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Lomatuell Pro contact layerand its role in the wound-healing process

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Abstract

There is a plethora of wound contact layer dressings on the market each with its own properties to promote healing, which makes dressing selection complicated. An effective and efficient choice of dressing depends on holistic patient assessment, along with an understanding of the wound-healing process, moist wound healing and wound bed preparation. This paper, supported by clinical case studies, demonstrates the effectiveness of the Lomatuell® Pro dressing (Lohmann & Rauscher) in the management of graft wounds, although it is known to be effective in the management of dermal and deep dermal wounds as well. Lomatuell Pro offers benefits of conformability, open mesh gel-forming wound contact properties and a low risk of adhering to the wound bed. It enables moist wound healing by allowing exudate to be absorbed by a secondary dressing. Lomatuell® Pro demonstrates excellence in maintaining a moist wound environment, allows atraumatic dressing removal and encourages a healthy periwound area.

■ wounds ■ wound-healing process ■ wound dressing ■ Lomatuell® Pro

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There are numerous wound contact layer dressings on the market (Ovington, 2007; Abdelrahman and Newton, 2011). However, this degree of choice can make it difficult to select appropriate wound contact layers in clinical practice (Weller and Sussman, 2006; Baranoski and Ayello, 2015). The absence of high-quality research data supporting individual dressings has led to selection often being based on familiarity, personal preference and cost (Watson and Hodgkin, 2005). Each wound contact layer dressing on the market has its own characteristics (Ovington, 2007; Jones, 2015a).

Wound contact layer dressings do not heal wounds; they facilitate the healing process by creating an environment that is conducive to wound healing (Watson and Hodgkin, 2005; Weller and Sussman, 2006).

Choice must be influenced by a holistic patient assessment and an understanding of the wound healing process, the theory of moist wound healing and the principles of wound bed preparation (Watson and Hodgkin, 2005).

Holistic patient assessment

When assessing patients with a wound, the clinician must take into account the various factors that can affect the healing process (Chamanga, 2016). These are usually referred to as intrinsic and extrinsic factors or systemic and local factors respectively (Guo and DiPietro, 2010; Sussman, 2014).

Intrinsic factors relate to a patient's overall health or disease state and may negatively or positively affect the wound-healing process; they include, for example, conditions such as anaemia or poor glycaemic control (Guo and DiPietro, 2010). Extrinsic factors are external factors that affect the healing process negatively and need to be addressed so wound healing can be achieved. These include pressure, friction, medication and excessive alcohol consumption, among others (Guo and DiPietro, 2010; Stacey, 2016).

In addition to intrinsic and extrinsic factors, the patient's social and psychological status must be assessed, with particular attention paid to pain and anxiety, which may result in stress and discomfort (Hollinworth and Collier, 2000; Woo et al,

2008). Studies into quality of life have shown pain is a critical parameter for comfort or discomfort during dressing change (Kammerlander and Eberlein, 2002). Moreover, stress has been reported to disrupt the neuroendocrine immune equilibrium, which causes a substantial delay in wound healing by prolonging the inflammation phase (Sternberg, 2006). Stress can also lead to anxiety, depression, suboptimal sleeping patterns, inadequate nutrition, taking less exercise and the likelihood of excessive alcohol consumption, cigarette smoking and the use of other drugs, which are known to delay healing or increase the risk of infection (Godbout and Glaser, 2006).

Wound healing

The wound healing process is complex, involving four interrelated biological and molecular activities to repair and regenerate (Guo and DiPietro, 2010; Boateng and Catanzano, 2015; Han and Ceilley, 2017).

The four phases are:

- Haemostasis
- Inflammation
- Proliferation
- Maturation/remodelling. (McCarty and Percival, 2013; Stacey, 2016)

Different activities take place in the different phases, with most of the phases overlapping. The differences in activity at each phase means it is unlikely one dressing can be used for the whole wound healing process, as the choice of dressing often changes with each phase, depending on the wound bed (Weller and Sussman, 2006).

