Original Research Article

DOI: http://dx.doi.org/10.18203/2349-2902.isj20173417

Offloading of diabetic foot wounds using Amit Jain's offloading system: an experience of 23 cases

Amit Kumar C. Jain^{1,2*}, Roshan Dath³, U. Venkatkrishna Rao⁴, Kishore Kumar⁵, Harish Kumar⁵, Suresh Kumar⁵

Received: 22 May 2017 Accepted: 23 June 2017

*Correspondence:

Dr Amit Kumar,

E-mail: dramitkumarcj@yahoo.in

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ABSTRACT

Background: It is a well-known fact that around 15% of patients with diabetes are likely to be affected by foot ulcers during their lifetime. The aim of this study was to evaluate and analyze Amit Jain's offloading system used in diabetic foot wounds.

Methods: A cross-sectional, retrospective study was done at 3 centres namely Brindhavvan Areion Hospital, Synergy Centre for Diabetes and South City hospital in Bangalore, India. The study period was for 1 year from April 2016 to March 2017.

Results: 23 cases were included in the study. 16 patients (69.57%) had right foot involved whereas 7 patients (30.43%) had left foot involved. Majority of the patients had foot problems located at forefoot (86.96%). The most common condition where Amit Jain's offloading was used was in trophic ulcer (61%). In 22 patients (95.65%), the microcellular rubber and ethyl vinyl acetate combination was used whereas in one patient (4.35%), 7 mm of single layered EVA was used. 9 patients (39.13%) had their wounds healed within 8 weeks whereas 11 patients (47.83%) had their wounds healed within 8-16 weeks.

Conclusions: Amit Jain's offloading device is a new offloading device that can be effectively used as an alternative to felted foam. It is based on deflective technique just like felted foam. In this series, 86.98% of the wounds had healed by 16 weeks with this new offloading device. The Amit Jain's offloading device, which has a scientific rationale based on the deflective offloading as well as usage of visco-elastic material that is accepted worldwide, produces effective wound healing without any complication and without inhibiting patient's mobility. Amit Jain's offloading is a level one recommendation for diabetic foot wounds.

Keywords: Amit Jain, Diabetic foot, Felt, Law, Offloading, Ulcer

INTRODUCTION

It is a well-known fact that around 15% of patients with diabetes are likely to be affected by foot ulcers during

their lifetime.¹ Majority of these wounds are neuropathic in nature and occurs on plantar surface of foot.²⁻⁴ Mechanical trauma and increased plantar pressure are known risk factor for diabetic foot ulceration.⁵⁻⁷

¹Department of Surgery, Rajarajeswari Medical College, Bangalore, India

²Consultant Surgeon, Amit Jain's Institute of Diabetic foot and Wound Care, Brindhavvan Areion Hospital, Bangalore, India

³Consultant Orthopaedic Surgeon, South City Hospital, Bangalore, Karnataka, India

⁴Consultant Diabetologist, Synergy Centre of Diabetes, Bangalore, Karnataka, India

⁵Senior Consultants, Amit Jain's Institute of Diabetic foot and Wound Care, Brindhavvan Areion Hospital, Bangalore, India

Debridement of the wound, appropriate dressings and offloading are essential for healing of ulcers. 4.8

Numerous offloading methods are available and include bed rest, therapeutic shoes, felted foam, total contact casts, removable cast walkers, etc.⁶⁻¹¹ Felted foam padding is one such offloading method used commonly in clinical practice.¹² Amit Jain's offloading technique is an alternative to felted foam used to offload diabetic foot wounds.⁹

The current study aims at sharing study experience with Amit Jain's offloading system in diabetic foot wounds.

METHODS

A cross-sectional retrospective study was done at 3 centres namely Brindhavvan Areion Hospital, Synergy Centre for diabetes and South City Hospital in Bangalore, India. The study period was from April 2016 to March 2017. The following were inclusion and exclusion criteria.

