

MANAGEMENT OF DIABETIC FOOT ACCORDING TO WAGNER'S CLASSIFICATION AND FREQUENCY OF DIABETIC FOOT DISEASE IN OTHER FOOT A STUDY OF 98 CASES

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ABSTRACT

Objective: To find the grade wise distribution of diabetic foot ulcer, the best surgical management for different grades of diabetic foot ulcer and factors that can decrease the rate of morbidity and mortality in these patients.

Material and Methods: The study was conducted in Surgical "A" Unit, PGMI Lady Reading Hospital, Peshawar, Pakistan from April 2007 to April 2008. 98 patients with diabetic foot disease were included. Detailed history, clinical examination and investigations were recorded. Lesions of the diabetic foot were graded according to the Wagner classification and appropriate medical and surgical treatment carried out.

Results: Fifty nine patients were males and thirty nine were females. Common age group was above 40 years and mostly between 40-60 years. Ninety nine percent of the patients were suffering from Type II Diabetes Mellitus. In more than half (58.16%) of the patients family history of diabetes was absent. Eleven patients had grade 1, 15 grade 2, 19 grade 3, 32 grade 4 and 21 patients had grade 5 lesions. *Staphylococcus aureus* was the commonest organism (74.28%) isolated. On Doppler studies of the patients 61.9% patients were found to have stenosed leg vessels (Popliteal, Anterior tibial and Posterior tibial). Other co-morbid conditions like hypertension were found in 75 patients, ischemic heart disease in 40 patients and renal disease in 28 patients. Seven patients were treated with conservative antibiotics alone, 22 had incision and drainage, 28 had debridement and dressing, 38 needed amputations of different types and 2 patients needed skin graft for chronic ulcer. Disease in other foot was noted to be in 50 patients, 28 with grade 0 and 22 with grade 1.

Conclusion: In patients of Diabetic foot disease all grades were seen. Lesser grade lesions responded well to conservative treatment with antibiotics while higher grades needed incision and drainage, debridement and dressing and even amputation. Early hospital admission, good glycemic control, appropriate medical and surgical treatment along with patient counselling in foot care can decrease morbidity and mortality due to the complications of diabetic foot disease.

Key Words: Diabetic foot ulcer, Type II Diabetes mellitus, Complications, Stenosed leg vessels.

INTRODUCTION

Diabetes is a common disease affecting one million persons in UK, about 2 % of the whole population¹ and the cost of caring for diabetes exceeds 137 billion dollars per year.

It affects about 10% of our population. Persons with diabetes have a 15% lifetime risk of

developing a foot ulcer and have a 15 to 40 fold higher risk of lower-extremity amputation compared with their non-diabetic counterparts².

Risk factors that place the diabetic foot at risk for ulceration, include peripheral vascular disease, biomechanical dysfunction and deformities, trauma, high plantar pressures, limited joint mobility, duration of diabetes, and elevated

WAGNER'S CLASSIFICATION FOR DIABETIC FOOT DISEASE (ADOPTED FROM LEVIN AND O'NEALS3).

Grade-0	Skin intact, but bony deformities produce a "Foot At Risk".
Grade 1	Localized Superficial Ulcer.
Grade 2	Deep Ulcer involving Ligament, Tendon, Joint capsule or Fascia.
Grade 3	Deep Ulcer with Abscess and/or Osteomyelitis.
Grade 4	Gangrene of the Toes or Forefoot.
Grade 5	Gangrene of entire Foot.

Table 1

glycohemoglobin levels. About 1 in 100 diabetic patients per year require an amputation of some sort¹. Diabetic foot is a serious complication of diabetes mellitus and in some cases the initial presentation of undiagnosed diabetes⁴.

This study was performed to manage the diabetic foot disease according to Wagner's classification (Table-1), which helps in treatment according to the grade of disease⁵ and to find out the condition of the other foot.

MATERIAL AND METHODS

This study was conducted in the Surgical "A" unit of PGMI Lady Reading Hospital, Peshawar, Pakistan. Ninety eight patients with diabetic foot disease presented from April 2007 to April 2008 were included in the study. Patients with previous amputations who presented with infected wound, were also included.

Patients were admitted from surgical OPD and casualty surgical department. In a pre-designed proforma, data was collected by taking a detailed history, complete clinical examination and a series of investigations carried out. Data of those patients, who presented with post amputated infected wound, were collected from their previous record.

Age, sex, family history of diabetes mellitus, duration and type of diabetes, examination findings, investigations including blood sugar profile, renal functions, swabs from wound / ulcer, X-ray of foot and Doppler ultrasound of lower extremities and treatment carried out were recorded. The incidence of diabetic foot disease in other foot was also recorded.

The patients were evaluated and managed by classifying their disease according to Wagner's classification for diabetic foot disease. Both medical and surgical methods of treatment were used. Antibiotics were used according to culture and sensitivity. Data was compiled, analyzed and frequencies were calculated.

