

Study of Lower Extremity Amputation in Diabetic Patients

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Abstract

Lower limb amputation is one of the most feared complications of diabetes preceded by foot ulcers. Amputations among people with diabetes are more common than in non-diabetic patients. This retrospective study included 50 random cases of lower extremity amputation done in diabetic patients admitted and treated in department of surgery, M.P. Shah medical college, Jamnagar during period of November 2015 to October 2017. Their age ranged between 24-87 years with a mean age of 58.86 years. There were 34 males and 16 females. All 50 patients were admitted previously, out of them 27 patients had history of previous any amputation and 23 patients treated conservatively. The majority of patients presented with alone or combination with infected/non healing ulcer, cellulitis and gangrene. The primary healing occur in 18 patients, healing occur after refashioning in 10 patients, after split skin grafting in 4 patients, required proximal amputation in 12 patients and 6 patients expired. The mean duration of hospital stay was 42.18 days±27.48 with no significant difference in the hospital stay in relation to the level of the amputation. Transmetatarsal, Transtibial and Transfemoral amputations are the main types of lower extremity amputations in diabetic patients. Transtibial amputations are associated with higher rates of complications, reoperation, delayed healing and mortality.

Keywords: Diabetes; Lower Extremity Amputation.

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Introduction

Diabetes mellitus is heterogeneous primary disorder of carbohydrate metabolism with multiple etiological factor that generally involves absolute or relative insulin deficiency or insulin resistance or both leading to hyperglycemia and various long term complication [1].

India has a dubious distinction of having largest number of persons with diabetes in the world. Type-2 diabetes has become the most common metabolic disorder. Its prevalence is growing more rapidly among people in the developing world, primarily due to marked demographic and socioeconomic changes in this region. India currently leads the world with an estimated 41 million people with diabetes; this figure is predicted to increase to 66 million by 2025. The diabetes epidemic is more pronounced in urban areas in India, where prevalence rates of diabetes are roughly double than those in rural areas [2].

Following the introduction of insulin and more recently the oral hypoglycemic agents, the control of diabetes has markedly improved, and the major problem facing diabetic patients, is the development of the long term complications of the disease, such as neuropathy, angiopathy and ocular complications [3].

Diabetic foot is one of the serious complication of diabetes which is associated with prolonged hospitalization and risk of lower limb amputation [4].

The increase in incidence of diabetic foot problems is due to rise in diabetic population as well as increase in lifespan of the people. In India, around 45,000 legs are estimated to be amputated every year [5]. The significant risk factors for a patient with diabetes to require an amputation are lower extremity ischemia, neuropathy, a history of foot ulcer, elevated HbA1c and retinopathy and indicators for lower extremity amputations include

septic gangrene, peripheral arterial occlusion, non healing ulcer, severe soft tissue infection and osteomyelitis. Amputations not only affect the physical functional status but also affect their psychosocial status and increase the financial burden by means of hospital stay and treatment and loss of employment [5].

The risk of lower extremity amputation is 18-30 times higher among those with diabetes in comparison to general population [6].

Amputation becomes inevitable when repeated treatment failure occurs. Limited amputations such as Transmetatarsal, Tarsometatarsal and Chopart/lisfranc type amputation may be appropriate due to unsatisfactory vascular and neuropathic status. Stump healing is a frequent problem. Skin flap problem are common among diabetic patients and reamputation become mandatory. Lower limb amputation is a common end result of a diabetic foot patient in India [7,8].

Aims of Study

1. To study incidence of various lower limb amputation in diabetic patients in department of general surgery, M. P. Shah medical college, G. G. Hospital Jamnagar.
2. To study various epidemiological factors like; age, sex, socio economic status, co-morbid conditions etc. In diabetic patients who underwent lower extremity amputation.
3. To identify and quantify risk factors for amputation in diabetic patients with foot infection.
4. To study the indications and anatomical levels of lower limb amputation.
5. To study various treatment modalities for lower limb amputation.
6. To identify:
 1. The healing patterns of lower limb amputation at various levels.
 2. The rate of postoperative stump infection.
 3. The rate of reoperation.
 4. Hospital mortality and mean hospital stay.
7. To study about clinical outcome of diabetic foot patients.

Material and Method

The study included 50 random cases of lower extremity amputation among cases of lower extremity amputation done in diabetic patients, admitted and treated in department of surgery, M.P. Shah medical college, Jamnagar during period of November 2015 to October 2017. All the patient's case papers were taken from medical record branch and

details about onset, duration, and progression of disease with associated symptoms were taken. Lower extremity amputations in diabetic gangrene wound examinations, details and further higher level of amputation like below knee or above knee amputation or split skin grafting were required or not and cause of death was taken from case papers.

