



Study of Efficacy of Various Modalities in Treatment of Diabetic Foot Ulcer

KEYWORDS

Diabetic foot, hyperglycemia, infection, rehabilitative measures.

Dr. Asma Khalife

DNBSurgery(Appearing)

Dr. Reina Khadilkar

M.S.(Gen.Surgery), 2, A-2, 24, New Ajantha Ave Hsg. Soc., Paud Road Pune, Maharashtra. 411038

Dr. Pradeep Sharma

M.S.(Gen.Surgery,DNB(surgery) FACRSI,FAIS, Fellow,Israel

ABSTRACT

100 cases of diabetic foot lesions were examined. Age, sex and duration of diabetes seen in this study were comparable with the other series. Males are affected more commonly than females with ratio of 1.5:1. The incidence of foot problem is more in the 50 to 60 years age group than the rest in our study. 24 patients were found to have diabetes for more than 4 years. Most of the patients presented with fore foot involvement (56%). Sensory neuropathy was the most frequent component. Pure sensory neuropathy was seen in 15 patients while mixed sensory and motor neuropathy was seen in 15 patients, most with abscesses and gangrene. Mixed infection with both aerobes and anaerobes was the most common. Nosocomial infections were seen in patients having prolonged duration of stay following surgery. Rapid control of infection led to decreased insulin requirement and rapid glycemic control contained the spread of infection. Third generation cephalosporins were commonly used for diabetic foot lesions along with metronidazole and aminoglycosides. The main presenting feature was gangrene of the foot or toes or plantar abscesses. Surgical debridement with or without Ray amputation of the gangrenous toes was the most commonly done surgical procedure. Transmetatarsal or Syme's amputation was less commonly performed. The mean duration of recovery was 4 weeks. Higher education regarding foot care forms an integral part of surgical management.

INTRODUCTION

Foot infection in Diabetic patients represents a major concern. Somewhere in the world a leg is lost to diabetes every 30 seconds. It is estimated that approximately 15% of all people with diabetes will be affected by a foot ulcer during lifetime. The human and economic consequences of diabetic foot are extreme. In developed countries up to 5% of people with diabetes have foot problems but in developing countries it is seen in up to 40% of cases.

One of the major nontraumatic nonmalignant cause of lower limb amputation is diabetic foot. Majority of the skin ulcers if not detected early and not treated appropriately will result in amputation. In the past amputation was considered as a treatment of choice in patients with spreading infection in diabetic foot but now newer trends in treating diabetic foot infections such as newer antibiotics, antidiabetic treatments, various growth factors, newer tests in early detection of diabetic neuropathy, early conservative foot salvage surgeries and rehabilitative aids such as foot wears etc. and various other methods have made it possible to do conservative treatment in view of saving the limb and its function.

This study emphasizes on these newer modalities in view of medical, surgical and rehabilitative aspects of treating diabetic foot infections and taking a conservative approach to minimize amputations so that we can make patients physical, mental as well as social life better.

AIMS AND OBJECTIVES:

- To study efficacy of new modalities for treating diabetic foot infection.
- To stress importance of conservative approach in treating diabetic foot infections.
- To stress importance of foot care.

MATERIAL AND METHODS:

STUDY METHOD:-

- The study is a randomized prospective as well as retrospective ethical study.
- 100 cases of diabetic foot lesions were examined.
- Only those cases that required admission are studied. Patients with minor ulcerations and small foot lesions were

not admitted and so not included in this series.

- All patients were evaluated by taking detailed history, clinical examination and necessary investigation according to case Performa.
- Preoperative preparation, intra operative details and postoperative management were recorded.
- Categorization and tabulation of the data was done according to age, sex, duration and control over diabetes, presentation of foot lesion, vasculopathy and neuropathy, organism cultured, surgery offered as first procedure to the patient, re surgeries required and outcome of treatment.
- Treatment decision was taken after thorough evaluation of patient with all noninvasive investigation procedures. The type and extent of the initial surgical procedure was determined according to clinical judgment of treatment team, often with a conservative treatment philosophy of minimizing bone resection whenever possible.
- Patient was considered cure if wound healed within 6 months of treatment. Treatment failure was defined as persistence of the ulcer at 6 months or further surgical resection of bone after initial hospitalization.

STUDY PERIOD:-

Study period was from August 2009 to July 2011.

STUDY GROUP: We studied sample size of 100 patients. Patients between 30-80 years of age, including both male and females were studied.