Haemostasis phase

The first phase of the wound-healing process is the haemostasis phase. This begins with the blood vessels constricting (vasoconstriction); the platelets then aggregate, and a clot is formed to prevent excess blood loss (Ng, 2010; Stacey, 2016).

Following vasoconstriction, there is little blood loss. As part of wound management, the area needs to be covered by a non-adherent wound contact layer, except in cases of severe bleeding, which cannot be controlled by vasoconstriction.

Inflammation phase

The inflammation phase is predominantly characterised by the presence of neutrophils and macrophages in the wound bed and surrounding tissue, which fight invading harmful microorganisms and degrade foreign materials (Harding et al, 2002).

The inflammatory response causes blood vessels to become leaky and release plasma; fibrin is broken down as part of the 'clean-up' process (Meyers and Hudson, 2013). As the wound goes through the inflammation phase, there is a natural increase in exudate production as a result of the action by neutrophils and macrophages. The amount of exudate produced at this stage varies from one wound to another as it is influenced by intrinsic and extrinsic factors.

The wound contact layer chosen must facilitate atraumatic dressing removal.

Proliferation phase

During the proliferation phase, new supporting tissue is formed. This typically presents as granulation tissue, which has the appearance of fresh, moist beef or a strawberry. It fills the wound bed from the base to normal skin level, in conjunction with wound contraction or the point where epithelialisation will occur (Meyers and Hudson, 2013). The granulation tissue is supported by the formation of new blood vessels, which is called angiogenesis (Martin, 2013).

In this phase, a non-complicated wound bed presents with a mild to moderate amount of exudate; the choice of wound contact layer must be based on the exudate level.

Maturation or remodelling phase

This is the final phase of wound healing. New epithelial cells emerge from the dermal edges and hair follicles, slowly bringing the wound edges together in conjunction with wound contraction (Meyers and Hudson, 2013).

Following total wound closure, the tissue on the site will retain only 70–80% of the tensile strength of the original tissue and will remain vulnerable to damage (Meyers and Hudson, 2013).

Theoretically, no exudate should be present at this phase of wound healing; however, the overlapping nature of the phases needs to be taken into account.

The wound contact layer used at this phase of healing should provide protection to the newly formed epithelial cells.

Theory of moist wound healing

Wound management hinges on the theory of moist wound healing, a concept proposed by Winter in 1962. The theory is that, if a wound is left to dry out, the normal healing process will be delayed; therefore, moisture is needed at the wound-dressing interface for optimal healing (Bishop et al, 2003; Bryan, 2004). Although this concept was founded on treating acute wounds, it has also been proven to be effective in managing chronic wounds (Hollinworth, 2005). Because of Winter's (1962) work, dressings have been manufactured that promote wound healing by maintaining a moist wound environment while ensuring patient comfort (Jones, 2015b).

Wound bed preparation

Wound bed preparation involves clinical interventions that are intended to start or encourage the wound-healing process by implementing the TIME framework (Harries et al, 2016). TIME originally stood for: tissue nonviable; inflammation and/or infection; moisture imbalance; and edge of wound not advancing.

The TIME framework enables practitioners to assess the wound bed systematically as part of an overall holistic assessment of a patient and help them decide on a care plan (Harries et al, 2016;Vowden 2017).

The framework was designed by a team of international experts in wound management to provide a structured approach to wound bed preparation as an effective way of optimising patients' outcomes when managing chronic wounds (Leaper et al, 2012).

