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A Study of Prognostic Factors of Diabetic Foot in Relation to Plan of Management

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Abstract: *Diabetic foot complications remain major medical, social, economic problems that are seen in all types if diabetes in every countryhowever, the reported frequencies of amputation and ulceration vary considerably as a consequence of different diagnostic criteria used.*
Aim: *To study the etiology, presentation, and the management ofdiabetic foot ulcersto study the prognostic factors of diabetic foot in relation to plan of treatment.To increase the meagre awareness of diabetic foot problems.To understand the role of various factors involved in the complications arising out of diabetic foot and ascertain their role in the prognosis in relation to the plan of treatment.To reduce the risk of lower limb complications in people with diabetes.To empower diabetics in better foot care, early problem detection and in seeking timely help.*
Material and Methods: *In this case study 75 patients were studied. This study was conducted from December 2013 to September 2015..The protocol for the study was approved both by the Department Of General Surgery and the Ethical Review Committee of Meenakshi Medical College Hospital and Research Institute, Kanchipuram.*
Results: *Findings were tabulated according to age and other clinical aspects.*
Conclusion: *Age, gender, duration of diabetes, mode of treatment of diabetes and tobacco smoking did influence whether or not a diabetic with a foot lesion will have major amputation, an unsatisfactory outcome of primary treatment, prolonged hospital stay or will die. Also, the presence of foot infections alone, microangiopathy (nephropathy, retinopathy), foot ischaemia alone or neuropathy alone had no relationship to poor prognostic indices. In addition, dyslipidemia, hypertension and infection of the foot were related to need for major amputation. The factors that influence the outcome seem to be male gender, delay of management, quality of medical treatment, surgical attitude, inadequate level of amputation and finally lack of structured prevention. We therefore suggest that the high morbidity seen with diabetic foot lesions could be reduced by optimizing glycaemic control, using combination antibiotic chemotherapy, vigorously correcting anaemia and encouraging early presentation of even mild lesions before underlying bone disease supervenes.Prevention is based on the patient's education, general practitioners' training and a better and more efficient cooperation between surgeons and diabetologists.*

I. Introduction

Diabetic foot complications remain major medical, social, economic problems that are seen in all types if diabetes in every countryhowever, the reported frequencies of amputation and ulceration vary considerably as a consequence of different diagnostic criteria used..Among the many chronic complications of diabetes, diabetic foot has remained the most feared complication, with both patients and treating health care professionals sharing the dread in equal measure. Major challenges remain in getting across important messages relating to the diabetic foot:

a. Foot ulceration is common, affecting up to 25% of patients with diabetes during their lifetime.
b. Over 85% of lower limb amputations are preceded by foot ulcers and diabetes remains the most common cause of non-traumatic amputation.
c. Prevention is the first step towards solving diabetic foot problems. It is estimated that a leg is lost to diabetes somewhere in the world every 30 seconds; a more important fact is that up to 85% of all amputations in diabetes should be preventable.
d. Reduction in amputations will only be achieved if health care professionals from all specialties realize that, as Brand once stated, "pain is God's greatest gift to mankind":it is the loss of pain that permits patients with neuropathy to develop ulcers and continue walking on them despite the presence of often over-whelming infection.

e. Strategies aimed at preventing foot ulcers are cost-effective and can even be cost saving if increased education and effort are focused on those patients with recognized risk factors for the development of foot problems.

f. Diabetes is now the most common cause of Charcot neuroarthropathyan another condition that should be preventable.

II. Aim And Objectives

To study the etiology, presentation, and the management of diabetic foot ulcers.
To study the prognostic factors of diabetic foot in relation to plan of treatment.
To increase the meagre awareness of diabetic foot problems.
To understand the role of various factors involved in the complications arising out of diabetic foot and ascertain their role in the prognosis in relation to the plan of treatment.
To reduce the risk of lower limb complications in people with diabetes.
To empower diabetics in better foot care, early problem detection and in seeking timely help.

