

SEEKING CLARITY IN MINOR BURN MANAGEMENT: PART 2

Burns injuries pose a significant challenge to inexperienced clinicians throughout their pathway of treatment. Accurate management needs to continue from the initial burns first aid, addressing scar tissue and associated complications to ensure successful outcomes for patients and their families. This pathway can continue up to 2 years post-injury and so awareness of scar management techniques is imperative to the care of a patient whether they be treated by a specialist unit or in the community.

“Any delay in assessment and treatment that can happen when a clinician is not experienced in emergency burn care can lead to a multitude of adverse consequences.”

Historically, burns injuries, whether minor or major, can be life-changing events requiring long-term management (Long, 1840). Minor burns are defined as first and second degree burns covering less than 15% of an adult's body or 10% of a child's. Third degree burns that cover less than 2% of the body are still considered minor (Buttaro, 2013). Even though these burns are classed as minor, challenges still arise throughout the pathway, which can lead to poor outcomes and quality of life for the patients.

Trends predict that an increasing number of minor burns will continue to present yearly (Stylianou et al, 2015). This increase can be attributed to the constant exposure we have with day-to-day items that pose risks to us and our families from minor burns injuries. This will, in turn, put increasing pressure on healthcare professionals outside specialist centres to manage these patients successfully (National Burn Care Review (NBCR), 2001).

Initial burn management can be daunting and challenging for

inexperienced clinicians (Stiles, 2015) and these demands can continue after the initial episode of care. This article deals with the long-term management of minor burns with particular reference to atypical scarring.

The London South East Burns Network (LSEBN) has followed other networks in developing strategies to support non-specialist clinicians. The LSEBN aims to educate healthcare professionals and the general public on not only prevention of minor burns, but also guidelines with regards to treatment techniques. Their referral criteria for onwards management give inexperienced clinicians clear boundaries to care that can be managed outside specialist burns centre (Stiles, 2015). The main aim of the LSEBN is to facilitate the management of minor burns successfully outside specialist units (LSEBN, 2010). This is required due to the complexity of managing burns injuries and the severe consequences after mismanagement.

Challenges to care

Currently within the NHS, emphasis

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has been placed on high-quality assessment and care that can be delivered in the patient's local area (Department of Health [DH], 2013). This has ended up with assessments and treatment for minor burns being carried out by clinicians who may not be experienced in burn care (Muehlberger et al, 2010).

Any delay in assessment and treatment that can happen when a clinician is not experienced in emergency burn care can lead to a multitude of adverse consequences including loss of function, restriction of joint mobility, restriction of growth, altered appearance and adverse psychological effects (Hawkins and Pereira, 2007).

This highlights the importance of increasing burns management skills in assessment and treatment for non-burns specialist healthcare professionals within these primary and secondary care centres. Stiles (2015) highlights these skills within initial assessment and wound management in part 1 of this series. Certain areas of skill and understanding need to be advanced to ensure successful outcomes:

- ▶ Scar tissue
- ▶ Assessment
- ▶ Basic scar management
- ▶ Specialist scar management.

Long-term care for minor burns

Scar tissue

The stages of healing for a minor burn start with the inflammatory stage characterised by haemostasis being achieved and then the phagocytic cells mounting a host response to break down any devitalised tissue. During the proliferation stage, the wound is rebuilt with new granulation tissue, which is comprised of collagen and extracellular matrix. Maturation/remodelling is the final phase and occurs once the wound has healed. This phase involves remodelling of

Table 1. Characteristics of hypertrophic and keloid scars.

Hypertrophic	Keloid
Stays within the original wound margin	Projects beyond the original wound margin
Develops 6-8 weeks post healing and continues up to 6 months	Develops within years of injury/damage
Well-organised type 3 collagen bundles	Spontaneous signs of regression (shrinking)
High contractile force	No irregular clusters of type 1 and type 3 collagen
Typical sites — shoulder, neck, ankle and knee	Typical sites — earlobe and sternum.



Figure 1. Hypertrophic scarring.

collagen from type III to type I and cellular activity decreases.

Scar tissue is made up of disorganised bundles of collagen synthesised during the proliferation and maturation stage of wound healing. Scar tissue formation is a normal part of the healing process after a dermal injury (Pellard, 2006).

Epidemiology of burns provides us with some indication of the wounds that should be monitored closely during the maturation stage. Research has shown factors that influence abnormal scar formation include healing times, site, depth, age, pigmentation, hormone production,



Figure 2. Keloid scarring.

ethnicity and family history (Herndon, 2007). For example, more than 50% of all keloid patients have a positive family history of keloid scarring (Atiyeh, 2007).