Table 1. TIMES framework for wound bed assessment

Description	Factors	Clinical action
Tissue non-viable	Slough or necrotic tissue Foreign material Adherent dressing material Biofilms or debris	Debride defective tissue (surgical or autolytic debridement) Remove obstruction
Inflammation and/or infection	Increased exudate, increased odour or surface discolouration	Remove or reduce bacterial load (antimicrobials, debridement of devitalised tissue)
Moisture imbalance	Heavy exudate, risk of maceration or dry wound bed, risk of desiccation	Restore moisture balance (absorb exudate or add moisture to dry wounds)
Edge of wound not advancing	Rolled edges Encrusted exudate over granulation	Revisit and address T, I and M factors
Surrounding skin	Hyperkeratosis/dry skin Eczema Fragile skin	Remove hyperkeratosis Hydrate dry eczema Protect fragile skin
Adapted from Weller and Sussman, 2006; Leaper et al, 2012; Wounds UK, 2016		

Recently, a panel of experts realised the importance of the surrounding skin to wound bed preparation. They therefore added an S to TIME making it TIMES, so practitioners would not overlook the condition of the periwound area (Wounds UK, 2016).

The TIMES framework in now based on five factors, with each factor aligned to wound bed or periwound presentation (*Table 1*).

Lomatuell Pro

Lomatuell Pro (Lohmann & Rauscher) is a conformable open-mesh, gel-forming wound contact layer, with a low risk of adhering to the wound and wound edge while enabling moist wound healing (Wolber et al, 2014).

It is characterised by polyester tulle with a coating compound made from a polymer matrix, an elastic malleable fixing compound, petroleum jelly and hydrocolloid. When hydrocolloid particles come into contact with wound exudate they gel, keeping the wound environment moist.

In addition, the petroleum jelly moisturises dry periwound areas and the wound edge. This meets the S part of the TIMES wound bed preparation principle, which gives the dressing an advantage over other contact layers such as soft silicone dressing. Anecdotally, this has been reported to minimise pain during dressing change.

Because of Lomatuell Pro's conformability, it fills the dead space as it follows the contours of the wound bed. The open mesh structure of the tulle promotes transfer of excess exudate into a secondary dressing, but granulating tissue cannot granulate through the mesh. It can be left in place for up to 7 days. The dressing can be cut into wound size. It can also be used as an interface dressing with topical negative pressure wound therapy (NPWT) without its structure disintegrating (Wiegand et al, 2017).

Traditional tulle dressings have been known to adhere to the wound bed once their paraffin properties have been lost (Watson and Hodgkin, 2005). However, Lomatuell Pro includes petroleum jelly, polyester and hydrocolloid, which reduce adherence, because of the moisture-retentive and gel-forming nature of elastomers that they contain (Weller and Sussman, 2006; Abdelrahman and Newton, 2011; Jones, 2015b).

Areas of use for the Lomatuell Pro:

- All exudation phases
- Superficial wounds
- Chronic wounds, e.g. leg ulcers, pressure ulcers, diabetic foot ulcers
- Acute wounds, e.g: lacerations, incisions and abrasions, second-degree burns
- Post-surgical wounds, e.g. surgical wounds healing by secondary intention, and skin graft donor and recipient sites
- Can be used in combination with NPWT as the interface dressing.

Conclusion

Effective wound management is dependent on holistic patient assessment of factors that may enhance or delay the wound-

Box 2 Product suitability

Product	Moist wound healing	Wound bed preparation	Wound healing phase
Lomatuell® Pro	Provision and maintenance of optimal hydration	Applicable to: ■ Granulating tissue ■ Epithelialising tissue ■ Macerated tissue ■ Tender tissue (pain)	Appropriate for use in any of the following phases, with choice informed by the wound bed: ■ Haemostasis ■ Inflammation ■ Proliferation ■ Maturation

KEY POINTS

- Choice of wound dressing must be influenced by a holistic patient assessment and an understanding of the wound-healing process and wound bed preparation
- Pain associated with dressing change needs to be explored and managed appropriately
- In addition to wound bed presentation, intrinsic and extrinsic factors need to be explored and addressed to optimise the wound healing process
- Lomatuell Pro® was trialled on surgical-graft patients and the case studies are presented in this article

CPD REFLECTIVE QUESTIONS

- What are intrinsic and extrinsic factors and how do they affect the wound-healing process?
- Why is holistic patient assessment an important element of wound assessment?
- What is wound bed preparation?
- Why is the theory of moist wound healing important in wound healing?

