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## Assessment of surgical management of diabetic foot ulcers

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### Abstract

**Background:** Diabetic foot ulcers are main cause of hospitalization in diabetic patients. The present study was conducted to assess surgical management of diabetic foot ulcers.

**Materials & Methods:** 78 patients of diabetic foot ulcers of both genders were enrolled in the study. The patients were evaluated and managed surgically according to Wagner's classification for diabetic foot.

**Results:** Out of 78, males were 48 and females were 30. Wagner classification grade 0 was seen in 4, grade 1 in 7, grade 2 in 12, grade 3 in 16, grade 4 in 19 and grade 5 in 20 patients. The difference was significant ( $P < 0.05$ ). The management done was incision and drainage in 5, transmetatarsal in 8, amputation was 40, debridement in 8, below knee amputation in 7, above knee amputation in 5 and Rye's procedure in 5 patients. The difference was significant ( $P < 0.05$ ).

**Conclusion:** Diabetic foot ulcers are common complications seen in poorly controlled diabetics, hence glycaemic control is essential.

**Keywords:** Diabetic foot ulcers, glycaemic control, debridement

### Introduction

Diabetic foot ulcers are main cause of hospitalization in diabetic patients. Patients with diabetes mellitus are at higher risk of lower extremity complications than their non diabetic counterparts<sup>[1]</sup>. Every year approximately 5% of diabetic patients develop a foot ulcer. Approximately 15% of all diabetics develop foot problems during course of their illness. Diabetic foot ulcers carry a significant risk of amputation<sup>[2]</sup>.

Factors such as age and duration of the disease will increase its incidence. Once tissue damage has occurred in form of ulceration or gangrene, aim is preservation of viable tissue. Diabetic foot ulcers are commonly classified according to Wagner classification. Wagner classification assesses ulcer depth and presence of osteomyelitis or gangrene<sup>[3]</sup>.

Surgical therapy has several aims. The main goal is to control the deep infection, with the hope of salvaging the limb<sup>[4]</sup>. This is accomplished by drainage of any pus, removal of all necrotic or infected tissues, and creating a healthy wound bed. It is also important to keep in mind the functional results after surgery. Residual foot deformities may lead to abnormal pressure points and, thus, re-ulceration<sup>[5]</sup>. The surgeon must also consider the vascular status of the limb and the anatomic level at which a wound would be likely to heal. Furthermore, the surgeon must ensure that there is sufficient viable soft tissue to cover any deficits left by resections or amputations<sup>[6]</sup>. The present study was conducted to assess surgical management of diabetic foot ulcers.

### Materials and Methods

The present study comprised of 78 patients of diabetic foot ulcers of both genders. The consent was obtained from all enrolled patients.

Data such as name, age, gender etc. was recorded. A detailed history was obtained regarding the duration of the diabetes. Vascular evaluation was performed checking capillary refill and distal pulses of the foot which included dorsalis pedis, posterior tibial, popliteal and femoral arteries. Neurological examination such as light touch, pinprick, position sense and vibration sense was recorded. The patients were evaluated and managed surgically according to Wagner's classification for diabetic foot. Data thus obtained were subjected to statistical analysis. P value  $< 0.05$  was considered significant.

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**Results**

**Table 1:** Distribution of patients

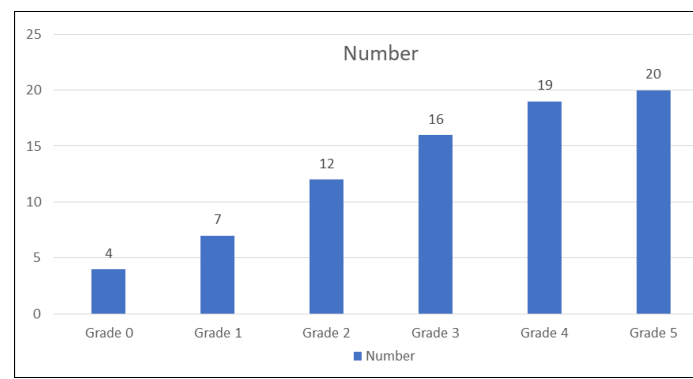
Total- 78		
Gender	Males	Females
Number	48	30

Table 1 shows that out of 78, males were 48 and females were 30

**Table 2:** Classification of Diabetic Foot

Wagner Classification	Number	P value
Grade 0	4	0.05
Grade 1	7	
Grade 2	12	
Grade 3	16	
Grade 4	19	
Grade 5	20	

Table 2, graph 1 shows that Wagner classification grade 0 was 4, grade 1 in 7, grade 2 in 12, grade 3 in 16, grade 4 in 19 and grade 5 in 20 patients. The difference was significant ( $P < 0.05$ ).

