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Review

The use of split-thickness versus full-thickness skin graft to resurface volar aspect of pediatric burned hands: A systematic review

Theddeus O.H. Prasetyono^{a,*}, Patricia M. Sadikin^b, Debby K.A. Saputra^b

^a Division of Plastic Surgery, Department of Surgery, Cipto Mangunkusumo Hospital/Faculty of Medicine University of Indonesia, Jakarta, Indonesia

^b Diponegoro 71, Jakarta 13410, Indonesia

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ABSTRACT

Objective: The aim of this systematic review was to discuss the comparison of split-thickness skin graft (STSG) and full-thickness skin graft (FTSG) use as the treatment for volar digital and palmar burns in children.

Methods: We conducted PubMed and Cochrane Library searches using keywords “hand injuries”, “contracture” and “skin transplantation”. The search was limited to studies published from 1st January 1980 until 31st December 2013 and used English language. We selected the studies based on specific inclusion and exclusion criteria. We assessed the quality of the studies by using Newcastle–Ottawa Scale (NOS) for cohort studies.

Results: We included eight articles in our systematic review. One of those studies is a prospective cohort study and the others are retrospective cohort studies. Based on combined range of motion (ROM) evaluation in three studies, STSG group yielded poorer functional outcomes than FTSG group. However, there is no study which can fairly show that FTSG was significantly superior to STSG to achieve good functional outcomes.

Conclusion: Currently, there is no strong, high-quality evidence to prove that FTSG is superior to STSG to cover pediatric palmar burns. Either FTSG or STSG can be utilized with consideration of several influential factors especially splinting and physiotherapy.

Type of study/level of evidence: Therapeutic, II.

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* Corresponding author at: Division of Plastic Surgery, Department of Surgery, Cipto Mangunkusumo Hospital/Faculty of Medicine University of Indonesia, Medical Staff Building 4th floor, Jl. Diponegoro 71, Jakarta 13410, Indonesia. Tel.: +62 817858899; fax: +62 21 31903152.

E-mail addresses: teddyohprasetyono@yahoo.com (Theddeus O.H. Prasetyono), patricia_marcellina@yahoo.co.id (P.M. Sadikin), db.k.adi.saputra@gmail.com (Debby K.A. Saputra).

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1. Introduction

Burn is one of the most common cases in plastic surgery which has various and prolonged sequelae especially in children. It is the fifth most common cause of non-fatal injuries in childhood [1]. Worldwide, it is estimated that over half a million children are hospitalized with burns every year [2]. In low- and middle-income countries, approximately one-third of overall burn cases comprised children younger than 4 years old [3]. Children have higher risk to get burns especially in upper extremities because naturally they are active and curious to explore their surroundings with their hands but they have slow withdrawal reflexes which cause them to have prolonged contact with heat sources resulting in a deeper burn [3–5]. Burns in children mostly are caused by scald from hot liquids, flame, and direct contact with hot objects in which the latter can cause deep burns to the palms [6,7].

Most of superficial pediatric hand burns can be treated with topical antibiotics, dressing, and splinting, however, in cases of deep partial and full thickness burns, surgical interventions are needed to close the wound [4,8,9]. Modalities available to cover deep palmar hand burns are skin grafts and flaps. Surgeons utilize skin grafts more often than flaps because the cases of pediatric burned hand which need flaps to cover the wound are rare. However, the nature of skin grafts is to develop secondary contracture [7]. It is aggravated by the nature of the hand to flex in resting position (intrinsic minus posture) due to relatively greater strength of the flexor musculature [5,10]. This flexion contracture is undesirable since it will give long-term impacts toward children’s hand function and psychosocial well-being [11].

Several methods have been applied to immobilize the hands and prevent the formation of flexion contracture such as splinting, exercising, and pressure garments [7,8]. During rehabilitation period, the hand is splinted in position of extended wrist and hyperextended metacarpophalangeal (MP) and interphalangeal (IP) joints of digits 2–5 to maintain antideformity position [12]. Unfortunately, it is difficult to get cooperation from children to comply to the regimen therefore some degrees of contracture will still develop [10].

The use of either split-thickness (STSG) or full-thickness skin grafts (FTSG) as a wound closure has its own benefits and drawbacks. Controversy regarding which type of skin grafts is better to achieve good functional and esthetic outcomes in pediatric palmar hand burns is still present [11]. Based on our clinical experiences, the use of FTSG will still result in the

formation of contracture due to poor compliance of long-term night splint use. The aim of this systematic review is therefore to investigate studies comparing STSG and FTSG use to resurface the fingers and palm burns in pediatric hands in terms of functional outcomes and esthetic appearances. We considered conducting this systematic review because we try to provide a higher level of evidence, comparing FTSG and STSG, since most of the available studies do not exceed level III evidence.

2. Methods

The systematic review method was made based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (www.prisma-statement.org) [13].

2.1. Search and selection processes

Studies comparing the use of FTSG and STSG for covering burns of the volar aspects of the hand in children were our main interest. Papers reporting hand injuries inflicted by causes other than burns and burns to the dorsum of the hand were excluded. We also excluded studies which discussed flaps and the use of either FTSG or STSG alone, case reports/series, narrative review, letter to editor, and articles without available full-text. The assessed outcomes were in the form of functional outcomes including range of motion (ROM), incidence of contracture/re-contracture, and esthetic outcomes.

PubMed and the Cochrane Library search were conducted in February 2014. The publication date was limited from 1st January 1980 until 31st December 2013. Only articles published in English were included in this study. A specific search term (in Appendix) was developed using keywords “hand injuries”, “contracture”, and “skin transplantation” so that no relevant study was missed. The title and abstract of retrieved articles were screened by applying inclusion and exclusion criteria and full-text of relevant articles were obtained. Furthermore, the reference list from each relevant study was also screened for potentially suitable studies. Each included study was scrutinized by three reviewers (TOHP, PMS, and DKAS) and difference in opinion was settled through consensus. (Fig. 1)

2.2. Data extraction and quality assessment

A data extraction table was created to extract data from each article. We collected data on study design, patients’

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