Original Article

Clinical pattern of diabetic foot lesions and their management

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Abstract

Introduction: In the years between 1958 and 1993, the number of people diagnosed with diabetes multiplied five – fold1. In 1994, 135 million patients world - wide were living with Diabetes mellitus. By the year 2025, it is estimated that this figure would increase to more than 300 million. **Aims and Objectives:** To study Clinical Pattern of Diabetic Foot Lesions and Their Management **Methodology:** This is a prospective study of consecutive Diabetic patients with foot complications admitted in the surgical wards of Aarupadai Veedu Medical Co l l e g e and Ho s p i t a l during the period of September 2013 – August 2015. A total of 200 cases were analysed during this period. Detailed history and thorough clinical examination was done in all cases. Documentation was done using a stratified proforma which included demographic data of the patients studied; all the details of investigations carried out and the types of management and treatments provided to the patients enrolled in the study. Statistical analysis was done by Chi- square test. **Result:** 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. There was significant family history of diabetes mellites in 67.5% of patients ($p < 0.0001$). Foot lesions developed either due to trauma or spontaneously. But most of the neuropathic patients would have not noticed or felt the trauma. As per Clinical Pattern Abscess was present in 2% cases, cellulitis in 23% Cases, Ulcer in 55% cases and Gangrene in 19.5% Cases. Most of the patients presented with Wagner Grade II type of foot lesions. Hence early and effective management can save the limb The above table shows that 8% of patients had macrovasculararteriopathy. These patients were subjected to Duplex Scan. Neuropathy was present in 30.5% of patients. **Conclusion:** adequate glycemic control, appropriate antibiotic therapy and prompt slough excision–mediated debridement therapy can be the successful limb salvage programme in nearly all the diabetic foot cases.

Keywords: Clinical Pattern of Diabetic Foot, Management of Diabetic Foot.

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INTRODUCTION

In the years between 1958 and 1993, the number of people diagnosed with diabetes multiplied five – fold1. In 1994, 135 million patients world - wide were living with Diabetes mellitus. By the year 2025, it is estimated that this figure would increase to more than 300 million[1]. Diabetes mellitus is a chronic metabolic disorder, predominantly of carbohydrates, which has hereditary and environmental risk factors. According to the criteria of WHO and the ADA (American Diabetes Association) of 19973, a diagnosis can be established on the basis of fasting plasma glucose levels of : 1. 7.8 mmol/L (126 mg/dl) or above (with or without the presence of the classic signs such as polydipsia, tiredness, unexplained weight loss or pruritus). 2. 11.1 mmol/L (200mg/dl) and above measured at random and coexisting with the disease symptoms mentioned previously. 3. 11.1 mmol/L (200mg / dl) measured two hours after a standardized oral glucose tolerance test.Pyrce described, `a case of a perforating ulcer in diabetes and atactic symptoms, as early as 18874. In 1934, Elliot Joslin, one of the pioneers of diabetology, published an article entitled, `The menace

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of diabetic gangrene', in which, Joslindescribed the common causes of diabetic foot lesions[2], and he wrote, "that gangrene is not heaven sent, but is earth born". However, it was not until the 1950s that diabetic neuropathy, ischemia and infection were finally recognized as precondition of foot complications in diabetics - facts that still hold good today. A quarter of the diabetic population is at increased risk of foot injuries as a result of the presence of diabetic neuropathy or an arterial circulatory disorder. Every year 3 to 7% of diabetics suffer a foot lesion for the first time. 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 [3]. 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. India has 30 million diabetics at present and in the year 2025 India is predicted to have 57 million diabetics. The Meggitt – Wagner classificationis the most well-known and validated system for foot – ulcers[4]. Grade Description Grade 0 Pre or post-ulcerative lesion completely epithelialized.

Grade 1: Superficial, full thickness ulcer limited to the dermis, not extending to the subcutis

Grade 2: Ulcer of the skin extending through the subcutis with exposed tendon or bone and without osteomyelitis or abscess formation. Grade 3 Deep ulcers with osteomyelitis or abscess formation. Grade 4 Localized gangrene of the toes or the forefoot. Grade 5 Foot with extensive gangrene Diabetics characteristically have two different types of arterial changes : Large vessel (macroangiopathy) and small vessel (microangiopathy). There are qualitative differences in mucopolysaccharides, calcium and cholesterol compared with non - diabetics. The macrovascular lesion in "Garden - Variety" atherosclerosis. The disease is much more extensive and more commonly associated with medial calcific sclerosis in diabetics than in non – diabetics[13].Diabetic peripheral vascular disease has predilection for tibio- peroneal vessels. All the tibial arteries are occluded with sparing of the dorsal pedal or common plantar artery[5]. Of the various manifestations of diabetic neuropathy, three are of relevance to the lower limb (i) the acute sensory; (ii) chronic sensorimotor and autonomic neuropathies. A progressive, stock and glove symmetrical loss of vibration, temperature and pain perception is typical of the chronic sensorimotor form of the disease[6].

MATERIAL AND METHODS

This is a prospective study of consecutive Diabetic patients with foot complications admitted in the surgical wards of Aarupadai Veedu Medical College and Ho s p i t a l during the period of September 2013 – August 2015. A total of 200 cases were analyzed during this period. Detailed history and thorough clinical examination was done in all cases. Documentation was done using a stratified proforma which included demographic data of the patients studied; all the details of investigations carried out and the types of management and treatments provided to the patients enrolled in the study. Statistical analysis was done by Chi- square test.

RESULT

Table 1: Distribution of the Patients as per the Age and Sex

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: Distribution of the Patients as per the Family History

Family History of Diabetes	No. of Patients	%
Present	135	67.5%
Absent	65	32.5%

There was significant family history of diabetes mellites in 67.5% of patients ($p < 0.0001$).