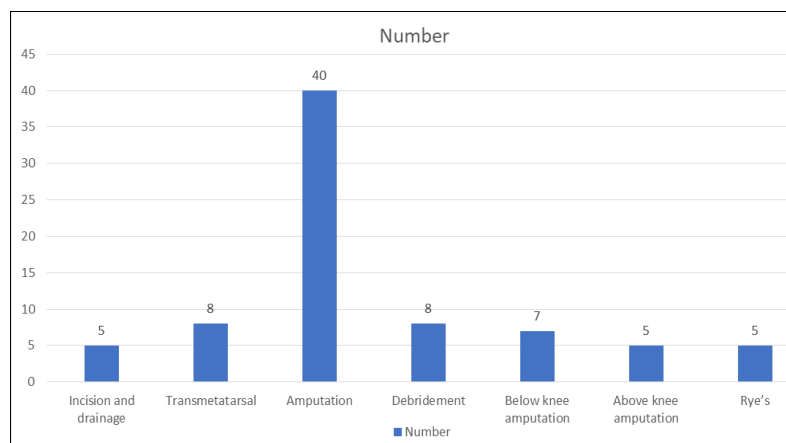


**Graph 1:** Classification of Diabetic Foot

**Table 3:** Management of diabetic foot

Management	Number	P value
Incision and drainage	5	0.02
Transmetatarsal	8	
Amputation	40	
Debridement	8	
Below knee amputation	7	
Above knee amputation	5	
Rye's	5	

Table 3, graph 2 shows that management done was incision and drainage in 5, transmetatarsal in 8, amputation was 40, debridement in 8, below knee amputation in 7, above knee amputation in 5 and Rye's procedure in 5 patients. The difference was significant ( $P < 0.05$ ).



**Graph 2:** Management of diabetic foot

## Discussion

Most deep infections are preceded by tissue breakdown, with local penetration of bacterial pathogens to the deeper tissues [7]. In many cases, the extent of the infection is underestimated; in 10%–15% of mild infections and in about 50% of serious infections, an underlying contiguous osteitis can be demonstrated. Familiarity with the several causative factors that lead to foot complications in diabetic patients and early recognition of the infection are crucial in ensuring proper treatment [8]. A combination of surgical and antibiotic treatment is mandatory in virtually all deep foot infections. Foot infections can be classified in several ways: by the depth of the infection and its severity, by the anatomic site affected, by the tissues involved, and by the causative factors, including any arterial insufficiency [9]. To ensure an ideal outcome, the surgeon must also possess an understanding of the microbiology and pathophysiological behavior of infection, wound management principles, and foot biomechanics [10]. The present study was conducted to assess surgical management of diabetic foot ulcers. We found that out of 78, males were 48 and females were 30. Gupta *et al.* [11] found that diabetic foot disease presented more among male in older age group and was more common in patients with uncontrolled diabetes, with longer duration of disease, with more than one co morbid condition. 38 patients (38%) had insulin dependent diabetics; and 87 (87%) of them were on irregular treatment. Other 58 patients (58%) had non-insulin dependent diabetes; out of which 19 (70.0%) were on irregular. Treatment. Remaining 4 patients (4%) were not getting any treatment for their disease. The commonest disease was grade 4 that comprised of 34 patients, followed by Grade 2 in 22 patients, followed by Grade 3 in 16 patients. These patients were managed according to Wagner classification as shown above. Conservative management with good diabetic control, antibiotic cover and foot care was carried out in 25 patients. Surgical intervention was carried out in rest of 75 patients. The commonest procedure was incision & drainage of foot abscess and debridement, that was performed in 41 (41%) of patients; while 35 (35.0%) patients needed some form of amputation. Multiple amputations were performed in 5 (5%) patients. This study also confirmed that diabetic foot ulcers is quite prevalent among diabetic population and thus, foot care education would be the most important way of dealing with this major problem. We found that Wagner classification grade 0 was seen in 4, grade 1 in 7, grade 2 in 12, grade 3 in 16, grade 4 in 19 and grade 5 in 20 patients. Eneroth *et al.* [12] demonstrated that deep foot infections in diabetic patients are a heterogeneous entity, and the type of infection is related to the outcome. Amputation was required more often for patients with deep soft-tissue infection, either alone or in combination with osteomyelitis, than for those with osteomyelitis alone. Armstrong *et al.* [13] validated a diabetic foot-wound classification system that demonstrated that the combination of infection and ischemia resulted in the worst outcome. Both of these studies emphasize the need for a thorough assessment of the infection. Wong *et al.* [14] retrospectively reviewed 54 local amputations that were due to diabetic foot infections and were done by surgeons with different levels of experience. Junior surgeons initially operated on the majority of the 22 patients who experienced failure, defined as the requirement for subsequent surgery. In contrast, all patients whose operations were done by senior surgeons healed, which demonstrates the importance of the experience of the surgeon.

## Conclusion

Authors found that diabetic foot ulcers are common complications seen in poorly controlled diabetics, hence glycaemic control is essential.

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