Inclusion criteria

- All the patients with diabetic foot neuropathic ulcers
- Patients with Postoperative wounds (less than 5 cm)/ incision scars in diabetic foot.

Exclusion criteria

- Non-diabetic foot wounds
- Patients who lost for follow up
- Ischemic wounds
- Patients with multiple ulcers on the foot were excluded
- Patients whose ulcer got infected during the treatment course and ended up in amputation.

RESULTS

A total of 27 patients had received the Amit Jain's offloading device but only 23 cases were included in the present study. 15 patients (65.22%) were males and 8 (34.78%) were females (Table 1).

The average age of males was 51.2 years and for females was 49.6 years. 16 patients (69.57%) had right foot involved whereas 7 patients (30.43%) had left foot involved (Table 2).

Table 1: Distribution of cases among males and females.

Sex	Number	Percentage
Males	15	65.22%
Females	08	34.78%
Total	23	100%

Table 2: Sides of foot involved.

Side of Foot	Number	Percentage
Right	16	69.57%
Left	07	30.43%
Total	23	100%

20 patients had foot problems located at forefoot (86.96%), 2 of whom had trans metatarsal amputation, one at midfoot (4.35%) and two patients (8.7%) at heel (Table 3).

Table 3: Part of the foot that was involved.

Part of the foot affected	Number	Percentage
Forefoot	20	86.96%
Midfoot	01	4.35%
Hindfoot	02	8.7%
Total	23	100%

19 patients (82.61%) had non-healing ulcer (Trophic ulcer), one patient (4.35%) had scar dehiscence and 3 patients (13.04%) had post-operative wounds on which Amit Jain's offloading were used (Table 4).

Table 4: Type of wounds affecting the foot.

Type of wound seen	Number	Percentage
Trophic ulcers	19	82.61%
Scar	01	4.35%
Post-operative wounds	03	13.04%
Total	23	100%

The postoperative wounds (less than 5 cm) were the wounds status post debridement for diabetic foot abscess (the wounds that didn't reach bone). Dressing was changed once in 3 to 4 days based on soakage and wounds were periodically inspected. A new offloading was used every time the dressing was changed and none where reused in this series.

In 13 patients (56.52%), 7 mm thick Amit Jain's offloading device (Table 5) was used (combination of 3mm microcellular rubber and 4 mm of ethyl vinyl acetate) and in 10 patients (43.48%) 8 mm thick offloader was used (3 mm MCR + 5 mm EVA).

Table 5: Distribution of Amit Jain's Offloading device according to thickness used.

Thickness of offloading device	Number	Percentage
07 mm thick offloading device	13	56.52%
08 mm thick offloading device	10	43.48%
Total	23	100%

In 22 patients (95.65%), the microcellular rubber and ethyl vinyl acetate combination was used (Figure 1-7).

whereas in one patient [4.35%], 7 mm of single layered EVA was used. This was purely based on availability of the viscoelastic materials during the study period. The single 7mm EVA [made by combining 5mm and 2 mm EVA] was used when the 3-mm microcellular rubber was out of our stock at our centre



Figure 1: Trophic ulcer in a diabetic patient with status post transmetatarsal amputation.



Figure 2: Application of Amit Jain's offloading system.



Figure 3: Alternative way of applying Amit Jain's offloading device.



Figure 4: Side view of the offloading device. The offloading is stabilized by application of adhesive bandage.



Figure 5: Dressing done on the ulcer and subsequent stabilization of offloading with help of dynaplast.



Figure 6: Wound at end of 3 weeks after 6 application of Amit Jain's offloading.

Note the decrease in diameter of the wound. The surrounding callus that gets build up is regularly debrided.



Figure 7: Patient at the end of 3 months. Wound healed completely.

We ensured to use a good quality durometer tested viscoelastic materials as there are huge number of fake and substandard MCR and EVA available in market and many a times even a doctor who is not in the diabetic foot field, will be unable to differentiate it (Figure 8).