III. Material And Methods

A total of 100 patients with diabetes mellitus from inpatients and outpatients were screened by meticulous clinical examination, especially inspection and palpation for diabetic foot ulcer.Seventy Five of the total number screened satisfied the inclusion criteria for the study.Diabetic foot ulcers was operationally defined as a breach on the normal skin occurring as induration,ulceration or change of colour on the foot for duration equal to or more than one week.Only patients with active foot ulceration(s) were included in the study.

For each of the recruited subjects, a history was obtained and it detailed the patient's demographics including the age,gender, andmarital status.Smoking, alcohol use, occupation, presence of trauma at onset of ulcer was noted.History regarding the diabetes including duration of disease (estimated from year of diagnosis), and the mode of treatment form either the patient or available hospital records were documented.The presence of neuropathic pain was noted.

A physical examination was then performed.Height, weight, Blood Pressured was recorded.Both feet were examined and the site,state and the stage of foot ulcers were documented.The presences of the high risk non-ulcer lesions were also described.The lesions were staged based on the Meggitt-Wegner classification.

Peripheral neuropathy was assessed by elucidating the presence or absence of vibration sense using the 128Hz tuning fork on the medial and lateral malleoli and documented.The pressure sensation was done.Then neurological disability scoring (NDS) system was used to each foot.In a situation where prior foot amputation had been performed,the score awarded to the examined foot was doubled.

Range of neuropathy score: 0 – 10

- 0 – 2 = No neuropathy
- 3 – 5 = Mild neuropathy
- 5 – 8 = Moderate Neuropathy
- >9 = Severe Neuropathy

Peripheral vascular disease: The dorsalispedis and posterior tibial arterial pulses were palpated with the patient in supine position and graded as present or absent.Lower limb Arterial Doppler study had been done in the patients at time of inclusion and re-visit.

The other dermatological and/or high risk lesions looked for were dryness, cracks, fissures, ingrown and/or improperly trimmed nails, edema, foot deformities e.gcharcto joints,hammer toes,pescavus and/or corns.X-rays were done to stage the ulcers of the patients.

Using the clinical information obtained, the type of the foot lesion was determined and classified as neuropathic, ischaemic or neuroischemic.Foot ulcers were categorized as ischaemic when peripheral vascular disease was present but the neurologic disability was less than or equal to 2 ; neuropathic when there was neurological disability more than or equal to 3 but no obvious peripheral vascular disease and neuroischemic when both neurological disability and evidence of peripheral vascular disease were present.

After the history and full clinical assessment of the patients in fasted state for about 10hours, venous blood drawn and sent for fasting blood sugars and lipid assays.Also blood was sent for glcosylated hemoglobin(HbA1c) values.The results were then reported in percentage as per assay test recommendation as:

HbA1c $\leq$ 7% - good metabolic control
>7 to <10% - fair control
$\geq$10% -poor metabolic control.

A pus swab was obtained from the ulcers and was delivered to the lab within half an hour The data was summarized in tabular form and is presented in the form of diagrams, tables, bar charts and histogram as appropriate.Qualitative data were entered in form of percentages and where appropriate associations were made.

IV. Observations And Results

A study was undertaken in seventy five patients of diabetic foot in Meenakshi Medical College And Research Institute, Enathur,Kancheepuram during December 2013 to September 2015.
The observations are as follows:

Table -1: Age Distribution

Peak age incidence was found to be sixth decade. But the diabetic complications were more common in the fifth decade in the males and sixth decade in the females.