Table 3: Distribution of the Patients as per the Precipitating Causes

Duration	No. of Patients	%
Spontaneous	60	30
Trauma	146	70

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

Table 4: Clinical Pattern of Presentation of Diabetic Foot Lesions

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

As per Clinical Pattern Abscess was present in 2% cases, cellulitis in 23% Cases, Ulcer in 55% cases and Gangrene in 19.5% Cases.

Table 5: Presentation of Various Grades of Diabetic lesions (Based on Wagner's Classification)

Grade	No of Patients
0	-
1	10
2	121
3	30
4	36
5	3

Most of the patients presented with Wagner Grade II type of foot lesions. Hence early and effective management can save the limb

Table 6: Clinical assessment of Arteriopathy

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

The above table shows that 8% of patients had macrovasculararteriopathy. 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, Jipmer Hospital Puducherry for Angioplasty and Revascularisation procedures for limb salvage.

Table 7: Distribution of Patients as per the 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: Management Strategies of Diabetic Foot Lesions

Management Strategies	No. of Cases
Antibiotics Only	24
Incision and Drainaige	4
Fasciotomy	19
Slough Excision	102
Slough Excision with SSG	22
Slough Excision with Flap	2
Toe Dysarticulation	22
Ray Amputation	3
Forefoot Ampuation	3
Below Knee Amputation	6
Above Knee Amputation	1

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.

DISCUSSION

The incidence of Diabetes Mellitus is increasing globally. India is emerging as the epicenter of Diabetes today with the current prevalence rate of 14% in the population. Patients with Diabetes have a 12-25% lifetime risk of developing a foot ulcer. Foot ulcers have become a major and increasing public health problem; the morbidities, impairment of the quality of life of patients and the implied costs for management have attracted the attention of health policy providers. Inspite of their rising importance, the management provided for foot ulcers is often inadequate, resulting in delayed healing and eventually the possibilities of amputation. It is projected that developing countries will experience the greatest rise in the prevalence of Type 2 Diabetes in the next twenty years. The people living in these countries, therefore, could expect greater risks of foot ulceration[7]. The present study was conducted in Aarupadai Veedu Medical College and Hospital in Puducherry. In our study of 200 consecutive cases of Diabetic foot, maximum rate of 30.5% was seen in 60-69 years age group, while it was 25% and 21% in the 50-59 and 40-49 years age-groups respectively. The age groups involved in our present study is similar to that reported from Karl Franzens University, Austria (Mean age 66 years) and by Hasbum *et al* from Mexico Hospital48 (Mean age 60+/-4 years). A study was undertaken in the USA in 2004 through the 2002 National Hospital Discharge Survey, looking at 275,000 in patient records from 500 hospitals since 1996. The study revealed that elderly Diabetics had twice the risk of developing a foot ulcer, three times the risk of developing a foot abscess and four times the risk of developing Osteomyeliti[11]. In Wagner's Grade 2 through 5, the overall chance of local or major amputation is estimated to be around 60%. In the present study, the patients with diabetic foot presented with abscess(2%); cellulitis(23%); ulcer(55%) and gangrene(20%). The ulcer pattern ranged from 94% in Grade 2, 20% in Grade 3, 36% in Grade 4 and 3% in Grade 5 category. In earlier studies, Treece et el from City Hospital,[12] UK in their study of 389 diabetic ulcer patients, 78.4% were of Grade 2 type, 10.8% had Grade 3 type and rest Grade 4. Austria reported 22.7% of cases with Grade 2 type and 38.7% with Grade 3 type. Similarly Hasbum *et al* from Mexico Hospital[8] have also reported 23% of their diabetic cases with Grade 2 ulcers and 21% with Grade 3. Our study observations are similar to those of Treece *et al* and Hasbum *et al*. The general management and treatment of Diabetic foot ulcers is multidisplinary. Foot ulceration is a complication caused by diabetes and is invariably infected. The Diabetic state, therefore, needs to be well controlled and infection should be effectively treated. Hence Infection control with appropriate antibiotics becomes a priority. Ulcer care and ulcer surgery is to be considered depending upon the clinical situation and the status of diabetic control. In the hospital settings, the

incidence of amputations, whether minor or major, tends to be higher because of the need for Hospital admission when the ulcer reaches a more advanced state. The statistics from one General Hospital in Hong Kong indicated that in a ten year period from 1995 to 2005, 154 of the 851 patients admitted with diabetic foot ulcers underwent major lower limb amputations (18.1). In the present study of 200 patients, toe dysarticulation was needed in 22 (11%). The types of amputation resorted to were Ray amputation Forefoot amputation in 3 cases each, below knee amputation in 6 and Above knee amputation in 1 case. Majority of the cases could be managed by limb salvage through debridement program of slough excision (102 cases) and slough excision with SSG (in 22 cases), slough excision with flap was resorted in two cases and fasciotomy in 19 cases. Compared to our experience, Hasbeem *et al* from Mexico Hospital reported amputation performed in 45% of their 377 patients series. Similarly Abhas *et al* from Tanzania[14] has resorted to amputations in 45% of their 288 cases managed in the Muhimbili National Hospital. However a lower rate of 2.4% amputation was reported by Jeffcoate *et al* from UK, City Hospital among the 370 patients treated by them which is similar to our observations. Similar amputation rate of 4.9% was also reported by Treece *et al* from UK, City Hospital50 in another series of 389 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. The patients with diabetic foot presented with abscess (2%); cellulitis (23%); ulcer (55%) and gangrene (20%). 35 cases (17.5%) have to undergo different levels of amputation within which majority of them (22/35) were only toe Disarticulation. 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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