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Clinical Pattern of Diabetic Foot Infections and Their Management – A Prospective Study

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ABSTRACT

The World Health organization defines the diabetic foot as an infection, ulceration and / or destruction of deep tissues associated with neurological abnormalities and various degrees of peripheral vascular disease in the lower limb. Foot ulcers occur in approximately 15% of people with diabetes which accounts for 25% of all hospital admissions with the hospital stay being 60% longer than the stay for other causes and the risk of amputation is 15 to 40 times greater in diabetics than in others6. Taking the disease burden into consideration, the following research analysis was done in 200 Diabetic patients with foot complications admitted in the surgical wards in a tertiary care centre. The present study concludes that adequate glycemic control, appropriate antibiotic therapy and prompt slough excision – mediated debridement therapy can be the successful limb salvage programme in nearly 93.5% of the diabetic foot cases.

KEYWORDS : Diabetic foot, amputation, peripheral vascular disease

INTRODUCTION

The World Health organization defines the diabetic foot as an infection, ulceration and / or destruction of deep tissues associated with neurological abnormalities and various degrees of peripheral vascular disease in the lower limb. Foot ulcers occur in approximately 15% of people with diabetes which accounts for 25% of all hospital admissions with the hospital stay being 60% longer than the stay for other causes and the risk of amputation is 15 to 40 times greater in diabetics than in others[6]. Diabetic foot ulcers account for more than 50% of non traumatic amputations and are associated with high rates of mortality, re-amputation and contra lateral limb amputation. Taking the disease burden into consideration, the following research analysis was done in 200 Diabetic patients with foot complications admitted in the surgical wards in a tertiary care centre with the following aim and objectives ; (i) to study the clinical pattern of foot infections in diabetic patients, (ii) to study the effect of Glycemic status in controlling infection, (iii) to analyze the risk factors leading to complications in diabetic-foot-infections, (iv) to study the outcome of the treatment modalities.

CASE STUDY

This is a prospective study of all Diabetic patients with foot complications admitted in the surgical ward in a tertiary care hospital. Detailed history and thorough clinical examination, hematological, biochemical, microbiological and radiological investigations were done. Blood sugar and Renal parameters were performed at the time of admission. Fasting, Post prandial, Pre dinner and Post dinner Blood sugar was done on the next day and repeated according to Blood sugar levels. Urine analysis including urine acetone was done . X-ray of local part, Duplex scan of the affected limb were done and documented. Appropriate treatment was provided according to the Grade of Diabetic foot lesions. This included infection control with antibiotics only ; Slough excision with antibiotics ; slough excision with split skin graft or flap; fasciotomy; incision and drainage or amputation at appropriate level. Health Education was given to patients regarding foot care and were followed up regularly every 2 weeks.

Table – 1
Age & Sex Distribution

Age	Male	%	Female	%	Total	%
0-19	0	0	0	0	0	0
20-29	1	0.5	0	0	1	0.5
30-39	9	4.5	1	0.5	10	5
40-49	27	13.5	15	7.5	42	21
50-59	37	18.5	13	6.5	50	25
60-69	34	17	27	13.5	61	30.5
70-79	24	12	5	2.5	29	14.5
80-89	6	4	1	0.5	7	3.5
	138	69%	62	31%	200	

Peak Incidence of diabetic foot was seen in the Age group of 50-69years. Increased prevalence was seen among males (69%). In males increased prevalence was seen in the age group of 50-59 years and in females in age group of 60-69 years.

Table – 2
Blood Sugar Values on Admission

Random Blood Sugar level (mg/dl)	No. of Cases	%
< 200	50	25
201 – 300	105	52.5
> 301	45	22.5

The analysis showed that about 52.5% of patients had uncontrolled Random Blood Sugar levels on admission in the range of 201 – 300 mg/dl.

Table –3
Range of Blood Sugar Levels and number of patients in each group.

Blood Sugar mg/dl	Random blood sugar	Fasting Blood sugar	Postprandial blood sugar	Pre Dinner blood sugar	Post Dinner blood sugar
< 150	1	1	-	3	-
150-200	49	123	3	110	1
201-250	70	43	43	67	39
251-300	35	27	52	15	57
301-350	42	6	83	4	84
351- 400	3		17		15
> 401	-		2		4

Random Blood Sugar was taken immediately after admission. Fasting, Post-Prandial, Pre dinner and Post dinner blood sugar was carried out on the next day of admission. Insulin dosage was adjusted accordingly to bring about diabetes control . After Glycemic control, Blood sugar was repeated once in three days. It was noticed that the Glycemic status determined the severity of infection. By achieving Glycemic

control along with appropriate surgical management, infection was effectively controlled.

Table – 4
Duration of Diabetes before the development of foot lesions .

Duration	No. of Cases	%
Detection at present admission	30	15
< 5 yrs	93	46.5
5-10 yrs	69	34.5
10-15 yrs	7	3.5
> 15 yrs	1	0.5

It is observed in this study that 81% of the foot lesions had occurred in patients who have had Diabetes mellitus for more than 1 year to 10 years.

