



A Simple New Classification for Diabetic Foot Ulcers

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Abstract

Gangrene, infections like abscesses and ulcers are some of the common diabetic foot complications. Of all these, diabetic foot ulcers pose a major public health problem. Around 80% of all the lower limb amputations are preceded by a foot ulcer. There are various classifications for diabetic foot ulcers out of which the two commonly used classifications are Wagner's ulcer classification and the classification of University of Texas. The author proposes another simple new classification specific for diabetic foot ulcer which is one of the common diabetic foot complications. This classification is an addition to the author's already existing new classifications on various aspects of diabetic foot so that a new Amit Jain's principle and practice of diabetic foot could be devised for improvising and standardizing the practice of diabetic foot. According to this new classification, diabetic foot can be clinically classified into 3 simple classes.

Key words: Diabetic foot, ulcer, new classification, Amit Jain's, Wagner's

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Introduction

Diabetes is considered to be one of the most common challenging health problems all over the world in the 21st century [1]. In fact it has been coined the 'Black Death of the 21st Century' due to its stark similarities with the 14th Century Plague in terms of rapid increase in its prevalence, morbidity and mortality [2]. According to WHO, the number of diabetic patients in 2000 reached to 171 million and was predicted to increase to 380 million by 2020 [3].

Diabetic foot ulcers are one of the most distressing complications of diabetes affecting around 15% of people with diabetes [4]. The annual incidence of diabetic foot ulcers is around 3% and the reported incidence in U.S and U.K studies ranges as high as 10% [5].

There are various foot ulcer classification systems that have been devised in order to categorize them more effectively and thus allow effective comparison of their outcomes in different centres [6].

The well established and most widely used ulcer classification are the Wagner's wound classification system and the University of Texas diabetic wound classification system [6,7].

These classifications are used in order to attempt to encompass different features of an Ulcer like site, depth, presence of infection, neuropathy and peripheral arterial disease [6,7]. They have been used to even compare the outcomes and to provide a guide to planning the treatment strategies [6,7].

The basic issue with Wagner's classification is that it mixes both ulcer and gangrene and further it doesn't mention about ischemia. UT classification is very difficult to remember and it cannot be applied in day to day practice [8].

The author proposes another new classification for diabetic foot ulcers. This classification was created based on clinical experience of managing different types of wounds in day to day practice. The classification was made in such a way that it becomes easy to use, is practical and can be communicated effectively among different specialist with an ease. This classification is an addition to the authors new [grading, typing, scoring] classification system [8-12] in order to devise the new principles and practice of diabetic foot that would

standardize and improvise the diabetic foot practice in India and other countries where diabetic foot is a neglected entity.

Need for New Classification

Various comprehensive classifications [13] have been developed over years for diabetic foot lesions. There are several well-known and accepted classification for ulcers in diabetic foot. The basic problem with Wagner's classification is that it mixes ulcer and gangrene which are two different entities in diabetic foot. Further, there is no mention of ischaemia in the Wagner's classification. The University of Texas classification is very complex and difficult to apply in clinical practice [8]. However the basic purpose of any classification in diabetic foot including the new proposed classification is to communicate among specialist and non-specialist equally and also to guide in therapy [14].

There is well known difference in diabetic foot between Asian and Caucasian population [15]. It hence becomes necessary to have a separate classification for diabetic foot ulcer which is distinct from the existing classification [15]. In field of diabetic foot, most specialists looks at a classification that will predict an outcome for any given treatment [16]. This should be avoided in modern practice of diabetic foot knowing that diabetic foot is multifactorial. Not only the local effect of the lesion and its extent, but even the systemic complications of diabetes and socioeconomic status of the patient have an impact on diabetic foot treatment and outcome especially in developing and underdeveloped countries. Further, the expertise of the treating doctor also plays a crucial role in final outcome of diabetic foot. In such scenario, no single classification can satisfy the researchers looking for a perfect classification that predicts outcomes and there shall never be any consensus.

