

Management of Diabetic Foot Ulcers

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ABSTRACT

Objective: To see the management options of diabetic foot ulcers in our patients, its presentation and the prognostic factors involved in planning the treatment in the Department of Surgery, Islam, Teaching Hospital Sialkot, Pakistan.

Study Design: Retrospective analytical & observational.

Place and Duration of Study: This study was conducted at Islam Teaching Hospital Sialkot from September 2010 to January 2013.

Materials and Methods: One fifty (150) cases of diabetic foot ulcers were included in this study. All patients were randomly selected attending to Islam Teaching Hospital OPD & emergency.

Results: The results were shown in Table No.1 to Table No.4 & graph No.1

Conclusion: In patients of diabetic foot ulcers, the treatment does not end with infection controlled, healed amputation stumps and prosthetic legs fitted; but it continues as reulcerations, involvement of healthy sides etc remains the feared consequences. The patient with diabetic foot infections and ulcers is a surgical patient throughout life as of a physician.

Keywords: diabetic foot, infection, ulcer, antibiotics, debridement, surgery

INTRODUCTION

The incidence of diabetes mellitus worldwide has reached almost epidemic proportions. There has been a significant rise in the morbidities associated with this disease. Amongst these complications, lower-extremity and foot manifestations are a very prominent¹. The lifetime risk of developing diabetic foot ulceration (DFU) is as high as 25% in patients with diabetes. In addition to the development of DFU, more than 50% of these ulcerations will become infected, accounting for nearly 20% of all diabetes-related hospital admissions². Foot ulceration and infection occur frequently and can deteriorate rapidly in the insensate diabetic patient. Frequently, infections in this patient population are masked by neuropathy and complicated by concomitant metabolic derangements, peripheral arterial disease, and immunocompromise³. Multiple classification systems exist for diabetic ulceration and diabetic foot syndrome. The most widely recognized classification is the Wagner system, which grades ulcers from 0 to 5 based largely on ulcer depth and severity⁴. Other diabetic ulcer descriptors are the University of Texas (UT) Classification and the PEDIS (Perfusion, Extent or size, Depth, Infection, and Sensation) classification. The UT system is easy to use and addresses not only the wound depth, but also the presence or absence of infection and the presence or absence of ischemia⁵. Severe diabetic foot infections are frequently found to be polymicrobial, with mixed aerobic and anaerobic species of bacteria and occasionally fungus. Mild or moderate infections, on the other hand, often have one primary pathogen, which is most frequently

Staph. aureus. Additionally, the increasing prevalence of MRSA in diabetic foot infections has been associated with wound healing complications and a higher risk of lower extremity amputation. Definitive antibiotic therapy is based on culture and sensitivity results from intra-operative cultures^{6,7}. After the patient is medically stabilized, initial surgical debridement is performed to resect all non-viable tissue and decompress gross abscesses. In severe diabetic foot infections, early decompression and drainage is crucial to successful control of the infection and must occur as soon as the patient's metabolic disturbances have been addressed⁸. Blunt dissection is used to determine the extent of involvement of the fascial planes. After thorough exploration of the affected pedal compartments, the surgeon is able to determine the necessary amputation level or the degree of wide excision needed. Exposed tendons should be excised if proximal migration of the infection is suspected and all marginal-appearing tissue should be resected for better wound bed granulation^{9,10}. Many patients with life- or limb-threatening diabetic foot infections have concomitant peripheral arterial disease that complicates their wound healing potential. For this reason, if pedal pulses are non-palpable or mono/biphasic via the handheld Doppler signals, or if minimal bleeding is visualized during the initial surgical debridement, non-invasive vascular studies should be ordered without delay following initial debridement. Ankle and toe brachial indices, pulse volume recordings, and transcutaneous oxygen pressures provide valuable information that ultimately determines the appropriateness of vascular surgery consultation and invasive vascular studies^{11,12,13}.

Patients with Diabetes and having foot ulcers are a constant feature of Surgical outpatients department. These patients constitute a significant part of surgical practice as indoor patients and in the operative workload. This study was designed to retrospectively analyze the factors involved in decision making in the various operative procedures.

