

Role of Nail Filer Assisted Dermabrasion in Scald Burns

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Abstract

Deep second-degree and full-thickness burns tend to heal slowly and often result in scarring. To encourage proper healing, deep dermal burns need to be treated early with tangential excision and skin grafting. While superficial burns, which affect only the epidermis and upper dermal layers, can often be managed with wound irrigation, debridement, and basic wound care, deeper burns that extend into the lower dermal layers and beyond typically require more intensive treatment, such as tangential excision and grafting. Dermabrasion, a mechanical exfoliation technique, has been widely used for treating acne scars, traumatic injuries, and cosmetic skin resurfacing due to its effectiveness in stimulating the regeneration of new skin. When performed early during wound management, dermabrasion is associated with improved outcomes, such as reduced infection risks and accelerated healing by removing dead tissue and stimulating blood flow to the affected area. In this case, a novel approach was employed using a nail filer as an adjunct tool for dermabrasion-assisted debridement, further enhancing wound healing by providing precise, controlled removal of damaged tissue.

Keywords: Dermabrasion, wound healing, scald burns, burns, nail filer

INTRODUCTION

Developed in the 1950s, dermabrasion is a technique that mechanically removes the epidermis and the upper layer of the dermis [1]. Dermabrasion is a procedure that removes the entire epidermis and part of the dermis, promoting the growth of smoother skin. While the dermis does not fully regenerate, this technique is widely used by plastic surgeons and dermatologists for treating acne scars, surgical scars, benign tumors, and facial rejuvenation. Beyond its cosmetic uses, dermabrasion is increasingly recognized for its potential in wound care, especially for treating burns, as it encourages skin regeneration and healing [2].

Burn wounds heal in stages, starting with the removal of dead (necrotic) tissue, followed by the growth of new granulation tissue and finally, re-epithelialization, where the skin regenerates. The first step, removing necrotic tissue, is critical because it can hinder healing and lead to infection if left untreated. While there are medications that help with tissue removal, surgical debridement remains the primary method. Common debridement techniques include escharotomy, which cuts through dead tissue to release pressure, and tangential excision, which removes damaged skin layer by layer [3].

However, while escharotomy and tangential excision are frequently used, dermabrasion is not as commonly employed in burn treatment. This method offers a less invasive option for gradually removing damaged skin, allowing for more precise control and preserving healthy tissue. This can result in faster healing and fewer complications

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Received Date: August 28, 2024

Accepted Date: October 13, 2024

Published Date: November 18, 2024

Citation: Venkatesh P., Ravi Kumar Chittoria, Bharat Prakash Reddy J. Role of Nail Filer Assisted Dermabrasion in Scald Burns. *Research & Reviews: Journal of Surgery*. 2024; 13(3): 6–10p.

compared to more aggressive techniques. Recent studies have demonstrated that dermabrasion can significantly improve the healing of burn wounds, especially scald burns, by reducing infection risk and speeding up tissue repair [4].

In this article, we highlight an innovative approach where a nail filer was used alongside dermabrasion for the debridement of scald burns. This method proved to be a valuable adjunct to traditional treatments, allowing for efficient removal of necrotic tissue and promoting faster recovery. Combining dermabrasion with nail filing represents a less invasive, yet effective, strategy in burn wound management, offering promising results for future burn care practices [5].

METHODS AND MATERIALS

This study took place in the Department of Plastic Surgery at a tertiary care hospital, focusing on an 8-year-old girl with no pre-existing health issues. She had suffered multiple second-degree burns – 5% superficial and 3% deep – on the right side of her chest and right forearm, making up 8% of her total body surface area (TBSA). The burns were caused by the accidental spillage of hot milk. Upon admission to the burn ICU, the child's treatment plan was comprehensive, involving a range of therapies to speed up healing and minimize complications (Figure 1).



Figure 1. At the time of admission.

Initial treatment included heparin saline irrigation, which helped improve blood flow and prevent clotting around the burned areas. Dermabrasion was performed under general anesthesia to remove the damaged skin layers. In this case, a nail filer was used as an additional tool during dermabrasion to precisely debride the affected skin (Figure 2). After this procedure, the team used autologous platelet-rich plasma (PRP) therapy, known to promote tissue healing and reduce inflammation by encouraging new cell growth. An amniotic membrane was also applied, offering protection and aiding the healing process by supporting the growth of new epithelial tissue [6].



