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Clinical Outcomes of Diabetic Foot and Its Management

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Abstract:
Aim And Objectives: The aim of the study is to study about the frequency of various clinical outcomes of diabetic foot and the management done for patients admitted in the surgical ward of surgery department of Tirunelveli Medical College Hospital.
Methods And Materials: This is a cross sectional study involving those patients admitted to the surgical ward with signs and symptoms of diabetes foot during a period from July 2014to August 2015.The study was done by involving the detailed history, clinical and epidemiological data of each patient, lab tests, management undertaken and the questionnaires are used to evaluate the outcome. All the persons were informed about the study which is to be undertaken and informed consent had been obtained from regarding person.
Result: The prevalence rate of minor amputation was 36%, major amputation was 8%, auto amputation was 4% and conservative treatment was 52%.
Conclusion: The study found that the prevalence of amputation was 44% and conservative treatment was 52%. Neuroangiopathy (40%) was found to be an important risk factor for diabetic foot infections. Effective foot care advice should be propagated to reduce the burden imposed by diabetic foot complication particularly in developing countries like India.

I. Introduction

Diabetes has many complications related to eyes, heart, kidney, etc. But most common and threatening complication is Diabetic foot. The maximum number of hospital admissions in diabetics is due to foot problems and not because of heart and kidney ailments. Three main factors that produce diabetic foot are Diabetic neuropathy, Diabetic atherosclerosis causing ischemia and Glucose laden tissue that is quite vulnerable to infection - a clinical entity made up of tissue ischemia, skin injury from trauma related to impaired skin sensation and self-protection, poor wound healing and secondary infections. Infection is the primary problem requiring hospital admission of diabetic patients with foot problem and it is also the most likely cause of partial or complete foot amputation.

This study is dealing with the various clinical outcomes of diabetic foot and their management. Risk factors for limb amputation have been identified in a number of foreign studies. The study of Chang et al identified the following risk factors for the development of foot ulceration among diabetics: smoking, presence of ischemic heart disease and hypertension. Foot ulcer grade on admission was a significant factor in determining the surgical intervention. Frequency of limb amputation increased as the grade of foot lesion advanced

II. Methods And Materials

Aim

The aim of the study is to study about the frequency of various clinical outcomes of diabetic foot and the management done for patients admitted in the surgical ward of surgery department of Tirunelveli Medical College Hospital.

Inclusion Criteria

All diabetic patients who are admitted for diabetic foot.

Exclusion Criteria

Uncooperative patients

III. Methodology

This is a cross sectional study involving those patients admitted to the surgical ward with signs and symptoms of diabetes foot during a period from July2014 to August 2015.

The study is done by involving the detailed history, clinical and epidemiological data of each patient, lab tests, management undertaken and the questionnaires are used to evaluate the outcome.
The foot lesions were described and graded according to Wagner's classification as follows:
Grade 1: ulceration involving only the dermis
Grade 2: ulceration involving tendons and/or joint capsules
Grade 3: extending to bone, usually causing osteomyelitis
Grade 4: localized gangrene
Grade 5: gangrene involving a major part of the foot

All the persons were informed about the study which is to be undertaken and informed consent has been obtained from the regarding person.

Tools

SemistructuredProforma

The proforma includes name, age, sex, occupation, education, chief complaints, detailed history, co-morbidities, duration of diabetes, treatment history, type of wound, clinical outcome and present treatment.

Limitations

Short sample size and short duration of the study makes this study weak.