Inclusion Criteria

Lower extremity amputation done in diabetic patients.

Exclusion Criteria

Amputation done in

- Peripheral vascular disease
- Gas gangrene
- Trauma
- Infections i.e. chronic osteomyelitis
- Deformities
- Malignancy i.e. osteosarcoma

Results

During the study period total number of diabetic patients admitted in department of surgery, M.P. Shah medical college, Jamnagar were 1765 patients and lower extremity amputation done in 853 patients. Incidence of lower extremity amputation in diabetic patient was total 48.32/100 over two years. In our study age ranged between 24 and 87 years (Figure 1). Out of 50 patients, 39 patients (78%) were in the age group 41-70 years. Out of 50 patients, 36 patients (72%) were males and 14 patients (28%) were females. Out of 50 patients, 29 patients (58%) were come from lower socio-economic class and 21 patients (42%) from middle socio-economic class. 32 patients (64%) had hypertension. 29 patients (58%) were smokers and all were males. Out of 50 patients, patients were presented with infecting/non healing ulcer in 47 patients (94%), cellulitis in 35 patients (70%) and gangrene in 21 patients (42%). In our study we found that while peripheral pulsation of DPA, ATA & PTA not palpable, reamputation at higher level was required after previous amputation in majority of patients because of poor peripheral blood supply leads to poor stump healing. Out of 50 patients, 13 patients (26%) were presented with wet gangrene which was operated in emergency condition. 27 patients (56%) were reported history of previous admission for amputation and 23 patients (46%) were treated conservatively.

In our study the duration of diabetes was from 1 to 50 years (Figure 2). The mean duration of diabetes was 10.72. The majority of our patients 72% had diabetes for

more than 20 years. Diabetes was controlled by oral hypoglycemic drugs in 44 patients (88%) and by inj. Insulin (Inj. Mixtard) in 6 patients (12%). Lower extremity amputation in 13 patients (26%) was operated in emergency and in 37 patients (74%) was operated as elective. Preoperative microorganism were isolated which was pseudomonas in 13 patients followed by

klebsiella in 8 patients, E.coli in 5 patients, cl.welchi in 4 patients, acinobacter in 3 patients, staphylococcus aureus in 2 patients and streptococci in 2 patients (Figure 3). Postoperative infection was present in 29 patients (Figure 4). Out of 50 patients, 27 patients (54%) were stayed in hospital for 11-40 days. Mean duration of hospital stay was 42.18±SD 27.48 days.

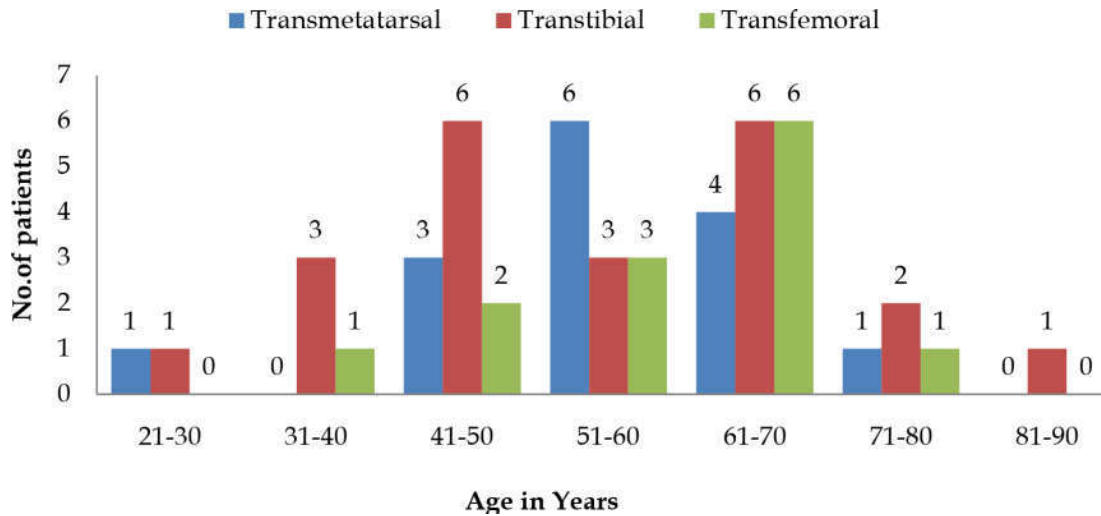


Fig. 1: Age distribution (n=50)