Instead, one should look at a classification like this new one which simplifies diabetic foot practice, fits into the modern concepts in diabetic foot and can be used as an effective teaching tool both among specialist and non-specialist.

The New Classification for Diabetic Foot Ulcers

According to this new classification, diabetic foot ulcers are classified into 3 simple types (Table 1).

Table 1. Showing the new Amit Jain's classification for diabetic foot ulcers

Class 1 diabetic foot ulcers	Simple ulcers
Class 2 diabetic foot ulcers	Complex ulcers
Class 3 diabetic foot ulcers	Complicated ulcers

Class 1 diabetic foot ulcers are simple diabetic foot ulcers. These ulcers don't have any intrinsic cause that affects its healing. These ulcers are not infected. The best example for such ulcers (Figure 1 and 2) are healing ulcers [including post-operative wounds] and callus ulcers. Even non infected post traumatic ulcers in diabetic foot patients can be included in this category. Good dressings, wound care and offloading are required for their healing.



Figure 1. Showing the healing ulcer over the dorsum of left foot



Figure 2. Showing healing ulcer over midsole. This is class 1 diabetic foot ulcer.

Class 2 diabetic foot ulcers are complex diabetic foot ulcers. These ulcers have an intrinsic cause for ulceration and it's non-healing. Best examples are Charcot foot ulcers (Figure 3), Ulcers due to deformities like claw toe, hammer toe, etc and ulcers with underlying peripheral arterial disease (Figure 4) [ischaemic ulcers]. Correction of these intrinsic factors becomes essential in management of such ulcers especially in cases where they don't heal.



Figure 3. Showing Charcot foot with ulcer. This belongs to class 2 diabetic foot ulcers.



Figure 4. Showing an ischaemic ulcer over left heel that occurred following an injury. This is class 2 diabetic foot ulcer.

Class 3 diabetic foot ulcers are complicated diabetic foot ulcers. Such ulcers have underlying infections like abscess (Figure 5 and 6) and osteomyelitis. These ulcers require immediate surgical intervention in case the infection has to be arrested in order to prevent rapid progression.



Figure 5. Showing an ulcer over left side. Note the pus discharge. These types of ulcer belongs to class 3 diabetic foot ulcers.



Figure 6. Showing an ulcer over left 2nd toe. It is infected. Hence it is class 3 diabetic foot ulcer.

When class 1 and 2 gets infected (Figure 7), they all come under class 3 ulcers/ complicated ulcers. Examples of these are infected trophic ulcers/ Charcot ulcers. Even postoperative ulcers which do not heal over weeks and subsequently detected to have underlying abscess or infected/necrotic tissue belongs to this category. They require surgery (debridement/amputation). Sometimes ulcers will be associated with wet gangrene of the toes. These also come under complicated diabetic foot ulcers.

Most of the complex and complicated ulcers after surgical intervention may start healing and these ulcers can be placed into class 1 category.



Figure 7. Showing an infected and ischaemic ulcer over left foot. Patient had undergone great toe amputation along with grade 4 debridement. This belongs to class 3 diabetic foot ulcers.



Figure 8. Showing venous ulcer in a diabetic just above left ankle. These types of ulcers are not included in this classification



Figure 9. Showing the postoperative ulcer over left leg and part of the dorsum of the foot. Patient was operated for necrotizing fasciitis predominantly involving the leg. These types of ulcers in diabetic lower limb are not included in the new diabetic foot classification.

Advantages of This New Classification

- 1] It is very simple
- 2] Easy to understand even by non-specialist and paramedical staffs like nurses
- 3] Practical
- 4] Useful as a teaching tool to disseminate the knowledge of diabetic foot
- 5] It shall help in standardization of diabetic foot practice across different regions
- 6] It will also help in providing the guidelines for management of diabetic foot ulcers
- 7] This classification will help in understanding which types of ulcers ends up in major and minor amputations frequently
- 8] It can be used as a communicative tool among different specialist and also among different regions

Exclusion criteria

- 1] Ulcers involving leg and thigh even in diabetics
- 2] This classification does not include wounds in non-diabetics
- 3] All venous ulcers are excluded (Figure 8)
- 4] Ulcers in filariasis also are excluded
- 5] Even postoperative ulcers secondary to debridement of necrotizing fasciitis in diabetics are excluded if it predominantly involves leg/thigh compared to foot (Figure 9).

