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Role of Non-Cultured Keratinocyte Graft in Scald Burn

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Abstract

Scald burns are common in paediatric age group in India. In children, contact with hot surfaces and scald burns are the most common presentation to the hospital. The practice of cooking at ground level or sleeping with a burning lamp are some of the causes. Early management of this type of burns results in better outcomes. In this case we describethe role of non-cultured keratinocyte graft as a therapy in Scald Burn.

Keywords: Non-cultured keratinocyte graft; Scald; Burn; Management.

INTRODUCTION

Burns are one of the leading causes of morbidity and mortality in children. Basic knowledge about thermal injury is important in the management of children presenting with burns. A study shows 2 million incidences of burns per year in the Indian Subcontinent. Forty percent of burn victims are under 15 years of age. Scalds and hot liquids make up 90% of burn injuries to children.[1] Common sites are at home around the kitchen and open fire places. The reconstructive ladder was a term coined by plastic and reconstructive surgeons to describe levels of increasingly complex management of soft tissue wounds.[1] Theoretically, the surgeon would utilize the lowest rung of the ladder, that is, the simplest reconstruction technique to address a clinical reconstructive problem. In this case report, we describe the role of non-cultured keratinocyte graft as a therapy in Scald Burn.

MATERIALS AND METHODS

This study was conducted in the department of plastic surgery in a tertiary care centre after obtaining the departmental ethical committee approval. Informed written consent was taken from the patient. The study is a non-randomized, prospective observational study. The patient under study was a 4 years-old male, with no other known comorbidities presented with mixed second degree superficial and deep scald burns to the left chest, arm and forearm constituting 15% of total burn surface area (Fig. 1). The child was managed according to WHO protocol. The burn wound was debrided with hydrojet and regenerative therapies like Autologous platelet rich plasma (APRP) and

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biological collagen scaffold dressing was done. Most of the second degree superficial heals by eight days with the conservative management and regenerative therapies. Remanent, non-healed burn wounds are grafted with non-cultured keratinocyte graft. Dermabrader is used for harvesting epithelial layers. Before harvesting, apply mupirocin ointment over the skin just near the burn wound. The dermabrasion is done using the high-speed rotating head dermabrader with 4200rpm over the targeted region (Fig. 2). The epithelial cells mixed with the mupirocin and forms a paste, which is applied over the non-healed burn wound (fig. 3).

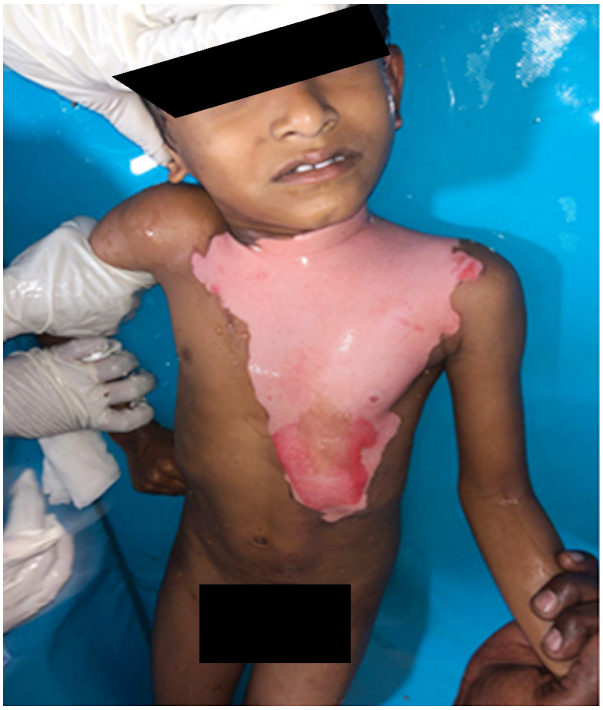

Fig. 1: At admission 15% TBSA scald burn

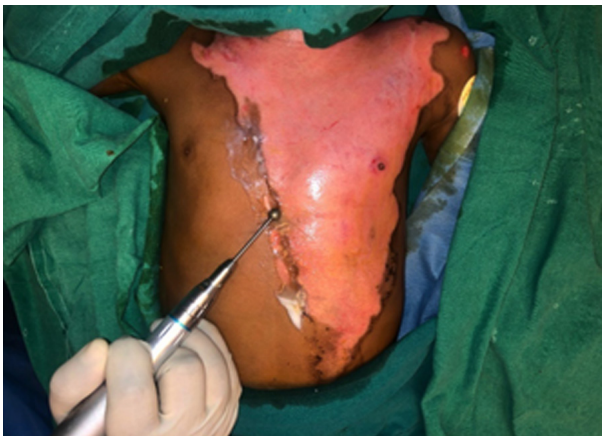

Fig. 2: Dermabrasion assisted non-cultured keratinocyte graft (NCKG)

