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Short Communication

Diabetic Foot in India – Reviewing the Epidemiology and the Amit Jain's Classifications

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Abstract: There is an increase in the prevalence of diabetes worldwide. Diabetic foot problems are the most common reason for hospitalization in diabetic patients. In India, the diabetic foot problems are becoming more and more common. This article aims at providing a brief epidemiology of diabetic foot problems in India and the current Amit Jain's classifications on various aspects of diabetic foot complications, which are the new concepts in improvising the diabetic foot practice in underdeveloped and developing countries like India. It highlights the important principles and practice of diabetic foot.
Keywords: Diabetes, Diabetic Foot, India, Amit Jain's classification, Grading, Staging.

INTRODUCTION

The global prevalence of diabetes was estimated to be 2.8% in 2000 and is predicted to increase to 4.4% by 2030, which means that there will be more than 366 million individuals with diabetes by that year [1]. Diabetes affects around 3% of the U.K population [2]. In neighboring countries like Pakistan, the prevalence of diabetes is 5.3% to 16.2% [2] whereas in Singapore, the prevalence is around 8.2% [3]. In India, it was estimated that in 2000 there were 32 million diabetics and the number is predicted to increase to 80 million by 2030 [1].

Diabetic foot problems in India

Diabetic foot ulcers will complicate the disease in more than 15% of the people with diabetes during their lifetime [4]. India, which is the second most populous country in the world [5], was once regarded as the diabetic capital of the world [6].

The hallmark of diabetic foot problem in India is the gross infection and major contributing factors for the late presentation include barefoot walking, attempts at home surgery, trust in faith healers and undetected diabetes [7], lack of knowledge regarding foot complications and socioeconomic status. Unhygienic conditions and poverty compound the effects of foot ulceration in people with diabetes. More than 350 million people still live on less than a dollar a day and at least 80 million people go to bed hungry [8].

In one study from south India, it was found that patients without foot problems spent 9.3% of their total income towards treatment whereas patients with foot problems had to spend upto 32.3% of their total income on treatment [9]. In India, almost 40,000 legs are amputated every year as a consequence of diabetes [10].

There is a slight difference in diabetic foot occurring in Indian patients compared to the west. For example, necrotizing fasciitis which is considered rare in the west is slightly more common in India [11]. Further, in the west the peripheral vascular disease is more common whereas in India, it accounts for less than 10% [12]. Diabetic foot is more of neuropathic and infectious in nature in India.

Amit Jain's classifications for diabetic foot complications

The most important development in understanding about the diabetic foot disease is the new Amit Jain's classifications. These newer concepts are essential in effectively communicating the diabetic foot disease in underdeveloped and developing countries like India.

Till now, the various concepts on diabetic foot disease where taken from the west. Recently, the various new classifications were introduced to improvise the practice of diabetic foot. These classifications are developed by Amit Kumar Jain, an expert diabetic lower limb salvage surgeon from St Johns medical college; India [13].These new classifications are as follows-

1. ***Amit Jain's Classification for diabetic foot complications***

Traditionally, Wagner's and university of Texas were the two most commonly used classification. Addressing their deficits, this new classification was proposed that addresses all the common complications of the diabetic foot.

This classification is simplest of all the classification, easy to understand and remember. Essentially, it can be used for teaching purposes to disseminate the knowledge of diabetic foot among the health professionals [13, 14]. According to this classification, diabetic foot complications can be classified in to 3 types namely, type 1, 2 and 3 [Table1].

Type 1 diabetic foot complications are infective, Type 2 are non infective and Type 3 are mixed. This classification can be easily compared to the common classification of diabetes which is Type 1 – insulin dependent, Type 2 - non insulin dependent and miscellaneous.

According to one of the recent studies [15] done on this classification , type 1 diabetic foot complications accounts for 86.66% of all the cases of diabetic foot treated as inpatients in a hospital and majority of the major amputations were seen in type 1 diabetic foot complications [15].

2. *Amit Jain's classification for debridement*

It's quite astonishing that there was no known classification for debridement for diabetic foot wounds, which is the most commonly employed procedure [16]. This is the first such new classification [Table 2] for debridement in diabetic lower limbs. This classification is to very simple, practical and easy to understand [16]. Most importantly it can be used as an important communicative tool and also for teaching purposes.

According to this classification, debridement can be graded into 4 types based on the structures removed and further be sub grouped in to A and B based upon the extent of the surgery done.

This classification would henceforth describe debridement done by the surgeons more specifically as the term debridement is very loosely used and it doesn't indicated the severity of the condition and the extent of the surgery done.

3. *Amit Jain's scoring system*

Another important newer concept is the new scoring system [6]. This unique scoring system for the first time addresses all the common diabetic foot complications. It uses clinical, radiological and surgical findings [Table 3] to arrive at a score that can predict the risk for the major amputations in the diabetic foot patients [Figure 1].

This scoring system can be used as a record for entering all the findings and can also be used as a chart. The scoring system is simple, easy to understand but difficult to remember. This scoring system could also help in medico legal cases in future.

In this scoring system, patients with a score of less than 5 should not undergo any major amputations [Table 4] whereas in patients with a score of more than 26, the amputation would be almost inevitable.

4. *Amit Jain's classification of diabetic foot osteomyelitis*

This is also a first new classification specific for diabetic foot osteomyelitis [17]. This classification helps in specifying the type of osteomyelitis in diabetic foot and has now opened the gates for new research on this entity.

