

DEBRIDEMENT OF A TRAUMATIC HAEMATOMA USING LARVAL THERAPY

Complex wounds require very careful multidisciplinary management and present clinicians with complicated challenges when trying to salvage limbs. Biosurgery, or the use of maggots to debride infected wounds, has been employed effectively in wound care for a number of years. This article follows the progress of two complex trauma wounds where larval debridement therapy was employed over a nine-week period. This care pathway ensured the patient's safety and provided excellent clinical outcomes.

WOUND BED PREPARATION

There are various techniques used for wound debridement, for example, sharp, surgical or hydrosurgical, and factors that have to be taken into account include:

- ▶▶ Patient choice
- ▶▶ Amount of tissue to be removed
- ▶▶ Time and speed of removal of devitalised tissue
- ▶▶ Pain caused by the procedure
- ▶▶ Availability of staff to deliver the treatment (Young, 2011).

The method chosen needs to be as non-traumatic as possible for the patient and larval therapy has been found to remove the

devitalised tissue effectively with minimal trauma (Calianno and Jakubek, 2006).

While haematomas are not truly necrotic, they do represent non-viable tissue that requires removal from the wound bed to enable healing. Removal of devitalised tissue has the following benefits:

- ▶▶ Creation of the optimal wound healing environment by production of a well-vascularised stable wound bed with minimal exudate (Vowden and Vowden, 2002)
- ▶▶ Reduction in wound malodour (Vowden and Vowden, 2002)
- ▶▶ Lowering of the wound's bioburden, which has a direct impact on wound healing
- ▶▶ Promotion of epithelial cells, thus enabling the restoration of the coverage of the epidermis (European Wound Management Association [EWMA], 2004)
- ▶▶ Helps clinicians perform thorough wound assessment (Benbow, 2008).

MANAGEMENT OF BACTERIAL BIOBURDEN

Infected wounds have a high level of exudate, which requires careful control and frequent dressing change to prevent maceration (Hilton et al, 2004). Falanga

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Figure 1: The first traumatic haematoma on the patient's inner right leg.

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(2000) suggests that debridement, is an important stage in the wound healing process, forming the key element of wound bed preparation and acting as an essential precursor to the use of modern wound management treatment. An inadequately prepared wound bed is unlikely to heal due to the wound being dry, which in the case of larval therapy, means the larvae will die. This will result in a waste of time and resources.

Larval therapy

Over the past decade, the use of sterile maggots has become an acceptable method in the debridement of infected necrotic wounds (Thomas, 2006).

Horobin et al (2005) highlight that larval therapy can be used to promote wound debridement and stimulate wound healing and Van der Plas et al (2008) state that they can reduce the bacterial load and eradicate Methicillin-resistant *Staphylococcus Aureus* (MRSA).

Larval therapy has been used effectively in wound care for a number of years (Thomas, 2006) and has a number of benefits (Table 1). Due to the severity of the wounds, the case featured here involved a four-week period of debridement with BioFOAM® dressing (Biomonde). The larvae used in this dressing debride devitalised tissue through sealed net bags that also contained foam chips, which absorb exudate.

In this case, the dressing was used to debride two haematomas. It was applied every five days for five applications on the first wound and every five days with four applications on the second wound.

TRAUMATIC HAEMATOMA

A large haematoma caused through trauma, for example from a fall, results in

swelling and tension on the skin, limits the range of movement, produces severe pain and can lead to wound complications, such as skin ischaemia and persistent bloody leakage of exudate/fluid (Clarke, 2011). The traditional way to remove a haematoma is surgical evacuation.

CASE REPORT

The author was asked to see Patient A, a 63-year-old woman who had been admitted with a haematoma on her right tibia and inner calf. She had a history of angina, back pain and fibromyalgia, chronic obstructive pulmonary disease, and asthma, which was managed with steroids.

The haematoma was sustained when she had fallen at home, knocking her right inner-lower leg.

Patient A was an anaesthetic risk due to heart failure and lung disease and, therefore, was unfit for theatre. She was also distressed by being recently widowed and for this reason she requested that she be allowed to return home as soon as possible.

The traditional care pathway for the management of a large haematoma would be sharp debridement performed in theatre by an orthopaedic surgeon. However, the orthopaedic surgeon and the author discussed Patient A's care and it was agreed that larval therapy may be beneficial.

On discussion with Patient A, she was initially very shocked and was not sure whether she would cope with the thought of having larval therapy, even if the maggots were contained in a bag. The author provided her with a patient information leaflet on larval therapy and outlined the advantages and disadvantages (Table 1). After

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Table 1
Advantages and disadvantages of larval therapy (Vowden and Vowden, 2002)

<i>Advantages</i>	<i>Disadvantages</i>
<i>Rapid but selective debridement</i>	<i>Availability</i>
<i>Reduction of bacterial burden</i>	<i>Slower than sharp or surgical debridement</i>
<i>Possible control of MRSA</i>	<i>Not suitable for all wounds</i>
<i>Possible chemical stimulation</i>	<i>Effectiveness limited by environment (wound pH, fluid and oxygen)</i>
<i>No reported toxicity or allergenicity</i>	<i>Disposal</i>



Figure 2: Assessment of the first wound after debridement on 18 April, 2011.



