

Case report

The use of Burnaid Gel™ on fracture blisters

Cox H & Nealon L

Fracture blisters

Fracture blisters refer to a fracture complicated by overlaying blisters. These blisters are caused by underlying oedema resulting in elevation of the superficial layer of the skin¹. Fracture blisters are classified as clear fluid-filled and/or blood-filled blisters. They can be quite large in size and often appear in multiples. The fluid contained within the blisters is a sterile serous fluid that is conducive to healing.

Fracture blisters can occur in any orthopaedic patient who has sustained a traumatic injury, and usually arise within 24-48 hours of acute injury. Fracture blisters in the pre-operative period can lead to serious complications such as delayed wound healing, wound infection, delayed surgery and, ultimately, will prolong recovery¹.

Patients who have excessive swelling post-surgery can develop similar blisters which are referred to as post-operative wound blisters. Patients who develop post-operative blisters have a decreased risk of developing wound infections than those with fracture blisters in the pre-operative period¹. All orthopaedic patients have the potential to develop fracture blisters; however, it is more commonly seen in traumatic injuries, particularly fractures of the tibia, ankle and elbow.

Previous pre-operative protocol for the treatment of fracture blisters at Prince of Wales Hospital (POWH) involved manually de-roofing the blisters and applying silver sulphur diazine (SSD) cream daily with a non-adherent dressing. This method meant a delay for surgical intervention by 18-21 days², until the blister had healed, thereby reducing the risk of infection during the operative and post-operative phase. The healing phase of the fracture blister would differ from patient to patient.

Helen Cox

Clinical Nurse Educator (Surgery)
Prince of Wales Hospital, Sydney, NSW

Lisa Nealon

Clinical Nurse Consultant (Orthopaedics)
Prince of Wales Hospital, Sydney, NSW

Fracture blisters that developed in the post-operative phase were left intact, allowing the transudate to remain sterile; once the fracture blister ruptures, it becomes contaminated with skin flora, increasing the risk of wound complications and delaying healing¹. The intact blister is always protected with an absorbent non-adherent dressing or other protective dressing.

Peri-operative treatment of fracture blisters with Burnaid Gel™

Division still remains on how to treat fracture blisters; however, surgery is usually unable to be performed until the fracture blister has healed. Formation of fracture blisters creates a disruption of skin integrity for the injured patient and creates unique challenges for nursing staff.

Burnaid Gel™ (Woundaid Hydrogel) is a propylene glycol gel with >90% purified water and an active ingredient of 4% melaleuca oil (teatree oil – TTO)³. Melaleuca alternifolia oil is unique to Australia and has well documented benefits, including natural antiseptic, antimicrobial, anti-inflammatory and anaesthetic properties. TTO has an anti-microbial effect against organisms such as *Staphylococcus aureus*, Methicillin-resistant *S. aureus*, Streptococci, *Escherichia coli* and *Candida albicans*⁴.

Testing of Burnaid Gel tubes (4% melaleuca oil) in accordance with the British Pharmacopoeia Preservative Test indicated Burnaid passed the test (Table 1). Testing of Burnaid Gel by the Department of Microbiology, Repatriation General Hospital, Concord, Sydney, for activity against a number of

Table 1. Testing of Burnaid Gel tubes in accordance with the British Pharmacopoeia Preservative Test.

Culture	Control count	0hr	6hr	24hr	48hr
<i>S. aureus</i>	1.9x10 ⁷	8.4x10 ⁵	<10	<10	<10
<i>P. aeruginosa</i>	4.7x10 ⁶	3.6x10 ⁵	<10	<10	<10
<i>C. albicans</i>	5.1x10 ⁶	4.0x10 ⁵	<100	<100	<100
<i>A. niger</i>	2.9x10 ⁶	4.7x10 ⁵	3.8x10 ⁵	2.6x10 ⁵	<100

Table 2. Testing of Burnaid Gel by the Department of Microbiology, Repatriation General Hospital, Concord, Sydney.