RESULTS

Ninety eight patients were studied, 60.2% (n=59) were males and 39.8% (n=39) were female. Majority of the patients were of age 40-60 years. Almost all patients presented with Type II Diabetes with the exception of one, which presented with Type I Diabetes. In more than half of the patients (58.16%), the family history of Diabetes mellitus was not there. (Table-2).

The main bulk of the patients presented with gangrene and post-amputated infected wound (n=53), 35 and 18 respectively, while 29 presented with ulcers (superficial and deep) and 16 with cellulitis.

According to Wagner's classification of diabetic foot, more than half of the patients were in Grade 4 and 5 i.e 54.07% (n=53), none presented with Grade 0, 11.22% (n=11) in grade 1, 15.30% (n=15) in grade 2 and 19.38% (n=19) presented in grade 3. (Figure-1).

SOCIODEMOGRAPHIC CHARACTERISTICS OF PATIENTS (N=98)

Characteristics	Number of Patients	% age
Sex		
Male	59	60.2
Female	39	39.8
Age (Years)		
<40	1	1.02
40-50	19	19.38
51-60	45	45.91
>60	33	33.67
Type of Diabetes Mellitus		
Type I	1	1.02
Type II	97	98.98
Family History of Diabetes		
Present	41	41.83
Absent	57	58.16

Table 2

INVESTIGATIONS OF PATIENTS (N=98)

Investigation	Number of Patients	% age
X-ray Foot	78	79.52
Culture (wound/ulcer)	70	71.42
a) Staph. Aureus isolated	52	74.28
b) Other organisms (Bacteroides spp., etc)	17	24.28
c)No growth	1	1.42
Color Doppler studies of Leg vessels	42	42.85
a) Normal study	16	38.09
b) Stenosed vessels	26	61.9

Table 3

Cultures from ulcer and wounds were done in 71.42% (n=70) of patients and Staphylococcus aureus was isolated in 74.28% of cases, while other organisms i.e Bacteroides spp., Pseudomonas spp., Proteus spp., E.coli, Klebsiella spp., Clostridium Perfringes and Enterobacter spp. was found to be positive in 24.28% (n=17) of cases. Colour Doppler studies of leg vessels were carried out in 42.85% (n=42) of patients and was found to be normal in 38.09% (n=16) of cases and stenosed leg vessels (Popliteal, Anterior tibial and posterior tibial) were reported in 61.9% (n=26) of cases (Table-3).

Diabetic foot disease patients were also associated with other co-morbid conditions. Hypertension was in 76.53% (n=75) of cases, Ischemic heart disease in 40.81% (n=40), while Renal disease was there in 28.57% (n=28) of cases.

The Frequency of diabetic foot disease in other foot was in 51.01% (n=50) of cases, out of which 28.57% (n=28) of cases presented with Grade-0, while 22.44% (n=22) with Grade-1 (Table-4).

NUMBER OF PATIENTS ACCORDING TO WAGNER'S CLASSIFICATION FOR DIABETIC FOOT DISEASE (N=98)

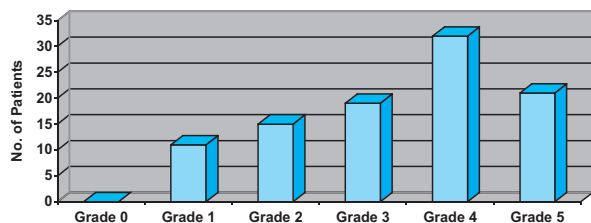


Figure-1

Medical and/or surgical treatment was provided to all the patients. In 8.16% of cases cure was achieved with conservative antibiotics, 22.44% needed Incision & Drainage, 28.57% needed Debridement and Dressing, while most of the patients, 38.77% needed amputation of different types and only 2 patients (2.04%) needed skin graft for chronic ulcer. (Table-5).

Mortality was 4, two patients expired due to Septicemia, while one each due to Diabetic ketoacidosis and chronic renal failure.

DISCUSSION

Lower limb diseases such as ulceration, gangrene, and amputation are frequent complications of diabetes mellitus and are leading causes for hospitalization in these patients². Diabetic foot disease is more common in males, as in our study, i.e 60.2% of males were affected.

Peripheral neuropathy is a common complication of diabetes, affecting >30% of the diabetic population⁶. In the foot, peripheral neuropathy leads to dry skin and loss of the protective sensations of pressure and pain; together

CONDITION OF THE OTHER FOOT ACCORDING TO WAGNER'S CLASSIFICATION (N=50)

Grade	Number of Patients	% age
Grade-0	28	28.57
Grade 1	22	22.44
Grade 2	0	0
Grade 3	0	0
Grade 4	0	0
Grade 5	0	0

Table 4

with reduced joint mobility⁷, it also increases the risk of ulceration induced by unperceived minor injury from shoes and other physical trauma⁸. The presence of macrovascular disease and possibly functional microangiopathy^{9,10} with infection increases the probability of a foot ulcer leading to a lower-limb amputation¹¹. Foot ulcers will occur in 5-10% of the diabetic population; up to 3% will have a lower-limb amputation¹². Ulceration is the most common precursor of amputation and has been identified as a component in more than two-thirds of lower-limb amputations¹³. It seems that poor clinical outcomes are generally associated with infection, peripheral vascular disease, and increasing wound depth; it also appears that the progressive cumulative effect of these comorbidities contributes to a greater likelihood of a diabetic foot ulcer leading to a lower-limb amputation²⁶. In our study 29 patients (29.59%) presented with superficial and deep ulcers, 16 patients (16.32%) with cellulitis, 35 patients (35.71%) presented with gangrenous patches and gangrene of the fore-foot or entire foot while 18 patients (18.36%) presented with post-amputated infected wound. In another local study common presentations were, patient with ulcers 21 %, abscess in 31 % and gangrene in 12.5%⁴.