Abnormal scarring, such as hypertrophic (Figure 1) and keloid scarring (Figure 2) occur most frequently after burns that take more than 14–21 days to heal (Farhadieh et al, 2015). Burns continue the remodelling process of synthesis and degradation for up to 2 years post-injury (butterworth, 1993) (Table 1).

Burns treatment throughout the stages of healing

Early detection and treatment of complications in each stage of healing may prevent excessive collagen production. Therefore, it is imperative that scar management starts before a wound is healed. Within the initial inflammatory stages, early debridement of dead

tissue reduces inflammation and prevents infections. All infected burns should be referred to a local burns service. (National Network for Burns Care, 2012).

During proliferation, accurate assessment of a burn's depth should be constantly re-completed leading to appropriate dressing selections. This selection of dressing could impact on the speed the wound bed will heal and, therefore, could prevent abnormal scarring. Furthermore, this would highlight to the clinician when a faster method of wound closure may be required and thus result in a referral to a local burns unit for assessment. Any burn wound taking over 14 days to heal should be referred to a local burns service for specialist advice (National Network for Burns Care, 2012).

Small areas may be closed by a specialist plastic surgeon using primary closure that 'pinches' the scar together. Alternatively, the most common technique for larger areas is using a dermatome to take a graft from the patient's thigh to cover the wound. One of the minor drawbacks of this technique is that the patient then has a donor site which could be considered cosmetically unsightly. (Herndon, 2007).

Early effective management through the inflammatory, proliferation and maturation stages reduces healing times, which has a direct effect on the production of abnormal scar tissue.

Assessment of scars

The British Burns Association (BBA) in 2005 highlighted the importance of ongoing assessment using validated outcome measures for assessing scar formation on people with burns. Prevalence of undesirable scar formation after burns is high compared with surgical or dermatological scarring (Herndon, 2007) Subjective assessments, such

as the Vancouver scar scale (VSS) which was the first validated tool for burns and the patient and observer scar scale (POSAS) are still the most widely used. These allow the clinician to establish the potential severity of a scar leading to a plan of optimal treatment modalities aimed at preventing abnormal scar tissue.

VSS considers four scar components:

- ▶▶ Pigmentation
- ▶▶ Vascularity
- ▶▶ Pliability
- ▶▶ Height.

A scar area of 4cm² is chosen and then scored on a numerical scale and totalled out of 14 (Sullivan et al, 1990). A higher score indicates greater severity in scarring.

The POSAS incorporates a patient rated assessment of the scar in addition to the clinician's score. The clinimetrics show it is a reliable, valid and feasible tool which incorporates the patient's perspective.

Medical photography is commonly used as an adjunct to these measurements.

Basic scar management

Burns that encroach on the dermis may disrupt the hair follicle leading to the onset of complications in this area. The most common of these is due to damage to the sebaceous glands, causing dehydrated scar tissue that is likely to crack.

To combat this, patients must be shown how to massage healed areas with non-perfumed emollient using small circular motions. This causes the tissue to blanch and should be completed up to three times a day for a period of at least ten minutes. Excess emollient needs to be removed to prevent maceration. Clients with limited grip strength or dexterity can use roller balls (such as an empty deodorant roller ball) to achieve an effective technique.

If it is possible, another person could massage the scars as the implied acceptance of the burn can help enormously with a person's acceptance of their changed appearance. Vanderbilt (2005) has described the effect of this in a personal reflection which showed how massage and physical touch can break down the psychological barriers a person may have about their burn wounds.

Scar massage is routinely taught by most burns therapists as it is claimed to soften restrictive fibrous bands and improve pliability, although there is little evidence to prove this (Patino et al, 1998).

Patients have reported the positive effect of massage on pruritus (Field et al, 2000), while Van Loey (2008) showed that up to 87% of people with burns report these symptoms between 3–9 months, post-injury.

Pruritus can also be managed using pharmaceuticals such as chlorphenamine (Piriton®) and hydroxyzine (Ucerax®, Atarax®), but this often does not solve the problem and gabapentin may be required (Ahuja et al, 2011).

Adequate sun protection is crucial for people with burns due to the repigmentation process that occurs throughout skin maturation. To prevent hyper-pigmentation (darkening of the scar tissue, compared to the normal skin tone as a result of excess melanin deposits), the Phoenix Society (2015) advocate application of factor 50 sun tan cream with UVA and UVB protection and avoiding midday sun.

Specialist scar management Silicone

Silicone has been used for burn wounds since the 1980s and its use was initially described by Perkins et al in 1983. The exact mechanism on hypertrophic scarring is unknown, however, it is likely that it shortens

the collagen remodelling stage, hydrates the wound and decreases capillary activity (Bloemen et al, 2009). Therefore, the scar tissue is less likely to become severely hypertrophic.

