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A Clinical Study on Surgical Management of Diabetic Foot Ulcers

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ABSTRACT

The lack of knowledge from either the patient or primary care physician remains a barrier to improving the outcome of diabetic foot lesions. In India the situation has deteriorated due to practices such as walking without shoes, lack of knowledge and cleanliness problems. We examined several elements of DFU therapy including dressing, debridement and amputation. All the patients underwent a comprehensive assessment, including a general physical examination, local examination and systemic examination. The evaluation also included Wagner's categorization to determine the severity of the condition. The operative characteristics that were considered included the type of procedures conducted and any post-surgical problems that occurred. A standard blood test, blood sugar test, urine sugar test, x-ray of the affected area and cultureand sensitivity test of the discharge from the infection were also conducted. Data were gathered via a specifically created survey. The data collected were analyzed using the computer software SPSS 15.0. Out of all the patients who were admitted, 42 of them were newly diagnosed with diabetes. Most of them had type 2 diabetes. A large majority of patients were seen between 8 weeks and 30 weeks after the ulcer started. Twenty-five individuals had a prior record of foot ulcers, while twelve individuals had a prior record of amputation. Primary and secondary healthcare systems have varying methods for managing diabetic foot care. In addition, it is essential for doctors to skillfully utilize diagnostic technologies to evaluate the condition and extent of diabetic foot problems. Basic hygiene habits, regular or at least yearly foot examination and patient education are advised.

INTRODUCTION

Diabetes can cause the loss of a foot owing to nerve damage[1]. You might not experience a cut, blister, or discomfort. Reduced blood flow due to microvascular illness, typically accompanied by lack of feeling due to neuropathy, makes individuals with diabetes mellitus more susceptible to foot infections. These infections range from basic, surface-level cellulitis to long-lasting osteomyelitis. Foot injuries are the primary cause of hospital admissions connected to diabetes. Surgery is often the most suitable choice in many of these instances[2].

Diabetic foot syndrome refers to the presence of various typical foot conditions in individuals with diabetes, including infection, diabetic foot ulcer and neuropathic osteoarthropathy[3]. On a global scale, diabetes mellitus has reached widespread levels, impacting 194 million individuals around the world. It is projected to rise in occurrence to 344 million by 2030. Among these patients, around 2-6% will experience the development of a diabetic foot ulcer on an annual basis[4,5].

Treating infections in patients with diabetes is challenging because these individuals have reduced blood flow in small blood vessels, which makes it harder for immune cells to reach the infected location and leads to low levels of antibiotics in the diseased tissues[6]. Diabetic foot infections can vary from fungal infections of the nails to severe infections that might cause limb or life-threatening conditions. The phrase diabetic foot infection includes many conditions that cover a range of infectious processes[7]. Cellulite and mild infections in the web spaces may advance more quickly in individuals with diabetes because of a combination of immune failure and the delayed identification caused by diabetic neuropathy and retinopathy. The clinical symptoms of infection may not become apparent until the infection has progressed. The usual bacterial pathogens seen differ depending on the Wagner grade and degree of infection. Infections that occur early usually involve only one type of microorganism, while infections that are more advanced tend to involve multiple types of microorganisms[8].

Individuals with diabetes mellitus have a 15% chance of developing foot ulcer. More than two-thirds of the population that is affected endure amputations of the lower limbs, with ulceration being the most common antecedent to this[9]. When diabetes reaches its severe stages and treatment is unsuccessful, lower extremity amputation can occur as a result of the disease. Individuals with diabetes have a significantly higher risk of amputation, ranging from 15-30 times greater compared to those without diabetes. Approximately every half a minute, a lower limb or a part of a lower limb is surgically removed due to diabetes in various parts of the world[10]. Because diabetes is becoming more common the occurrence of diabetic foot is also increasing due to the longer life expectancy of people affected by the condition. The lack of knowledge from either the patient or primary care physician remains a barrier to improving the outcome of diabetic foot lesions. In India, the situation has deteriorated due to practices such as walking without shoes, lack of knowledge and cleanliness problems[11]. In this situation, a study was carried out to assess the many ways in which diabetic foot ulcers (DFU) are presented. The study was observational and prospective in nature. We also examined several elements of DFU therapy including dressing, debridement and amputation.

MATERIALS AND METHODS

A grand number of 120 instances were included in the investigation. The current study was conducted to investigate the clinical symptoms, treatment, and surgical issues related to foot infections in diabetes patients. All the participants involved in the research were provided with information about the study and they were only asked to sign the informed consent if they were willing to do so. Only the patients who agreed to the informed permission were included in the study. The medical institute sought guidance from the ethics committee and obtained approval prior to conducting the investigation. A comprehensive medical history was documented for all patients, including any prior history of diabetes, wound healing issues, ulcers, or boils in other areas of the body.

