

ABC of burns

Rehabilitation after burn injury

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This is the ninth in a series of 12 articles

Prevention of scarring should be the aim of burn management. For every member of the burn team, rehabilitation must start from the time of injury. Having a substantial burn injury is frightening, particularly as patients will not know what to expect and will be in pain. Consistent and often repetitive education is a vital part of patient care. Oedema management, respiratory management, positioning, and engaging patients in functional activities and movement must start immediately. Patients need to be encouraged to work to their abilities and accept responsibility for their own management. Functional outcome is compromised if patients do not regularly engage in movement.

Pain control

In order to achieve desired outcomes and movement habits, ensuring adequate pain control is important. The aim of analgesic drugs should be to develop a good baseline pain control to allow functional movement and activities of daily living to occur at any time during the day. The use of combined analgesics such as paracetamol, non-steroidal anti-inflammatory drugs, tramadol, and slow release narcotics reduces the need for increasing doses of narcotics for breakthrough pain. Codeine should be avoided if possible because of its negative effects on gut motility. Other pain control methods that may be helpful include transcutaneous electrical nerve stimulation (TENS).

Inhalational injury

Aggressive, prophylactic chest treatment should start on suspicion of an inhalational injury. If there is a history of burn in a closed space or the patient has a reduced level of consciousness then frequent, short treatments should begin on admission. Treatment should be aimed at removing lung secretions (oedema), normalising breathing mechanics, and preventing complications such as pneumonia.

Initial treatment should include:

- Normalisation of breathing mechanics—such as using a positive expiratory pressure device, intermittent positive pressure breathing, sitting out of bed, positioning
- Improving the depth of breathing and collateral alveolar ventilation—such as by ambulation or, when that is not possible, a tilt table, facilitation techniques, inspiratory holds.

Movement and function

Movement is a habit that should be encouraged from admission to the burns unit. If a patient can accept the responsibility of self exercise and activities of daily living then the most difficult aspects of rehabilitation are easily achieved. If there is suspected tendon damage from the burn, then protected movement is appropriate and resting splints may be necessary.

Oedema management

Oedema removal should be encouraged from admission. The only body system that can actively remove excess fluid and debris from the interstitium is the lymphatic system. Oedema

Rehabilitation starts on the day of injury



Functional use of a positive expiratory pressure device to improve breathing mechanics (top) and practising activities of daily living to exercise a burnt limb (bottom)



Strengthening exercise for a patient who had sustained a high tension electrical flash burn to the right upper limb and right lateral trunk. Rehabilitation to restore function focuses on upper limb strength and trunk core stability

collection in the zone of stasis of a burn may promote the progression of depth of a burn. The principles of reduction of oedema should be adhered to in totality and not just in part:

- Compression—such as Coban, oedema gloves
- Movement—rhythmic, pumping
- Elevation or positioning of limbs for gravity assisted flow of oedema from them
- Maximisation of lymphatic function
- Splinting does not control oedema except to channel fluid to an immobile area.

Immobilisation

Stopping movement, function, and ambulation has its place. It should be enforced only when there is concomitant injury to tendon or bone or when tissues have been repaired (including skin reconstruction). If a body part must be immobilised—to allow skin graft adherence, for example—then the part should be splinted or positioned in an anti-deformity position for the minimum time possible.

Skin reconstruction

Skin reconstruction is tailored to the depth of burn found at the time of surgery. The application and time frames of reconstruction techniques utilised will be dependent on attending surgeon's preference. Other factors influencing choice of management include availability and cost of biotechnological products.

Scar management

Scar management relates to the physical and aesthetic components as well as the emotional and psychosocial implications of scarring.

Hypertrophic scarring results from the build up of excess collagen fibres during wound healing and the reorientation of those fibres in non-uniform patterns.

Keloid scarring differs from hypertrophic scarring in that it extends beyond the boundary of the initial injury. It is more common in people with pigmented skin than in white people.