Foot lesions developed either due to trauma or spontaneously. But most of the neuropathic patients would have not noticed or felt the trauma.

Table – 5
Clinical Assessment of Arteriopathy

Peripheral Pulses	No. of Cases	%
Absent	16	8
Present	184	92

The above table shows that 8% of patients had macrovascular arteriopathy. These patients were subjected to Duplex Scan. As the facilities for Revascularisation was not available in our Hospital, Six patients were having peripheral arterial disease were referred to Vascular Surgery department, Government General Hospital, Chennai for Angioplasty and Revascularisation procedures for limb salva

Table – 6
Assessment of Bone Involvement

No. of Patients subjected to x-ray local part	Bone Involvement	%
200	30	15

15% of patients with diabetic foot lesions had bone involvement either in the form of osteomyelitis, pathological fracture, small joint dislocation or other bony changes.

Table – 7
Prevalence of Neuropathy

Neuropathy	No. of Cases	%
Present	61	30.5
Absent	139	69.5

Neuropathy was present in 30.5% of patients presenting with diabetic foot lesions. Patients with Neuropathy presented with Higher Grades of Diabetic foot lesions.

Table – 8
Prevalence of Risk factors in Diabetic patients.

Risk factor	Present in No. of Cases	%
Family H/o Diabetes	135	67.5
Bony deformities	78	39
Obesity	104	52
Arteriopathy	16	8
Neuropathy Retinopathy	61 96	30.5 48

Majority of the patients had either or more of the risk factors leading to complications in Diabetic foot infections.

Table – 9
Presence of other Morbid Conditions

Associated Diseases	No. of Cases
Systemic hypertension	56
Ischemic Heart Disease	40
Nephropathy	18
Pulmonary Tuberculosis	2
Retinopathy	68

Presence of other systemic complication in patients with Diabetic foot lesions increases the morbidity.

Table –10
Assessment of Bacteriology in foot infections

Microorganism Noted	No. of Cases	%
Single Organism	80	73%
Mixed Organism	20	18%
No organizm isolated	10	9%

About 110 patients presented with Diabetic foot ulcers with infection. Pus was sent for culture and sensitivity, of this 73% were of mixed organisms like Klebsiella, E.coli, Proteus, Gram negative cocci. Only 18% had single organism grown in culture.

Table – 11
Antibiotic Sensitivity

Antibiotics	Sensitive in No. of cases
Gentamycin	82
Ciprofloxacin	71
Cefotaxime	96
Ampicillin	40
Cotrimoxazole	36
Doxycycline	43

Most patients were found to be sensitive to ciprofloxacin, Gentamycin and Cefotaxime.

Table – 12
Clinical Pattern of Presentation of Diabetic foot lesions

Presentation	No. of Cases	%
Abscess	4	2
Cellulitis	46	23
Ulcer	110	55
Gangrene	39 Toe gangrene 36 Foot gangrene 3	19.5
Joint involvement	1	0.5

This shows that about 55% of patients with foot ulcers and that toe gangrene was also a common presentation about 36% which if treated earlier can prevent higher level amputation.

Table – 12
Mode of Management of Diabetic foot lesions

Management	No. of cases
Antibiotics Only Toe Dysarticulation	2 22
Ray Amputation	3
Forefoot Amputation	3
Below knee Amputation	6
Above Knee Amputation	1
Slough Excision	102
Slough Excision with SSG	22
Slough Excision with flap	2
Fasciotomy	19
Incision and Drainage	4

Either a single modality or combined modality of treatment was given for effective management. Antibiotics was given to all these patients. Slough excision was done in stages.

13 cases expired or went home against Medical advice or got absconded in the middle of treatment.

Success rate was about 93.5% and mortality rate of 2.5%(5patients) was encountered in our study .Outcome was not traceable in the remaining 4% of patients.

CONCLUSION

76.5% of the diabetic foot cases were in the 40 – 69 years age groups, while maximum cases in men was seen in 50 – 59 years age group and the same in women was in the 60 – 69 years age group. 91% of the patients were bacteriologically positive for infection either with single organism(73%) or with multiple organisms(18%). The patients with diabetic foot presented with abscess(2%); cellulitis(23%); ulcer(55%) and gangrene(20%). While 110/200(55%) cases presented with diabetic ulcers, 85.4% of these cases presented with other ulcer complications. Bone involvement, arteriopathy, neuropathy, were the common risk factors in the study group leading to complications in diabetic foot. In this study, 165/200(82.5%) could be limb-salvaged with antibiotics alone and/or slough excision in various stages and fasciotomy. 35 cases(17.5%) have to undergo different levels of amputation within which majority of them(22/35) were only toe Dysarticulation. The present study concludes that adequate glycemic control, appropriate antibiotic therapy and prompt slough excision – mediated debridement therapy can be the successful limb salvage programme in nearly 93.5% of the diabetic foot cases.

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