AgeGroup	Frequency	Percentage
30-39	4	5.3%
40-49	12	16.0%
50-59	37	49.3%
>60	22	29.3%
Total	75	100%

Table 1a: Age Group *Procedure

			PROCEDURE		Total
			Amputattion	Wound Debridement	
Age Group	30-39	Count	0	4	4
		% within Procedure	0	100	5.33%
	40-49	Count	4	7	11
		% within Procedure	36.36	63.63	14.66
	50-59	Count	14	25	39
		% within Procedure	35.89	64.1	52
	>60	Count	14	8	22
		% within Procedure	63.63	36.36	29.33
Total		Count	32	43	75
		% within Procedure	100.00%	100.00%	100.00%

Table -2 Sex Distribution

Eighteen were female patients with 24% and Fifty Seven were male patients with 76%.

Sex	**Frequency**	**Percentage**
Female	18	24%
Male	57	76%
Total	75	100%

Table 2a : Sex * Procedure

			PROCEDURE		Total
			AMPUTATION	WOUND DEBRIDEMENT	
	MALE	Count	30	27	57
		%Within Procedure	52.64%	47.36%	76.0%
	FEMALE	Count	2	16	18
		%Within Procedure	11.11%	88.88%	24%
Total		Count	32	43	75
		%Within Procedure	100.0%	100.0%	100.0%

Table -3 : Duration Classification

Diabetic history of six years and above is taken as significant prognostic factors in this work. History of more than ten years is a bad prognostic factor due to increased complications of diabetes in them.

	Frequency	Percentage
Up to 5 yrs	12	16.0%
6-10	26	34.7%
11-15	25	33.3%
Valid16-20	9	12.0%
> 21	3	4.0%
Total	75	100%

3a: Duration Classification * Procedure

		PROCEDURE		Total
		AMPUTATION	WOUND DEBRIDEMENT	
UP TO 5 YEARS	Count	1	11	12
	% Within PROCEDURE	3.1%	25.6%	16.0 %
6-10	Count	13	13	26
	Within PROCEDURE	40.6 %	30.2%	34.7 %
11-15	Count	15	10	25
	% Within PROCEDURE	34.9 %	31.2%	33.3 %
16-20	Count	6	3	9
	% Within PROCEDURE	18.8 %	7.0%	12.0 %
21 AND ABOVE	Count	2	1	3
	% Within PROCEDURE	6.2%	2.3%	4.0%
Total	Count	32	43	75
	% Within PROCEDURE	100.0 %	100.0%	100.0 %

Table -4 : Dyslipidemia

Of the study group 45.3% of patients were found to have dyslipidemia.

	Frequency	Percentage
Present	34	45.3%
Absent	41	54.7%
Total	75	100%

Table – 4: Hypertension

50 patients were found to be hypertensives and only one of them underwent a below knee amputations and others were treated with minor surgical procedures.

	Frequency	Percentage
No	25	33.3%
Yes	50	66.7%
Total	75	100%

Table – 5: Smoking

Out of 75 patients studied 42 were found to have abused tobacco in some form in whom complications were found to be more when compared to non smoking diabetic patients

	Frequency	%	Valid %	Cumulative %
No	33	44.0%	44.0%	44.0%
Valid Yes	42	56%	56%	100%
Total	75	100%	100%	

Table 5a : Smoking Habit * Procedure

			PROCEDURE		Total
			AMPUTATION	WOUND DEBRIDEMENT	
SMOKING HABIT	NO	Count	8	25	33
		%within procedure	24.24%	75.75%	44.00 %
	YES	Count	24	18	42

		%within procedure	57.14%	42.85%	56.00 %
Total		Count	32	43	75
		%within procedure	100.00%	100.00%	100.0 0%

Table – 6: Alcohol Habit

48% of the population under study were consuming alcohol on a regular basis

	Frequency	Percentage
No	39	52.0%
Valid Yes	36	48.0%
Total	75	100%

Table 6a : Alcohol Habit * Procedure

			Procedure		Total
			Amputation	Wound Debridement	
ALCOHOL HABIT	NO	Count	8	31	39
		%within procedure	25.0%	72.1%	52.0%
	YES	Count	24	12	36
		%within procedure	75.0%	27.9%	48.0%
Total		Count	32	43	75
		%within procedure	100.0%	100.0%	100.0%

