

Assessment Of Risk Factors In The Surgical Management Of Diabetic Foot Ulcer

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Abstract

Background: Diabetes foot infection due to gangrene is the most common cause of prolonged hospitalization and amputation of their limbs. The present study was conducted to assess risk factors in the surgical management of diabetic foot ulcer.

Materials & Methods: 88 cases of diabetic foot ulcer of both genders were enrolled. Previous history of diabetes, wound healing, ulcers and boils in other part of the body were recorded. Parameters such as Wagner's classification, type of operations performed were recorded.

Results: Out of 88 patients, males were 48 and females were 40. Wagner classification grade 0 was seen in 5, grade 1 in 5, grade 2 in 14, grade 3 in 16, grade 4 in 20 and grade 5 in 28 patients. The difference was significant ($P < 0.05$). Gangrene was seen in 20, cellulitis in 15 and ulcer in 53 patients. Bacteria isolated were staphylococcus aureus in 64%, Beta haemolytic streptococci in 6%, gram negative organisms in 20% and anaerobic cocci in 10%. The difference was significant ($P < 0.05$). Management done was incision and drainage in 3, amputation in 45, debridement in 20, transmetatarsal in 8, below knee amputation in 7 and above knee amputation in 5 patients. The difference was significant ($P < 0.05$).

Conclusion: Grade 5, presence of ulcers and bacteria such as staphylococcus aureus and gram- negative organisms were major risk factors for the surgical management of diabetic foot ulcer.

Key words: debridement, diabetic foot ulcer, knee amputation

INTRODUCTION

Wounds of the foot are the most common reason for diabetes-related hospital admissions. In many of these cases, surgical intervention is the best option. Presence of several characteristic diabetic foot pathologies such as infection, diabetic foot ulcer and neuropathic osteoarthropathy is called diabetic foot syndrome.¹

Approximately 5% of diabetic patients develop a foot ulcer every year. About 15% of all diabetics develop foot problems during course of their illness. Diabetic foot ulcers carry a significant risk of amputation.² 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.³

Diabetes foot infection due to gangrene is the most common cause of prolonged hospitalization and amputation of their limbs. Besides, 28%–51% of amputated diabetics will have a second amputation of the lower limb within five years of the first amputation. Generally, diabetic foot complications remain the major medical, social, and economic problems for all types of diabetes. Clinical signs of infection may not manifest until the infection is advanced.⁴ The typical bacterial pathogens encountered vary with the Wagner grade and severity of infection. Early infections are generally monomicrobial, whereas advanced infections tend to be polymicrobial.⁵ The present study was conducted to assess risk factors in the surgical management of diabetic foot ulcer.

MATERIALS & METHODS

The present study comprised of 88 cases of diabetic foot ulcer of both genders. All gave their written consent for the participation in the study.

Data such as name, age, gender etc. was recorded. All patients underwent routine blood examination, blood sugar test, urine analysis, culture & sensitivity of the discharge from the infection. Previous history of diabetes, wound healing, ulcers and boils in other part of the body were recorded. Parameters such as Wagner's classification, type of operations performed were recorded. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution Of Patients

Total- 88		
Gender	Males	Females
Number	48	40

Table I shows that out of 88 patients, males were 48 and females were 40.

Table II Diabetic Footwagner Classification

Wagner Classification	Number	P value
Grade 0	5	0.04
Grade 1	5	
Grade 2	14	
Grade 3	16	
Grade 4	20	
Grade 5	28	

Table II, shows that Wagner classification grade 0 was seen in 5, grade 1 in 5, grade 2 in 14, grade 3 in 16, grade 4 in 20 and grade 5 in 28 patients. The difference was significant ($P < 0.05$).

Table III Clinical Presentation

Clinical presentation	Number	P value
Gangrene	20	0.05
Cellulitis	15	
Ulcer	53	

Table III shows that gangrene was seen in 20, cellulitis in 15 and ulcer in 53 patients.

Table IV Common Bacteria Isolated

Bacteria	Percentage	P value
Staphylococcus aureus	64%	0.02
Beta haemolytic streptococci	6%	
Gram negative organisms	20%	
Anaerobic Cocci	10%	

Table IV, graph I shows that bacteria isolated were staphylococcus aureus in 64%, Beta haemolytic streptococci in 6%, gram negative organisms in 20% and anaerobic cocci in 10%. The difference was significant ($P < 0.05$).

Graph I Common Bacteria Isolated

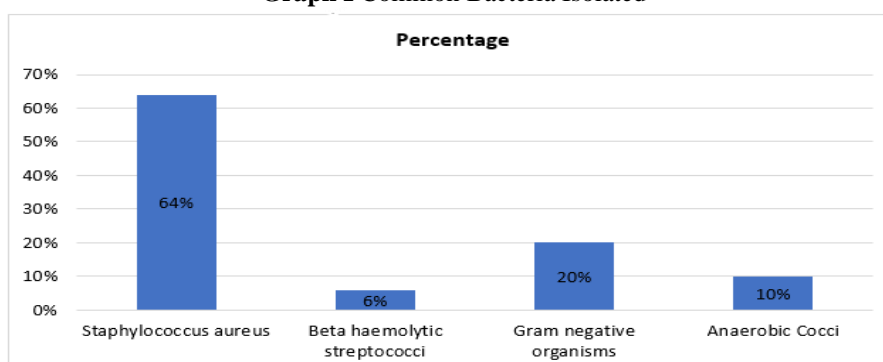


Table V Management Of Diabetic Foot

Management	Number	P value
Incision and drainage	3	0.02
Amputation	45	
Debridement	20	
Transmetatarsal	8	
Below knee amputation	7	
Above knee amputation	5	

Table V shows that management done was incision and drainage in 3, amputation in 45, debridement in 20, transmetatarsal in 8, below knee amputation in 7 and above knee amputation in 5 patients. The difference was significant ($P < 0.05$).