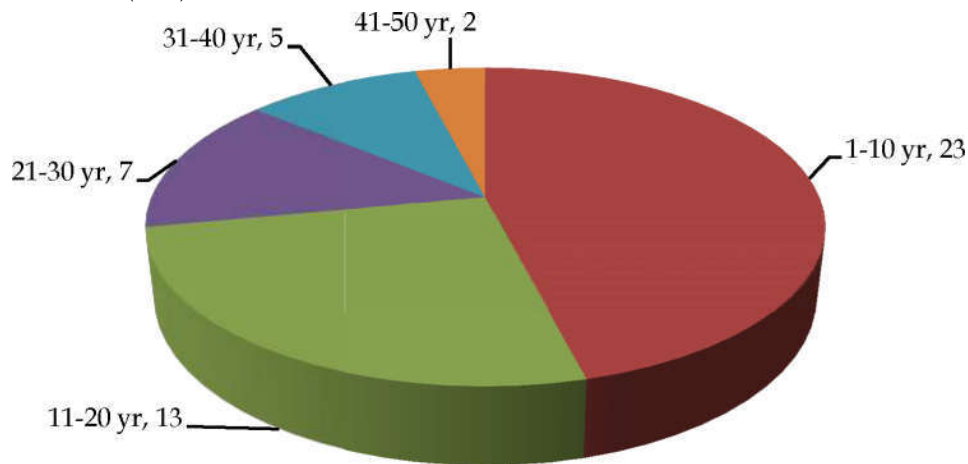


Fig. 2: Duration of diabetes mellitus (n=50)

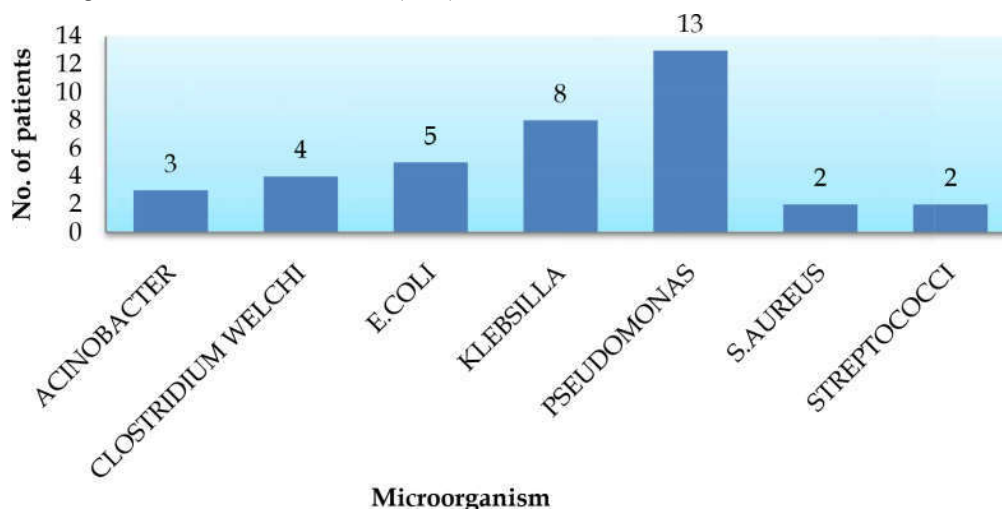


Fig. 3: Preoperative Microorganism Present in pus culture/sensitivity (n=50)