Table – 7 : Hba1c

Good control of diabetes was associated with less number of complications. In this study 32 cases with high HbA1c levels were treated with major surgical procedures with poorer prognosis than compared to that of 43 cases with normal HbA1c levels

	Frequency	Percent	Valid Percent	Cumulative Percent
HIGH	32	42.7	42.7	42.7
NORMAL	43	57.3	57.3	100.0
Total	75	100.0	100.0	

table 7a : hba1c(%) * procedure

		PROCEDURE		Total
		AMPUTATION	WOUND DEBRIDEMENT	
HIGH	Count	23	9	32
	% within procedure	71.9%	20.9%	42.7%
NORMAL	Count	9	34	43
	% within procedure	28.1%	79.1%	57.3%
Total	Count	32	43	75
	% within procedure	100.0%	100.0%	100.0%

Table – 8 : Dyslipidemia

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Absent	41	54.7	54.7	54.7
	Present	34	45.3	45.3	100.0
	Total	75	100.0	100.0	

Table 8a : Dyslipidemia * Procedure

Table 9: Neuropathy * Procedure

			PROCEDURE		Total
			AMPUTATION	WOUND DEBRIDEMENT	
PERIPHERAL NEUROPATHY	ABSENT	Count	8	33	41
		%within procedur	25.0%	76.7%	54.7%

		e			
	PRESENT	Count	24	10	34
		%within procedure	75.0%	23.3%	45.3%
Total		Count	32	43	75
		%within procedure	100.0%	100.0%	100.0 %

Table – 10: Vascular

Cases which showed vascular involvement with absent distal pulses in whom higher level of amputations were attempted.

Dorsalis Pedis

Grade	Frequency	Percentage
Negative	7	9.3%
Valid Positive	68	90.75
Total	75	100%

Posterior Tibial

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	-	6	8.0	8.0	8.0
	+	69	92.0	92.0	100.0
	Total	75	100.0	100.0	

Table 10 A : Dorsalis Pedis * Procedure

			PROCEDURE		Total
			AMPUTATION	WOUND DEBRIDEMENT	
DORSALIS PEDIS	-	Count	4	3	7
		% Within PROCEDURE	12.5%	7.0%	9.3%
	+	Count	28	40	68
		% Within PROCEDURE	87.5%	93.0%	90.7 %
Total		Count	32	43	75
		% Within PROCEDURE	100.0%	100.0%	100. 0%

Table 10b : Posterior Tibial * Procedure

			PROCEDURE		Total
			AMPUTATIO N	WOUND DEBRIDEMENT	
POSTERIOR TIBIAL	-	Count	3	3	6
		% Within PROCEDURE	9.4%	7.0%	8.0%
	+	Count	29	40	69
		% Within PROCEDURE	90.6%	93.0%	92.0 %
Total		Count	32	43	75
		% Within PROCEDURE	100.0%	100.0%	100.0 %

Table 10 C : Popletial * Procedure

			PROCEDURE		Total
			AMPUTATION	WOUND DEBRIDEMENT	
POPLETIAL	-	Count	1	0	1
		% Within Procedure	3.1%	0.0%	1.3%
	+	Count	31	43	74
		% Within Procedure	96.9%	100.0%	98.7%
Total		Count	32	43	75
		% Within Procedure	100.0%	100.0%	100.0%

Table – 11: Wagner's Grading

Grade	Frequency	%	Valid %	Cumulative %
II	23	30.6%	30.6%	30.6%
III	3	4.0%	4.0%	56.0%
Valid IV	24	32.0%	32.0%	92.0%
V	5	6.66%	6.66%	100%
Total	75	100%	100%	

