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## Extended application of Amit Jain's 'SCC' classification concept for diabetic foot

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### Abstract

In last few years, various developments have taken in field of diabetic foot. One such new development was Amit Jain's system of practice for diabetic foot. This new principle and practice of diabetic foot, which is now considered as a '*modern diabetic foot surgery*', has various concepts being laid down over last few years in order to simplify, improvise and standardize the approach towards diabetic foot. This article aims at extension and application of the Amit Jain's 'SCC' classification concept to various different aspects of diabetic foot like charcot foot, toe deformities, etc in order to ease our understanding and standardizing our approach of diabetic foot under the Amit Jain's system of practice, the *modern diabetic foot surgery system*.

**Keywords:** Diabetic foot, classification, Amit Jain, callus, Charcot foot, footwear, deformities, ulcer

### Introduction

Diabetic foot is a devastating complication of diabetes mellitus that can lead to amputation [1]. This is a costly complication that can affect 15% of patients during their lifetime and is a frequent cause of hospitalization [1, 2]. In spite of it being a common condition, it is often neglected in developing and underdeveloped countries both by patients and health care professionals [3].

In last few years, there has been tremendous development in diabetic foot with various new concepts being laid in diabetic foot. One such new development Amit Jain's principle and practice of diabetic foot, '*the modern diabetic foot surgery*', developed by the author [3, 4, 5]. This new system has changed the perception of diabetic foot and has attempted to simplify diabetic foot [3].

One such concept in Amit Jain's principle and practice is the 'SCC' classification concept (Amit Jain's E'SCC' classification). This concept was first applied for ulcer classification by the author in 2014 [5, 6]. In Amit Jain's classification for diabetic foot ulcer, which is a focal classification, the ulcers were classified into 3 simple types namely the Simple, Complex and Complicated diabetic foot ulcer [5, 6, 7]. The Amit Jain's classification for diabetic foot ulcer was recently validated [6]. This simple, complex, complicated (SCC) classification concept was later applied to Amit Jain's classifications for Diabetic foot classifications and Amit Jain's Classification for offloading [7, 8].

### Extension of Amit Jain's "SCC" classification concept

The author further aimed at expanding and extending this "SCC" classification concept to charcot foot, toe deformities, callus and diabetic footwear to simplify their understanding and clinical use. There are various existing different novel classifications for these entities [9, 10, 11]. Of all these, charcot foot has various distinct classification ranging from radiological, clinical and anatomical classifications [11]. Some of the known named classifications are Eichenholtz classification, Dounis classification, Sanders- Frykberg classification, Roger's-Bevilacqua classification, Sella- Barette classification, Brodsky-Rouse classification etc. [10, 11, 12].

Though footwear's in general are of different types, diabetic foot wear as such does not have any popular known classification that used in clinical practice commonly. The callus, toe deformities and Charcot foot are as such type 2 diabetic foot complication as per Amit Jain's universal classification for diabetic foot [3, 13].

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The Amit Jain's E"SCC" classification concepts for these entities are as follows.

**1. Amit Jain's 'SCC' classification for callus of the foot**

Callosity is a precursor of ulcer and amputation. It can affect any part of the foot although forefoot is most commonly involved. We applied the SCC classification concept [Table 1] to diabetic foot Callosities. Often, simple callus [Figure 1] requires debridement followed by appropriate diabetic/therapeutic footwear. Complex callus [Figure 2] requires debridement, cleaning and dressing, offloading and diabetic footwear. The author advises Amit Jain's category 1 or 2 offloading for ulcer

healing [8]. It is left to the choice of treating surgeon/podiatrist and his preference of category 1 offloading's and also availability. Complicated callus [Figure 3], where callus gets infected, requires debridement removing all infected tissues and antimicrobials/antibiotics. Wound care is given as per standard format. Offloading and footwear also becomes important. In case recurrent callosities, one needs to consider corrective surgeries. This should be highly individualized and depends on case keeping in mind other factors like ischemia, renal failure, cardiac disease, patient's mobility, financial status, acceptability of complications, etc

**Table 1:** Showing Amit Jain's 'SCC' classification for Callus of the foot.

Type of Callus of The Foot	Description	Clinical Characteristics	Treatment Guidelines
Type 1 Callus	Simple Callus	Callus Without Underlying Ulcer	Debridement, Cleaning & Dressing Diabetic Footwear
Type 2 Callus	Complex Callus	Callus With Underlying Ulcer	Debridement, Cleaning & Dressing Amit Jain's Category 1 Offloading, Diabetic Footwear, Corrective Surgeries If Recurrent
Type 3 Callus	Complicated Callus	Infected Callus	Debridement, Cleaning & Dressing Antibiotics, Amit Jain's Category 1 Offloading, Diabetic Footwear



**Fig 1:** Showing simple callus. This is Amit Jain's type 1 callus.



**Fig 3:** Showing an infected callus. This is a complicated callus and it is Amit Jain's type 3 callus.



**Fig 2:** Showing ulcer underneath the callus. This is complex callus and is Amit Jain's type 2 callus of the foot.

**2. Amit Jain's 'SCC' classification for Charcot foot**

The author also applied the SCC classification concept to Charcot foot [Table 2]. Type 1 Charcot foot are simple types and includes Charcot foot without ulcer be acute or chronic. Type 2 Charcot foot [Figure 4] are complex Charcot foot and they include Charcot foot with ulcer. Type 3 Charcot foot are complicated Charcot foot and includes Charcot foot with infections like infected ulcer with secondary cellulitis, osteomyelitis, etc. Even Charcot foot with instability [Figure 5] are included in this category.

