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Original Research Article

A retrospective study of management of diabetic foot ulcer in tertiary care hospital in North Karnataka

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ABSTRACT

Background: Foot ulcers and amputations are a major cause of morbidity as well as emotional and physical disability for people with diabetes. A cumulative life time incidence of diabetic foot ulcer (DFU) is as high as fifteen percent making it a leading cause of non-traumatic amputations worldwide. The objective of the study was to assess the outcome of diabetic foot ulcer based on Meggitt-Wagner classification system.
Methods: It was a retrospective review of 130 patients with diabetic foot ulcer managed at a tertiary care teaching hospital from January 2010-August 2016 in Bagalkot, North Karnataka, India.
Results: In this study most of the patients were in the age group of 51-60 years, most of them being male 85%, 49.23% of patients with ulcers were over the plantar aspect of the foot and 40% of ulcers were Grade 2. 11.53% of patients required disarticulation of toes. 3.07% of patients required below knee amputation and 2.30% of patients require above knee amputations. 42.30% of the patients had peripheral neuropathy and 12.30% of the patients had associated peripheral arterial disease.
Conclusions: Even though Meggitt-Wagner classification system is considered Gold Standard it has many disadvantages. The neuropathic changes, charcoats osteoarthropathy and associated vascular pathology has not taken into consideration, hence the outcome of the ulcer cannot be predicted.

Keywords: Diabetic foot, Meggitt-Wagner classification of diabetic foot ulcer, Peripheral neuropathy

INTRODUCTION

Diabetic foot ulcer can be defined as an ulceration and /or destruction of deeper tissues associated with peripheral neurologic abnormalities and vascular diseases accompanied by infections.[1] Mechanism of ulcer is very complex and is associated with many factors which can be categorised into 3 groups: pathophysiologic changes, Anatomic deformities and environmental influences.[2] Pathophysiologic changes leads to peripheral sensory neuropathy and autonomic deficits.[3] Peripheral vascular diseases and compromised immune system that reduces the wound healing capability. The anatomic deformities are consequences of motor neuropathy and charcots neuroarthropathy. Environmental factors like infection, acute and chronic trauma often acts as a precursor of ulceration. In developing countries, lack of public education on diabetes and lower socioeconomic status contribute to ignorance of diabetic ulcers, ultimately leading to major lower limb amputations. Several systems of ulcer classification are currently in use. Perhaps the easiest system is to classify lesions as neuropathic, ischemic or neuroischemic, with description of wound size, depth, and infection. Although no single system has been universally adopted, the classification system most often used was described and popularized by Meggitt and Wagner.[4,5] Since these grades fail to consider the important role of infection, ischemia and other co-

morbid factors. Subsequent authors have modified the classification system. The University of Texas San Antonio [UTSA] system associates lesion depth with both ischemia and infection.[6,7] This system has been validated, and is generally predictive of outcome. The UTSA system is now widely used in many clinical trials and diabetic foot centres.

METHODS

It is a retrospective study of patients admitted to the Department of Surgery of a Tertiary care Teaching hospital in Bagalkot, North Karnataka, India, from January 2010 to August 2016. The data was collected from the records of 130 patients, compiled and evaluated in terms of percentage. The subjects who fulfilled the inclusion criteria were included in the study.

All patients of diabetic foot ulcers from grade 1-5, as per Meggitt-Wagner classification of diabetic foot ulcer were included in the study.

Patients having ischemic ulcers due to peripheral arterial disease (atherosclerotic arterial disease and burgers disease) with or without gangrene of the limb. And decubitus ulcers with diabetes, tropic ulcers due to leprosy and venous ulcers were excluded from the study.

RESULTS

A total of 130 patients were eligible for the study. The ages of the patients were between 30 - 80 years. Most common site of DFU were toes (dorsal and plantar surface (N = 64), followed by plantar metatarsal head, mid foot and heal (N = 36) and dorsum of the foot (N=08) and in 22 patients there were multiple ulcers in the fore foot, mid foot and hind foot (Table 1).

Table 1: Anatomical location of DFU.