Table 11a : Grade * Procedure

			PROCEDURE		Total
			AMPUTATION	WOUND DEBRIDEMENT	
GRADE	II	Count	0	23	23
		% Within PROCEDURE	0%	100%	30.66%
	III	Count	3	20	23
		% Within PROCEDURE	13.04%	86.95%	30.66%
	IV	Count	24	0	24
		% Within PROCEDURE	100%	0%	32.0%
	V	Count	5	0	5
		% Within PROCEDURE	100%	0%	6.66%
Total		Count	32	43	75
		% Within PROCEDURE	100.0%	100.0%	100.0%

Table12 : Location

Location					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Left	41	54.7	54.7	54.7
	Right	34	45.3	45.3	100.0

		PROCEDURE		Total
		AMPUTATION	WOUND DEBRIDEMENT	
ABSENT	Count	6	35	41
	%within	18.8%	81.4%	54.7%
PRESENT	Count	26	8	34
	%within procedure	81.2%	18.6%	45.3%
Total	Count	32	43	75
	%within procedure	100.0%	100.0%	100.0%

Table 12a Location * Procedure

			PROCEDURE		Total
			AMPUTATION	WOUND DEBRIDEMENT	
	LEFT	Count	18	23	41
		%Within Procedure	56.2%	53.5%	54.7%

	RIGHT	Count	14	20	34
		%Within Procedure	43.8%	46.5%	45.3%
Total		Count	32	43	75
		%Within Procedure	100.0%	100.0%	100.0%

Table – 13 : PUS C/S

Most common infective organism was found to be Staphylococcus Aureus and Klebsiella species

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	A.BACTER	2	2.7	2.7	2.7
	E.COLI	7	9.3	9.3	12.0
	KLEB	14	18.7	18.7	30.7
	NS	1	1.3	1.3	32.0
	PROTEUS	7	9.3	9.3	41.3
	PSEUDO	6	8.0	8.0	49.3
	STAPH	38	50.7	50.7	100.0
	Total	75	100.0	100.0	

Table – 14 :

Procedure

Of the 75 patients 32 patients underwent amputation accounting to 42.7% and 43 patients underwent wound debridement accounting to 57.3%.

	Procedure	Frequency	Percentage
	AMPUTATION	32	42.7
	WOUND DEBRIDEMENT	43	57.3
	Total	75	100.0

V. Discussion

The study was conducted in Meenakshi Medical College, Kanchipuram, TamilNadu.The figures are comparable to other studies, but if the differences are significant, this is due to a regional variation in prevalence of diabetes mellitus and the local operating risk factors of diabetic foot ulcer disease.

The mean age of patients with diabetes was found to be 55 years. Peak age of incidence of diabetic ulcers was 51 – 60 years. Margueritte et al[26] in Seattle, USA, found a comparable mean of 60 years and a study done by P.N.Nyamu[31] et al in Kenyaitta National Hospital, Nairobi, found a mean age of incidence as 56.9 years. This comparable mean age may suggest certain time – dependent risk factors in the evolution and course of diabetic foot ulcer disease which are common to diabetes in whatever environment. Age of onset of diabetes is also different in continents.

Men with diabetes are more likely to suffer amputation than women.According toGayle E. Reiberet al[16] a consistently higher ulcer rate was found in males than in femalesThe estimated amputation rate in diabetic subjects is higher for males than for females. This is a uniform finding in most U.S. hospital discharge studies, with 1.4-2.7 times excess risk for males compared with females[2,17]. In 1990, the age-adjusted amputation rate for diabetes, computed from NHDS and NHIS data, was 61% higher in males than females (10.3 per 1,000 versus 6.4 per 1,000)[33]. This amputation risk was more pronounced in younger males.In our study,the male to female

ratio is 3.1 : 1 approximately and the prognosis is worse in male of age more than 50 years and in females more than 45 years.

