A Case Report: Offloading the diabetic foot wound in the developing world

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Abstract:
This is a case of a lady who presents with a highly infected lesion in the right mid-foot area. The lady, belonging to the upper middle social class, gives a history of long term uncontrolled diabetes and hypertension. About 10 weeks prior to presentation she developed cellulitis, followed by formation of an abscess on the plantar surface of the right foot following a puncture injury while walking barefoot in her home. She tried home remedies for two weeks or so and then consulted a general surgeon. The surgeon drained the abscess and prescribed oral antibiotics and other medicines for diabetes and hypertension. Unfortunately, offloading was completely neglected in the patient’s management. Even after 6 weeks of his treatment, the lesion was not improving. Dissatisfied with the outcome, the patient decided to change the doctor and came to our diabetes centre for further management. We offered her good metabolic control along with repeated debridement of the ulcer and antibiotic as per repeated culture and sensitivity reports. In addition, we offered offloading through the Samadhan System researched by the authors in the year 2000. After 8 weeks on this management plan, the lesion healed completely.

Key words: necrotizing fasciitis, gangrene, Diabetes Mellitus

Introduction

Compared to patients without diabetes, those with diabetes are 15 to 46 times more likely to have an amputation. The lifetime risk of having some form of lower extremity amputation in a person with diabetes has been estimated to be as high as 15%. Of these amputations, the vast majority (>80%) have historically been preceded by foot ulcers. Repetitive trauma and pressure on the ulcer bed are two of the primary reasons for the persistence of ulcers once they have developed. If a person with diabetes has a lesion on the sole of a foot, he or she needs offloading through some device to shift the body weight away from the site of ulcer. This is of vital importance: all therapeutic efforts are bound to fail if a person continues to walk on an ulcer. Methods to offload the foot include bed rest, the use of a wheelchair, crutch assisted walking, total contact casts, felted-foam, half-shoes, therapeutic shoes, custom splints and removable cast walkers. However, due to economic constraints, unavailability or to ignorance as to principles of management of foot ulcer, such modalities are not commonly used in the developing world. Total contact casts (TCCs) are considered the gold standard of the off-loading and treatment of neuropathic ulcers. Unfortunately, even TCC is surprisingly underutilized in clinical practice for various reasons ranging from cost, fear of complications and lack of expertise. A solution to the problem was to develop an offloading device based on the principles of simplicity, ease of application, affordability, effectiveness, and requiring no training. With these principles in mind, the Samadhan
System of offloading was developed in the year 2000 at L.K. Diabetes Centre, Lucknow, India. The word Samadhan means “solution” in Hindi language. The system incorporates both a removable version (Samadhan-R) and an irremovable version (Samadhan IR).

The Samadhan System is economical and the device is easy to manufacture. Approximately 200 Samadhan offloading devices can be made using just 1 foam sheet (4’ x 10’). To make a Samadhan device a quadrangular piece of foam (with a density of 40 and 4 x 6 inches in size) is taken. An adhesive is applied and the foam is rolled into a cylindrical shape. This is left to dry and this becomes the basic Samadhan device. Clinically the decisions are made regarding size of the device and its placement (where it renders offloading effectively). The device is kept in place using elastocreppe bandage. The patient can wear common hook-and-loop closure sandals. This is Samdhan R (removable). To make the Samadhan-IR (irremovable offloading device), one needs to make the removable version and then cut the border of elastocreppe bandage on the dorsum, followed by sealing this border using a few drops of sealing wax. As the wax solidifies the device becomes irremovable until the seal is broken. After this, the patient can wear sandals with hook-and-loop closure.

Case Report

This 47 year-old female, known diabetic and hypertensive for 20 years with no previous history of foot ulceration, attended our outpatient department in the 1st week of September, 2010 with a foul smelling lesion on right sole (Fig. 1). Her history revealed a puncture injury to the plantar surface of the right foot 10 weeks previously. She tried home remedies for a fortnight or so following which the foot developed a foul smelling odor. She rushed to a general surgeon who drained the abscess and dressed the ulcer. This was followed by simple dressings for 6 weeks. Unfortunately, offloading was completely neglected. As a result, the lesion did not heal and she then came to our diabetes centre for further management.