IV. Result

In the study of clinical outcomes of diabetic foot reported in the Tirunelveli Medical College Hospital during the period of July2014 – August 2015, the following were reported:

- Among the 225 cases, the most common age incidence was 40-70 yrs.
- Fifty two percent of the subjects were male (n=13). The mean age of all the patients was 60 yrs(S.D.=8.96)
- 20% were not previously diagnosed diabetics. 56% of the subjects were under Oral hypoglycemic agents, 4% were under parenteral therapy and 12% were under both oral & parenteral therapy. The mean duration of illness was 7.5 years (S.D.= 6.29)
- The prevalence of neuropathy was 24% (n=6), angiopathy was 36% (n=9) and neuroangiopathy was 40% (n=10).
- Presence of family history was 24% (n=6) and absence of family history was 76% (n=19).
- Patients who had previous history of diabetic ulcer and treatment were 28% (n=7) of which 3 patients who complained this time had undergone amputation.
- Prevalence of co-morbidities: Hypertension was 24% (n=6), Renal problems was 24% (n=6) and cardiac problems was 12% (n=5)
- Among the subjects who were previously diagnosed as D.M. and was under treatment, those under regular treatment were 52% (n=13), irregular treatment were 28% (n=7) and recently diagnosed were 20% (n=5).
- Among the patients under regular treatment, the prevalence of minor amputation was 38.5% (n=5), major amputation was 7.7% (n=1), debridement was 38.5% (n=5) and medical treatment was 15.4% (n=2).
- Among the patients under irregular treatment, the prevalence of major amputation was 14.3% (n=1), autoamputation was 14.3% (n=1), minor amputation was 42.9% (n=3) and debridement was 28.6% (n=2).
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V. Discussion

- This study found that the prevalence of amputation was 48% and the prevalence of conservative treatment was 52% in Type 2 diabetic patients. Neuroangiopathy (40%) was found to be a major risk factor for diabetic foot infections. The prevalence of monomicrobial infections was 48% among the subjects.

A multicentric study from India by V. Viswanathan et al, was done to determine the prevalence of foot complications such as neuropathy, peripheral vascular disease (PVD), amputations and infections and the associated diabetic complications and practice of foot care among the subjects selected from four different centres across India. This study found that the prevalence of infection was 6-11% and prevalence of amputation was 3% in type 2 diabetic patients. Neuropathy (15%) was found to be an important risk factor for diabetic foot infections. Effective foot care advice should be propagated to reduce the burden imposed by diabetic foot complication particularly in developing countries like India.

- This study also found that, the later the notification of diabetic foot, the more was the complications. The subjects who had the diabetic foot for more than a month were the ones to undergo below knee amputation and also one had an autoamputation. Those who noticed earlier had conservative treatment or else minor amputation and had lesser complications.

  Gulam-Abbas Z et al, did a prospective cohort study to determine the prevalence rate, clinical features, risk factors, and clinical outcome of foot ulcers in diabetes patients admitted to MuhimbiliNational

Hospital, Dar es Salaam, Tanzania during a study period of January 1997 to December 1998. Of 627 diabetes patients evaluated during the study period, 92 (15%) had foot ulcers. Of these 92 patients, 30 (33%) were selected for surgery (minor and major amputations); the rest were managed conservatively. They concluded that diabetic foot ulcers are associated with significant morbidity and mortality in Tanzania. Mortality rates among patients with severe ulcers remain high despite surgery. Thus, surgery undertaken during the less severe stages of ulcers may improve patient outcome. Education of patients should underscore the importance of foot care and consulting a doctor during the early stages of foot ulcer disease.

- This study also showed that there was poor compliance to Oral Hypoglycemic Agents. The subjects who were under the oral diabetic therapy were the ones who underwent major amputation and autoamputation. Of the 14 subjects, 9 of them had undergone amputation(major amputation- 2, minor amputation- 6 and autoamputation- 1).

Marie Fe P. Raymundo et al, conducted a prospective analytical cohort study among in-patients admitted at the University of the Philippines-Philippine General Hospital to determine the clinical and microbiologic risk factors for amputation among patients with diabetic foot infection and to identify the most common organisms isolated and their sensitivity patterns. They concluded that once infection has already set in, the most significant risk factor for limb amputation is the grade of foot ulceration on time of admission. The more advanced the diabetic foot infection by Wagner's classification, the higher the likelihood of amputation.