The mean duration of diabetes in this study is 10.52 years comparable to 7.98 years, 13 years and 5 years in Margueritte et al[26] in Seattle, USA study, P.N.Nyamu[31] et al in Kenyaitta National Hospital, Nairobi study, McLigeyo and Otieno's study on diabetic foot ulcers[27]respectively.The variation in results may be due to difference in quality of diabetes care at various centres. Better diabetes care can prolong the onset of ulceration.This study revealed that the longer the duration of diabetes, the higher the risk of occurrence of infection and amputation.This is in correlation with study conducted by Nelson RG, Gohdes DM[27].There is an increased association with atherosclerosis, peripheral neuritis in patients with longer duration of diabetes and poor glycemic control.

Hypertension is a risk factor in the disease process of diabetic foot ulceration. Control of hypertension has been well shown to reduce cardiovascular mortality. In our study, 30 out of 50 patients who were hypertensive have undergone amputation and hence it can be regarded as a poor prognostic factor.In a study conducted by Ogbuawa et al[30], they found hypertension to be an independent risk factor for macrovascular disease and subsequent foot ulceration.A lot of other studies conducted previously had conflicting results with some failing to show any association between blood pressure and diabetic foot ulcers[17,29,13]. In accord with the haemodynamic hypothesis early hyperaemia and capillary hypertension promote more sinister late functional abnormalities with increasing duration of diabetes. These late functional abnormalities include loss of autoregulation and reduced hyperaemic responses which interact with loss of neurogenic flow regulation, disturbed endothelial function, and abnormal rheology to produce the familiar clinical picture of the diabetic foot[2]. Both essential hypertension and diabetes mellitus affect the same major target organs. The common denominator of hypertensive/diabetic target organ-disease is the vascular tree.As it can be seen that both the systemic diseases affect the vascular tree the patients with diabetic foot ulcer would have poor wound healing.
The Framingham study suggests that smoking in diabetic foot patients, atleast, has the same adverse effect on macrovascular disease as they so in non-diabetics.In my study, 42 out of 75 patients gave the history of smoking in whom higher levels of amputations were attempted with poor prognosis.Smoking affects the small blood vessels and make the wounds heal slower.

In the observation of wound healing rates with high HbA1c, it was observed that patients with low HbA1c values had faster healing. My study shows 32 patients had high HbA1c of which 72.9% showed poor wound healing rates and underwent subsequent amputation. This is in correlation with Andrea L.Christman et al[3] study which showed that individuals with HbA1c of 5.6% had a wound healing rate of 0.35 cm2 per day whereas those with HbA1c 11.1% had a healing rate of 0.001 cm2 per day.This suggests that a relationship exists between faster wound healing rate and low HbA1c levels.Many physiological factors that are thought to contribute to poor wound healing in diabetic foot individuals include decreased or impaired keratinocyte and fibroblast migration and proliferation, cytokine and growth factor function, and angiogenic response, and response to infection[7].Many of these mechanisms involve hyperglycemia.Hyperglycemia reduces keratinocyte migration and proliferation.[22,37].Also it adds to the oxidative stress with the production of reactive oxygen species[20].In my study, of the 23 out of 32 patients who underwent amputation, 3 cases underwent forefoot amputation, 7 underwent below knee amputation, 1 underwent above knee amputation, 12 underwent toe amputations.

In my study, dyslipidemia in diabetic foot patients is found to be a poor prognostic factor as it delayed wound healing significantly.Dyslipidemia directly did not influence the diabetic foot as such but it played an important role in the development of peripheral vascular disease which in turn affected the outcome of diabetic foot.This finding is in correlation with a study done by P.J. Palumbo et al[9],where they found that age, sex, diabetes, hyperlipidemia, hypertension, and cigarette smoking are significant risk factors for LEAD. In patients with diabetes, vascular disease, ABI, current smoking, and arm systolic blood pressure were identified as significant independent risk factors for LEAD.