STATISTICAL ANALYSIS:-

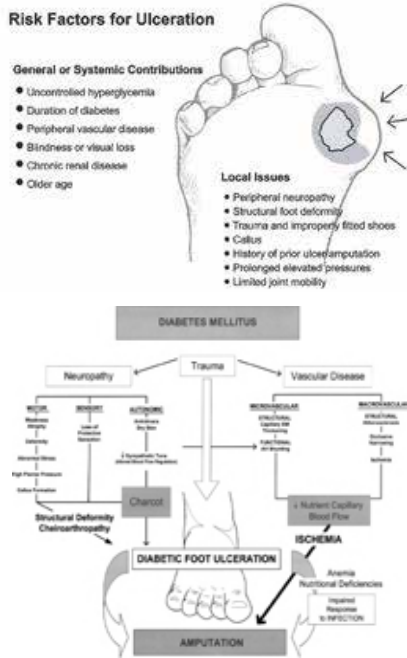
The observations of our study are analyzed using the statistics package for social science (SPSS software version 11) by using frequency, percentage, and chi square test. P-value less than 0.05 were considered as significant.

INCLUSION CRITERIA-

- All adult patients both male and female with diabetic foot infection.
- All patients who had been treated earlier for diabetic foot infection and coming for follow up for the same in the mentioned study period
- Ulcers extending only up to the knee and not above knees

EXCLUSION CRITERIA-

1. Patients who are critically ill
2. Ulcers extending above knee joint
3. Severe infections such as necrotizing fasciitis



OBSERVATIONS AND RESULTS

The following observations were made and results drawn from the study on 100 diabetic foot patients.

Table 1: Duration of diabetes

Duration of diabetes	No. of patients	Percentage
Unknown	23	23.0
1yr	16	16.0
2yr	16	16.0
3yr	4	4.0
>4 yr	24	24.0
>10yr	17	17.0
Total	100	100.0

Table no.2 - Incidence of success according to sex

Sex	Outcome		Total
	Success	Failure	
Male	46 (76.7)	14 (23.3)	60
Female	33 (82.5)	7 (17.5)	40
Total	79 (79.0)	21 (21.0)	100

P value 0.483

Table no. 3: The distribution of patients studied according to their age

Age group (years)	No. of patients	Percentage
<=40	4	4.0
41 – 49	16	16.0
50 – 59	64	64.0
>=60	16	16.0
Total	100	100.0

Observation:-

In our study, 56 patients required surgical debridement and 6 patients were managed with local treatment. 12 patients required resurgery ,amputation or debridement. 5 patients required skin grafting.

60% of our patients were males ,40% were females. Males are affected more commonly than females with ratio of 1.5:1. Nearly 46% of patients were having poor glycemic control .

Pure sensory neuropathy was seen in 15 patients while mixed sensory and motor neuropathy was seen in 15 patients, most with abscesses and gangrene.

Infection was fairly common in all diabetic foot lesions. Mixed infection with both aerobes and anaerobes was commonly seen. Nosocomial infections were seen in patients having prolonged duration of stay following surgery. Hyperglycemia and infection were complementary to each other. Rapid control of infection led to decreased insulin requirement and rapid glycemic control contained the spread of infection. Third generation cephalosporins, metronidazole and aminoglycosides were commonly used .

Patients presented with extensive lesions like gangrene of the toes or foot or deep plantar abscesses were treated with debridement and Ray amputation. Only 3 patients primarily required below knee amputation and one required below knee amputation as a re-surgery.

Primary surgical procedure was sufficient in 86 patients while 14 required revision of primary procedure. Mean duration of recovery was 4 weeks. Prolonged stay was seen in poorly controlled diabetics.

CONCLUSION:-

Single aggressive debridement achieved better control of diabetes.

Neuropathy and vasculopathy were common occurrences in diabetes and affect the healing of the ulcer.

Patients required rehabilitative measures such as off-loading foot wear, crutches or artificial limbs for rehabilitation.

Strict control of hyperglycaemia and proper foot care helps in preventing diabetic foot lesions.

It is possible to achieve limb salvage in patients by early treatment of diabetic foot lesions, and prevention of new lesions.

Foot scans have completely changed the foot wear advised for diabetics, preventing traumatic injuries.



SUMMARY:

Any diabetic patient with suspected infection should be immediately advised strict off-loading of the affected foot. Indoor care with immediate glycaemic and metabolic control should be instituted with parenteral, oral antibiotic for 8-10 weeks. As most of the diabetic foot infections are polymicrobial, combination of broad spectrum antibiotic.

It is necessary to reduce the edema by use of elasto-crepe bandage. Patient should be assessed for presence of vasculopathy.

The foot infection should be assessed properly. The extent of radical debridement and conservative amputation will depend upon the involvement of plantar spaces.

The procedure should be done as early as possible.

