 20% with abnormal ABPI [16].

Organisms isolated in culture

MRSA is the most common organism isolated from the culture in my study, 13 cases (26%). This is due to the late presentation of case to the surgical OPD and misuse of the antibiotics resulting in antibiotic resistant organisms.

Procedure done

Ray's amputation was the commonest procedure done among my study population, 16 cases (32%) since the most common mode of presentation was gangrene compared to Kalburgi EB *et al.* (2017) with 11.45% [17]. Post treatment most of the cases had no complications (50%) and 26% presented with poor healing due to uncontrolled diabetes and most were discharged at 2 weeks.

Conclusion

The commonest age group presenting with diabetic foot ulcers are 41-50 years of age and common among males. Gangrene of the toe(s)/foot is the most common presentation commonly involving the dorsal aspect. Neuropathy is the commonest cause leading to the formation of diabetic foot ulcers. Trivial trauma left unnoticed may lead to the ulcer formation and hence neuropathy plays a significant role in diabetic patients. According to Wagner's grading, Grade 4 lesions were more common among my study group but the ABPI was normal in most of the patients. The most common organism isolated was MRSA and sensitive to piperacillin and tazobactam. The most common procedure performed was ray's amputation since the cases reported at the state where the toe(s) can't be salvaged and

the wound healed well postoperatively in most of the patients without any complications. Therefore, it is essential to search for the diabetic foot at early stages by careful examination of foot, performing test to identify neuropathy and microangiopathy and salvaging the foot by earlier means of intervention and proper care.

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