**Table 2:** Showing Amit Jain's SCC classification for Charcot foot.

Type of charcot foot	Description	Clinical characteristics	Treatment guidelines
Type 1 charcot foot	Simple charcot foot	Charcot foot without ulcer [acute/chronic]	Tcc/rcw – acute charcot Modified footwear-chronic charcot foot
Type 2 charcot foot	Complex charcot foot	Charcot foot with ulcer	Offloading, Surgery like exosectomy if recurrent ulcer
Type 3 charcot foot	Complicated charcot foot	Charcot foot with infection or instability	Surgery like debridement, removal of infected bone, antibiotics, offloading Reconstructive surgery for unstable charcot foot



**Fig 4:** Showing a Charcot foot with an ulcer. This is a complex Charcot foot and it is Amit Jain's type 2 Charcot foot.



**Fig 5:** Showing unstable Charcot foot with instability requiring reconstructive surgery. This is a complicated Charcot foot and it is Amit Jain's type 3 Charcot foot.

### 3. Amit Jain's 'SCC' classification for toe deformities

The Amit Jain's SCC classification can be applied to the common toe deformities like claw toe, hammer toe, mallet toe, etc [Table 3]. Type 1 deformities [Figure 6] are simple deformities without any ulcer. Type 2 deformities are complex deformities [Figure 7] with underlying ulcer or callosities, Type 3 deformities are complicated deformities where there is underlying infection like infected ulcer, osteomyelitis, etc.

Although a brief treatment guideline has been given, one should note that there is a difference in these guidelines between diabetics and non-diabetics, elderly versus young patients, painless versus painful deformity, etc. Associated conditions like underlying ischemia, previous amputation, systemic complications like renal failure/ischemic heart disease, etc are important factors deciding corrective surgeries. They should be reserved in cases like recurrent ulcerations.

**Table 3:** Showing Amit Jain's SCC classification for toe deformities

Type of Toe Deformities	Description	Characteristics	Treatment Guidelines
Type 1 Deformities	Simple Deformity	Deformities Without Ulcer (Flexible/Rigid)	Splints, Toe Caps, Diabetic Footwears, Etc
Type 2 Deformities	Complex Deformity	Deformities With Ulcer/Callosities	Cleaning And Dressings, Debridement, Corrective Surgeries Like Tenotomy, Arthroplasty, Etc, Offloading, Diabetic Footwears
Type 3 Deformities	Complicated Deformity	Deformities With Infection (Infected Ulcer, Abscess, Cellulitis, Etc	Surgeries Like Debridement, Resection of Infected Bone, Amputation Etc. Cleaning And Dressing, Antibiotics, Offloading, Diabetic Footwears



**Fig 6:** Showing hammer toes on left foot. This is a simple type of toe deformity and it is Amit Jain's type 1 toe deformity.



**Fig 7:** Showing claw toe with ulcer over 2<sup>nd</sup> toe. This is a complex toe deformity and it is Amit Jain's type 2 toe deformity.



#### 4. Amit Jain's 'SCC' classification for footwear [therapeutic/diabetic footwear]

The Amit Jain's SCC classification can also be applied to therapeutic footwear [Table 4]. They are commonly referred as diabetic footwear by many when it is used on diabetes patients. The type 1 footwear's are simple footwear [Figure 8] which

includes the regularly prescribed Microcellular rubber (MCR) or polymer (MCP) sandals or shoes. Type 2 footwear's are complex footwear [Figure 8] and includes anterior/posterior ortho wedges, rockers, half shoes, etc. Type 3 Footwears are complicated footwear and include the modified moulded footwear which is commonly recommended in Charcot foot.

**Table 4:** Showing Amit Jain's SCC classification for diabetic foot wears

Type Of Footwear	Description	Characteristics	Examples
Type 1 Footwear	Simple Footwear	Regular Mcr/Mcp Sandals/Shoes	Diabetic Patients With Neuropathy
Type 2 Footwear	Complex Footwear	Wedged Footwears [Anterior/Posterior], Half Shoes, Rockers, Etc	Patients With Recurrent Tylomas, Recurrent Trophic Ulcers, Transmetatarsal Amputation, Etc
Type 3 Footwear	Complicated Footwear	Modified Moulded Footwears	Charcot Foot



**Fig 8:** Showing a microcellular rubber (MCR) sandal. This is simple footwear and it is Amit Jain's type 1 footwear.



**Fig 9:** Showing anterior ortho wedge footwear. This is complex footwear and it is Amit Jain's type 2 footwear.

Diabetic foot quote based on amit Jain's 'SCC' concept **"Diabetic foot is a complex disease with many complications and every effort should be made to understand and treat it in as simple way as possible"**

#### Conclusion

The new Amit Jain's "SCC" classifications are extremely simple, easy to understand and remember, practical and applicable in day to day practice. They can be well understood even by non-specialist. They are excellent teaching tool. These classifications can serve as a communicative tool. Some of these classifications guide therapy and they are precise enough to be used in clinical practice. All classifications need not serve same purpose and they need to be assessed based on what they are meant for which most researchers/reviewer's often don't do. Further, future studies on these Amit Jain's "SCC" classification

concept will give us new insights on clinical and practice oriented results on diabetic foot.

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