

# The Use of Dressing With Super Absorbent Polymers (sorbion sachet S) in the Treatment of a Long Standing Diabetic Foot Wound: A Case Study

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## Background

This case study follows a complex, multi-factorial foot ulcer where management of excessive exudate with a dressing with super absorbent polymers (sorbion sachet S) proved crucial in wound healing. The patient was a male type 2 diabetic, with profound neuropathic deficit but intact peripheral circulation. He had undergone a forefoot amputation which resulted in altered biomechanics and left a non-healing, heavily exuding wound which had not responded to gold standard therapy.

## Method

A prospective case study of a person with Type 2 diabetes with a non-healing foot ulcer using a unique dressing with super absorbent polymers (sorbion sachet S). Wound progression was monitored with photographs, measurements and wound exudate levels. Investigator and the patient rated the treatment regime in terms of overall performance, healing progression, patient comfort and handling on application.

## Results

The wound showed a positive response resulting in complete healing, managing high exudate under foot pressure. The therapy was well tolerated. Pain severity scores were extremely low throughout the treatment period. The investigator and patient ratings of the treatment regime were very positive. The wound has remained healed to follow up in 12 months.

## Conclusions

Abnormal wound healing in people with diabetes is well recognised. One of the significant contributions to a delay in wound healing is excessive exudate production. This patient despite receiving gold standard therapy failed to progress, excessive exudate being the confounding factor. The use of a dressing with super absorbent polymers controlled the excessive exudate and allowed the wound to progress to healing. The treatment was considerably less expensive than topical negative pressure and other absorbent dressings.

## Wound progression



**Week 0**



**Week 1**



**Week 4**



**Week 12**

# The use of sorbion sachet S in the treatment of a highly exuding diabetic foot wound

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Abnormal wound healing in people with diabetes is well recognised. One of the significant contributors to delayed wound healing is excessive exudate production. The case study reported herein follows a complex, multifactorial foot ulcer, where management of excessive exudates with sorbion sachet S assisted wound healing.

The concept of moist wound healing is well established within the literature, as are the problems associated with excessive exudate, causing peri-wound maceration, increased risk of infection and delayed wound closure (Winter and Scales, 1962; Sharman, 2003). There are many products, including foams and alginates, designed to manage exudate, but in the author's clinical experience, these products often fail to cope with excessive exudate production in the high-pressure environment under the foot, where altered moisture vapour transmission rates also occur. This is a significant problem in the treatment of diabetic foot ulcers.

Topical negative pressure (TNP) therapy has proven to be a successful management option for highly exuding diabetic foot ulcers (Armstrong et al, 2005), but unfortunately TNP can be an expensive option for long-term

treatment (Benbow, 2006). These ulcers require a cost-effective product that can (i) manage excessive exudate production, and (ii) work effectively on the plantar surface of the foot. These properties appear to be evident in the product sorbion sachet S (distributed in the UK by H&R Healthcare), developed by Sorbion AG. This dressing uses super-absorbent polymers to efficiently manage moderately to highly exuding wounds.

## Case study

Mr L is a 64-year-old man with well-controlled diabetes (HbA<sub>1c</sub> 6.7%). He is profoundly neuropathic, with sensory loss to knee level, measured with a 10g monofilament and 128MHz tuning fork. Mr L's peripheral circulation is intact with both dorsalis pedis and posterior tibial pulses being palpable. Non-invasive vascular assessment revealed an ankle-brachial pressure index of 1.1, with a

biphasic wave form. Mr L previously underwent a fifth digit amputation of the left foot. In November 2005, Mr L developed an ulcer in his left first plantar digit area that led to osteomyelitis in the first and second metatarsals. Mr L was admitted in February 2006 and, following consultations with diabetologists, radiologists, microbiologists, podiatrists and surgeons as members of the multidisciplinary foot ulcer clinic, a decision was taken to perform a forefoot amputation. This was deemed to be the best course of action, taking into account the previous amputation, the risk of further surgery and the need to create an adequate platform for foot function. Mr L was treated with an 8-week course of intravenous teicoplanin, the foot was off-loaded and conventional

wound care methods were employed. The wound healed in 18 weeks. Unfortunately, due to the loss of the base of the fifth metatarsal, there was a subsequent loss of peroneal function, resulting in over-pull of the anterior and posterior tibialis muscles, and a supinated foot. Consequently, in November 2006, Mr L developed an ulcer on the plantar surface of the stump, over the prominent cuboid. A variety of off-loading devices (including total contact casts [TCC], total contact insoles [TCI] and adapted shoes), in conjunction with a variety of absorbent dressings (including foams, alginates and hydrofibre) were used from November 2006 to July 2007, in an effort to heal the wound. Production of excessive exudates

meant that the TCC and TCI devices were rapidly soiled, and required frequent changes. The amount of exudate also raised concern regarding possible osteomyelitis, but x-rays and magnetic resonance imaging carried out in June 2007 proved negative. However, the wound persisted.

Due to the lack of sustained healing, Mr L was taken back to theatre in July 2007. The wound and the cuboid were surgically debrided to reduce the over prominence and create an acute wound. Following surgery, the wound was 50x30mm, with bone at the base. The surrounding tissue was clean and granulating and was not surgically closed. The surgeon reported the bone was "hard", and bone cultures were negative for bacteria. TNP (-80mmHg) was applied following surgery, and Mr L was non-weight bearing. Two weeks after surgery, a removable focused-rigidity below-knee cast (FRC) was fitted, with the TNP device being bridged on the dorsum and channelled through the front opening of the cast.