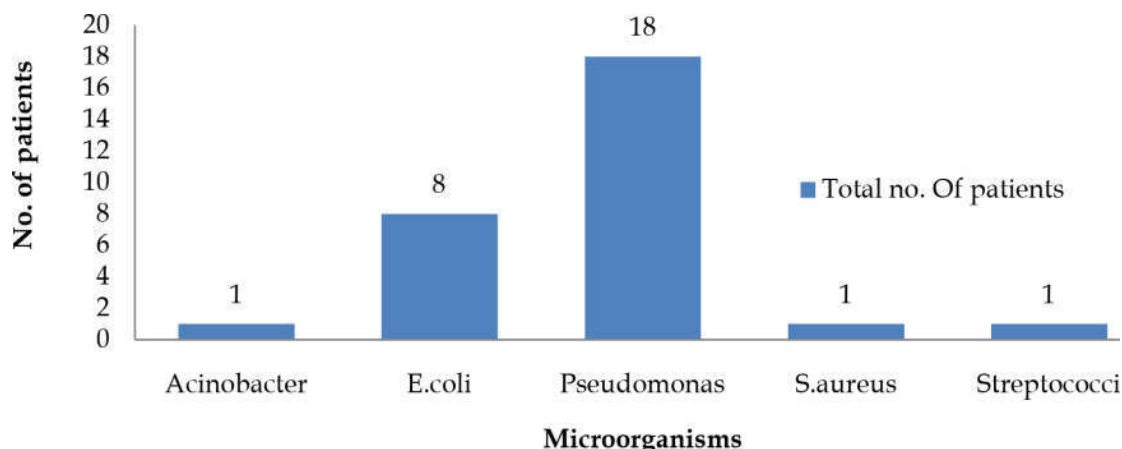


Fig. 4: Organisms present in pus culture/sensitivity in postoperative patients. (n=50)

Table 1: Final outcome (n=50)

Amputation and final outcome	No. of Patients (n=50)
TMT amputation with primary healing	3
TMT amputation healing after SSG	3
TMT amputation ended with transtibial amputation	8
TMT amputation→Transtibial amputation→Transfemoral amputation	1
Transtibial amputation with primary healing (out of 8, In previous 1 Transmetatarsal amputation)	8
Transtibial amputation healing after refashioning	5
Transtibial amputation healing after SSG	1
Transtibial amputation ended with Transfemoral amputation(out of 3, In previous 1 Transmetatarsal amputation)	3
Expire after Transtibial amputation	5
Transfemoral amputation with primary healing (In previous 7 Transtibial amputation)	7
Transfemoral amputation healing after refashioning (out of 5 previous 1 transtibial amputation)	5
Expired after Transfemoral amputation	1

Discussion

During the study period total no. Of diabetic patients admitted in department of surgery, M.P. Shah medical college, Jamnagar were 1765 patients and lower extremity amputation done in 853 patients. Incidence of lower extremity amputation in diabetic patient was total 48.32/100 over two year.

In our study age ranged between 24 and 87 years. Out of 50 patients, 39 patients were in the age group 41-70 years. The mean age was 56.9±13.6 year. Dr. Mohammed osman [9] reported mean age was 61.5±11.85 year. The age in years was not significantly related to level of amputation.

There were 36 males and 14 females.

Out of 50 patients, 29 (58%) patients were came from lower socio economic class and 21 (42%) patients were came from middle socio economic class.

There were 32 (64%) patients who had history of hypertension. Ali SM [10] reported systemic hypertension in (18%) of patients presenting with diabetic foot sepsis. 29 patients (58%) were smokers

and all were males and non smokers were 21 patients (42%). No significant correlation was encountered between smoking and level of amputation. Mohamed IM [11] reported 35% patients were smokers.

Patients were presented with infecting/non healing ulcer in 47 patients (94%), cellulitis in 35 patients (70%) and gangrene in 21 patients (42%). Morris AD^[12] reported in their series of 258 patients non traumatic major LEAs in diabetic patients, infected non healing ulcer (31%) and gangrene (29%) as the two main indications for amputation.

In our study we found that while peripheral pulsation of Dorsalis pedis artery, Anterior tibial artery & Posterior tibial artery not palpable, reamputation at higher level was required after previous amputation in majority of patients. This is because of poor peripheral blood supply leads to poor stump healing for which required reamputation at higher level.

Preoperative glycemic control was graded as good, moderate and bad according to the blood sugar level. Two indices were considered: FBS and PP₂BS. Our study show that in FASTING BLOOD SUGAR level

monitoring, 35 patients (70%) were fall into moderate control group and 14 patients (28%) were fall into bad control group and in POST PRANDIAL BLOOD SUGAR level monitoring, 22 patients (44%) were fall into moderate control group and 28 patients (56%) were fall into bad control group.

In our study 31 patients (62%) were stayed for 1-7 days, 6 patients (12%) for 8-14 days, 3 patients (6%) for 15-21 days and 7 patients (14%) for 22-28 days in hospital for diabetic foot. Out of 50 patients, 27 patients (54%) were stayed in hospital for 11-40 days. Mean duration of hospital stay was $42.18 \pm SD 27.48$ days. Dr. Mohammed osman [9] reported mean duration of hospital stay was $30.14 \pm SD 21.87$ days.

