Indian J Surg (March–April 2012) 74(2):131–135
DOI 10.1007/s12262-011-0341-3

(17)

PUB: 50/2012

ORIGINAL ARTICLE

A Study of Surgical Management of Diabetic Limb Complications Among Rural Population

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Received: 28 December 2010 / Accepted: 27 September 2011 / Published online: 10 January 2012
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Abstract Surgical complication of diabetes mellitus has been a common clinical problem among the rural population because of illiteracy and poor health education. The present study was undertaken to evaluate patients with respect to age, sex, presentation and to do other specific investigations. The patients were treated by conservative or surgical methods, and the outcome was monitored.

The majority of the patients were males with peak age group in the sixth decade. Septic lesions were more than the neuropathic or the ischaemic lesions.

Keywords Diabetic · Foot · Ischaemia · Amputations · Surgery

Introduction

In this millennium where mankind has succeeded in deciphering the human genetic code, the issue of chronic wound management still remains an enigmatic challenge [1]. Chronic wounds, especially non-healing types, are one of the most common surgical conditions a surgeon comes across among patients with diabetes. From time immemorial, doctors have been trying many methods to treat these types of wounds.

Objectives of the Study

1. To study the pattern of presentation of patients with a diabetic limb in a rural teaching hospital.
2. To evaluate the efficacy of available treatment options in salvaging the affected limb.
3. To study the impact of socio-economic status on management of diabetic limb complications.

Methods

A prospective study was carried out on 100 patients with diabetes mellitus with associated surgical complications who presented to the surgical outpatient at R. L. Jalappa Hospital and Research Centre from December 2008 to November 2009.

Observations and Results

Age Incidence

The average age of the patients was 65 years. It is implied that the most common age group is 61–70 years and the least common is older than 70 years (Fig. 1).

Sex Incidence

In the present series of 100 cases, 70 were males and 30 were females (Fig. 2).

Income/Socio-Economic Status

About 60% of the patients belonged to either the middle or the upper class, and about 40% belonged to the low-income group.

Occupation

In this area, most of the people are agriculturists and are ignorant of the sequel of diabetes mellitus; hence, the high

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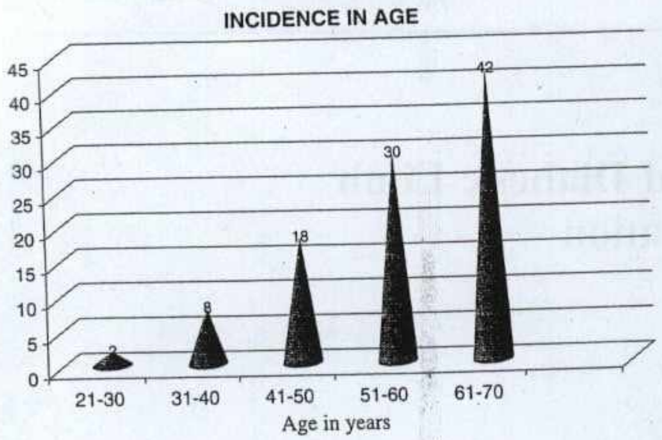

Fig. 1 Age incidence of patients with diabetes mellitus

incidence among them. In literature, it is reported that the disease is common in people with sedentary lifestyle. But the present study shows that it is common in hard-working people also (Fig. 3).

Family History

The family history of diabetes is positive in 34% and negative in 66% of the patients (Fig. 4).

Precipitating Causes

The majority (46%) of foot lesions developed without an apparent cause. But majority of the neuropathic patients would have felt the trauma.

Sensitometer was not used as it was not available in our set-up.