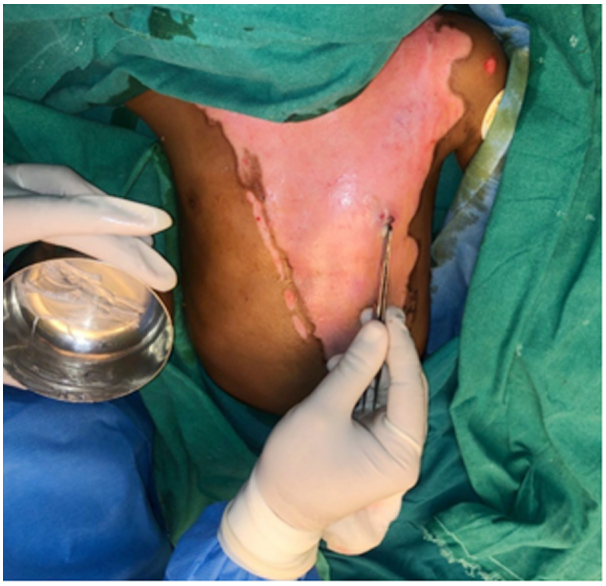

Fig. 3: Application of non-cultured keratinocyte graft (NCKG) over the non-healed areas on day 8

RESULTS

The non-healed second degree burn wound are healed well with non-cultured keratinocyte graft (fig. 4).

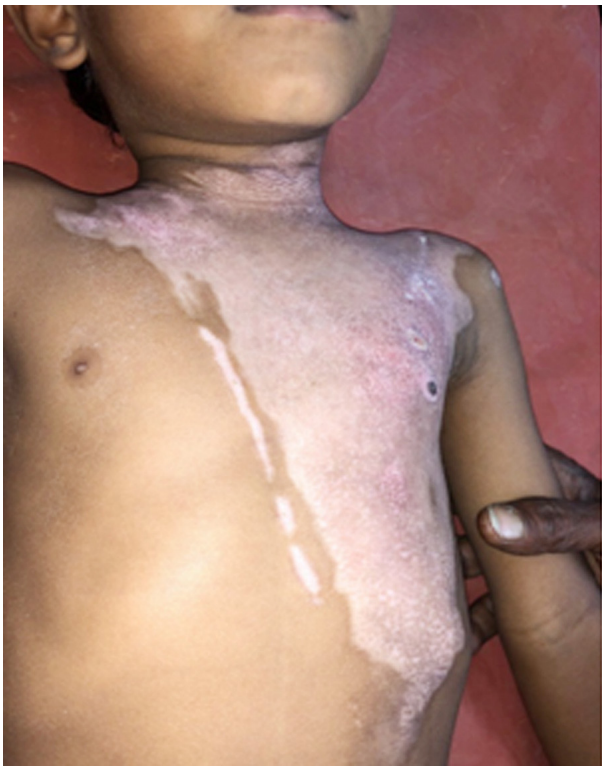

Fig. 4: Healed burn wound at day 16

No complications noted with procedure. The skin site which is used for harvesting keratinocyte graft also healed within Seven days. No residual raw area

by Sixteen days. Patient discharged successfully. Non-cultured keratinocyte graft treated wound showed accelerated wound healing.

DISCUSSION

Wound healing is a complex process. It involves three phases inflammation proliferation and maturation. The chronic wounds are characterized by a prolonged and persistent proliferative phase due to altered local and systemic factors. The spectrum of modalities available to manage these types of wounds is very wide. Conveniently it can be grouped into four categories conventional therapy, novel therapy, reconstructive therapy, and cell based therapy.[2] Conventional therapies include conventional dressings with or without topical application of antimicrobial agents, growth factors; various biological dressings such as silver and alginate; hyperbaric oxygen, etc. Novel therapies include the use of platelet rich plasma, negative pressure wound therapy (NPWT), and skin substitutes. These are minimally invasive with much better healing efficacy than conventional therapies. Reconstructive therapy, such as skin and flap grafting, are invasive and damage the normal tissue also. Cell based therapy is also emerging as a part of wound management.[3]

Application of cultured keratinocytes appears to promote healthy granulation tissue formation within the wound bed. The graft, when applied as a sheet, act as an occlusive dressing, preventing wound dehydration and maintaining a moist environment. The majority of evidence suggests that cultured epidermal allografts do not survive indefinitely after transplantation.[4] Their brief contact with the wound, however, seems sufficient to stimulate re-epithelialisation, particularly when dermal tissue is present in the wound bed. This may be due to the release of growth factors by keratinocytes which may favourably influence wound healing. In addition to this, there is a release of several growth factors by keratinocytes that promote wound healing.[5] It is known that cultured keratinocytes release various factors that enhance the growth of other cells in vitro including keratinocytes, fibroblasts, and melanocytes. Identified factors include interleukin-1, other interleukins, and transforming growth factor-alpha.[6] These keratinocytes may be autologous or allogenic in origin. These cells are separated from skin graft by using trypsin or other methods. After separation, these are cultured in appropriate media to form a sheet. These sheets are used as graft to cover the wound. In our case, we have used autologous non-cultured, non-trypsin treated keratinocytes cells to promote the healing. We observed favourable result in terms of healing of scald burn wounds and rapid epithelialization of the wound from the margins.

CONCLUSION

This is a preliminary study to assess the use of non-cultured epithelial graft in Scald burn wounds. A large multicentric, double blinded control study with statistical analysis is required to further substantiate the results.

Conflicts of interest: None

Authors' contributions: All authors made contributions to the research, is putatively expected to be useful article.

Availability of data and materials: Not applicable.

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Consent for publication: Not applicable

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