Understanding these Ulcers

Trophic /callus ulcers without foot deformities fall in category of simple diabetic foot ulcers as a good wound care and offloading can heal these ulcers. Many a times these trophic ulcers recur due to walking on it and such cases require strict offloading.

Ischaemic ulcers that do not show wound healing with good wound care and non-interventional modalities require revascularizations procedure like peripheral angioplasty/vascular bypass procedure. Ulcers with mild peripheral arterial disease may not require revascularization if with good wound care they show signs of healing. Some ischaemic ulcers are not amenable for any revascularization procedure. In such cases all possible adjunctive measures can be attempted for limb salvage.

Few ulcers may have necrotic patch [following trauma/silencer burns]. They may not be infected. Simple debridement/ removal of it can result in wound healing. These ulcers can be grouped under class 1. Ulcers caused due to bony prominence like Charcot foot, claw toes, hammer toes, etc are class 2 diabetic foot ulcers and they require corrections.

An Ischaemic diabetic foot ulcer when infected secondarily becomes complicated diabetic foot ulcers (Figure 7). Such diabetic foot ulcers are at very high risk for amputation. Some ischaemic diabetic foot ulcers occur following trauma or after debridement or amputation of dry gangrene of the toe.

Venous/varicose ulcers even in diabetics should not be included in this classification.

Discussion

Diabetic foot ulcers pose a major public health problem worldwide and they are known to cause significant morbidity and mortality in diabetic patients [17]. It has been reported that 85% of the lower limb amputations in diabetic patients are preceded by foot ulceration [18,19].

A diabetic foot ulcer is considered to be a pivotal event in the life of a person with diabetes and a marker of serious disease and comorbidities [20]. Individuals who develop a diabetic foot ulcer are at greater risk of premature death, myocardial infarction and fatal stroke than those without a history of diabetic foot ulcer [20].

The diabetic foot ulcers poses a therapeutic challenge even to the surgeons especially in developing countries where health care resources are limited and the vast majority of patients present to health care centre with advanced foot ulcers [17].

Diabetic foot ulcers are prone for infections, chronicity and recurrence which eventually affect the mental health of patients [4]. Over 50% of the ulcers become infected resulting in high rates of hospitalization, increased morbidities and potential lower extremities amputation [21]. Around 14 to 24% of diabetic foot ulcers will end up in amputation [22].

In fact, in one of the series from the best limb salvage centre in India [23], around 29.4% of the patients who underwent below knee amputation had a diabetic foot ulcer [infected/non healing] and this was the commonest cause for below knee amputation.

Although there are various classification for diabetic foot ulcers like Wagner's, University of Texas, S(AD)AD system, etc [6], the author proposes another classification system for diabetic foot ulcers that is not only simple but also easy to understand. It includes most of the ulcers in diabetic foot that is commonly encountered in day to day practice. This classification could also be used as a teaching tool among different grades of specialist and non-specialist across different countries for simplifying diabetic foot practice.

Addition of this new classification by the author is another new concept and it will facilitate in development of the new "Amit Jain's Principle and Practice of diabetic foot" that will

improvise and standardize the diabetic foot practice [11,12,24,25]. The classification is named on the author to avoid reduplication and plagiarism of this innovative work.

Conclusion

Diabetic foot complication like infection, ulceration and gangrene are common reason for inpatient admission in diabetes. Various classifications exist for diabetic foot ulcer. The new diabetic foot ulcer classification is an addition to this ulcer classification and it forms a component for the author's new principle and practice of diabetic foot that shall improvise the diabetic foot as it is a neglected entity in underdeveloped and developing countries.

Conflict of Interests

The authors hereby declare that they have no competing interests.

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