Ulcer Site	n = 130	Percentage
Toes (dorsal and plantar surface)	64	49.23
Plantar Metatarsal head, mid foot and heal	36	27.69
Dorsum of foot	08	6.15
Multiple ulcers- fore foot, mid foot and hind foot.	22	16.92

A total of 55 patients had associated peripheral neuritis distributed in different grades of ulcers, and was a precursor, in association with acute and chronic trauma to the foot responsible for development of DFU. 84 patients had infected ulcers. 33 patients with grade 3 ulcers had either localised abscess with underlying necrosis (N=9). 10 patients had cellulites with necrotising fasciitis involving whole foot and extending to lower part of the leg. 14 patients suffered from osteomyelitis. All these cases were diagnosed based on thorough clinical examination. Simple probe test was helpful in diagnosis of osteomyelitis (Fig No-1) all these patients had x-ray foot which confirmed osteomyelitis. (Fig. No-2). None of the patients had CT or MRI foot in this study. These cases were treated with drainage of abscess with debridement.

Table 2: Distribution of cases as per Wagner's classification.

Grade		N= 130	Percentage	Peripheral neuritis N = 55 42.30%	Peripheral arterial disease N = 16 12.30%	Infections N = 84 64.61%
1	Superficial ulcers	14	10.76	14	02	12
2	Deep ulcers	52	40	16	03	20
3	Deep ulcer with abscess and osteomyelitis	33	25.38	17	01	33
	With abscess	09	6.92			
	With cellulitis and necrotising fasciitis	10	7.69			
	Osteomyelitis	14	10.76			
4	Local Gangrene	21	16.15	03	06	16
5	Gangrene of entire foot	10	7.69	05	04	03

Fasciotomy was performed for cellulites with necrotising fasciitis. Wound debridement with excision of infected bony fragments was done for the patients with chronic osteomyelitis. These patients were put on broad spectrum triple antibiotic regime based on culture and sensitivity report. Aminoglycosides were not used in combination therapy. 16 patients had limb ischemia due to peripheral arterial disease (Table 2). In all grades of DFU thereweare associated ischemia of lower limb. Doppler ultrasound study confirmed the block in either superficial femoral artery or poplititeal artery.

Table 3: Outcome of the ulcer.

Outcome of ulcers	No	Percentage
Primary healing of ulcer	70	53.84
Unhealed ulcer	18	13.84
Recurrent ulcer	20	15.38
Disarticulation of toes	15	11.53
Below knee amputation	04	3.07
Above knee amputation	03	2.30

Out of 130 ulcers, 70 (most of them from grade 1-3,) healed primarily. 18 Ulcers which did not heal were associated with peripheral arterial disease. Those with disabling claudication and Doppler ultrasound proved block in the popliteal artery (Figure 3) were referred for surgical vascular intervention.

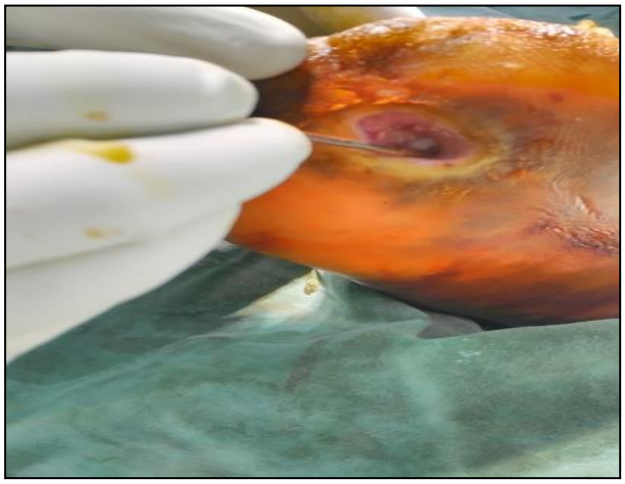

Figure 1: Probe test.

Figure 2: X-ray foot showing osteomyelitis.

20 patients having recurrent ulcers required multiple admissions to the hospital. 15 patients with Gangrene of toe underwent disarticulation of toes. (Figure 4, 5, 6, 7). 4 patients with Gangrene of the foot required below knee amputation, and 3 patients who had block in the popliteal artery required above knee amputation (Table 3). Out of total 31 patients with grade 4 and 5 ulcers, 10 patients had associated peripheral arterial disease and 8 patients with peripheral neuritis and 19 patients had severe infections.