Figure 3: The first wound healing well on 9 May, 2011.

reading this, Patient A agreed to try the technique.

On further assessment, the haematoma on her right inner lower leg was found to measure 16 x 11cms and comprised 100% dark purple tissue. The patient gave permission for photographs to be taken for teaching and publication purposes (Figure 1).

The author requested that Patient A's lower legs be elevated on the bed. A profiling bed frame and an alternating mattress were also used with 2–4-hourly changes of position to prevent the development of pressure ulcers on her sacrum as she had to sit upright due to her heart failure and lung disease. Patient A was eating well and had the following clinical results:

- ▶▶ Waterlow Score (Waterlow, 2005): 9
- ▶▶ Body mass index (BMI): 22
- ▶▶ Malnutrition universal screening tool (MUST) (BAPEN, 2004): 0
- ▶▶ Serum albumin: 47
- ▶▶ Haemoglobin: 12.0
- ▶▶ White cell count: 14.2.

She did not have raised temperature and had been commenced on intravenous antibiotics at the request of the medical consultant.

Care pathway

The author returned the next day, removed the previous dressing and cleansed the wound with saline. She then applied the first larval therapy dressing

to the wound. The haematoma was soft and pliable but the surrounding skin was very tense and tight. The author liberally applied Sudocrem® (Forest Laboratories UK Ltd) around the wound to protect the skin from excoriation. Two 10 x 10cm bags of larvae, two pads of gauze (as per manufacturer's instructions — www.biomonde.com) and a large absorbent pad were secured with a bandage, which would require twice-daily changes until its scheduled removal on 13 April, 2011. The gauze, surgical pad and bandage required regular changes due to the amount of exudate being produced by the larvae.

On 11 April, 2011 the author was contacted by the ward staff and informed that the larvae had died, the obvious implication being that the debridement had not been successful. The author reordered the larval therapy dressing and in the meantime the ward staff were advised to redress the haematoma with Intrasite® Gel (Smith & Nephew) and Biatain® foam dressing (Coloplast), every 48 hours.

The author repeated the application of the larval therapy dressing on 13 April, 2011. On removal of the interim dressing, the haematoma had split open and the skin was starting to lift. The haematoma itself was soft and measured 16 x 11cm. It was still 100% dark purple. The author reapplied the larval therapy dressing and Patient A continued to elevate her legs on the bed.

After the latest application of larval therapy the consultant was happy for

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Patient A to be discharged and to manage her care as an outpatient. The district nursing team was contacted and were happy to undertake the daily application of Sudocrem, dry gauze and absorbent pad secured with bandage. The author reordered the larval therapy for further application.

On 18 April, 2011 the author applied two new larval therapy dressings to the wound. On removal of the previous dressing, the larva were fat and mobile. The haematoma was soft, measured 14.5 x 7cm and had split open further. The skin was starting to debride and consisted of 60% dark purple and 40% pink tissue (*Figure 2*). The district nursing team were contacted and were happy to continue the daily regimen.

The author reviewed Patient A on 9 May, 2011 in the clinic following a further two applications of the larval therapy dressings. The right inner lower leg had a partial thickness wound (a loss of dermis presenting as a shallow open wound) measuring 14.5 x 8cm. This was a slight increase in size, a phenomenon which regularly occurs prior to the wound starting to contract on the final phase of wound healing. The wound exhibited 20% yellow sloughy tissue, 80% pink tissue and signs of epithelialisation.

The wound was still healing well (*Figure 3*) and the author began applying two layers of Aquacel® (ConvaTec) and an Eclipse® dressing (Advancis Medical) secured with toe-to-knee bandage. The author advised that this dressing regimen should be changed every three days and recommended that Patient A elevate her right lower leg to help promote wound

healing. A further review was scheduled on the 6 June, 2012 in clinic.

However, on 23 May, 2011 the author was contacted by the ward to see Patient A again as she had been readmitted with another haematoma on her outer right tibia. The orthopaedic consultant stated that this injury had been caused at the same time as the original injury in April, 2011, but had remained hidden. The author discussed the care pathway that had been initiated on the original wound on the inner leg and because of the results of using the larval therapy it was agreed to instigate the same treatment regimen on the second wound.

The haematoma on Patient A's right outer lower leg measured 9 x 4cm and comprised 100% dark purple tissue. It was protruding through the skin in an egg shape. The author ordered the larval therapy and advised elevating both Patient A's legs on the bed and providing analgesia. Despite the new wound, Patient A was eating well and her blood results were all normal, apart from her white cell count, which was raised at 14.3.