The wound progressed over the next week, with granulating tissue forming over the bone and a reduction in size (45x28mm). A decision was made to discontinue TNP therapy, and move to conventional wound care at this point. Mr L's wound

was dressed with silver-based absorbing foam.

Despite daily dressing, the wound became macerated and over-granulated (Figure 1) with soiling of the FRC, and in September 2007, a new FRC was fitted and sorbion sachet S was substituted as the primary wound dressing. At this time, the wound was 32x29mm.

Mr L was reviewed 1 week later and reported that the dressing had been changed five times, the last dressing having been applied 2 days prior to the clinic appointment. There was strike-through on the dressing and through the outer bandage (Figure 2), but maceration was minimal (Figure 3). There was no dressing adherence to the wound, no bleeding and the dressing was easily removed. There was some malodour. The wound was the same size (32x29mm), but the condition of the granulation tissue was good. This regimen was continued, with Mr L re-apply his dressings daily.

At review 4 weeks after commencement of the new FRC and sorbion sachet S dressing treatment, there was strike-through into the dressing but not into the outer bandage (Figure 4), no malodour was detected and the wound had reduced in size (20x26mm). By week 10, the wound had again reduced in

size (10x7mm) and there was no strike-through or malodour (Figure 5). Mr L was now changing his dressings twice weekly.

By week 12, the wound had healed (Figure 6).

Mr L continued wearing the FRC for a further 2 weeks, and then changed to a bespoke ROM Walker (Ossur UK, Manchester), and remains healed using this device.



**Figure 1.** Mr L's macerated, over-granulated wound, 1 week after cessation of topical negative pressure therapy.



**Figure 4.** Strike-through into the dressing, but not the outer bandage, was seen after 4 weeks using sorbion sachet S.



**Figure 2.** Strike-through on the dressing and outer bandage were seen after 1 week using sorbion sachet S.



**Figure 5.** Wound size had reduced and there was no malodour after 10 weeks using sorbion sachet S.



**Figure 3.** Minimal wound maceration was seen after 1 week using sorbion sachet S.



**Figure 6.** After 12 weeks using sorbion sachet S as the primary dressing, Mr L's wound healed.

## Discussion

Two practical issues confounded wound healing in this case: (i) the over-prominence of the cuboid and supinated foot; and (ii) the high volume of wound exudate. Off-loading and pressure management were pursued using gold-standard therapy, and it was the over-production of exudate that was the central reason for failure to heal.

A 10x10cm sorbion sachet S dressing was used in this case to manage excessive exudates, following failure with other dressings. Sorbion sachet S both absorbs and effectively binds up to 100mL of exudate (Cutting, 2008), reducing the risk of peri-wound maceration (Cutting and White, 2002). Binding of the exudate ensures that the dressing remains effective, even under compression bandage therapy, as was the case for Mr L, whose underlying foot deformity resulted in some pressure to the wound, despite off-loading.

Matrix metallo-proteinases (MMPs) are important during the inflammatory stage of wound healing, but become destructive to the wound matrix when the normal inflammatory stage is prolonged in a chronic wound, suppressing cell proliferation and angiogenesis due to

the disruption of growth factors as well as matrix proteins that provide necessary substrates for cell migration and integrity of the tissue (Lobmann et al, 2002). Sorbion sachet S, rapidly removes, binds and deactivates MMPs in wound exudate. (Cutting et al, 2007).

Efficient wound exudate management may also reduce the risk of infection. It is suggested that chronic wounds host bacterial communities in the form of biofilms (Rhoads et al, 2007). Rapid removal of exudate, by a highly absorbent dressing like sorbion sachet S, may assist in managing this bioburden by accelerating the transit of exudate through the biofilm and preventing the full extraction of nutrients and their utilization (Wolcott et al, 2008).

Treatment with a highly absorbent dressing can extend the length of time between dressing changes. Fewer dressing changes leaves the wound undisturbed for longer periods – avoiding disruption to the delicate tissues of the wound bed and promoting healing. In this case, due to the high volume of exudate, daily dressings were used initially, but as the exudate became controlled, the frequency of dressing changes was reduced.

Furthermore, the efficiency of a highly absorbent dressing reduces the costs that

would otherwise be associated with a less efficacious product that requires more frequent dressing changes. It has been shown that treatment with sorbion sachet S is considerably less costly than other wound dressings, as 50% fewer dressing changes have been achieved in clinical use (Cutting et al, 2007).

In this case, no adverse effects (e.g. burning, stinging) were associated with sorbion sachet S, as have been experienced with some other absorbent dressings (Hollingworth, 1995). This product's polypropylene contact layer is hypoallergenic, as no adhesives are used in the manufacturing process (Cutting, 2008).

## Conclusion

This case study suggests that sorbion sachet S is a useful addition to clinical practice in the management of highly exuding diabetic foot ulcers. It is highly absorbent, works in areas of high pressure, is hypoallergenic and is inexpensive in comparison with other treatment options. ■

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