Silicone (*Figure 3*) is produced in sheets, gel and sprays and should be worn 12–24 hours a day for at least 2–3 months. The most popular for children with burns are silicone gels, which allow no restrictions in movement and are invisible once dry.

Silicone is important for non-operative hypertrophic scar management due to its properties not only to improve appearance and outcomes of scarring by depressing the height of hypertrophic areas, but also by impacting positively on symptoms, such as pruritus (Mustoe et al, 2002; O'Brien and Jones, 2013).

Pressure garments

Custom-made pressure garments are the front-line of treatment for hypertrophic scarring and can be fabricated for areas over the entire body (Li-Tsang et al, 2015). As long as the hypertrophic scar is still active, which is shown by the increased vascularity compared to the patient's normal skin colour, the mechanisms of pressure are effective. The desired force of 24–28mmHg is required so that the garment can oppose and equal that of the capillary pressure. If used early in the maturation phase, decreased blood flow will reduce collagen synthesis and regain the balance between synthesis and lysis, preventing over-production of collagen and, therefore, hypertrophic scars forming (Kealey et al, 1990).

Highly specialist technicians produce these custom-made pieces (*Figure 4*), and they can be altered according to the patient's needs. These garments are worn constantly and can be removed only for massage, showering and washing. Incorrect use of emollients



Figure 3. Silicone Cica-care sheets.

can lead to wound maceration and degradation of the fabric, therefore wearing instructions must be followed. Close monitoring is imperative with pressure garments used to improve scar health. They need to be assessed regularly to avoid any interference with growth, particularly when used for children (Fricke et al, 1999).

Thermoplastic splints

Hypertrophic scarring will contract until it meets an opposing force. Contracture can affect both motion and function. Remouldable thermoplastic splints produced by a specialist therapists can be used in severe cases over many months post injury to prevent joint deformities (Procter, 2010) (*Figure 5*). The length of the prescription for the splint is dependent on the severity of the contracture. Prefabricated splints are rarely used but can be of great assistance in certain area such as the axilla.

Corticosteroids

Corticosteroids can be used to treat hypertrophic and keloid scarring. Various mechanisms of action are



Figure 4. Custom-made pressure garments.

theorised regarding intralesional injections including reducing fibroblast proliferation, collagen synthesis, glycosaminoglycan synthesis and suppressing inflammatory mediators. (Bloemen et al, 2009). Response rates vary but usually range from 50–100% for reducing hypertrophic scarring with a reoccurrence rate of 9–50% after a series of injections over 3–6 months (Niessen et al, 1999; Koc et al, 2008).

Keloid scars pose a significant challenge to clinicians when treating, compared to hypertrophic scarring due to their characteristics (*Table 1*). With corticosteroid treatments, Atiyeh (2007) showed effects are considerably improved within younger scars, this means early recognition and early referrals to a burns service can positively affect outcomes.

Cosmetic treatment and psychological support

Pigmentation changes and increased vascularity of scarring results in their reddish purple hue. Due to the cosmetic appearance, patients with burns may feel less confident and withdraw leading to long-term



Figure 5. A splint produced to reduce the effects of contracture.

implications on them and society. Psychological support should be available to everyone treated at a specialist burns centre (National Network for Burn Care, 2013). Psychological support can also be vital to compliance with other modalities of treatment.

Camouflage make-up has been identified as an important adjunct to other therapies for burns. Consultations are performed within burns units by in-house technicians or charities such as Changing Faces, offer these services. They aim to match the patient's natural skin tone to camouflage the scar. Treatment with camouflage make-up has its limitations; it is not a cure for hypertrophic scarring but can help the client accept their scars.

Hypertrophic scarring has a tendency to have high contractile strength due to the myofibroblast production during the healing stage and functionality should be prioritised when burns are treated surgically with cosmetic appearance being a secondary consideration (Herndon, 2007). Specialist burns plastics surgeons may delay surgical intervention on scar

tissue till the maturation stage, relying on alternative modalities of treatment in the interim, such as pressure garments, silicone and splinting.

Excisions of keloid scars should be considered with caution due to a reoccurrence range between 45% and 100%, however, with adjuvant therapy post-op successful outcomes can provide good cosmetic results (Atiyeh, 2007).

Conclusion

Minor burns are being managed by a range of multidisciplinary professionals within both specialist burns services but also local primary and secondary care centres. The LSEBN strive to standardise this treatment regardless of where it is delivered to ensure that the management of minor burns is optimal from initial interaction to scar management. This hinges on improved education for non-specialists.

Scar management starts before the wound has healed. Multiple modalities can be used dependant on the type, size, site and compliance of the scar. Improving the knowledge of healthcare professionals will

prevent delay and also help to avoid complications which can affect a wide range of psychological, functional and physical outcomes and result in the increased quality of life outcomes for the patients with a minor burn. **WE**

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