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TITLE: STUDY OF SURGICAL MANAGEMENT OF DIABETIC FOOT AT A TERTIARY HOSPITAL

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ABSTRACT

Background: The annual incidence of diabetic foot ulcer (DFU) in population-based studies is 1.0 to 4.1% and prevalence of 4.5 to 10%, with an overall lifetime incidence of up to 25%. Surgical management (such as dressing, offloading, debridement, and the necessary surgeries) play an important role in controlling/healing DFU. Present study was aimed to study surgical management of diabetic foot at our tertiary hospital.

Keywords: Diabetic foot ulcers, therapeutic management, surgical management, amputations, debridement

INTRODUCTION

Lower extremity diseases, including peripheral neuropathy, peripheral arterial disease (PAD), and foot ulceration, is twice as common in diabetic subjects as compared with nondiabetic persons and affects 30% of diabetic people older than 40 years.[1] The annual incidence of diabetic foot ulcer (DFU) in population-based studies is 1.0 to 4.1% and prevalence of 4.5 to 10%, with an overall lifetime incidence of up to 25%.[2,3]

Diabetic foot ulcers are the most common cause of non-traumatic lower limb amputations in developing countries, and the risk of lower extremity amputation is 15 to 46 times higher in diabetics than in persons who do not have diabetes mellitus.[4] Only two thirds of these ulcers are expected to heal, the median time to healing of all ulcers is approximately 6 months. Up to 28% may result in some form of amputation.[5]

Previous studies showed that the premise of a good therapeutic effect for DFU includes not only blood glucose/HgA1c level control and anti-infection, but also surgical methods such as cleaning, dressing, off-loading, biofilm control, vascular status assessment and surgeries, etc.[6,7] Among them, surgical management (such as dressing, offloading, debridement, and the necessary surgeries) play an important role in controlling/healing DFU.[8] Present study was aimed to study surgical management of diabetic foot at our tertiary hospital.

MATERIAL AND METHODS

Present study was a prospective, observational study of 100 cases with Diabetic foot admitted and treated (from Aug 2016 to Sep 2018) at Department of General Surgery, Sri Devraj Urs Academy of Higher Education and Research.

Inclusion criteria

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- Patients 0f 31-70 years, of either gender, surgical wards with diabetic foot ulcers.

Exclusion criteria

- Healed diabetic foot ulcer patients.

Patients with active diabetic foot ulceration (DFU) came to OPD or medical ward were admitted under surgical wards for appropriate surgical management. Study was explained & written informed consent was taken for participation. DFU was defined as a hole on the normal skin occurring as a change of color on the foot for more than two weeks, induration and ulceration.

Demographic details (age, gender, address), detailed history of the current illness, previous history of wounds, gangrenes, ulcer, boils, any associated arterial or venous disorders associated with diabetes, clinical characteristics including duration of diabetes, duration of diabetic foot ulcer, previous history of amputation, anatomical site, foot affected were noted. The DFUs were graded according to Wagner's classification.

Routine investigations such as complete blood counts, Fasting and Post Prandial Blood sugar levels, ESR, ECG, complete urine examination for the presence of ketone bodies and sugar and special investigations like Doppler studies, X- ray of the part involved were done in all patients. Assessment of glycemic control done by the HbAlc estimation. The results were reported in percentage, and graded as:

1. HbAlc < 7% (good metabolic control),
2. HbAlc 7- 10% (fair metabolic control),
3. HbAlc ≤ 10% (poor metabolic control).

Patients with Diabetic Cellulitis of foot were treated with debridement, split skin grafting, and amputations. Patients with Diabetic Gangrene foot were treated with amputation.

Operative data comprised the type of surgeries performed, postoperative complications was noted. Statistical analysis was done using descriptive statistics.

RESULTS

During study period, 126 patients of DFU were treated at our hospital. Majority of patients were females (62.7 %), from 41-50 years age group (41.27 %), had comorbif=dities such as hypertension (34.13%), ischemic heart disease (18.25%) & peripheral vascular disease (7.14%), had habits such as smoking (30.95%) & alcohol consumption (11.90%), had normal BMI (57.14%).

Table 1- General characteristics of Study Population

Parameters	No. of patients (n=126)
Age (years)	
31-40	17
41-50	52
51-60	38
61-70	19
Gender	
Male	47
Female	79

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Co-morbid conditions	
Hypertension	43
Ischemic heart disease	23
Peripheral Vascular Disease	9
Smoking	39
Alcohol consumption	15
BMI	
Normal	72
Underweight	4
Overweight	50

In present study, majority had poor glycaemic control (76.19%), receiving either Insulin (32.54%) OR OHA (37.30%) OR Insulin + OHA (24.60%). 7 patients were not on any treatment (5.56%).

Table 2: Glycaemic control & treatment

Parameters	No. of patients(n=126)
Glycaemic control	
Poor	96
Fair	21
Good	9
Treatment	
Insulin	41
OHA	47
Insulin + OHA	31
Not on any treatment	7

Among study patients, majority had >5 years duration of diabetes (83.33%), 4-52 weeks duration of diabetic foot ulcer (63.49 %), 8 patients had history of amputation. Most common anatomical location was Forefoot (56.35%) followed by Hindfoot (19.84%) & Midfoot (17.46%). most common Type of ulcer was Neuropathic (61.90 %), others were Neuro-Ischemic (16.67%), Ischemic (11.11%) & Unclassified (10.32%). As per Wagner's Classification, majority were from Grade 4 (30.95%) followed by Grade 5 (26.19%), Grade 2 (19.05%), Grade 3 (16.67%) & Grade 1 (7.14%).

