

# EVALUATION AND MANAGEMENT OF DIABETIC FOOT ACCORDING TO WAGNER'S CLASSIFICATION A STUDY OF 100 CASES

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**Background:** Wagner's classification is the most widely utilized grading system for lesions of the diabetic foot. The aim of the study was to evaluate and manage the different lesions of diabetic foot according to Wagner classification. This will help to describe the lesions we treat study and compare outcomes and also identify measures to decrease morbidity and mortality due to diabetic foot disease. **Methods:** the study was conducted in surgical "c" unit of Khyber Teaching Hospital, Peshawar from July 2002 to June 2003. 100 patients with diabetic foot disease were included in the study. Detailed history, clinical findings and investigations were recorded. Lesions were graded according to wagner classification and appropriate medical and surgical treatment carried out. **Results:** diabetic foot disease formed 1.04% of total admissions and 0.23% of OPD patients. 62 (62%) were males and 38 were females. Common age group was 40 – 60 years, 6 patients had grade 0, 14 grade 1, 25 with grade 2, 30 with grade 4 and 4 with grade 5 lesions. 17 patients were managed conservatively with antibiotics alone, 33 had incision drainage and debridement while 48 needed amputation of different types. Staphylococcus aureus was the commonest organism isolated. **Conclusion:** majority of the diabetic foot lesions were in grade 2 to 5. Lesser grade lesions responded well to conservative treatment with antibiotics and surgical debridement while those with higher grades needed amputations. Effective glycemic control, timely hospital admissions, approximate surgical / medical treatment along with patient education in foot care can decrease morbidity and mortality due to diabetic foot disease.

**Key words:** Diabetes mellitus, Complications, Diabetic foot disease, Wagner's classification.

## INTRODUCTION

Diabetes is a common disease affecting one million patients in UK, about 2% of the whole population<sup>1</sup> and the cost of caring for diabetes exceeds 137 billion dollars per year. It affects about 10% of our population. The prevalence figures for diabetes vary from 5.3% to 16.2%<sup>2</sup>. It is the largest killer in the country. Approximately 10-25% of all diabetics develop some foot problems during the course of their illness from simple calluses to major abscesses and osteomyelitis.

**Table-1: Wagner's classification for diabetic foot disease (Adopted from Levin and O'Neals<sup>7</sup>).**

<b>Grade-0</b>	High risk foot and no ulceration.
<b>Grade -1</b>	Superficial Ulcer.
<b>Grade -2</b>	Deep Ulcer ( cellulitis )
<b>Grade -3</b>	Osteomyelitis with Ulceration or abscess.
<b>Grade -4</b>	Gangrenous Patches. Partial foot gangrene.
<b>Grade -5</b>	Gangrene of entire foot.

Diabetic foot disease in the form of ulceration, charcot joint, fracture and amputation affects 20% of patients due to peripheral neuropathy, muscle atrophy, foot deformity and neuropathic fractures<sup>3</sup>. About 1 in 100 diabetic patients per year require an amputation of some sort<sup>1</sup>. Diabetic foot is a serious complication of diabetes mellitus and is in some cases the initial presentation of undiagnosed diabetes<sup>4</sup>.

This complication has become more prevalent as the life expectancy for the patients with diabetes has increased due to advances in general medical care and discovery of insulin. This study was performed to evaluate and manage the diabetic foot disease according to Wagner's classification for diabetic foot disease (as in Table 1), which helps in treatment according to the grade of disease<sup>5</sup>.

## Material and methods

This study was conducted in the Surgical-C-Unit of the Khyber Teaching Hospital Peshawar. Being one of the biggest Teaching Hospitals in Peshawar it receives patients from all over NWFP and also neighbouring Afghanistan. Hundred patients with diabetic foot disease presenting from July 2002 and June 2003 were included in the study. Patients with chronic diabetic foot disease and previous amputations were also included.