All the patients underwent a comprehensive assessment, including a general physical examination, local examination and systemic examination. The evaluation also included Wagner's categorization to determine the severity of the condition. The operative characteristics that were considered included the type of procedures conducted and any post-surgical problems that occurred. A standard blood test, blood sugar test, urine sugar test, x-ray of the affected area, and culture and sensitivity test of the discharge from the infection were also conducted. Data were gathered via a specifically created survey. The data collected were analyzed using the computer software SPSS 15.0. The test statistics utilized included the t-test for students and the Chi-squared test. The average and variability for continuous variables, such as age, RBS level, and HbA1c level and the occurrence and proportion for categorical variables, such as age distribution, HbA1c distribution, gender, duration of diabetes mellitus, SINBAD scores and other risk factors of foot ulcers, were computed. The relationship between amputation, SINBAD score, HbA1c level and RBS level was evaluated using a significance level of $p \leq 0.05$.

RESULTS

A grand number of 120 patients were enrolled in the study. All the patients were aged between 40 and 60 years. The average age was 56.31 years. The increased occurrence of diabetic foot sores in males is attributed to poor foot hygiene, injuries, smoking, and other unhealthy habits. There were 60 males and 60 females, with 86% of the patients belonging to a low socioeconomic position. The majority of the patients came from rural areas that were placed at a considerable distance from the medical institute. The condition of diabetic foot is commonly observed in individuals belonging to the middle-aged group, typically in their 40s and 50s.

Of the 120 patients included in the study, 12% had gangrene in their diabetic foot, 21% had cellulitis in their diabetic foot, and 72% showed indications of a diabetic foot ulcer. Twenty percent of the population had a familial history of diabetes mellitus. Out of all the patients who were admitted, 42 of them were newly diagnosed with diabetes. Most of them had type 2 diabetes. A large majority of patients were seen between 8 weeks and 30 weeks after the ulcer started. Twenty-five individuals had a prior record of foot ulcers, while twelve individuals had a prior record of amputation.

Regarding the therapy, 27% of the patients received conservative treatment consisting of daily dressing and antibiotics, while 75% of the patients underwent surgical treatment. The majority of patients who had surgical treatment underwent lower limb amputation in 61% of cases. At least 41% of the total patients admitted for treatment acknowledged smoking, tobacco chewing, and alcohol usage. Staphylococcus aureus was detected in 56% of the diabetic foot infection cases, gram negative organisms in 26% of cases, beta haemolytic streptococci were found in 9% of all cases and anaerobic cocci were found in 12% of cases.

The average duration of hospitalization was around 5 weeks, varying based on an individual's ability to recuperate. There were a total of 25 problems after surgery in a group of 60 individuals. The surgery site infection was the most frequent complication, affecting a total of 12 individuals. The rate of complications was very high in patients who underwent substantial lower limb amputations.

Table 1: Age incidence of patients with diabetic mellitus

Age group	No.
40-50 years	60
51-60 years	60
Total	120

Table 2: Distribution of types of presentation

Types of Presentation	No. of cases
Ulcer	83
Cellulites	21
Gangrene	21
Total	120

Table 3: Common bacteria isolated those with non-gangrenous characteristics

Name of Organism	Percentage of cases
Staphylococcus aureus	56
Gram negative organisms	26
Beta haemolytic streptococci	9
Anaerobic cocci	12

Table 4: Types of operations performed (n = 120)

Type of operation	Frequency
Debridement	29
Amputation	64
Skin grafting	9
Incision and drainage	8
Sequestrectomy	10

DISCUSSIONS

Foot problems are frequently seen in individuals with diabetes and foot ulcers are considered to be one of the more severe outcomes. If not treated quickly and correctly, infections in the feet of people with diabetes can become impossible to cure or possibly result in septic gangrene, which may need amputation of the foot[12]. Samples for culture should be collected after wound cleaning to prevent contamination and improve the identification of pathogens. Diabetic foot sores are frequently observed in individuals who are in their middle years, typically throughout their fourth and fifth decade of life[12,13].

Sensory nerve damage and reduced sense of body position hinder the foot's capacity to adjust to repeated local pressures and as a result, ulcers in the foot can develop and worsen without being noticed. Research conducted in the Netherlands and Iran revealed a significant prevalence rate of 20.0-20.4% respectively. The variations in prevalence may be due to regional variances in the occurrence of diabetes mellitus and the local risk factors associated with diabetic foot ulcer disease.

Morbach and colleagues,[14] When comparing foot illness in Germany, India and Tanzania, it was observed that German patients were considerably older than those from Tanzania and India. The research was carried out at various centers that provide diabetes care of varying standards. The similar average age may indicate specific time-related risk factors in the development and progression of diabetic foot ulcer disease that are shared among individuals with diabetes, regardless of their surroundings. The age at which diabetes often begins also varies among continents.

In our current research, it was shown that males were more impacted than females, which aligns with findings from earlier studies. The higher number of males may be explained by their smoking habits, which were seen in 36.1% of cases. Ulcer healing was achieved by performing wound debridement, removing slough and then applying dressings with povidine-iodine, metronidazole, collagenase, L-lysine and mupirocin. Other treatment options included skin

grafting, disarticulation, below knee amputation and above knee amputation[15]. Wong and colleagues documented an 87% success rate in preserving limbs after employing multiple "piecemeal" debridements and herbal beverages. Dressing materials commonly used include gauze dressings soaked in saline solution and dressings that help retain moisture, which are designed to create an optimal environment for wound healing.