Table 3- Clinical characteristics

Clinical Characteristics	No. of patients
Duration of Diabetes (in years):	
< 5	19
>5	105
Duration of Diabetic Foot Ulcer (in weeks)	
<4	26
4-52	80
>52	20
Previous history Of amputation	8
Anatomical	

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Forefoot	71
Midfoot	22
Hindfoot	25
Whole foot	8
Type of ulcer	
Neuropathic	78
Ischemic	14
Neuro-Ischemic	21
Unclassified	13
Wagner's Classification	
Grade 0	0
Grade 1	9
Grade 2	24
Grade 3	21
Grade 4	39
Grade 5	33

Majority were managed surgically (77.78%) as compared to conservative management (22.22%). Surgical measures such as debridement (37.30%), amputations (34.13%), below knee amputation (11.90%), above knee amputation (10.32%), incision & drainage (5.56%), transmetatarsal (3.97%), multiple (2.38%) & Rye's (1.59).

Table 4- Treatment given

Treatment	No. of patients
Surgical	98
Debridement	47
Amputations	43
Below Knee Amputation	15
Above Knee Amputation	13
Incision & drainage	7
Transmetatarsal	5
Multiple	3
Rye's	2
Conservative	28

In present study, common post-operative complications surgical site infection (10.32%), skin grafting failure (8.73%) & stump gangrene (7.14%). Other complications were wound dehiscence (5.56%), wound hematoma (4.76%), revision amputation (3.97%), diabetic coma (2.38%) & phantom pain (1.59%).

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Table 5- Post-operative complications

Complications	No. of patients
Surgical site infection	13
Skin grafting failure	11
Stump gangrene	9
Wound dehiscence	7
Wound hematoma	6
Revision amputation	5
Diabetic coma	3
Phantom pain	2

DISCUSSION

Diabetic foot is defined as infection, ulceration or destruction of deep tissues associated with neurological abnormalities and various degrees of peripheral vascular diseases of lower limb. Foot ulcers can cause severe disability and hospitalization to patients and considerable economic burden to families and health systems.[9]

About 85% of diabetes‐related amputations are preceded by foot ulcers, and it accounts for more than half of non‐traumatic lower limb amputations.[10] Individuals who develop foot ulcers have a decreased health‐related quality of life.[11] In diabetic patients, long-term elevated blood sugar leads to a slew of chronic complications. Studies show that male gender, smoking, length of illness, cardiovascular disease, and poor glycemic control are the main risk factors for the development of diabetic foot ulcers.[12]

The majority (60–80%) of foot ulcers will heal, while 10–15% of them will remain active, and 5–24% of them will finally lead to limb amputation within a period of 6–18 months after the first evaluation. Neuropathic wounds are more likely to heal over a period of 20 weeks, while neuroischemic ulcers take longer and will more often lead to limb amputation.[13,14]

An increased susceptibility to foot trauma due to the presence of vision-threatening retinopathy; small- and large-fiber peripheral neuropathy; limited joint mobility; and presence of foot deformity, particularly claw toes, hallux valgus, bunion, and prominent metatarsal heads are a proven risk factor for ulceration in a patient with diabetes. The gold standard for diabetic foot ulcer treatment includes debridement of the wound, management of any infection, revascularization procedures when indicated, and off-loading of the ulcer.[15] Other methods have also been suggested to be beneficial as add-on therapies, such as hyperbaric oxygen therapy, use of advanced wound care products, and negative pressure wound therapy (NPWT).

In study by A Ravitheja et al.,[17] among 100 patients of diabetic foot, commonest presenting lesion was ulcers (64%), followed by cellulitis (20%), and gangrene (16%). Trauma is the initiating factor in most of the cases. Out of which 82% of patients had infection. Most common microorganism grown from wound discharge culture was staphylococcus aureus (56%), 86% of patients were treated with wound debridement, 14% of patients underwent amputation. Prognosis was good in all patients.

Anil Gupta et al.,[18] noted 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. The commonest disease was Grade 4 (34 %), followed by Grade 2 (22%) & Grade 3 (16%). 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. (incision & drainage of foot abscess and debridement in 41 %, amputation in 35.0%).

Vanlalhlua C[19] studied 50 DFU patients, commonest presentation was ulcer followed by gangrene and abscess. The most common site of lesion was toes (42%) followed by dorsum of foot (30%) and planter of foot (16%). 72% of patients (36) had neuropathy, 14% had vasculopathy and 10% had both. 30 (60%) patients are healed by debridement and dressing alone, 11 (22%) patients need amputation or disarticulation to heal. Skin grafting was done in 9 patients.

In study of Lakhani DJ et al.,[20] average age of presentation was 55.70 years, male to female ratio was 1.27:1. Most of the patients have duration of diabetes more than 5 years. Most common microorganism grown from culture was Staphylococcus aureus. This study has higher rate of amputations of 74% due to late presentation and neglected disease due to peripheral neuropathy causes decreased pain sensation.

The diabetic foot ulcer is a major health issue that necessitates a multidisciplinary approach and has a negative impact on the lives of individuals. The principles of diabetic foot ulcer prevention and treatment include determining the foot at risk, routine foot supervision, patient, family, and healthcare professional education, adequate shoe selection, and treatment of early signs of foot ulcers.[21]

CONCLUSION

Diabetic foot ulcers increases morbidity, high expenditure for therapeutic management (surgical/medical), precede amputations & associated with post-operative complications. Proper education at high risk group like self-inspection, foot hygiene, use of suitable footwear, good sugar control, surveillance early recognition and prompt professional treatment are important.

Conflict of Interest: None to declare
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