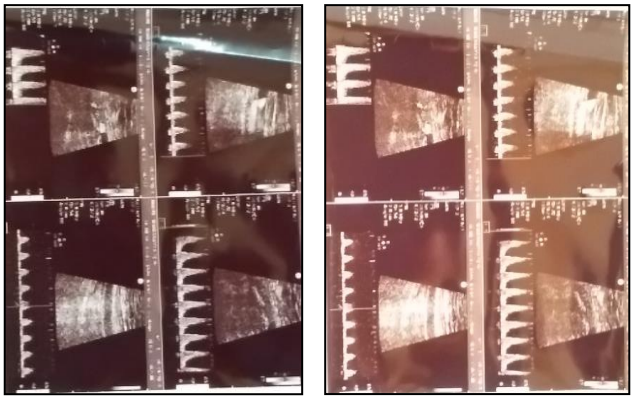

Figure 3: Doppler ultrasound studies showing atherosclerotic arterial disease involving popliteal arteries.

Figure 4: Gangrine of 2nd toe.

Figure 5: Disarticulation of 2nd toe.

Figure 6: Disarticulation of little toe.

Figure 7: Disarticulation of 1st and 2nd toe.

DISCUSSION

Diabetic patients with foot ulcers constitute the majority of hospital admissions. No foot ulcer is so slight that it should be neglected or so severe that life should be despaired of. Every cell is a diabetic cell and dysfunction is found in all tissues of the foot.

The anatomic site of DFU has both etiologic and treatment implications. In the present study most common site were the toes, either dorsal or plantar surface, followed by plantar metatarsal head, mid foot and heel. Ulcer severity may be more important than ulcer site in determining the final outcome of ulcer.[8] Meggitt-Wagner grading of the ulcer 1, (superficial ulcer) healed in 4-8 weeks with simple dressing and good glycemic control. In an analysis that utilized medical records from 150 wound care facilities in 38 US states, these investigators confirmed that among 72,525 diabetic foot wounds in 31,106 patients, wounds that were older, larger and deeper in grade (Wagner grade > 3) were more likely to take more than 20 weeks to heal after adjustment for gender and age.[9] Sheehan and colleagues reported that among 276 patients with Wagner grade 1 or greater DFU of 30 days duration, a decrease in ulcer area within 4 weeks of treatment onset strongly predicted complete wound healing by 12 weeks.[10] Patients in each of the above studies received similar ulcer care, including off loading, wound debridement, and moist wound dressing.

In this study, deeper ulcers involving tendon and/or joint capsule (Grade 2) were a majority (N = 52). Initial thorough wound debridement, control of infection and glycemic control with insulin and offloading, ulcers started healing at 4 weeks and at the end of 8 weeks ulcer size was reduced.

Depth ischemia classification system is a modification of the Meggitt-Wagner classification.[11,12] This classification makes the decision- making path clearer. The University of Texas Classification represents an advance in the treatment of diabetic foot. It separates evaluation of ischemia from wound depth. It adds consideration of infection to the classification. Assessment of the outcome of the ulcers can be achieved with this system of classification. One study showed that outcome worsened with the increasing grade and stage of the wound.[13] Infection and ischemia were stronger determinants of outcome than was wound depth.[14] The diabetic peripheral neuropathy is common and frequent cause of morbidity and disability and is one of the important risk factor for foot ulcers. Peripheral neuropathy and peripheral arterial diseases commonly co-exist in patients with diabetes and foot ulcers. Foot deformity was reported as significantly associated with foot ulcer in one selected study several studies confirmed that peripheral sensory neuropathy and poorer diabetes control were causes for the recurrence of ulcer.[15]

CONCLUSION

Even though Meggitt and Wagner classification is gold standard, and is found useful, the outcome of the ulcer cannot be predicted. Depth ischemia classification and University of Texas wound classification system are more useful in decision making and in assessing the outcome of ulcer.

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