According to this new classification [17], diabetic foot is classified into 3 types and 4 subgroups. Type 1 diabetic foot osteomyelitis involves forefoot, Type 2 midfoot and Type 3 involves hindfoot. In subgroup A, there is no radiological evidence of osteomyelitis, in subgroup B, there is cortical erosion, in subgroup C, there is complete bone destruction and in subgroup D, more than 2 bones are involved.

Introduction of these new classifications have undoubtedly equated the diabetic foot practice to that of oncological practice.

Fig-1: Diabetic foot

Figure 1: showing the ulcer over the sole following debridement for an abscess in the plantar region done outside. This is type 1 diabetic foot complication according to Amit Jain's classification. The score for this would be 14 which is moderate risk for major amputation according to the new Amit Jain's scoring system.

Table 1 Showing Amit Jain's Classification of Diabetic Foot Complications.

Sl No	Type Of Complications	Lesions
1	Type 1 [Infective]	Cellulitis, Necrotizing Fasciitis, Wet Gangrene, Abscess,Etc
2	Type 2 [Non-infective]	Non Healing Ulcers, Peripheral Arterial Disease, Entrapment Neuropathies, Diabetic Neuro-osteoarthropathy,Etc
3	Type 3 [Mixed]	Example - Non Healing Ulcer With Osteomyelitis

Table 2 showing Amit Jain's Grading of debridement in diabetic lower limb wounds.

Grades of debridement	Description of the surgery done
Grade 1	Removal of sloughs from the ulcer, callus removal, deroofing the large blisters/blebs, removal of dessicated tendons,etc
Grade 2	Removal of necrotic/unhealthy skin and subcutaneous tissue
Grade 3	Removal of infected/necrotic skin, subcutaneous tissue along with either tendons/retinaculum/deep fascia
Grade 4	Removal of infected/necrotic skin,subcutaneous tissue , tendon/retinaculum/deep fascia along with necrotic/ infected muscle
Subgroups	A – When 2 sites are involved. Ex – foot+leg or leg+thigh. B – When 3 sites are involved. Ex – foot+leg+thigh. R – repetitive debridement – R1- repeated once, R2 – repeated twice, and so on.

Table 3 showing the Amit jain's scoring of diabetic foot complications

Sl no	Characteristics	Involvement of foot			
1.	Presence of ulcer	No ulcer → 0	Forefoot ulcer → 2	Midfoot ulcer → 4	Hindfoot ulcer/ full foot → 6
2.	Osteomyelitis [O.M]	No O.M→ 0	Forefoot O.M→ 2	Midfoot O.M→ 4	Hindfoot O.M→ 6
3.	Presence of pus	No pus→ 0	Forefoot pus/dorsum→ 2	Midfoot pus→ 4	Hindfoot pus/beyond it → 6
4.	Gangrene [dry/wet]	No gangrene→0	Forefoot gangrene → 2	Midfoot gangrene →4	Hindfoot gangrene/beyond→8
5.	Peripheral arterial disease	No P.A.D→ 0	Mild→ 2	Moderate→ 4	Severe→ 8
6.	Charcot foot	No→ 0	Forefoot → 2	Midfoot → 4	Hindfoot/whole foot → 8
7.	Necrosis of the skin	No→ 0	Forefoot necrosis →2	Midfoot necrosis →4	Hindfoot necrosis/beyond→8
8.	Associated cellulitis	No→ 0	Upto forefoot→2	Upto midfoot→4	Upto hindfoot & beyond→ 6
9.	Previous amputation	No → 0	Toe amputation → 2	Forefoot amputation → 4	Midfoot amputation→ 6
10.	Presence of gas – radiologically	No → 0	Gas in forefoot→ 1	Gas in/upto midfoot→ 2	Gas in/upto hindfoot→ 3
11.	Myonecrosis	No → 0	Myonecrosis involving single muscle group→ 2	Myonecrosis involving more than one group → 4	Myonecrosis of entire foot muscle with extension to leg → 8
12.	Joint involvement	No → 0	Forefoot joint exposure→ 2	Midfoot joint exposure→ 4	Hindfoot joint exposure → 6
13.	Septic shock	No → 0		Present → 2	
14.	Renal failure	No → 0		Present → 2	
15.	Smoking	No → 0		Present → 2	
16.	Surgeon factor	Qualified diabetic foot specialist → 0		Other surgeons → 2	

Table 4 showing the major amputation risk assessment using the new Amit Jain's scoring.

Sl no	Scoring	Major amputation risk	Percentage
1	< 5	No amputation	0%
2	6 – 10	Low risk	< 25%
3	11 – 15	Moderate risk	25% - 49%
4	16 – 20	High risk	50% - 74%
5	21 – 25	Very high risk	75% - 99%
6	>26	Amputation inevitable	100%

Conclusion

Diabetic foot is a dangerous complication of diabetes. Its incidence is increasing and it is becoming a major public health problem. This disease is neglected in India both by the physician and the patients. The new Amit Jain's classification would definitely improve the practice of diabetic foot around the countries. Some of these classifications like grading of debridement for diabetic lower limb lesions and new types of diabetic foot osteomyelitis are being proposed first time in literature, there by raising the standards of diabetic foot practice and equating it with other surgical subspecialties.

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