DISCUSSION

Diabetes mellitus (DM) is a non-communicable disease and one of the most common chronic diseases.^{6,7} World health organization defined DM as a metabolic disorder of multiple etiology characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both.⁸ Complications of DM become a major public health problem in all countries. Surgical therapy has several aims. The main goal is to control the deep infection, with the hope of salvaging the limb.⁹ 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.^{10,11} The present study was conducted to assess risk factors in the surgical management of diabetic foot ulcer.

We found that out of 88 patients, males were 48 and females were 40. Wagner classification grade 0 was seen in 5, grade 1 in 5, grade 2 in 14, grade 3 in 16, grade 4 in 20 and grade 5 in 28 patients. Gupta et al¹² analyzed the risk factors leading to complication in diabetic foot infection and to study the outcome of treatment modalities of the diabetic foot. The diabetic foot was found in the middle-aged group persons usually in 4th and 5th decade. There were 50 males and 50 females of which 70% patients had symptoms of diabetic foot ulcer, 20% patients had diabetic foot cellulites, 10% of patients presented with gangrene diabetic foot. The surgical site infection was the most common complications accounting for total of 10 patients.

We observed that Gangrene was seen in 20, cellulitis in 15 and ulcer in 53 patients. Bacteria isolated were staphylococcus aureus in 64%, Beta haemolytic streptococci in 6%, gram negative organisms in 20% and anaerobic cocci in 10%. Bekeke et al¹³ found that of the 115 diabetes foot ulcer patients, 64(55.65%) were males and the mean age of participants was 44.4 ± 14.7 years. Fifty-eight (50.43%) of the patients had chronic health problems and 56(48.69%) had diabetic complications. Of patients with complications, 35(30.43%) were undergone amputations. Diabetic foot ulcer grade ≥ 4 , inappropriate antibiotics use, overweight, obesity, poor blood glucose control and neuropathy were predictors of amputation up on multivariable logistic regression analysis. Blood glucose level, higher body mass index, inappropriate antibiotics use, neuropathy and advanced grade of diabetic foot ulcer were independent predictors of amputation. Thus, special emphasis for patients having neuropathy and advanced grade of diabetic foot ulcer as well as weight reduction, managing hyperglycaemia, and appropriate antibiotics prescription practice would decrease untoward effects of diabetic foot ulcer.

We found that management done was incision and drainage in 3, amputation in 45, debridement in 20, transmetatarsal in 8, below knee amputation in 7 and above knee amputation in 5 patients. Eneroth et al¹⁴ 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 al¹³ 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.

The limitation the study is small sample size.

CONCLUSION

Authors found that grade 5, presence of ulcers and bacteria such as staphylococcus aureus And gram- negative organisms were major risk factors for the surgical management of diabetic foot ulcer.

REFERENCES

1. Steed DL, Donohoe D, Webster MW, et al. Effect of extensive debridement and treatment on the healing of diabetic foot ulcers. Diabetic Ulcer Study Group. *J Am Coll Surg* 1996; 183:61–4.
2. Smith AJ, Daniels T, Bohnen JM. Soft tissue infections and the diabetic foot. *Am J Surg* 1996; 172:7S–12S.
3. Armstrong DG, Lavery LA, Harkless LB. Validation of a diabetic wound classification system. The contribution of depth, infection and ischemia to risk of amputation. *Diabetes Care* 1998; 21:855–9.
4. Wong YS, Lee JC, Yu CS, et al. Results of minor foot amputations in diabetic mellitus. *Singapore Med J* 1996; 37:604–6.
5. Said G: Diabetic neuropathy—A review. *Nature clinical practice Neurology*. 2007; 3:331-40.
6. Besse JL, Leemrijse T, Deleu PA. Diabetic foot: the orthopedic surgery angle. *Orthopaedics & Traumatology: Surgery & Research* 2011; 97:314-29.
7. Delbridge L, Ctercteko G, Fowler C, Reeve T, Le Quesne L. The aetiology of diabetic neuropathic ulceration of the foot. *British Journal of Surgery*. 1985; 72:1-6.
8. Shapiro J, Nouvong A. Assessment of Microcirculation and the Prediction of Healing in Diabetic Foot Ulcers: INTECH Open Access Publisher, 2011.
9. Shapiro J, Koshimune D, Moellmer R. Diabetic Foot Ulcers— Treatment and Prevention. Open Access distributed under the Creative Commons Attribution 2013; 3.
10. Ansari M, Shukla V. Foot infections. *The international journal of lower extremity wounds* 2005; 4:74-87.
11. Adams Jr CA, Deitch EA. Diabetic foot infections, 2001. 8. Neville RF, Roberts AD, Simon GL. Diabetic Foot Infection. *Essentials of Vascular Surgery for the General Surgeon*: Springer, 2015, 71-81p

12. Gupta A, Haq M, Singh M. Management Option in Diabetic Foot According to Wagners Classification: An Observational Study. *Jk Science*. 2016 Jan 1;18(1).
13. Bekele F, Chelkeba L, Fekadu G, Bekele K. Risk factors and outcomes of diabetic foot ulcer among diabetes mellitus patients admitted to Nekemte referral hospital, western Ethiopia: Prospective observational study. *Annals of Medicine and Surgery*. 2020 Mar 1;51:17-23.
14. Eneroth M, Apelqvist J, Stenstrom A. Clinical characteristics and outcome in 223 diabetic patients with deep foot infections. *Foot Ankle Int* 1997; 18:716–22.