MATERIALS AND METHODS

Data from the operation theatre was collected of 150 patients who underwent surgical procedures for diabetic foot ulcers and the record was analyzed retrospectively. The procedures like debridement, toe amputations labeled as minor amputations and major amputations like below knee and above knee amputations were included. Information regarding site of ulcers, their size and exposure of underlying bones were recorded; moreover patients factors like smoking, awareness to the pathology and foot care knowledge, literacy, age, gender were also included in the data. The surgical procedures were performed in the theatre under local blocks, spinal anesthesia and general anesthesia. Similarly data of indoor patients who were admitted for diabetic foot infections and ulcers collected and percentages and means were calculated and compared. All the included patients were further followed in surgical outpatients department and outcome or result of different procedures were recorded.

This study was carried from September 2010 to January 2013 in Islam Teaching Hospital affiliated to Islam Medical College, Pasrur road, Sialkot, Pakistan . Data collected was analyzed using SPSS 17.0.

RESULTS

In this study, 150 cases of surgical procedures performed for diabetic foot ulcers were included. Most of them i.e. 91(61%) underwent debridements, 42(32%) had minor amputations like toe amputations as single toe 29(19%) or more 13(9%) while 17 (12%) patients had major amputations like below knee amputations 16 (11%) and one (0.7%) had above knee amputation. The statistical detail is given in Table I.

Table 2 variables like site, size and exposure of underlying bones as well as systemic illnesses and septicaemia were also recorded

Major amputations were carried out depending upon the level of infections, tracking of pus along the tendons, presence of dead and necrosed. (Table 3)

Out of 17 major amputations one patient who had severe infection up to the level of mid calf and below knee amputation was performed had to land up with above knee amputation. Out of 42 amputation of toes 7 amputations landed up in amputation of 2nd toe; while 6 patients underwent amputation of two or more toes straight forward depending upon the severity of infections. The main indication of surgical intervention were; uncontrolled infections in 127 (85%),

osteomyelitis of underlying bones in 14 (9.3%), and septicaemia in 9 (6%) patients. The surgical procedures performed were retrospectively studied to know the indications of surgery as shown in the Table 4

Table No.1: General Demographic Data – All cases

Age	31-67 (mean 39.88)
Sex(M:F)	69:81(46%:54%)
Educational status(literate: illiterate)	43:107
Socioeconomic status(good: poor)	37:113
Smoking	45(30%)
Minor procedures like debridements	91(61%)
Single toe Amputations	29(19%)
Amputations of more than one toe	13(9%)
Major Amputations	17(12%)
Below knee amputations	16(11%)
Above Knee Amputations	1(0.7%)
Mortality	1(0.7%)
Hospital stay	1-6 weeks (mean 2.1 weeks)
Multiple admissions	23(15.3%)
Total No. of Patients	150

Table No.2: Variables like site, size and exposure of underlying bones etc.

Site	Fore foot- 109(72%) Hind foot- 41(28%)
Size	Less than 5 cm diameter – 119(79%) More than 5 cm diameter- 31(21%)
Exposure of underlying bone	37(24%)
Symptoms of septicaemia	23(15.3%)

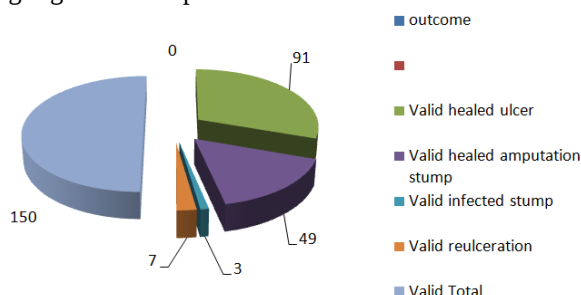
Table No.3: statistics of indoor cases of diabetic foot infections muscles.

Admissions for infections associated with diabetes	289
Diabetic foot ulcers admissions	190(65%)
Diabetic foot ulcers required surgical procedures in the operation theatre	150(52%)
Referrals for management by the vascular/ plastic surgeons	16(5%)

Table No.4: Analysis of location of ulcers and Surgical procedures

	Fore foot ulcers- 109	Hind foot ulcers- 41
Debridements – 91	62	29
Minor amputations -42	42	Nil
Major amputations -17	5	12

Out 150 surgical procedures 13(8.6%) cases of debridement were carried under local blocks, 38(25.3%) in general anesthesia and 99(66%) patients had spinal anesthesia. Outcome of surgical modalities is highlighted in Graph I



Graph No.I: Outcome of surgical modalities

About 27% i.e 41 patients had follow up of more than 3 months while 109 patients attended the surgical OPD for 3 months.