At our centre we render specialized foot care services as well as diabetes education, medical nutrition therapy and basic podiatric surgical procedures. Each morning we have the wound clinic where debridement and dressings are performed and in the afternoons and evenings a regular diabetes clinic is conducted where consultations are rendered to people with diabetes. India is a country with 50 million people

Figure 1: Infected mid-foot plantar lesion (as on Day 1)
with diabetes\textsuperscript{11}. More than 35\% of the 1.3 billion population in India lives below poverty line and 80 million people in India go to bed hungry\textsuperscript{11}. Only 10\% of the Indian population has medical insurance\textsuperscript{11}. Under these circumstances, our centre contributes to cost savings by rendering multidisciplinary diabetic foot care services as well as general diabetes and medical management.

Upon presentation the patient’s fasting blood glucose was 160mg\% and post lunch was 250mg\%. Her blood pressure was 150/80 mmHg. With a height of 170 cms and weight 75kgs, her BMI was 25.95 Kg/M\textsuperscript{2}. Her blood urea was 40 mg\%, Serum Creatinine 1.1mg\% and Serum Uric acid 5.2mg\%. Her Lipid profile revealed Total Cholesterol as 180mg\%, Triglycerides 200 mg\%, HDL 42.0 mg\% and LDL (calculated) was 98 mg\%. Her ECG was normal.

The Ankle Brachial Index (ABI) was 0.9 in both feet. Vibration perception threshold (VPT) was 40 and 42 volts in the left and right foot, respectively. Neuropathy was further confirmed with a 10 Gram monofilament score of 0 in both feet while hot and cold sensation, tested with Tip Therm, was also absent. X-ray of the right foot was normal (\textit{Fig.2}) while MRI revealed multifocal soft tissue collections seen in fore and mid foot region. Her foul smelling and discharging lesion was in the right mid foot measuring 7cm X 5cm.

We advised her to take Glimeperide 1mg twice daily at breakfast and dinner, Rosuvastatin 5mg once daily after dinner, Telmisartan 40mg once daily at night and Methylcobalamin 500mg three times daily. We also prescribed oral Cefixime 200mg twice daily with Amikacin 500 mg IM twice daily (administered by her nurse at home) along with oral metronidazole 400mg 3 times daily. Debridement of the lesion was done repeatedly along with offloading with the Samadhan System of offloading (\textit{Fig.3}). This was followed by daily dressings which included cleaning of the lesion with normal saline.

After one week she was investigated for metabolic control. Her blood glucose levels were under control with fasting as 100mg\% and post-prandial as 150mg\%. Her blood pressure was 130/80mmHg. Due to regular dressings the foul smell from the lesion had stopped and lesion was looking much better. Eight weeks later the lesion was healed completely (\textit{Fig.4}).

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{image1}
\caption{(1st week under our care)}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{image2}
\caption{The Samadhan System of offloading (In this patient – 2 Samadhan devices were used).}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{image3}
\caption{Lesion healed after 8 weeks under our care}
\end{figure}
Discussion

Most of the Indian physicians - turned podiatrists advocate inserting a foam insole (with a hole cut into the region of the plantar ulcer) into a one size larger shoe for offloading. Unfortunately, such an insole is often ill fitted and can cause an “edge effect” or even new ulcers. This approach has not done well with most of our patients because many patients are reluctant to purchase new shoes, especially when the existing shoes are relatively new. Economical factors, in addition to the costs of podiatric care, also contribute to this reluctance.

At our foot clinic, we developed the aforementioned “Samadhan System of offloading”. It is based on the following principles: 1) simplicity—easy to make, 2) no special training is required, 3) affordability, and 4) effective offloading. The Samadhan System has a removable (Samadhan-R) and an irremovable version (Samadhan-IR).

Conclusion

Clinicians from developing countries are advised to improvise modalities as materials or facilities are available to them to improve health care. The Samadhan System of offloading shows that clinical research does not necessarily require a huge expense. As devices like the Samadhan System are further tested, they can be adopted by even the richest nations, where more expensive options may not be available to the poor.

References