Precipitating causes	Number of foot lesions	Percentage
Spontaneous	46	46
Infected nail bed/Fissure	22	22
Trauma	32	32
Total	100	100

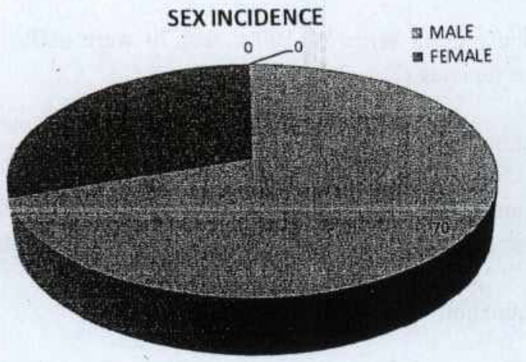

Fig. 2 Sex incidence of patients with diabetes mellitus

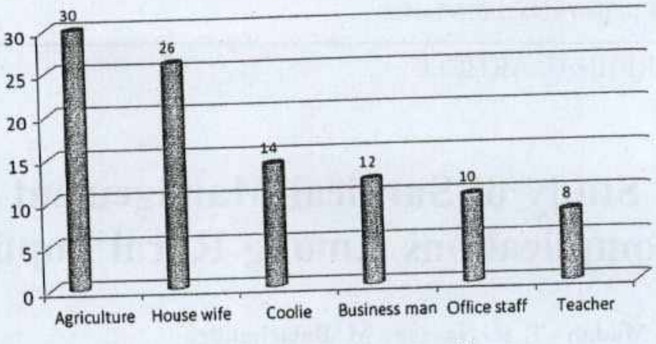

Fig. 3 Occupation of patients with diabetes mellitus

Incidence of Involvement of the Parts of the Body

The lesions occurred most commonly in foot about 78%, and in leg about 20%. The occurrence of the lesions was common among the agriculturists who walk barefoot and neglect the early inflammation (Fig. 5).

Bacteriology of the Local Infections

The commonest organism identified was staphylococcus (Fig. 6).

Bone Involvement

X-ray showing	Number	Percentage
Bone involvement	30	30
Bone non-involvement	70	70

Distribution of Types of Lesions

Among the study of 100 patients, total septic lesions were 84% and ischaemic lesions were 16% (Fig. 7).

Treatment

Minor operative procedures such as incision and drainage, slough excisions, etc. were carried out in 80 patients.

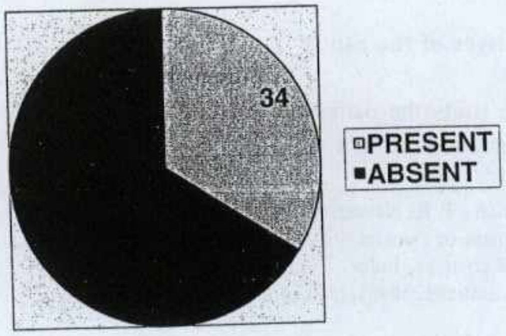

Fig. 4 Incidence of diabetes mellitus in the family

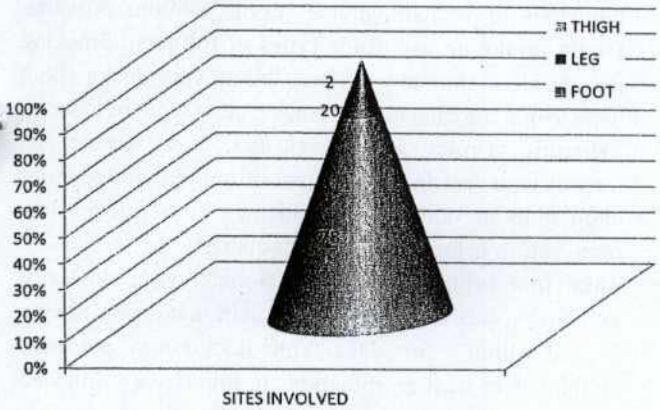

Fig. 5 Incidence of involvement of the parts of the body

Disarticulation of the toes was carried out in 6 patients. Below-knee amputation and above-knee amputation were carried out in 6 and 2 patients, respectively (Fig. 8).

In 10 limbs we took split skin graft.