Several analytic studies have provided evidence for an association between neuropathy and lower extremity amputations. In the cohort study of Pima Indians[43] and in the Seattle VA case-control study[5] it is observed that impaired vibratory perception was a statistically significant risk factor for amputation after controlling for age, sex, and diabetes duration. In the latter, the significance of this predisposing condition in terms of population-attributable risk percent was high because of the higher prevalence of hypoesthesia among cases (78%) than among controls (18%).Foot sensory neuropathy emerged as the most predictive of foot ulcer risk in our population. Several case-control and prospective studies have demonstrated higher foot ulcer risk in association with insensitivity to the 5.07 monofilament, absent Achilles ten-don reflex, and diminished vibration sensation as reflected by a hallux vibration perception threshold .25 measured using the biothesiometer (22–24).In our study, patients

According to a study conducted by Robert J. Hinchliffe et al[38];they concluded that both peripheral neuropathy and peripheral arterial disease predispose to the development of ulcers and to their slow healing.

Neuropathy inhibits healing partly by increasing forces on certain parts of the foot while walking (as a result of motor neuropathy and wasting of the small muscles of the foot) and by a loss of protective behaviour (as a result of reduced sensation). Peripheral arterial disease inhibits healing though its impact on local blood flow and a disruption of the processes needed for re-epithelialization.Inan other study conducted by Robert G. Frykberg et al[9],it has been concluded that peripheral arterial disease (PAD) rarely leads to foot ulcerations directly. However, once ulceration develops, arterial insufficiency will result in prolonged healing, imparting an elevated risk of amputation.Additionally, attempts to resolve any infection will be impaired due to lack of oxygenation and difficulty in delivering antibiotics to the infection site. Therefore, early recognition and aggressive treatment of lower extremity ischemia are vital to lower limb salvage.In my study it has been found a major percentage of patients with associated peripheral vascular disease had underwent amputation.

Wagner's classification score may be different for a surgeon as compared to physician because the diabetic foot patients come with advanced disease to a surgeon and for this reason patient with grade 0, 1, 2 are lesser and those with grade 3, 4, 5 are more in our study.The standard treatment for diabetic foot according to wegner's classification is prevention for grade 0, antibiotics and good glycemic control for grade 1.In grade 2 patients need hospitalization, as they need surgical intervention along with antibiotics and glycemic control.Grade 3 requires debridement and some sort of amputation.In grade 4, aggressive debridement and amputation while in grade 5 the preferred treatment is below knee amputation.Initial aggressive and radical debridement with daily surgical follow-up is the mainstay in the treatment of diabetic ulcers in nearly 90% of our patients.Patients with Grade 3, 4, 5 underwent amputation indicating grade of ulcer at presentation is a predictive factor for plan of treatment.

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VI. Conclusion

Age, gender, duration of diabetes, mode of treatment of diabetes and tobacco smoking did influence whether or not a diabetic with a foot lesion will have major amputation, an unsatisfactory outcome of primary treatment, prolonged hospital stay or will die.

Also, the presence of foot infections alone, microangiopathy (nephropathy, retinopathy), foot ischaemia alone or neuropathy alone had no relationship to poor prognostic indices.

However, when these complications appeared in concert (neuropathy, ischaemia and infection) and when, at presentation, there was associated systemic disease (as shown by anaemia and leucocytosis), severe fasting hyperglycaemia, evident bone destruction and anaerobic superinfection, the outcome of treatment was adverse.

In addition, dyslipidemia, hypertension and infection of the foot were related to need for major amputation. Poor long- term control did influence prognosis adversely.

The factors that influence the outcome seem to be: male gender, delay of management, quality of medical treatment, surgical attitude, inadequate level of amputation and finally lack of structured prevention.

We therefore suggest that the high morbidity seen with diabetic foot lesions could be reduced by optimizing glycaemic control, using combination antibiotic chemotherapy, vigorously correcting anaemia and encouraging early presentation of even mild lesions before underlying bone disease supervenes.

Prevention is based on the patient's education, general practitioners' training and a better and more efficient cooperation between surgeons and diabetologists.

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