Figure 2. Dermabrasion with nail filer.

Further, the team used a regenerative scaffold to promote skin regeneration and employed cyclical negative pressure wound therapy (NPWT), a technique that helps prepare the wound bed and encourages the growth of healthy tissue (Figure 3). NPWT creates a vacuum environment around the wound, improving blood circulation and reducing infection risk.



Figure 3. Application of cRONPWT.

To manage bleeding after the procedure, adrenaline saline was applied to control small points of bleeding, and a closed dressing system with NPWT was used to maintain an ideal environment for healing. The treatment plan proved effective, and the child was discharged once the wounds had healed completely (Figure 4). This case highlights the benefits of combining dermabrasion with advanced therapies like PRP, amniotic membranes, and NPWT for treating pediatric burn injuries [7].



Figure 4. At the time of discharge.

TECHNIQUE

As with any cosmetic surgical procedure, meticulous patient selection and thorough room preparation are crucial to ensuring the best outcomes in dermabrasion. Optimal lighting and appropriate monitoring equipment help the surgeon maintain precision and safety during the procedure. It is important to inform the patient about the risks, benefits, and limitations of dermabrasion to ensure they have realistic expectations of the procedure. The technique itself is highly operator-dependent, requiring that the surgeon be proficient in dermabrasion to avoid complications and maximize results [8].

Before starting, Gentian violet solution is often applied to outline the treatment areas clearly. Refrigerant topical anesthesia is used to numb the skin, temporarily freezing the surface to reduce discomfort during the procedure. The surgeon maintains the skin in a taut position to ensure even, effective abrasion as each anatomical unit is treated systematically. Throughout the process, care is taken to apply the appropriate amount of pressure and direction, as over-abrasion can lead to scarring, while under-treatment may yield suboptimal results [9].

After the procedure, the surgeon may use either an open dressing or a closed dressing system, depending on the wound's size and complexity. Postoperative care is integral to recovery, often involving antiviral medications to prevent viral infections, antibacterial agents to minimize bacterial contamination, and corticosteroids to reduce inflammation. The healing process, or re-epithelialization, typically completes within 5–7 days, though residual erythema (redness) may persist for up to 4 weeks. During this time, it is vital for patients to practice stringent sun protection, as exposure to UV rays can worsen scarring or cause pigmentation issues in the newly treated skin, delaying recovery and complicating the aesthetic outcome [3, 10–12].

DISCUSSION

Dermabrasion-assisted debridement has become a crucial component in the effective management of burn injuries. It is particularly beneficial for certain types of deep burns with partial skin loss, especially scalds, which are among the most prevalent burn injuries. After the removal of necrotic skin, a thin to moderate thickness skin graft is applied immediately [13]. Tangential excision and debridement are commonly employed techniques in burn surgery. This approach reduces the risk of infection, minimizes pain, and facilitates a quicker return to daily activities, leading to faster hospital discharge and overall recovery, including an earlier resumption of feeding. Necrotic skin is removed until a punctate bleeding surface on the underlying dermis is visible.

For deep dermal and full-thickness burns, early tangential excision followed by split-thickness skin grafting is the standard treatment. After about three weeks, or sometimes slightly longer, deep dermal burns heal naturally through the formation of granulation tissue and the epithelialization of surrounding healthy skin. In cases of full-thickness burns, where all epithelial cells are destroyed, skin grafting is necessary. Studies indicate that performing dermabrasion on deep dermal burns-not full-thickness wounds-alongside prompt tangential excision leads to faster healing, improved stability, enhanced appearance, and prevention of hypertrophic scarring. In such cases, grafting is often not needed [14].

Dermabrasion allows for better control over the depth of tissue removal while preserving viable tissues, resulting in a stable endpoint, rapid healing, and less blood loss. This combined approach of tangential excision and dermabrasion is typically performed between the third and fifth day post-burn, with only about 10% of the body's surface area being eligible for removal and replacement during a single procedure [15].

CONCLUSIONS

Dermabrasion assisted with debridement with nail filer is a technically easy operation with minimal blood loss and minimal pain. The use of dermabrasion-assisted debridement for scald burn wounds has demonstrated positive outcomes, including quicker wound coverage, lower infection rates, and enhanced healing. This approach not only shortens hospital stays and treatment expenses but also improves patient prognosis. Additionally, patients showed good compliance with this procedure.

Conflicts of Interest

None.

Financial Support and Sponsorship

None.

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