DISCUSSION

In our study ; the retrospective analysis of 150 surgical procedures have highlighted that though the frequency of minor amputations is more in forefoot ulcers i.e. 42(32%) but still the major amputations 5 has to be performed. While the hind foot ulcers which are less common than the fore foot ulcers; these are treated by repeated debridement's i.e. 29 and the role of minor amputations i.e. nil, is minimum and if decision for amputation is to be taken, it is usually a major amputation i.e. 12 and the loss of foot and rehabilitation is a major concern for the patient. Debridement's lead to successful treatment and patients were free from infections in those patients which had ulcers of less than 5 cm size and this factor was more confident in the ulcers which had not yet exposed the underlying bones. The more feared prognostic factor which lead to major amputations was exposure of bone in the hind foot which was even more dreadful in ulcers of more than 5 cm size. Out of indoor patients i.e 289 , only 150 (52%) patients required formal surgical procedures; while rest of the patients managed by dressings and broad spectrum antibiotics were discharged with satisfactory healing. After treatment; 11 patients with major amputation had been fitted with prosthetic limbs and rehabilitated while others are waiting for their rehabilitation. After the treatment and discharge from hospital, the follow up in surgical outpatients show that 3 patients are with unhealed amputation stumps after below knee amputations, 9 cases with unhealed wounds after minor amputations, and 7 patients reported for reulceration and are being managed as OPD patients. In the study by Eneroth et al.¹⁴ , . Eighty-six percent had

surgery before healing or death. Thirty-nine percent healed without amputation; 34% healed after a minor and 8% after a major amputation. Sixteen percent were unhealed at death, and 3% were unhealed at the end of the observation period. Of those unhealed at death or follow-up, 4 patients had had a major and 11 a minor amputation. So, in our study; the good prognostic factors turned out to be ulcer size less than 5 cm, forefoot ulcers and non-exposure of underlying bones. Similarly ; ulcers >5 cm size, hind foot ulcers and the exposure of underlying bones were met with poor outcome. Patients factors of smoking , poor knowledge of the disease and foot care practices and poor socioeconomic status were contributing bad prognostic factors. Poor control of blood glucose levels in operated patients added to the morbidity due to delayed or non healing/ closure of amputation stumps; moreover this factor lead to use of prolonged courses of antibiotics. We are having 3 patients at follow up with open stumps and mild infection persisting in cases of below knee amputation. Poor health and systemic illnesses like hypertension and hepatitis lead to poor response to antibiotics and a single mortality which was encountered in our study was due to these factors in addition to the much delayed presentation of the patient who was initially managed at home by the quacks. In the study by Jeff G Van Baal¹⁵ , out of 51 patients, the majority of whom had operations for deep infections in neuropathic feet, most required 11 procedure and multiple admissions . Similarly, in a series of 212 urgent or emergent foot operations performed on 114 diabetic patients because of infection or ischemia, the average number of operations per limb was 1.5, and 48 limbs required revascularization. Ultimately, 36 needed major amputations up to 86 months after the initial operation, but the long-term salvage rate was 73% for threatened legs. These results are reasonably good, given that most of these operations were limb salvage procedures. Yeager RA et al¹⁶ in another study reported on 162 patients requiring forefoot or toe amputations; 72% had diabetes, 73% did not have palpable foot pulses, and 83% underwent concomitant or subsequent limb revascularization. Major amputation was eventually necessary in 18.5% of cases. Multivariate analysis indicated that unsuccessful revascularization predicted lack of healing or major amputation.

CONCLUSION

The patients with diabetic foot ulcers make a significant workload in the surgical outpatient, indoor as well as operative work. The treatment does not end with infection controlled, healed amputation stumps and prosthetic legs fitted; but it continues as re ulcerations, involvement of healthy sides etc. remains the feared consequences. The patient with diabetic foot infections

and ulcers is a surgical patient throughout life as of a physician.

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