On the 24 May, 2011 the haematoma on the right outer lower leg had split open and the skin was starting to lift. The haematoma itself was soft and comprised 100% dark purple tissue (*Figure 4*).

The author applied two bags of larval therapy, two gauze pads and a large absorbent pad secured with a bandage to the right outer lower leg wound. This regimen required changing twice daily until scheduled removal on 27 May, 2011. She also liberally applied Sudocrem around the wound to protect the skin from excoriation.



Figure 4: The second haematoma on 24 May, 2011.



Figure 5: The primary wound on 24 May, 2011 assessment.

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On the 24 May, the original wound was also assessed (*Figure 5*). It was dressed with Polymen Max (Aspen Medical) every four days and was left in situ while the larval therapy dressing was applied to the second wound.

The author debrided some hard tissue from the second haematoma leaving soft tissue in the wound bed, which measured 9 x 4cm and consisted of 100% dark purple tissue.

On 27 May, the author applied the larval therapy to the second wound and applied Sudocrem liberally around the wound to protect the skin from excoriation (*Figure 6*). She also applied two bags of debridement larvae, two pads of gauze, and a large absorbent pad secured with a bandage to be changed twice daily until 2 June, 2011. The author advised that the Polymen Max should remain undisturbed on the inner wound. She also asked that Patient A's legs be elevated on the bed while undergoing larval therapy.

There appeared to be another collection of haematoma just on the outside of the right knee which required monitoring.

On 2 June, 2011, the author reapplied the larval therapy to the second wound. On inspection, the previous batch had died. Despite this, there appeared to have been effective debridement of the haematoma on the patient's right outer lower leg (*Figure 7*). The wound had decreased to 5 x 8cm and comprised 50% haematoma and 50% pink granulation tissue.

Despite the progress, Patient A was very worried about the possibility losing her leg and the author reassured her that it was



Figure 6: Second wound on 27 May, 2011.



Figure 7: Second wound at assessment on 2 June, 2011.

making good progress. The author reapplied the larval dressing therapy to the right outer lower leg wound and the Polymen Max was continued on the inner wound every four days. Patient A was discharged on the following Monday after another application of larval dressing therapy.

On the 6 June, 2011 the author reapplied the larval therapy to the second haematoma in clinic. The last batch had been effective and her right outer lower leg haematoma now measured 5 x 8cm and comprised 100% pink granulation tissue (*Figure 8*). The initial wound was healing well (*Figure 9*).

The same treatment regime was maintained. The district nurses were happy to continue her treatment at home. She understood the importance of elevating her legs at home while undergoing the larval therapy.

On completion of the larval therapy treatment the author advised application of Polymen Max to both wounds every four days, secured with toe-to-knee bandage.

The author reviewed Patient A in clinic on 17 June. The second haematoma on her right outer lower leg was now fully debrided had decreased in size to 4 x 7.5cm, comprised 100% pink granulation tissue and was nearly flush with the skin (*Figure 10*).

The original wound on Patient A's inner leg had completely healed with excellent results. It had the appearance of a skin graft wound (*Figure 11*).

The small haematoma just on the outside of the right knee, which had required monitoring, appeared to be reabsorbed naturally into the tissue.

KEY POINTS

- ▶ While haematomas are not truly necrotic tissue, they do represent non-viable tissue that requires removal from wound bed to enable healing.
- ▶ The traditional care pathway for management of large haematoma would be sharp debridement performed in theatre by an orthopaedic surgeon.
- ▶ This case features two complex trauma wounds where larval debridement therapy was employed.
- ▶ This care pathway ensured the patient's safety and provided excellent clinical outcomes.



Figure 8: The second wound on 6 June, 2011.



Figure 9: The primary wound on 6 June, 2011.



Figure 10: The second wound on 17 June, 2011.

Patient A's wounds were making good progress, despite the fact that she was not able to mobilise well and was using a wheelchair due to her heart problems. The author advised that the Polymen Max should be continued on the second wound and secured with toe-to-knee bandage every four days. The wound on the inner leg now required Dermol 500, an emollient used to moisturise dry tissue and continue wound healing.

Patient A was given another clinic appointment for four weeks time, when she was discharged as the wounds were completely healed.

CONCLUSION

Effective debridement in the traumatic haematoma wound is very challenging.

It is essential that a multidisciplinary approach is adopted and that every problem is addressed in turn.

Treating the underlying problems and selecting a suitable care pathway is vital to the patient's recovery and in this case saved the patient's leg. She was not suitable for theatre due to her medical conditions and this article presents an alternative management care pathway.

Whilst this is only one case study, the larval therapy dressing had excellent result and demonstrated that debridement with larval therapy followed by traditional wound management could be successful inside a nine-week period. This meant the patient was able to go home and be treated as an outpatient by the district nursing team and the author. [WUK](#)



Figure 11: On 17 June, the primary wound had the appearance of skin graft.