Extended application of Amit Jain’s ‘SCC’ classification concept for diabetic foot

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DOI: https://doi.org/10.33545/surgery.2019.v3.i1d.32

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, improve 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, Douinis 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].
The Amit Jain’s ‘SCC’ classification concepts for these entities are as follows.

1. Amit Jain’s ‘SCC’ classification for callus of the foot
   Callus 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 callus. 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. 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 callus, 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.

   ![Fig 1](image1.png)
   Fig 1: Showing simple callus. This is Amit Jain’s type 1 callus.

   ![Fig 2](image2.png)
   Fig 2: Showing ulcer underneath the callus. This is complex callus and is Amit Jain’s type 2 callus of the foot.

   ![Fig 3](image3.png)
   Fig 3: Showing an infected callus. This is a complicated callus and it is Amit Jain’s type 3 callus.

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 1](image4.png)

   Table 1: Showing Amit Jain’s ‘SCC’ classification for Callus of the foot.

<table>
<thead>
<tr>
<th>Type of Callus of the Foot</th>
<th>Description</th>
<th>Clinical Characteristics</th>
<th>Treatment Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1 Callus</td>
<td>Simple Callus</td>
<td>Callus Without Underlying Ulcer</td>
<td>Debridement, Cleaning &amp; Dressing Diabetic Footwear</td>
</tr>
<tr>
<td>Type 2 Callus</td>
<td>Complex Callus</td>
<td>Callus With Underlying Ulcer</td>
<td>Debridement, Cleaning &amp; Dressing Amit Jain’s Category 1 Offloading, Diabetic Footwear, Corrective Surgeries If Recurrent</td>
</tr>
<tr>
<td>Type 3 Callus</td>
<td>Complicated Callus</td>
<td>Infected Callus</td>
<td>Debridement, Cleaning &amp; Dressing Antibiotics, Amit Jain’s Category 1 Offloading, Diabetic Footwear</td>
</tr>
</tbody>
</table>

   ![Table 2](image5.png)

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

<table>
<thead>
<tr>
<th>Type of charcot foot</th>
<th>Description</th>
<th>Clinical characteristics</th>
<th>Treatment guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1 charcot foot</td>
<td>Simple charcot foot</td>
<td>Charcot foot without ulcer (acute/chronic)</td>
<td>Tcc/rcw – acute charcot Modified footwear-chronic charcot foot</td>
</tr>
<tr>
<td>Type 2 charcot foot</td>
<td>Complex charcot foot</td>
<td>Charcot foot with ulcer</td>
<td>Offloading, Surgery like exosectomy if recurrent ulcer</td>
</tr>
<tr>
<td>Type 3 charcot foot</td>
<td>Complicated charcot foot</td>
<td>Charcot foot with infection or instability</td>
<td>Surgery like debridement, removal of infected bone, antibiotics, offloading Reconstructive surgery for unstable charcot foot</td>
</tr>
</tbody>
</table>
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.

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

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

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.

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 2nd 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 to 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

<table>
<thead>
<tr>
<th>Type Of Footwear</th>
<th>Description</th>
<th>Characteristics</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1 Footwear</td>
<td>Simple Footwear</td>
<td>Regular MCR/MCP Sandals/Shoes</td>
<td>Patients With Neuropathy</td>
</tr>
<tr>
<td>Type 2 Footwear</td>
<td>Complex Footwear</td>
<td>Wedged Footwears [Anterior/Posterior], Half Shoes, Rockers, Etc</td>
<td>Recurrent Tylomas, Recurrent Trophic Ulcers, Transmetatarsal Amputation, Etc</td>
</tr>
<tr>
<td>Type 3 Footwear</td>
<td>Complicated Footwear</td>
<td>Modified Moulded Footwears</td>
<td>Charcot Foot</td>
</tr>
</tbody>
</table>

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.

References