- The most common co-morbidity was hypertension (24%) and renal pathology (24%).
- The subjects, who were under treatment previously and were irregular in taking the treatment, were the ones under higher risks of amputation.
- In this study the risk factors have been identified as peripheral sensory neuropathy, peripheral vascular disease, foot ulcers, former amputation, longer duration of diabetes and diabetic foot and poor compliance to oral hypoglycemic agents.

Risk factors for limb amputation have been identified in a number of foreign studies. In July 1999, Hamalainen et al did a case-control study of 733 diabetic patients and concluded that amputated patients had longer duration of diabetes, lower ankle/brachial pressure index, and history of retinopathy, nephropathy and hypertension and with more visual handicap. During the same year, Adler et al reported in a prospective study that peripheral sensory neuropathy, peripheral vascular disease, foot ulcers, former amputation, and treatment with insulin are independent risk factors for amputation among diabetics in general.

VI. Conclusion

The study found that the prevalence of amputation was 44% and conservative treatment was 52%. Neuroangiopathy (40%) was found to be an important risk factor for diabetic foot infections. Once infection has already set in, the most significant risk factor for limb amputation is the grade of foot ulceration on time of admission. The more advanced the diabetic foot infection by Wagner's classification, the higher the likelihood of amputation. Effective foot care advice should be propagated to reduce the burden imposed by diabetic foot complication particularly in developing countries like India.

Acknowledgement

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Tables and Charts

Chart 1: Prevalence of Diabetes by history of similar illness in Family

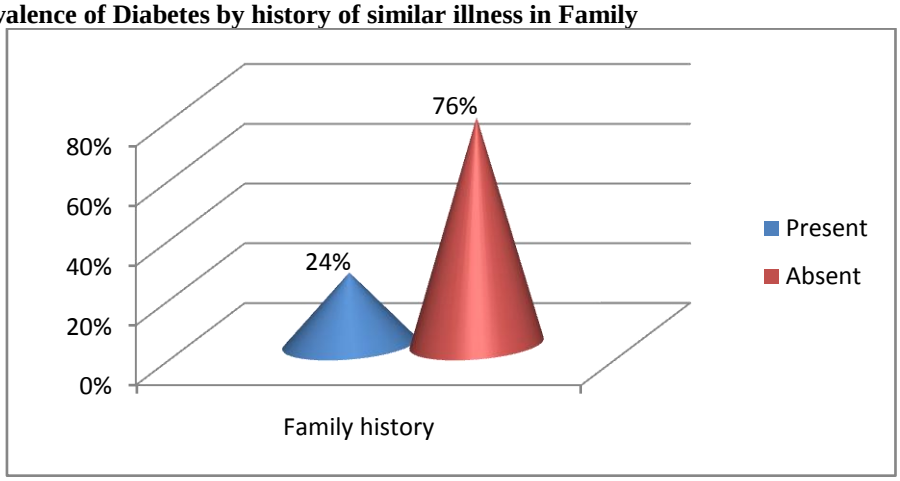

Table 1: Time of notifying the Diabetic foot among the subjects

Duration of Diabetic foot	No. of cases	Percentage
< 5 days	27	12%
6-10 days	81	36%
11-15 days	18	8%
16-20 days	9	4%
20-25 days	9	4%
1-3 months	81	36%

Chart 2: Treatment history - Type of treatment given to the patients diagnosed as Diabetes Mellitus earlier