Patients were recruited from surgical OPD and also the patients admitted in the surgical wards. Data was collected by taking a detailed history and clinical examination of foot, its wound or ulcer were recorded on a pre-

designed proforma. Data of outdoor patients with chronic diabetic foot or previous amputation were collected from their previous records.

Age, sex, socioeconomic status, duration and type of diabetes, Wagner's Classification, examination findings, investigations including blood sugar profile, renal functions, swabs from wound / ulcer and X-ray of foot and treatment carried out were 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. Aminoglycosides, Clindamycin, new Pencillin derivatives and Cephalosporins were commonly used. Data was compiled and frequencies were calculated.

## Results

During this period 9552 patients were admitted in the ward while 42668 were examined in the OPD. Diabetic foot disease formed 1.04 % of total admitted patients and 0.23 % of OPD patients.

**Table-2: Sociodemographic characteristics of patients (n = 100)**

Characteristics	Number	%age
<b>Age/Years</b>		
<40	9	9%
41-50	47	47%
51-60	32	32%
>60	12	12%
<b>Sex</b>		
Male	62	62%
Female	38	38%
<b>Type of Diabetes</b>		
Type I	2	2%
Type II	98	98%
<b>Family Hx. Of Diabetes</b>		
Present	41	41%
Absent	59	59%
<b>Socioeconomic Status</b>		
Lower	14	14%
Middle	60	60%
Upper Class	26	26%

The socio-demographic characteristics of the study population and type of diabetes are shown in table 2. Majority of the patients were of 40-60 years of age while two patients with type-I diabetes were aged 12 and 16 years. Males predominated with 62 % while females were 38 %, with male to female ratio of 3:2. Majority of the patients had type II diabetes while only 2 had juvenile diabetes only.

**Table-3: Number of patients according to Wagner's classification for diabetic foot disease (n=100)**

Grade	No. of Patient	Grading of DFD
0	6	6%
1	14	14%
2	25	25%
3	30	30%
4	21	21%
5	4	4%

**Table-4: Treatment provided**

Type of Treatment	No. of Patients	%age
Conservative Antibiotics	17	17 %
Incision Drainage	5	5 %

Debridement	28	28 %
<b>Amputation (Total)</b>	<b>48</b>	<b>48 %</b>
Toe/Rye's	32	66.6 %
Sym's	5	10.4 %
Below knee	11	22.9 %
Skin graft for chronic ulcer	2	2%

**Table-5: Investigations and culture reports (n = 100)**

Investigations	No. of Patients	%age
X-ray foot	83	83 %
Culture (wound/ulcer)	78	78 %
Staph. Anreus isolated	63	81 %
Other Organisms	15	19 %

**Table-6: Cause of mortality in DFD(n= 4)**

CAUSE	NUMBER OF PATIENTS
Septicemia	1
Ketoacidosis	1
Chronic Renal Failure	2

41 patients had positive family history of diabetes. Table 3 and 4 shows the number of patients according to the Wagner's Grades of diabetic foot disease and treatment provided. Majority of the patients presented with advanced disease with 25 % in

grade 2, 30 % in grade 3 and 21 % with grade 4 disease. Cure was achieved with conservative treatment with antibiotics in 17 % patients, surgical treatment in the form of incision drainage and debridement was needed in 33 % patients, while the main bulk i.e. 48 % needed amputation of different types, Toe / Rye's amputation was done in 32 patients, Sym's in 5 patients while 11 patients had below knee amputation. Cultures from ulcer and wounds were done in 78 patients and Staphylococcus aureus was isolated in 81 % of cases. Mortality was 4 in our study, and was due to chronic renal failure (2 cases) and one each due to septicemia and ketoacidosis as shown in table 6.

## DISCUSSION

Diabetic patients have always suffered from complications affecting the lower limbs. Foot infection and the subsequent amputation of a lower extremity are the most common cause of hospitalization among diabetic patients<sup>6</sup>. It is more common in males, which formed 62 % of our patients with diabetic foot. In another local study 66.6 % were males and 33.3 % were females<sup>4</sup>. Age groups most commonly affected in our study was between 40-60 years age.

