Management of a non-healing postoperative wound using a bacteria and fungi-binding mesh

This case report describes the use of Sorbact®, a bacteria and fungi-binding dressing, to treat a chronic surgical wound in a patient with a history of substance abuse and peripheral arterial disease. The wound had previously been treated unsuccessfully with negative pressure wound therapy and antimicrobial dressings, and had not healed 7 months after surgery. The use of Sorbact was viewed by the treating team as a turning point in wound healing, and its suggested mode of action in enabling wound healing is outlined here.

Chronic wounds are defined as wounds that have failed to proceed through an orderly and timely reparative process to produce anatomic and functional integrity over a period of three months.[1] An underlying causative factor is often responsible for wound non-healing, and can be classified in one of the following broad areas:

- Arterial insufficiency
- Venous stasis
- Chronic disease
- Pressure injury.

Secondary factors can contribute to wound chronicity, including medication regimens, lifestyle factors (such as exercise, personal hygiene, smoking, alcohol and other drugs), and wound management[1].

The chronic wound environment, rich in inflammatory products and inflammatory cytokines, leads to an excess of matrix metalloproteases that clear the extra cellular matrix in preparation for subsequent tissue regeneration. The balance between these proteolytic wound enzymes and their inhibitors is often uneven in the chronic non-healing wound and can lead to a cycle of continued wound degradation and inflammation. The presence of wound microorganisms also promotes local inflammation that can lead to wound infection, inflammation and further inhibition of wound healing[2]. These wounds cause patients severe emotional and physical stress and create a significant financial burden on patients and the healthcare system as a whole[3].

Wounds associated with intravenous (IV) drug users vary, and include chronic non-healing ulceration secondary to venous stasis or deep vein or intra-arterial thrombosis[4]. IV drug use increases the risk of embolic events that can lead to limb ischaemia[5]. The inadvertent or deliberate intra-arterial injection of drugs can cause severe tissue ischaemia and necrosis, resulting in wounds that are difficult to manage[6]. The presentation of chronic wounds in this patient group can therefore be challenging to manage owing to the potential presence of arterial insufficiency and the contribution of secondary lifestyle factors[7].

Case report
A 54-year old male with a history of substance abuse was admitted to an acute hospital for surgical treatment of advanced peripheral arterial disease. The patient underwent an aortobifemoral bypass, using a Y-graft procedure, which produced a surgical wound to his left anterior thigh and groin. The patient had previously had an above knee amputation of the left leg, after failed surgery to salvage the lower leg following an acute ischaemic event. The patient remained in hospital following the bifemoral bypass as part of his inpatient recovery. However, the surgical wound failed to heal, and thus became the primary active medical issue[Figure 1]. This case study outlines the subsequent management of this chronic non-healing wound.

Initial wound management
The patient’s wound was initially managed using standard protective surgical dressings. However, 2 weeks following surgery, wound dehiscence occurred — felt by staff to be related to the patient’s excessive movement of the area — and the risk of infection increased.
A management plan was implemented to protect the wound from infection and provide the best environment for wound healing to occur; this included negative pressure wound therapy and silver-based antimicrobial dressings. However, following 7 months of failed wound management interventions, the patient was transferred to a non-acute specialist rehabilitation centre, for continued rehabilitation and wound management.

Use of bacteria and fungi-binding mesh
On arrival at the centre, a bacteria and fungi-binding gel dressing (Sorbact, ABIGO Medical, Sweden) was applied to the wound for continued wound management. This decision was largely based on anecdotal evidence by the healthcare professionals that Sorbact can help break the cycle of chronic inflammation, which was evident in this wound. An antimicrobial dressing was not used because an urgent infective process was not identified. Also antimicrobial dressings had been used up to this point without success and the need to relieve the wound of exposure to possible irritants was identified. The intended outcome of Sorbact use was to dampen inflammation by:

- Binding and removing wound pathogens
- Avoiding chemical agents
- Protecting from further wound colonisation, including MRSA

The gel dressing was applied as a wound contact layer (Figure 2) with additional support using standard secondary dressings. No significant changes to the patient medication regimen or diet occurred over the period of wound management.

Outcomes
After 1 week of using the new treatment, the wound edge and surrounding wound tissue had become less indurated and lighter in colour. The granulation tissue was more evenly distributed and less friable (Figure 3). By week 3, the wound edges were lower, less indurated and clinically less inflamed. The wound bed was approaching the more favourable pink colour associated with positive wound healing and autolytic debridement of fibrin and cellular debris. By week 5 the upper half of the wound, which extended 10cms from the left inguinal groove to the anterior thigh, appeared to be almost completely healed (Figure 4). The lower wound, separated by a 2 cm skin bridge and extending 15 cms toward the mid-anterior thigh, was considerably shallower and continued to display signs of improvement. The peri-wound area was settled with respect to inflammation and the wound bed demonstrated stable granulation tissue and wound epithelialisation.

After 6 weeks both the treating team and the patient were very happy with the healing outcome of the wound (Figure 5), and the patient was transferred home for ongoing home-based care.

Discussion
The factors relating to chronic wound healing are varied and complex. Healing is influenced by many factors, such as lifestyle and patient compliance, so it can be difficult to define precisely which parameter change correlates to wound healing outcomes. In this case study the change in environment may have improved the patient’s wellbeing — knowing he was one step closer to home — which in turn resulted in improved lifestyle factors and treatment compliance.

However, sometimes a change to a single variable is all that is required to enable the patient to ‘turn the corner’ in wound healing.
In this case study, the treating team felt the introduction of a form of bacteria and fungi-binding dressing was the key to success. This form of dressing works by facilitating an optimal wound healing environment. It achieves this by binding to wound microorganisms to help dampen both the effect of these pathogens and the often chronic local inflammation that is associated with these types of wounds[11-12]. The mechanism of action is based on the physical principle of hydrophobic interaction[13] and does not rely on the deposition of any bactericidal chemicals or endogenous toxins to the wound bed [Figure 6]. Following a change in dressing regime, there was an almost immediate improvement in a wound that had not healed to any satisfactory extent in the preceding 7 months since surgery.

**Conclusion**

This case report demonstrates the use of an inert dressing that binds bacteria and fungi, in treating a chronic surgical wound in a patient with a history of substance abuse and peripheral artery disease. Following the introduction of Sorbact, an appropriate wound healing environment was achieved by breaking the cycle of chronic inflammation, and this resulted in improved wound healing with sustained results.

**Figure 6.** Sorbact is able to bind bacteria and fungi, which are removed at dressing change. This mode of action is different to traditional antimicrobial dressings that kill bacteria using chemical agents[14].
The Sorbact® method is a clinically established Swedish innovation for management of all types of wounds. With a natural mode of action, Sorbact® binds bacteria and fungi. The fact that Sorbact® does not contain antiseptics or other toxic agents is positive for the environment. Wound management with Sorbact® does not contribute to the increasing worldwide problem of bacterial resistance to antibiotics. Through our partners and distributors, Sorbact® is used to manage a wide variety of wounds in more than 60 countries on all continents.