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Effects of Pressure off-Loading in Diabetic Foot

Medical Science

KEYWORDS :

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ABSTRACT

Background: *Diabetic foot is a frequent complication involving the foot of diabetic patient. Diabetic foot poses a significant health problem. It is rather an endemic disease today. Complications involving the foot cause significant pain and suffering, loss of productive time, hospitalization, heavy expenses to the patient, community and nation as well. To add to above vascular insufficiency and neuropathy accompanying the diabetic foot most often necessitate amputation of the limb. Advances in treatment of diabetes have caused increase in life span of diabetic patient which has resulted in an increase in complications of Diabetes Mellitus like vasculopathy, neuropathy and nephropathy. This in return has increased the prevalence and incidence of diabetic foot. Material and methods: This is the prospective study of 100 patienrs of diabetic foot during duration of about 2 years. Study group of newly diagnosed cases of Diabetis mellitus with foot lesions requiring surgical care was made. Over a period of 2 ½ years we studied 100 patients of diabetes mellitus with following aims and objectives: To identify the importance of foot care and footwear modifications in the form of pressure offloading, To identify and study effects of pressure offloading in duration of healing and salvaging the limb in a patient of diabetic foot, To compare results in patients of diabetic foot treated with pressure offloading and without pressure offloading, To analyze the results of study and reach a consensus regarding a practical and ideal plan of management for cases of diabetic foot. Results: In our study age varied from 25 years to 85 years. The highest incidence was in age group of 46 to 65 years (57%). Majority of patients were of type 2 i.e. non insulin dependent diabetes. Majority of patients presented with gangrene (25%) or non healing wound (33%) on foot. 62% of patients with offloading got healed completely within 10 weeks. Conclusion: Offloading application in patients with diabetic foot ulcer decreases the time period for complete healing of ulcers and decreases rate of complications.*

Introduction

Diabetic foot is a frequent complication involving the foot of diabetic patient.[1] It involves a spectrum from superficial ulceration to complete gangrene of foot. India presently has about 45 million patients of diabetes mellitus.[2] Diabetic foot poses a significant health problem. It is rather an endemic disease today. Complications involving the foot cause significant pain and suffering, loss of productive time, hospitalization, heavy expenses to the patient, community and nation as well. To add to above vascular insufficiency and neuropathy accompanying the diabetic foot most often necessitate amputation of the limb.[3] In INDIA habits like walking barefooted, lack of knowledge regarding diabetic foot, hot climate leading to increased perspiration, poor hygiene, poor sanitation, diet poor in proteins, general poverty, lack of basic medical infrastructure, etc have worsened the problem. Neglect from medical and surgical faculty due to lack of glamour associated with this field has added to the problem statement. Over the years the life expectancy of diabetic patients with gangrene of foot has not changed much. Advances in treatment of diabetes have caused increase in life span of diabetic patient which has resulted in an increase in complications of Diabetes Mellitus like vasculopathy, neuropathy and nephropathy. This in return has increased the prevalence and incidence of diabetic foot. With the above considerations we undertook the study of 100 patients of diabetic foot admitted in our institute over a period of 2yrs and 6 months. An emphasis was laid on determination of peripheral neurological status and to study in detail the risk factors responsible for late healing and amputation. Aims and objectives:

Over a period of 2 ½ years we studied 100 patients of diabetes mellitus with following aims and objectives.

1] To identify the importance of foot care and footwear modifications in the form of pressure offloading.
2] To identify and study effects of pressure offloading in duration of healing and salvaging the limb in a patient of diabetic foot.
3] To compare results in patients of diabetic foot treated with pressure offloading and without pressure offloading.
4] To analyze the results of study and reach a consensus regarding a practical and ideal plan of management for cases of diabetic foot.

Material and methods

This is the prospective study of 100 patienrs of diabetic foot during duration of about 2 years. Study group of newly diagnosed cases of Diabetis mellitus with foot lesions requiring surgical care was made. Informed and written consent were taken from all the patients before including them into study.Clinical history & findings were be noted. Necessary investigations were carried out. Comparison of healing time was done between patients who have been treated with and without offloads

Inclusion criteria:

1] New and known cases of diabetes mellitus.
2] Wound / ulcer / gangrene of feet due to diabetes.

Exclusion criteria:

1] Seriously ill patient who required intensive care unit monitoring.
2] Wound / ulcer / gangrene of feet due to diseases other than diabetes.

Half of the patients were given offloading as the form of total contact casting and rest half were not given offloading in the form of total contact casting. Patients were counselled for foot care and need for regular follow up on discharge.