Figure 8: Two different ethyl vinyl acetate materials purchased from different dealers. The EVA in the left hand (upper one) is of substandard quality with very cheap price.

9 patients (39.13%) had their wounds healed within 8 weeks. 11 patients (47.83%) had their wounds healed within 8-16 weeks and 3 patients (13.04%) wound remained unhealed after 16 weeks (Table 6). They were subsequently put on different offloading methods like TCC and Bohler iron cast. None of these patients had

any iatrogenic ulcers from offloading. In whomever possible, protective footwear where also encouraged.

Table 6: Duration of wound healing with Amit Jain's offloading system.

Duration of wound healing	Number	Percentage
Less than 8 weeks	09	39.13%
8- 16 weeks	11	47.83%
More than 16 weeks	03	13.04%
Total	23	100%

DISCUSSION

Foot Complications is one of the major health issues in diabetic patients.¹³ It is estimated that plantar wounds range from 25% at first toe, 23%-50% at first MTP joint and 38% at lesser metatarsal heads.¹² Around 56% of the diabetic foot ulcers become infected and 20% of the patients with infected wounds end up with some form of amputation.¹⁴ Hence one should aim at faster healing of trophic ulcer before it gets infected and offloading the foot is on such treatment strategy. Uncomplicated plantar ulcers should heal within 6 to 8 weeks with good offloading.¹⁵ Of the various offloading devices, felted foam, a deflective padding method, is used frequently in west to deflect pressure away from a particular area of foot.^{12,16}

The issue with felted foam is its cost, availability in developing and underdeveloped countries and most importantly its very short pressure relief properties. 9,17 To address these issues, Amit Jain's offloading device was developed, which utilizes the elastic/ viscoelastic materials, especially the combination of microcellular rubber and ethyl vinyl acetate wherein the MCR is capable of stretching in all the directions as well as its strong ability to spring back to its original shape quite faster. 9 It acts as a rescue to EVA when excessive pressure is applied on EVA, due to prolonged standing or patient's heavy body weight that results in it getting compressed. 9

Recently, the new Amit Jain's offloading classifications, which is first such classification system on offloading the wounds in the world, has been proposed that broadly divides offloading systems into general and focal classification. There are 2 focal classification of offloading based on ease of application and based on role/function of offloading system. Summing up briefly, the felted foam and Amit Jain's offloading device/system are simple, synthetic, deflective and therapeutic offloading system as per the new Amit Jain's offloading classification system and is a level 1 recommendation as per Amit Jain's recommendation of offloading.

Although, combination is often applied in Amit Jain's offloading system, usage of visco-elastic materials in isolation or any combination of acceptable thickness is also considered as Amit Jain's offloading system

(variant) and it is governed by "Amit Jain's Law" for offloading system. This was done to avoid Plagiarism by others which the author has observed to be a growing menace in diabetic foot field and also to avoid naming any such variants as their own invention by other researchers.

The current study shows that the Amit Jain's offloading system is capable to achieve complete wound healing with 16 weeks (86.96%) of the cases with 95.65% of the patients receiving the standard combination.

CONCLUSION

Amit Jain's offloading device is a new, simple, synthetic, therapeutic offloading device that can be effectively used as an alternative to felted foam. It is based on deflective offloading technique just like felted foam. In this series, 86.98% of the wounds had healed by 16 weeks with this new offloading device. The Amit Jain's offloading device, which has a scientific rationale based on the deflective offloading as well as usage of viscoelastic material that is accepted worldwide, produces effective wound healing without any complication and without inhibiting patient's mobility. It also allows wound to be inspected periodically. Amit Jain's offloading is a level one recommendation for diabetic foot wounds.

Funding: No funding sources Conflict of interest: None declared Ethical approval: Not required

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Cite this article as: Jain AKC, Dath R, Rao UV, Kumar K, Kumar H, Kumar S. Offloading of diabetic foot wounds using Amit Jain's offloading system: an experience of 23 cases. Int Surg J 2017;4:2777-81.