Duration of diabetes in our patients ranged from 1 to 50 years. The mean duration of diabetes was 10.72. The majority of our patients (72%) had diabetes for more than 20 years. Dr. Mohammed osman [9] reported mean duration of diabetes was 9.04 year. No Any Newly Diagnosed Diabetics Were Reported In our Study.

In our study 27 patients (54%) reported history of previous admission for amputation and 23 patients (46%) treated conservatively. Dr. Mohammed osman [9] reported 40% history of previous admission for amputation.

Diabetes was controlled by oral hypoglycemic drugs in 44 patients (88%) and by inj. Insulin (Inj. Mixtard) in 6 patients (12%). However all patients were shifted to inj. Plain insulin after admission. Dr. Mohammed osman [9] reported diabetes was controlled by oral hypoglycemic drugs in 64 patients (92%) and by inj. Insulin in 3 patients (4%) and by diet in 3 patients (4%).

Out of 50 patients who were underwent lower extremity amputation 13 patients (26%) operated as in emergency and 37 patients (74%) operated as elective. 13 patients (26%) operated in emergency had wet gangrene associated with infected ulcer/ non healing ulcer/cellulitis and among 4 patients (8%) of 13 had gas gangrene.

Preoperative microorganism were isolated which was pseudomonas in 13 patients (26%) followed by klebsiella in 8 patients (16%), E.coli in 5 patients (10%), cl.welchi in 4 patients (8%), acinobacter in 3 patients (6%), staphylococcus aureus in 2 patients (4%) and streptococci in 2 patients (4%). Dr. Mohammed osman [9] reported Preoperative microorganism isolated in which Staphylococcus aureus was isolated in (50%) of patients. It was followed in frequency by coliforms (38.63%), streptococci in (4.55%) and no growth was obtained in 3 cases (6.8%).

Postoperative infection was present in 29 (58%).

The requirement of reoperation was in 24 (48%) patients. The most frequent type of reoperation was proximal amputation in 12 (24%), followed

refashioning in 10 (20%) and SSG in 4 (8%). Primary healing occurred in 3 (6%) who underwent Transmetatarsal amputation, 8 (16%) who underwent transtibial amputation and in 7 (14%) who underwent Transfemoral amputation.

In this study we found that after amputation patients were provided with crutches and artificial limbs. All the patients were feeling comfortable with crutches and artificial limb.

The overall in hospital mortality in our study was 6 (12%), 5 patients died after transtibial amputation and 1 patient died after Transfemoral amputation. Dr. Mohammed osman [9] reported hospital mortality was 20%.

In our study 50 patients underwent lower extremity amputation. Out of 50 patients, 15 patients underwent Transmetatarsal amputation, primary healing occur in 3 patients (6%), healing after SSG occur in 3 patients (6%), ended with transtibial amputation in 8 patients (16%) and Transfemoral amputation in 1 patients (2%). Out of 50 patients, 22 patient underwent transtibial amputation, primary healing occur in 8 patients (16%), healing after refashioning occur in 5 patients (10%), healing after SSG occur in 1 patients (2%), ended with Transfemoral amputation in 3 patients (6%) and 5 patients (10%) expired. Out of 50 patients, 13 patients were underwent Transfemoral amputation, primary healing occur in 7 patients (53%), healing after refashioning occur in 5 patients (10%) and 1 patient (2%) expired.

Conclusion

In this retrospective study, all 50 diabetic patients (who underwent lower extremity amputation) case papers that were admitted in department of surgery, M.P. Shah medical college, Jamnagar during period of November 2015 to October 2017 were study and properly access for end result and associated factors which were responsible for lower extremity amputation. Lower extremity amputations most commonly performed in male patients, common in 41-70 years age group and Majority of patients were come from lower socio-economic class. Majority of patient came with gangrene, swelling and foul smelling pus discharge. Most of patient had history of hypertension, diabetic nephropathy, diabetic retinopathy and also smoker. Delay or impairment in healing due to increasing age, long duration of diabetes, non palpable pulse at Dorsalis pedis artery, Anterior tibial artery and, Posterior tibial artery, severe anemia, septicemia and poor glycemic control causes requirement of reamputation at higher level at below knee or above knee level and/or patient expired. Transmetatarsal, Transtibial and Transfemoral amputations are the main types of lower extremity amputations in diabetic patients. Transtibial

amputations are associated with higher rates of complications, reoperation, delayed healing and mortality. In some patients limb salvage was possible.

Overall this study helped us to analyse end output after lower extremity amputation in diabetic patients.

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