The hallmark of diabetic foot problem in our populations and India is gross infection, and major contributing factors for late presentation include bare foot gait, attempts at home surgery, trust in faith healers and undetected diabetes<sup>7</sup>.

Ill fitting footwear leading to foot deformity and improper toe-nail cutting increases the risk while use of Chappal with a single thong between hallux and second toe results in pressure ulcers<sup>7</sup>. In our study 6 patients with foot at risk had hallus vulgus, deformed foot, callosities, onychocryptosis, onychogryphosis and were in grade-0. Fourteen patients with superficial ulceration and erythema, 25 patients of deep ulceration with bad granulation tissue, 30 patients had osteomyelitis, 21 patients of gangrenous patches on pressure areas while 4 patients presented with gangrene of entire foot. In another local study common presentations were, patient with ulcers 21 %, and abscess in 31 % and gangrene in 12.5%.<sup>4</sup>

Wagner's classification score may be different for a surgeon as compared to physician because they come with advanced disease to a surgeon and for this reason patient with grade 0 , 1 and 2 are lesser and those with grade 3, 4 and 5 are more in our study.

Peripheral neuropathy and infection are common risk factors for diabetic foot in our setup. Infection with Staphylococcus aureus is common and was isolated in 54 % of culture.<sup>4</sup> In our study Staph, aureus was isolated from cultures in 81 % of patients. In diabetic population wound and foot infection are often mixed and may contain three to six organisms creating a significant problem regarding antibiotic protocols.<sup>8</sup>

The standard treatment for diabetic foot according to Wagner's classification is Prevention for grade-0, Antibiotics and good glycemic control for grade 1. In grade-2 needs hospital admission, as they need surgical intervention along with antibiotics and glycemic control. Grade-3 requires some sort of amputation, In grade-4 wide debridement and amputation while in grade-5 the preferred treatment is below knee amputation.

In our study 17 % patients responded to conservative treatment with antibiotics, 33 % patients had debridement while 48 % patients needed amputations, unlike an another local study 64 % were cured by drainage of abscess and debridement, and only 36 % needed amputations.<sup>4</sup>

A single stage surgical approach with total excision of ulcer, broad exposure, correction of underlying osseous deformity and primary closure using a local tendon flap in 67 patients reduced healing time, with no need for additional surgical procedures, resulting in decreased hospital stay and cost, also the recurrence rates were reduced.<sup>9</sup>

In another study topical hyperbaric oxygen and low energy laser therapy was found effective in chronic diabetic foot ulcers with 81% healing rates.<sup>10</sup> In our study there were 2 patients with chronic diabetic foot ulcers and in them skin grafting was done with success.

There were 4 mortalities in our study, all had grade 4 or 5 Wagner's diabetic foot disease, Of these 1 was due to Septicemia, 1 due to ketoacidosis and 2 deaths were due to chronic renal failure. Chronic renal failure patients with diabetes has a diabetic foot disease and lower limb amputation rate 10 times greater than the general diabetic population.<sup>11</sup>

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 factor.<sup>12,13</sup>

Prescription footwear accommodating deformity and decreasing pressure and shear forces applied to skin overlying bone prominence, keep individuals ambulatory and protect them from ulcer formation.<sup>14</sup>

A Nurse provided 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 extremity amputation.<sup>15</sup>

## CONCLUSION

Foot ulceration in diabetic patients is a resource consuming, disabling morbidity that often is the first step towards lower extremity amputation. Prevention is the best treatment.

Grading diabetic foot lesions according to the Wagner classification helps in correlating appropriate treatment to proper grade of lesion with better outcome. Effective glycemic control and patient education are of key importance for decreasing diabetic foot disease, while early presentation and hospital admission, aggressive and appropriate medical and surgical treatment according to grade of disease can improve outcome and reduce the morbidity and mortality due to diabetes.

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