

Role of Innovative Use of Tooth Brush in Debridement of Post Burn Scalp Wound

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Abstract

Surgical debridement is considered the gold standard for burn treatment and can be performed using various tools. This procedure removes necrotic tissue and foreign debris, effectively reducing the bacterial load and enabling cultured skin preparation, if needed. Surgical excision typically involves instruments like the Weck/Goulian knife and the Blair knife, which are commonly used for this purpose. Challenging areas to debride include contoured regions (e.g., spaces between fingers and toes), delicate areas (such as the face and the back of the hands), and edematous regions resulting from fluid resuscitation.

Surgical knives may occasionally cause incomplete or uneven debridement, necessitating multiple passes, which can extend operative time and increase bleeding. There is no universal agreement on the optimal tools for wound excision and debridement, as this decision is typically based on the operating surgeon's preference and the resources available at each facility. When selecting techniques and tools for burn excision, factors such as the patient's quality of life, the physiology of the affected area, aesthetic outcomes, and overall survival should be carefully considered.

Keywords: Debridement, Toothbrush, Burns, scalp.

INTRODUCTION

Burns is the fourth most common type of injury worldwide, following road traffic accidents, falls and interpersonal violence. Flames, scalds, and electrical burns are the top three causes of severe burns in most studies. These occur in regions that generally lack the infrastructure to reduce the incidence and severity of burns. Burns are globally

recognized as a significant challenge for burn care specialists, as the resulting impairment to various organ systems can lead to deeper and more severe injuries. The successful treatment of burn injury involves the time of presentation, with or without inhalational injury, early recognition of the severity of burn injury, accurate assessment of the area of burn injury, the degree of burn injury, adequacy of fluid resuscitation and recognition of signs of

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organ failure and direct treatment accordingly. Assessing these vital parameters is essential for tailored management of the patient and constant monitoring of such patients is crucial.

MATERIALS AND METHODS

The study was carried out in the Department of Plastic Surgery at a Tertiary Care Centre following approval from the departmental ethical committee. Informed consent was obtained prior to participation. The subject was an 8-year-old male child who suffered an accidental high-voltage electrocution burn injury. He sustained 35% total body surface area burns involving the face, neck, chest, abdomen, bilateral upper and lower limbs, along with deep burns to the scalp (entry wound) and the right great toe (exit wound). (Fig. 1). He was admitted to the Burns Care ICU and underwent wound debridement of the burn injuries under general anesthesia. It is essential to perform thorough debridement of burn wound. Some areas are particularly difficult to toilet adequately. We have found that a toothbrush can be used to debride these difficult areas with better precision and less trauma to surrounding tissue. (Fig. 2 & 3)



Fig. 1: At admission



Fig. 2: During toothbrush debridement



Fig. 3: After toothbrush debridement



Fig. 4: Healed wound

Polypropylene toothbrush was used, which is autoclavable. Other forms of disinfection like formaldehyde can also be used, if the toothbrush do not tolerate autoclaving.

RESULTS

Intra-operative and post-operative periods were uneventful for the patient. The wounds healed well after 2 weeks with minimal scarring. No complications and side effects were noted.

DISCUSSION

Debridement is a standardized approach employed to promote healing by removing nonviable tissue from the wound bed and edges. This includes eliminating excess callus from the periphery, necrotic dermal tissue, foreign materials, and bacterial components. There are various methods of debridement available:

1. **Surgical Debridement:** Sharp surgical methods (using scalpel and scissors), radiofrequency, ultrasound, and laser debridement fall into this category. These techniques are rapid, selective, and provide the surgeon with precise control during the debridement process. The choice of method depends on the surgeon's assessment and may or may not require anesthesia. However, determining the appropriate extent of debridement can be challenging. A notable limitation of sharp surgical debridement is the risk of associated bleeding and pain. For burns covering a large percentage of total body surface area (%TBSA) and those involving a mix of partial- and full-thickness burns, the surgical knife technique is often the preferred method. This approach enables faster and more efficient debridement, with precise preservation of healthy surrounding tissue, promoting better wound healing and minimizing scar formation.³
2. **Mechanical Debridement:** This category includes methods such as hydro jet, syringe pump, and wet-to-dry dressings, primarily used for selective debridement to remove minimal slough or achieve partial removal. Jet Lavage is an effective technique for removing loosely attached slough on superficial planes. It provides better irrigation and cleansing while being less painful. Syringe pumping operates on a similar mechanism but is less effective compared to jet lavage. Wet to dry dressing involves applying a wet gauze to the wound for an extended period until it dries and adheres to the slough. The gauze, along with the slough, is then removed. However, this method is not recommended due to its slower action and associated pain.
3. **Enzymatic Debridement:** Enzymatic debridement involves the use of rapid-acting chemical agents to facilitate the removal of necrotic tissue. These enzymes, derived from microorganisms such as *Clostridium histolyticum*, collagenase, varidase, papain, and bromelain, are particularly effective in managing wounds with significant necrotic debris or eschar, including burns. Some enzymatic agents selectively target necrotic tissue, while others do not. This technique is contraindicated in patients with clotting disorders and should be used with caution in cases of cellulitis, cavity wounds, wounds with exposed nerves, or neoplasms. While enzymatic debridement can be highly effective, its outcomes are inconsistent, and the degree of effectiveness may vary.
4. **Autolytic Debridement:** Autolysis utilizes the body's natural enzymes to rehydrate, soften, and eventually liquefy hardened eschar and slough. This method is highly selective, targeting only necrotic tissue for liquefaction, and is generally will not cause any pain to the patient. Autolytic debridement is facilitated by occlusive or semi-occlusive dressings that keep wound fluids in contact with the necrotic tissue. Common materials used include hydrocolloids, hydrogels, and transparent films. However, caution is advised when using this technique in immunocompromised patients.
5. **Biological Debridement:** Also referred to as biosurgery, this method involves the use of larvae from the *Lucilia sericata* (green bottle fly). These maggots are specially bred under sterile conditions to ensure they do not carry any bacteria. Maggots are capable of debriding a wound within one to two days. They obtain nutrients through a process known as extracorporeal digestion, during which they secrete proteolytic enzymes that break down necrotic tissue into a liquefied form for easy removal. Advocates of this therapy highlight its speed, safety, and effectiveness. However, its drawbacks include concerns about aesthetics, as well as local discomfort and itching experienced by some patients.

Toothbrush debridement

It is method of mechanical debridement of removal of necrotic material from wound bed. The efficiency can be improved by using a motorised toothbrush.

CONCLUSION

Debridement is an essential part of burn wound management. Toothbrush use has been found useful, cost-effective and convenient in managing burn wounds.

Conflict of Interest: None declared.

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