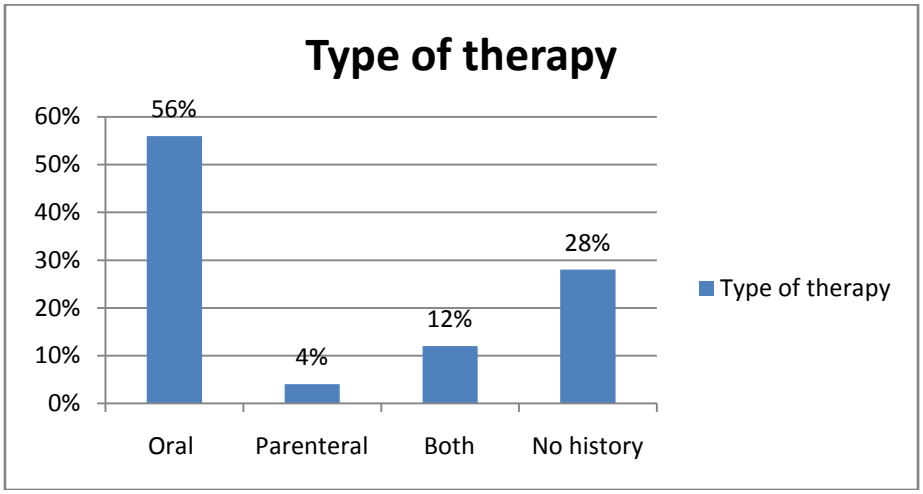

Chart 3: Prevalence of Regularity of treatment in the subjects diagnosed earlier

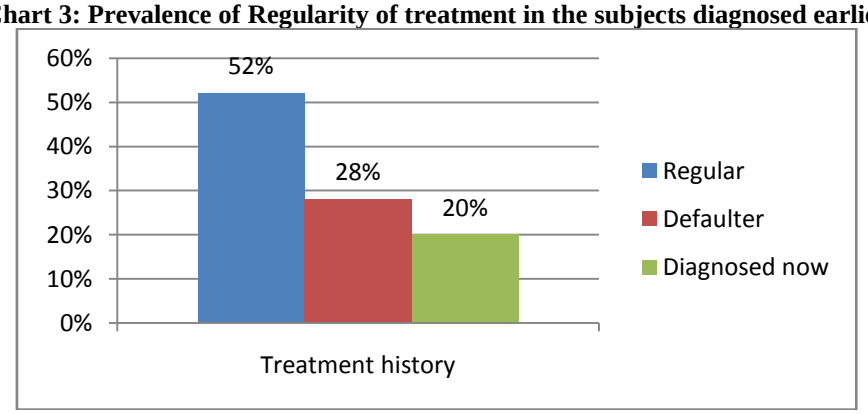

Chart 4: Prevalence of various pathological types in Diabetic foot

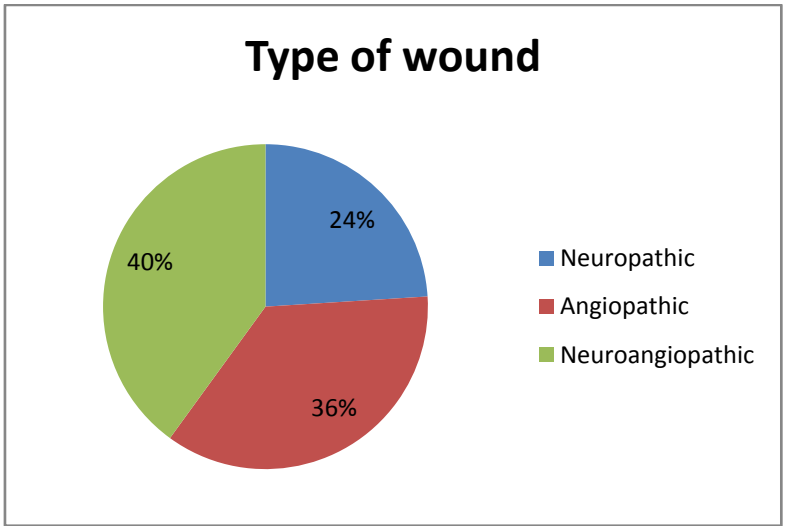

Chart 5: Prevalence of various Co-morbidities among the subjects

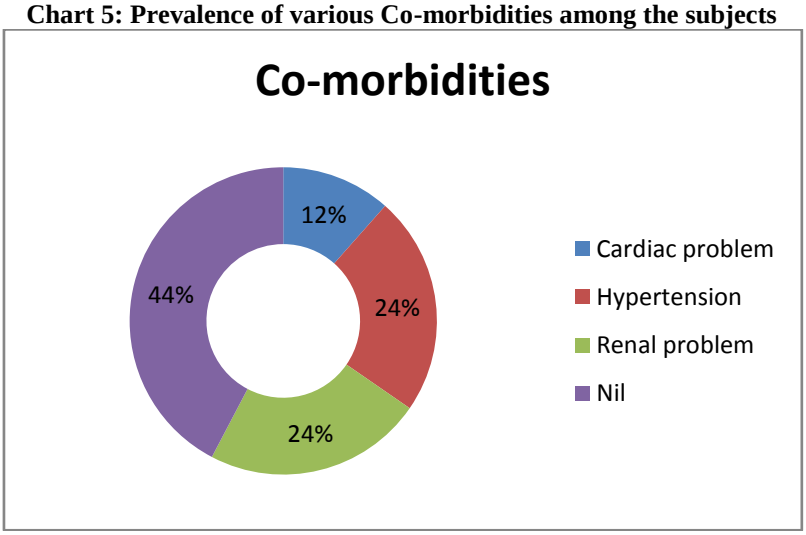

Table 2: Prevalence of various Clinical Outcomes among the subjects

Surgical procedure	No. of cases	Percentage
Debridement, I&D, Sloughectomy	99	44%
Ray's Amputation	81	36%
Below knee amputation	18	8%
Medical treatment alone	18	8%
Autoamputation	9	4%

Chart 6: Prevalence of the various clinical outcomes

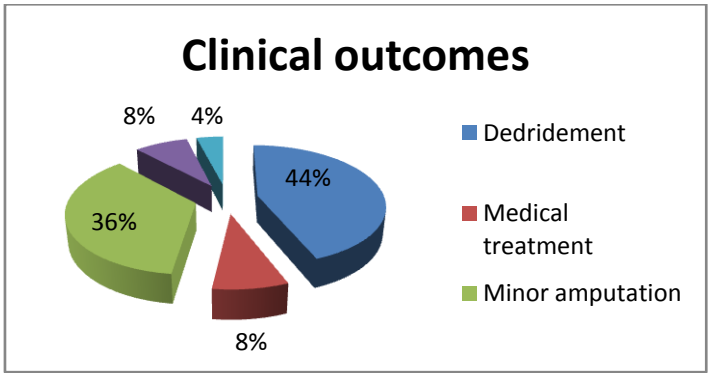

Table 3: Major clinical outcomes based on the Regularity of treatment of the subjects

Regularity of treatment	No. of cases	Clinical outcomes		
		Types	No. of cases	Percentage
Regular	117	Major amputation	9	**7.7**
		Minor amputation	45	**38.5**
		Conservative	45	**38.5**
		Medical treatment	18	**15.4**
Irregular	63	Major amputation	9	**14.3**
		Minor amputation	27	**42.8**
		Auto amputation	9	**14.3**
		Conservative	18	**28.6**
Recently diagnosed	45	Minor amputation	9	**20**
		Conservative	36	**80**

Table 4: Various clinical outcomes based on the Pathological types of Diabetic Foot

Type of wound	No. of cases	Clinical outcomes		
		Types	No. of cases	Percentage
Neuroangiopathy	90	Major amputation	18	**20%**
		Minor amputation	45	**50%**
		Conservative	18	**20%**
		Medical treatment	9	**10%**
Neuropathy	54	Conservative	36	**66.67%**
		Medical treatment	9	**16.67%**
		Auto amputation	9	**16.67%**
Angiopathy	81	Minor amputation	36	**44.44%**
		Conservative	45	**55.56%**

- Conservative treatment includes sloughectomy, debridement, fasciotomy and incision & drainage.