Results

Table-1 Distribution of data as per lesion at presentation

Lesion at presentation	Frequency
Abscess	6
Cellulitis	31
Gangrene	25
Other (minor wounds& boil)	5
Ulcer	33
Total	100

Table-2 Comparison of healing time (in weeks) in study groups with and without offloading

Time in weeks	Patients without offloading	Patients with offloading
(0- 2 weeks)	-	1
(2- 4 weeks)	1	3
(4- 6 weeks)	3	4
(6- 8 weeks)	5	10
(8-10 weeks)	3	13
(10-12 weeks)	13	8
(12-14 weeks)	9	5
(> 14 weeks)	16	6
Total	50	50

Discussion

In this study of 100 patients of diabetic foot requiring admission to civil hospital ahmedabad, following factors were assessed and compared with previous studies. In our study age varied from 25 years to 85 years. The highest incidence was in age group of 46 to 65 years (57%). This is similar to the findings of highest incidence being in age group of 45 to 64 years in the National health department survey (N.H.D.S) at USA.[4] The incidence in higher age group can be well explained by fact that diabetic foot is a disease due to complication of diabetes mellitus. Complications of diabetes increase with age. Also diabetes is disease of mostly elderly. Maximum patients were males (75%). This was similar to that observed in review of literature by Ramsey et al, NHDS survey USA. India being a male dominated country and lack of medical care given to females may be a contributing factors. Majority of patients were of type 2 i.e. non insulin dependent diabetes. Majority of patients presented with gangrene (25%) or non healing wound (33%) on foot. In previous studies majority of patients presented with abscess or ulcer. This can be well explained by fact that the patients admitted in our study were having advanced disease. Also majority of patients had peripheral vascular disease (44%) clinically [thereby gangrene and non healing wounds. We found the incidence of peripheral vascular disease to be 44% on clinical examination. This was very high as compared to previous studies were it was quoted at 6.3% in diabetics.[5] This may be explained by the fact that majority of lesions admitted were gangrene or non healing ulcers which are sequale of vasculopathy. Prolonged duration of diabetes, male predominance, associated habits like smoking further add to increase the prevalence of peripheral vascular disease in these patients. Duration of diabetes, smoking and hyperglycemia were the most important factors responsible for development of peripheral vascular disease. Of patients having peripheral vascular disease duration of diabetes more than 10 years and hyperglycemia were statistically most important factors. The presence of peripheral neuropathy in our study was 49%. This matched the higher prevalence as seen in previous studies by Boulton et al of 37%.[6] Peripheral neuropathy is supposed to be most important factor leading to foot ulcerations in diabetic patients. Foot deformity was present in 24% (X-Ray changes) of patients as opposed to 8% in previous studies. A high incidence of peripheral neuropathy leading to unnoticed minor fractures, hyperglycemia leading to degeneration of ligaments may well explain the high incidence of foot deformity.[7] Majority of patients i.e. 90% on admission had hyperglycemia. Low socioeconomic strata, associated sepsis, advanced lesions can well explain the high incidence of hyperglycemia. In our study 62% of patients with offloading got healed completely within 10 weeks, which is comparable with the study done by Katz IA, Harlan A, Miranda-palma B, et al which suggest 74% of patients show complete healing within 10 weeks.[8]

We have identified the important risk factors for formations of foot lesions in diabetic as follows.

A] Duration of diabetes.B] Uncontrolled glycaemic status.C] Presence of peripheral vascular disease.D] Presence of peripheral neuropathy.E] Presence of foot deformities.[9] Factors 'c', 'd' and 'e' are again dependent on factors 'a' and 'b', thereby making them the most important factors. Offloading application in patients with foot ulcer decreases the time period for complete healing of ulcers and decreases rate of complications. Based on the following study we propose the following protocol to be followed for patients of diabetic foot.

A] Early determination of foot at risk.

This can be done by regular check up of high risk diabetics with: Assessment of vascular status by clinical examination of peripheral pulses and Doppler examination as and when required, Assessment of peripheral neuropathy by Semmes wienstein monofilament or 128 hz tuning fork, To check for foot deformities.[10]

B] Investigations and referrals:

Patients with significant PVD on Doppler or ABI less than 0.8 should be referred to vascular surgeon. For patients with significant peripheral neuropathy and / or foot deformity should be referred to orthotist for custom made shoes. A regular fasting and postprandial sugar level determination should be carried out with referral to Diabetologist for glycemic control.

C] A thorough assessment of lesions should be done at admission:

Lesions should be graded in Wagner's grading system. Along with all routine investigations a Doppler examination with ABI determination should be done in case of PVD suspicion.

D] A basic counseling regarding the pathogenesis of foot lesions should be given to patient. This will help in reducing the incidence of diabetic foot. This includes the following instructions: a) Washing feet everyday in the bath or shower with a bowl of warm water, and also gently between toes not to miss any developing lesion.b) Use mild, domestic soap and rinse feet well after washing and clean feet with soft cloth avoiding trauma.c) Do not soak feet in water for long periods as it makes them dry.d) If skin is dry, rub moisturizing cream into dry areas.e) If feet are moist and sweaty, apply surgical spirit to toes twice daily.f) Avoid barefoot walking. Use proper fitting footwear which cover foot completely.g) Inspect feet daily before going to bed. Do not treat foot problems yourself. Consult your doctor.h) Check footwear daily for penetrating nails or sharp objects.i) Always ask for advice if you notice anything unusual about your feet.[11]

Conclusion

Offloading application in patients with diabetic foot ulcer

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decreases the time period for complete healing of ulcers and decreases rate of complications.[12]

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