Amputation may produce changes in gait or foot shape that influence risk of ulcer, as demonstrated in a study of past hallux amputation and ipsilateral foot deformities²⁸. The hallmark of diabetic foot problem in our population and India is gross infection, and major contributing factors for late presentation include bare foot walking, attempts at home surgery, trust in faith healers and undetected diabetes³. In our study the frequency of diabetic foot disease in other foot was high, that is more than 50% of patients have diabetic foot disease, 28.57% of cases presented with Grade-0 and 22.44% with Grade-1.

In a study, it has been shown that diabetic patients with foot ulcers have a lower survival rate when compared with non-diabetic patients with foot ulcers¹⁴. The ability to probe to bone¹⁵ with the presence of local or systemic infection and suggestive radiological features provided a clinical diagnosis of osteomyelitis. In our study *Staphylococcus aureus* was isolated from cultures in 74.28% of cases, while in another local study, it was isolated in 54% of culture⁴.

The well-established widely used Wagner wound classification system provide descriptions of ulcers to varying degrees and is easy to use among health care providers, and can provide a guide to planning treatment strategies.

It has been suggested that empirical

TREATMENT PROVIDED (N=98)

Type of Treatment	No. of Patients	% age
Conservative Antibiotics	8	8.16
Incision & Drainage	22	22.44
Debridement & Dressing	28	28.57
Amputation (Total)	38	38.77
a)Transmetatarsal	9	23.68
b)Ray	5	13.15
c)Digital	15	39.47
d)Below knee	7	18.42
e)Above knee	2	5.26
Skin graft for Chronic Ulcer	2	2.04

Table 5

treatment with appropriate antibiotics may be the most effective strategy for patients with suspected osteomyelitis¹⁶. In our study cure was achieved in 8.16% of cases with conservative antibiotics, 22.44% needed Incision and drainage, 28.57% needed Debridement, unlike an another study 64% were cured by drainage of abscess and debridement⁴.

In a study it has been demonstrated that skin oxygenation plays an important role not only in predicting the healing of diabetic foot ulcers¹⁷, but also in the development of these lesions. In the study of Landau Z et al¹⁸ topical hyperbaric oxygen and low energy laser therapy was found effective in chronic diabetic foot ulcers with 81% healing rates. In our study there were 2 patients with chronic diabetic foot ulcers and in them skin grafting was done with success.

Previous studies have shown that infection and peripheral vascular disease are associated with an increased risk of amputation^{19,20}. Several studies in recent years indicate that the 5-year survival rate after major amputation is less than 50%^{21,22}. In a retrospective study from Italy, Luciano Scionti and colleagues²⁷ of Perugia, Italy, reported on an 8-year population-based survey on Lower limb amputation in both people with and without diabetes. Using operating room registries to ascertain data from a defined population, there was nearly a 30-fold incidence in diabetes-related amputations compared with that in the nondiabetic population. Once a person has had a foot ulcer, there is always a higher risk for developing another ulcer. Risk factors for amputation are quite similar to those for ulceration because 85% of diabetes-related lower-extremity amputations have an ulceration in their causal sequence^{2,22,23}. In addition to neuropathy, ischemia, trauma, and

ulceration, other component causes for amputation include prior partial-foot amputations, infection, and gangrene²³. In our study 38.77% of cases needed amputations of different types, like in another local study 36% needed amputation⁴.

Chronic renal failure patients with diabetes has a diabetic foot disease and lower limb amputation rate 10 times greater than the general diabetic population²⁴. In our study there were 4 mortalities, all of them were presented with Grade-4 or Grade-5 Diabetic foot disease. The cause of mortality was Diabetic ketoacidosis in 1 case, septicemia in 2 cases and chronic renal failure in 1 case.

Prevention strategy including patient education in foot care, prophylactic skin and nail care, and footwear reduces the risk for foot ulcers and lower extremity amputation by 25% in those patients with no specific risk factor²⁵. A Nurse providing foot specific diabetic screening and education, combined with protective foot wear, is a cost and resource effective method of decreasing the rate of diabetic foot ulcers, and the risk for eventual lower limb amputation.

CONCLUSION

Patient education, treating the infection aggressively, performing the amputations on time, to stop the spread of infection and/or ischemia, footwear and pressure relief, overall glycemic control, all are key to success to control the diabetes related morbidity and mortality.

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