Discussion

Incidence of Septic Lesions

The incidence of septic lesions in this series appears to be very high. However, it is concluded that septic lesions are supposed to be most common, compared with other types of lesions [2].

	Warren-Le series (1969)	Pennsylvania hospital report (1998)	Present series
Number of cases in series	818	614	100
Septic lesions	213	358	84
Percentage	26	58.3	84

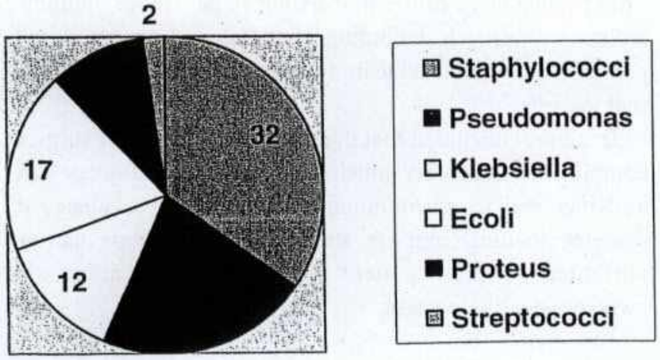

Fig. 6 Common bacteria isolated

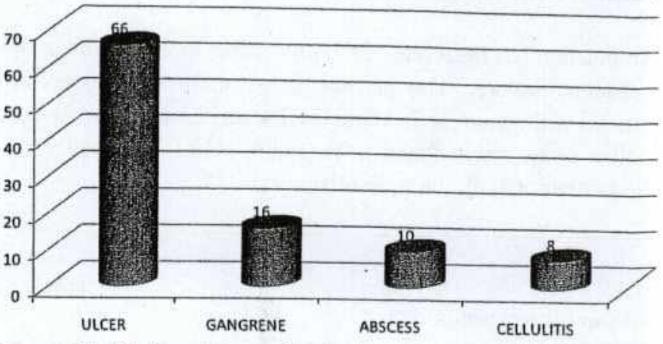

Fig. 7 Distribution of types of lesions

Ischaemic Lesions

Incidence of Gangrene

With respect to the ischaemic lesions, there has been a lower incidence (44.78%) when compared with the Pennsylvanian hospital report of 1998 [3].

	Pennsylvania hospital report (1998)	Present series
Number of case studies	614	100
Cases with gangrene	275	16
Percentage	44.78	16

Age Incidence of Ischaemic Lesions

The most affected age group has been sixth decade for the ischaemic lesions in both the studies [4].

	Wheel Lock and Root (1986)	Present series
Average age (Years)	68	65
Youngest age (Years)	34	30
Oldest age (Years)	89	70

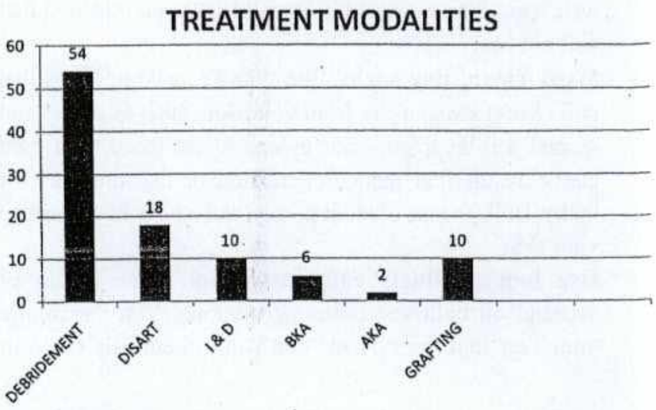

Fig. 8 Treatment modalities

Incidence of Amputation Rate

Amputation has been one of the procedures in the treatment of ischaemic lesions. The percentage of amputations done in patients with gangrene in Daniel series was 27.43% and in the Collen series it was found to be 38.6% [5] as compared with the present 50% in the present study.