Strict off-loading of the affected foot should be maintained till the wound fully heals. Gradual mobilization should be done wearing proper footwear after wound heals.

Proper postoperative dressing should be done.

Patients need rehabilitative measures like footwear for artificial limb.

Foot scans have radicalized the foot wear for each individual.

REFERENCE

1. Almutaz A. Diabetic foot: Off loading devices 2009;7(6).
2. Bakker K, Riley P. The year of Diabetic foot, Diabetic Voice 2005; 50(1): 11-14.
3. Frykberg, Roberts G. Epidemiology of the diabetic foot: Ulceration and amputations; 1999; 12:139-41.
4. Yusuf M, Sulaiman A R. Diabetic foot complications: a two year review of limb amputation in Kelatanese population 2007; 48(8) :729.
5. Lipsky A, Berendt A. Diagnosis and treatment of Diabetic Foot Infections, IDSA guidelines of diabetic foot infections 2004; 39: 885-910.
6. Man Wo Tsang, Grace Cam. Human Epidermal Growth Factor Enhances healing of Diabetic Foot Ulcer, Diabetes Care 2003; 26(6):1856-61.
7. Feng J, Du WH. Clinical study of Various Growth Factors on the improvement of impaired healing ulcers in patients with diabetes disease; 1999; 13(5), :273-7.
8. Armstrong DG, Nguyen HC, Lavery LA. Off-loading the diabetic foot wound: A randomized clinical trial, Diabetes care 2001; 24:1019-22.
9. Khallaf A.N., Fathi O. Diabetic foot ulcer: Conservative management as Limb Salvage 2006; 30(2):107-11.
10. Reiber GE, Vileikyte L, Boyko EJ. Casual pathways for incident lower extremity ulcers in patients with diabetes from two settings. Diabetes care 1999; 22:157- 62.
11. Boyko EJ, Ahroni JH, Stensel V, Forsberg RC, Davignon DR, Smith DG. A prospective study of risk factors for diabetic foot ulcer. The Seattle Diabetic Foot Study. Diabetes care 1999; 22:1036-42.
12. Marchal de Calvi. Researches of accidents in diabetes. W.B. Saunders 1976; 23-32.
13. Unwin N. Global Lower Extremity Amputation Study Group. Epidemiology of lower extremity amputation in centres in Europe, North America and East Asia. The Global Lower Extremity Amputation Study Group. Br J Surg 2000; 87:328-37.
14. Bild DE, Selby JV, Sinnock P, Browner WS, Braveman P, Showstack JA. Lower-extremity amputation in people with diabetes. Epidemiology and prevention. Diabetes Care 1989; 12:24-31.
15. Songer TJ. The role of cost-effectiveness analysis and health insurance in diabetes care. Diabetes Res Clin Pract 2001; 54:S7-11.
16. Reiber GE, Lipsky BA, Gibbons GW. The burden of diabetic foot ulcer. Am J Surg, 1998; 176 (Suppl. 2A) : 5S – 10S.
17. Levin ME, Bowker JH, Pfeifer MA. Pathogenesis and general management of foot lesion in the diabetic patient. In., editors. Levin and O'neal's the diabetic foot, 6th ed. St. Louis: Mosby 2001; 219-60.
18. Janku H.U, Mehnert H. Peripheral vascular disease in diabetes and screening with Doppler technique. Diabetes care 1980; 3: 207-12.
19. Kissebath Ali., Evans D.J. Integrated regulation of VLDL, Triglycerides and Apolipoprotein B kinetics in diabetes. Diabetes 1982; 31:217-25.
20. Macfarlane R.M., Jeffcoate W.J. Factors contributing to the presentation of diabetic foot ulceration. Diabetic Med 1997; 10: 867-70.
21. Hofling B., Polnitz A.V. Percutaneous removal of atheromatous plaque in peripheral arteries. Lancet 1988; 1:384- 86.
22. Eichenholtz S. N. Charcot's Joints. Springfield, T.L.: Charles C Thomas; 1966; vol 227:3-8.
23. Kosiak M. Aetiology and pathology of ischaemic ulceration. Arch Phys Med Rehabil 1959; 40: 62-69.
24. Brand P.W. Pathomechanics of diabetic (neuropathy) ulcer and its conservative management In: Bergan JJ, Yao JST, Eds. Gangrene and severe ischemia of the lower extremities. New York: Grune and Stratton; 1978. 185-9.
25. Crickshank and Payne: Antipneumococcal power of alloxan diabetics in rabbits. Bull John Hopkins Hospitals 1949; 84: 334-43.
26. Perillie, Nolon and Finch. Studies resistance to infection in diabetes mellitus. A local cellular exudative response. J. Lab Clin Med. 1962; 59: 1008.