Foot ulcers caused by diabetes are a common reason for hospitalization among patients with diabetes in India. These ulcers are a result of various sociocultural factors, including walking barefoot, lack of adequate diabetic treatment facilities, low education level and poor socioeconomic status. This syndrome is the most frequent outcome of diabetes mellitus, typically not mending and leading to amputation of the lower leg. Nevertheless, it can be efficiently controlled via knowledge, blood sugar control, wound cleaning, enhanced bandaging and therapies. Under specific conditions, surgery has the potential to reduce the seriousness of issues, leading to improvements in patient's well-being and overall quality of life. This is particularly true when a collaborative approach involving multiple disciplines is employed.

The majority of patients in this study came to the surgical department within a range of four to 52 weeks (with a median of 18 weeks) after the ulcer started. Other research have also made a similar observation. Delayed arrival of our patients could be linked to factors such as limited financial resources, impoverished conditions, insufficient knowledge about diabetes (including the importance of taking care of their feet and understanding the consequences associated with diabetes), unnoticed foot injuries from walking without shoes and limited availability of healthcare services. Additional factors that contribute to delayed presentation include self-performed surgical procedures at home, reliance on faith healers, and undiagnosed diabetes.

CONCLUSION

Diabetic foot is a common ailment, particularly in underdeveloped nations. Efficiency in classification systems requires fast and cost-efficient treatments, which rely on patient adherence. The classification scheme employed has both benefits and drawbacks. The SINBAD score is a simplified form of the S (AD) SAD system that takes into account size, ischemia, neuropathy, bacterial infection, area and depth. Each feature is assigned one point and the total score is then calculated. The SINBAD score is easy to use in daily practice and more efficient in defining the disease processes for auditing reasons. Primary and secondary healthcare systems have varying methods for managing diabetic foot care. In addition, it is essential for doctors to skillfully utilize diagnostic technologies to evaluate the condition and extent of diabetic foot problems. Basic hygiene habits, regular or at least yearly foot examination and patient education are advised. Providing appropriate and comfortable shoes, as well as effectively treating minor injuries, helps reduce the recurrence of ulcers.

REFERENCES

1. Said, G., 2007. Diabetic neuropathy: A review. Nat. Clin. Pract. Neurol., 3: 331-340.
2. Besse, L., J., T. Leemrijse and P. ,A Deleu, 2011. Diabetic foot: The orthopedic surgery angle. Orthop. Traumatol. Surg. Res., 97: 314-329.
3. Delbridge, L., G. Ctercteko, C. Fowler, T.S. Reeve and L.P.L. Quesne, 1985. The aetiology of diabetic neuropathic ulceration of the foot. Br. J. Surg., 72: 1-6.
4. Shapiro, J. and A. Nouvong, 2011. Assessment of microcirculation and the prediction of healing in diabetic foot ulcers. Topics Prev., Treat. Complications Type 2 Diabetes, Vol. 1. 10.5772/21967
5. Shapiro, J., D. Koshimune and R. Moellmer, 2013. Diabetic foot ulcers treatment and prevention. Type 2 Diabetes, Vol. 26 .10.5772/56400
6. Ansari, M.A. and V.K. Shukla, 2005. Foot infections. Int. J. Lower Extremity Wounds, 4: 74-87.
7. Adams, C.A. and E.A. Deitch, 2001. Diabetic foot infections. J. Med., Vol. 1.
8. Patel, P. and M. Chudasama, 2015. Surgical management of diabetic foot: Clinical study. Springer., 1: 71-81.
9. Oyibo, S.O., E.B. Jude, I. Tarawneh, H.C. Nguyen, L.B. Harkless and A.J.M. Boulton, 2001. A comparison of two diabetic foot ulcer classification systems. Diabetes Care, 24: 84-88.
10. Rogers, L.C. and N.J. Bevilacqua, 2010. Organized programs to prevent lower-extremity amputations. J. Am. Podiatr. Med. Assoc., 100: 101-104.
11. Kapur, A., S. Shishoo, M. Ahuja and K.S.V. Mankame, 1997. Diabetes care in India: Patient's perceptions, attitudes and practices. Int. J. Diab. Dev. Countries., 17: 5-14.
12. Armstrong, D.G. and B.A. Lipsky, 2004. Diabetic foot infections: Stepwise medical and surgical management. Int. Wound J., 1: 123-132.
13. Kosinski, M.A. and B.A. Lipsky, 2010. Current medical management of diabetic foot infections. Expert Rev. Anti-infective Ther., 8: 1293-1305.
14. Morbach, S., J.K. Lutale, V. Viswanathan, J. Möllenberg and H.R. Ochs *et al*., 2003. Regional differences in risk factors and clinical presentation of diabetic foot lesions. Diabetic Med., 21: 91-95.
15. Parker, P.J., 2000. Kosovo 1999: A surgical template for modern conflict. J. Royal Army Med. Corps, 146: 199-203.