Organism	Zone of inhibition (mm)
<i>C. albicans</i>	5
<i>C. tropicalis</i>	11
<i>S. aureus 3</i>	40
<i>S. aureus 4</i>	47
<i>E. coli 5</i>	30
<i>E. coli 6</i>	24

organisms expressed as zones of inhibition, indicated activity against all organisms (Table 2)⁵.

Studies by Pippin *et al.*⁶ and Finlay-Jones & Hart⁷ documented that terpinene-4-ol and alpha-terpineol may selectively regulate cell function during inflammation and, following topical application, may control inflammatory responses to foreign antigens in the skin. They postured that TTO enables neutrophils to remain fully active in an acute inflammatory response, whilst suppressing monocyte inflammatory mediators, thereby preventing oxidative tissue damage in a prolonged inflammatory state⁴.

Case report

The patient was a 36 year old male admitted in 2006 after a motorcycle accident left him with a tri-malleolar fracture and a posterior dislocation of the right leg. The patient had no significant medical history and was previously fit and well. The dislocation was realigned on the day of injury and a backslab was applied (Figures 1 & 2). On admission it was

Figure 1. X-ray of right leg fracture.



Figure 2. MRI scans of right leg fracture.



Figures 3 & 4. Swollen and bruised toes showing gross fracture blisters.



noted that his toes were swollen and bruised, along with the presence of gross fracture blisters (Figures 3 & 4). We used Burnaid Gel in the treatment of these fracture blisters.

On Day 1 the blisters were de-roofed after rupturing and treated with Burnaid Gel and a non-adherent dressing. The dressings were attended daily with normal saline as a cleansing agent (Figure 5). By Day 3 the blisters were progressing well and the patient did not report any discomfort during dressing changes (Figure 6).

On Day 5 the blisters were healing well and daily dressings of Burnaid Gel continued. The patient even commented on the pleasant smell from the gel (Figure 7). On Day 7 the blisters were between granulation and epithelialisation; the dressings were easily removed without causing pain to the patient due to the gel formulation (Figure 8).

By Day 10 the blisters were at the epithelialisation stage. The orthopaedic surgeons were ready to proceed with surgical intervention (Figure 9). On Day 11 the patient was transferred

Figure 5. The dressings were attended daily with normal saline as a cleansing agent.



Figure 6. Day 3 – blisters progressing well.



Figure 7. Day 5 – blisters healing well.



Figure 8. Day 7 – blisters between granulation and epithelialisation.



to operating theatre for open reduction and internal fixation of the fractured right ankle and the removal of the external fixation (Figures 10 & 11). The patient experienced a non-eventful recovery after the surgical procedure and was discharged home on crutches 5 days post-surgery.

Conclusion

The use of Burnaid Gel in the treatment of fracture blisters was able to reduce the time the patient waited to receive appropriate surgical treatment. The patient found the gel soothing to the broken skin and also commented on the pleasant smell from the gel itself. It was also noted that the gel did not cause any irritation or maceration to the healthy outerlying skin.

Several more patients with fracture blisters were treated with Burnaid Gel over the following 12 months, with equally successful results. The clinical nurse consultant for orthopaedics reviewed the clinical procedure for the

Figure 9. Day 10 – blisters at the epithelialisation stage.



Figures 10 & 11. Post surgery.



treatment of fracture blisters at the POWH in 2007 and has now introduced Burnaid Gel as the product to be utilised in the fracture blister treatment policy.

The most significant change in the use of Burnaid Gel in the management of fracture blisters is the improved time delay for surgical intervention whilst allowing for the healing process of the blister to occur. It improved the wait for surgical intervention by 7 to 10 days. Burnaid Gel has shortened the healing time, provided additional pain management to the patient and also protected the surrounding skin of the blister, thus allowing a more positive and time efficient solution in the treatment of fracture blisters.

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