Scarring is influenced by many factors:

- Extraneous factors—First aid, adequacy of fluid resuscitation, positioning in hospital, surgical intervention, wound and dressing management
- Patient related factors—Degree of compliance with rehabilitation programme, degree of motivation, age, pregnancy, skin pigmentation.

Management techniques

Pressure garments are the primary intervention in scar management. Applying pressure to a burn is thought to reduce scarring by hastening scar maturation and encouraging reorientation of collagen fibres into uniform, parallel patterns as opposed to the whorled pattern seen in untreated scars.

Garments need to be tailored to patients' requirements and are often influenced by the type of surgery completed. Patients should generally be measured for garments at five to seven days after grafting surgery, and these should be fitted as soon as they are available. A pressure garment lasts for about three months; after that time it is helpful to re-measure patients frequently to accommodate the changing dimensions of the scar.

If people have moderate to severe burns around the neck or face, an acrylic face mask must be considered. This provides conforming pressure over the face and neck. Material masks can also be made for patients to wear at night.



Compression glove (Coban)

Immobilisation times for different types of skin reconstruction

Reconstruction method	Depth of burn	Length of immobilisation
Biological dressings (such as Biobrane, TransCyte)	Any (preferably not full thickness)	< 24 hours
Cultured epithelial autograft (suspension)	Superficial to intermediate	24-48 hours
Split skin graft	Intermediate to deep partial thickness	3-5 days
Dermal substitutes (such as Integra, Alloderm)	Deep partial thickness to full thickness	5-7 days
Fasciocutaneous or myocutaneous flaps	Full thickness	7-14 days



Example of hypertrophic scarring



Acrylic face mask providing conforming pressure over burns to the face and neck

For areas of persistent scarring that have not responded well to pressure garments, further scar management techniques must be considered. These include the use of massage, moisturising creams, and contact media.

Team education of scar management

Because of the altered functions of the skin after a burn, patients should be continually encouraged to maintain a good moisturising regimen. Moisturising is important as it prevents the skin from drying out and then splitting and cracking, which may lead to secondary infection and breakdown of the skin.

Education on sun protection is also important for patients. Patients must be made aware that they need to protect themselves from the sun for up to two years and that they will need to keep their skin protected and covered in sun screen (and appropriate clothing) if working or playing outside.

Outpatient follow up

A burns unit team should offer outpatients regular and comprehensive follow up reviews. The type of follow up required obviously depends on the severity of the burn, but in terms of movement and function, patients require regular monitoring and updating of their prescribed exercise regimen and home activity programme.

Therapists who do not regularly treat burns patients require experienced support to achieve the expected outcomes. This should include written, verbal, and visual communications as well as monitoring of management plans.

Conclusion

The rehabilitation of burns patients is a continuum of active therapy. There should be no delineation between an “acute phase” and a “rehabilitation phase”—instead, therapy needs to start from the day of admission (and before if possible). Education is of paramount importance to encourage patients to accept responsibility for their rehabilitation. A consistent approach from all members of the multidisciplinary team facilitates ongoing education and rehabilitation.

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Scar management techniques in addition to pressure

- Massage—Helps to soften restrictive bands of scar tissue, makes scar areas more pliable
- Silicone gel sheets (contact media)—Mode of action not known; possibly limits the contraction of scars through hydration, occlusion, and low molecular weight silicone
- Elastomer moulds (contact media)—Used to flatten areas of scarring where it is difficult to encourage silicone to mould effectively (such as toes and web spaces between them)
- Hydrocolloids (contact media)—As for silicone sheets, except that these may be left in situ for up to 7 days. Massage can be given through thin sheets
- Moisturising creams—Combined with massage to compensate for lost secretory functions of skin; protect against complications from skin cracking
- Ultrasound—Low pulsed dose aimed at progressing the inflammatory process more rapidly



Endurance training by a burns outpatient

Further reading

- Schnebly WA, Ward RS, Warden GD, Saffle JR. A nonsplinting approach to the care of the thermally injured patient. *J Burn Care Rehabil* 1989;10:263-6