	Daniel series (1961)	Collen's series (1982)	Present series
Number of cases with gangrene	328	215	16
Number of amputations	90	83	8
Percentage	27.43	38.6	50

Types of artificial limbs used:

For transtibial amputation—Patellar tendon bearing socket
For above-knee amputation—Transfemoral prosthesis

Measures Taken to Prevent Complications in the Other Foot

To prevent diabetes complications in the other limb we 'educate the patient' to make a commitment to managing their diabetes, eat healthy foods, include physical activity in their daily routine and keep their blood sugar under control. Then put their best foot forward with these simple foot-care tips:

- **Wash your feet daily.** Wash your feet in lukewarm water once a day. Dry them gently, especially between the toes. Sprinkle talcum powder or cornstarch between your toes to keep the skin dry. Use a moisturizing cream or lotion on the tops and bottoms of your feet to keep the skin soft.
- **Inspect your feet daily.** Check your feet for blisters, cuts, sores, redness or swelling once a day. If you have trouble bending over, use a hand mirror to see the bottoms of your feet or ask someone to help you.
- **Trim your toenails carefully.** Trim your nails straight across. If you have any nail problems or poor feeling in your feet, ask your doctor about professional nail trimming.
- **Don't go barefoot.** Protect your feet with comfortable socks and shoes, even indoors. Make sure new shoes fit well, too. Even a single blister can lead to an infection that will not heal.
- **Wear clean, dry socks.** Wear socks made of fibres that pull (wick) sweat away from your skin, such as cotton and special acrylic fibers—not nylon. Avoid those with tight elastic bands that reduce circulation or that are thick or bulky. Bulky socks often fit poorly, and a poor fit can irritate your skin.
- **Use foot products cautiously.** Don't use a file or scissors on calluses, corns or bunions. You can injure your feet that way. Also, don't put chemicals on your feet, such as wart removers. See your doctor or podiatrist for problem calluses, corns, bunions or warts.
- **Don't smoke or use other types of tobacco.** Smoking reduces blood flow to your feet. Talk to your doctor about ways to quit smoking or to stop using other types of tobacco.
- **Schedule regular foot check-ups.** Your doctor can inspect your feet for early signs of nerve damage, poor circulation or other foot problems. Your doctor may refer you to a foot specialist (podiatrist).
- **Take foot injuries seriously.** Contact your doctor if you have a sore or other foot problem that doesn't begin to heal within a few days. Your doctor may prescribe antibiotics to treat an infection. In other cases, infected tissue may be drained or removed. Sometimes surgery is needed to remove infected bone or increase blood flow to the affected area.

Conclusion

Good results can be achieved in our set-up also if we star to adopt the team approach to the diabetic foot lesions. Specific emphasis should be given on patient education about how to care for the feet such as pairing of nails, importance of wearing footwear, early report to the physician if an ulcer develops, importance of continuing treatment even after leaving hospital, the need to modify the diet, avoidance of smoking, reduction of weight and rehabilitative measures.

Reduction of pressure, or offloading, is another essential aspect of diabetic wound care. Foot pressures, shock and shear can be reduced with appropriately fitted shoes, insoles and socks. In our set-up, we used total non-weight bearing using a wheelchair or crutches as we thought it is the most effective method of relieving pressure, although most patients have difficulty complying with these modalities. Total contact casts are effective in significantly reducing pressure, but we found ulcers occurring when it was not properly applied; hence, in our study we thought total non-weight bearing using a wheelchair or crutches is better.

As mentioned earlier, specific emphasis on patient education is required, as illiteracy about the disease and quackery of the treatment by non-medical personnel can take the disease from healing stage to life-threatening stage. Hence, multidisciplinary approach including diabetologist, surgeon and podiatrist make an ideal team for the management of diabetic foot patients.

It is thus concluded that diabetes mellitus and its surgical complications are very much prevalent in rural areas such as Kolar and its surrounding villages. The prevalence of diabetes mellitus and its surgical complications can be attributed to poor patient knowledge, education and awareness of the disease.

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