CASE STUDY 1

Following skin-graft surgery a non-adherent dressing is usually applied. This is to allow any potential shearing (forces moving in opposite directions applied to bodily tissue) to take place between the dressings and the skin graft, rather than between the skin graft and the wound bed. It also prevents the removal of the skin graft with the outer, absorbent dressings at the first graft check.

Patient Information

A 21-year-old lady sustained flame burns to her left leg when petrol was thrown onto a bonfire. Once the burns became infected she was started on antibiotics. As she appeared to respond well to the antibiotics, she was taken to theatre and the dressings were removed (*Figure A*). A MolecuLight image confirmed the relative absence of bacteria (*Figure B*). The burn was excised (surgical removal of the traumatised area) and a split thickness skin graft was applied (*Figure C*).

Method

Lomatuel® Pro was chosen as the contact layer on top of the skin graft because of its low adherence properties (*Figure D*). One week later the dressings were removed.

Results

The Lomatuell Pro came off very easily and the underlying skin graft had taken very well (*Figure E*).

The ability of the Lomatuell Pro to prevent shear, while the skin graft 'took', enabled any movements to take place at the plane of the Lomatuell Pro rather than between the skin graft and its bed. It also allowed for pain-free removal of the dressings at the first graft check. The first graft check is often a fraught time for nursing staff and the patient, as dressings can be painful to remove. With a dressing that will not stick to the wound, nursing staff have the confidence to perform a pain-free dressing change.

CASE STUDY 2

Most dressings do not affect the length of time a donor site takes to heal, so choose a dressing that is the most comfortable for the patient.

Patient information

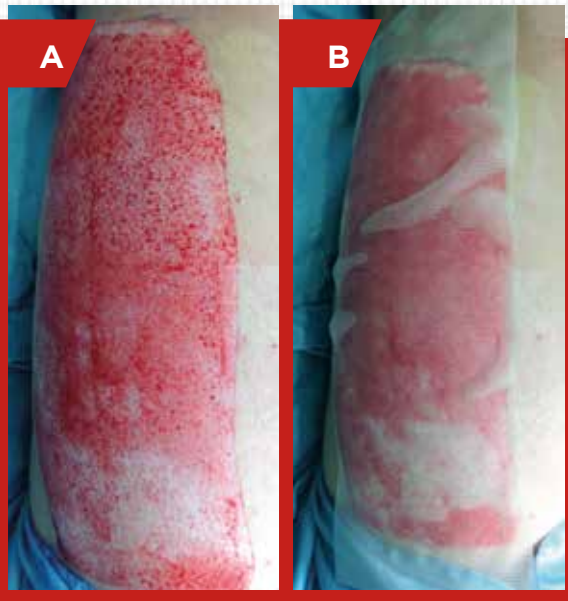
A 36-year-old-man required a skin graft to a wound on his left leg. The split-thickness skin graft was harvested from the left thigh using a dermatome set to 8/1000 (*Figure A*).

Method

Lomatuell Pro® was placed on the donor site wound (*Figure B*) and a secondary dressing of gauze was applied, followed by a crepe bandage.

Results

The donor site dressing was changed one week following surgery. Both the outer layer and the Lomatuell Pro were replaced. At two weeks following surgery, the donor site had healed well. Lomatuell Pro prevented adhesion between the donor site wound and dressings, so it was not disrupted by the patient's day-to-day movements and was easy to remove.



healing process, supported by the practitioner's understanding of the wound-healing process and knowledge of available dressings. When selecting appropriate dressings, it is the role of the clinician to make an informed clinical decision. Lomatuell Pro has been reported to be effective in managing epidermal and dermal wounds and from the presented case studies there is evidence of positive outcomes in managing burns and graft wounds. **CWC**

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