

Role of Autologous Platelet Rich Plasma in Management of Pediatric Postburn Web Space Scar Contracture

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Abstract

Burns are one of the most common injuries among the children. Scald injuries tend to be the most common type of burn injury under the age of five, accounting for over 65% of the cases. Despite appropriate initial treatment and compressive therapy, contractures are common after deep burn. The most common and functionally limiting are web space and hand contractures.

Autologous platelet rich plasma (APRP) has gained its importance in medical field since it was found to have wound healing and scar modifying properties.

Hence, use of Autologous Platelet rich plasma (APRP) has been incorporated into the management of this case for a good outcome.

Keywords: Burns; Web Space; Contracture; Autologous Platelet Rich Plasma; Pediatric Burns.

INTRODUCTION

Burns injury is one of the important factors contributing to mortality in a developing country like India. Despite appropriate initial treatment and compressive therapy, contractures are common after deep burn. The most common and functionally limiting are web space and hand contractures.

In recent years skin regenerative techniques such as APRP has been found to give better results in wound management as they reduce inflammation and aid in the healing process.

Platelet rich plasma contains a cocktail of growth factor and cytokines, which are thought to play a role in reducing inflammation and also aid the healing process and scar remodelling.

MATERIALS AND METHODS

This study was conducted in Tertiary Care Centre in Department of Plastic Surgery after getting the department ethical committee approval. Informed consent was obtained. The subject was a 9yr/M with scar contracture of left ring finger and 3rd webspace contracture. Patient came with the complaints of inability to extend his left middle finger for 6 years after suffering scald burns at the age of 2 years following which he developed scar over his left upper limb. He had history of In-hospital admission for the scald burns at 2 years, release of scar contracture at left middle finger with SSG and release of contracture of 2nd, 3rd webspace.

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For the 3rd Webspace contracture, preoperative webspace splinting was done for 2 weeks. The maximum angle of abduction was measured with a goniometer (Fig. 1) and documented. He underwent JESS distractor application (Fig. 2) and APRP injection (Fig. 4) into webspace contracture site. Post-operatively slow distraction was started. When the preoperative angle of maximum abduction was achieved, no further distraction was done. JESS distractor was retained for 3 weeks. After removal, the angle of abduction in 3rd webspace was assessed- the maximum angle was achieved (Fig. 3,5). Patient advised to continue passive and active physiotherapy and splinting.



Fig. 1: Preoperative assessment of reduced webspace angle of 32°



Fig. 2: Application of JESS distractor

RESULTS

Intraoperative and post-operative periods were uneventful for the patient. Deformity due to post burn contractures was found to be decreased

and functional improvement in function of hand was seen. Webspace contracture releases. No complications and side effects were noted during entire procedure.

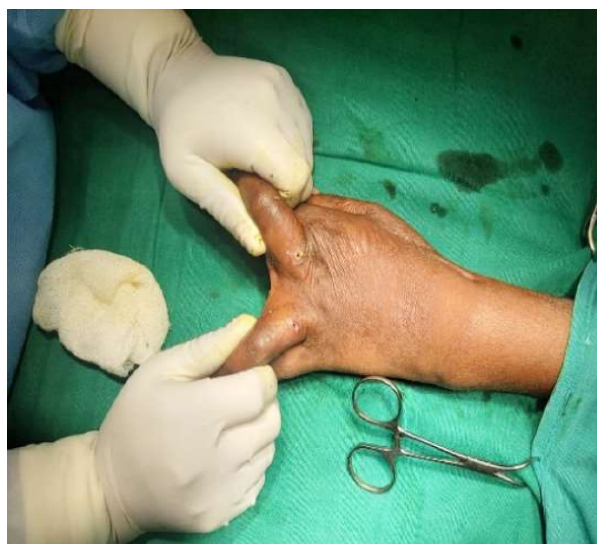


Fig 3: Intraoperative webspace stretching after JESS removal



Fig. 4: APRP injection over webspace contracture

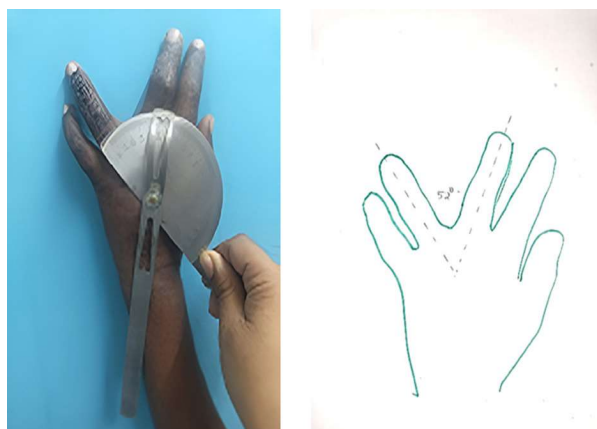


Fig 5: Post JESS removal webspace angle attained is measured using a goniometer

DISCUSSION

The hands account for less than 5 % of total body surface area. Despite this small percentage, many burns requiring hospitalization involve the upper extremity.^{1,2} Hand burns are considered severe injuries by the American Burn Association and should be referred to specialized care centers to minimize sequelae of thermal injury including nail deformities, hypertrophic scars, boutonniere deformity, digit loss, and contractures. The skin on the palmar and dorsal aspects of the hand has distinct properties that make them variably susceptible to contracture formation. Dorsal skin is more thin and pliable and the extensor mechanism lies just deep to a thin layer of subcutaneous tissue. The glabrous skin of the palmar surface contains thicker skin and subcutaneous tissues. Additional fibrous septa, and the palmar fascia, protect the flexor tendons. For these reasons, the dorsal skin and extensor mechanism are more susceptible to contractures than the palmar skin and flexor tendons.³ Postburn contractures which affect the web spaces can lead to substantial functional and aesthetic deformities. Web contractures may involve the dorsal web, palmar web, or interdigital space, so-called burn syndactyly. These contractures affect the normal 45° dorsal slope and palm-to-finger ratio.⁴ Thumb-index web contractures may involve only skin, and in chronic settings may include fibrosis and shortening of the adductor pollicis muscle. In severe and chronic cases, soft tissue contractures may have underlying bony abnormalities; radiographic evaluation facilitates treatment decision making.

Autologous platelet rich plasma used in a chronic wound serves as a source of growth factors and thence has mitogenic, angiogenic and chemotactic properties. Autologous platelet rich plasma has also been shown to stimulate human dermal fibroblast proliferation and thus increasing the deposition of type I collagen, the above mechanism being proposed to its use in scar management. Application of activated Autologous platelet rich plasma also provides 5 to 10 times the normal concentration of growth factors that include PDGF,

VEGF, TGF- β locally also accelerating wound healing and scar remodelling.⁵⁻⁸

CONCLUSION

Post thermal burn scars of hand can be challenging to manage due to scar contracture and loss of functional use of the fingers and hand. We have demonstrated an effective and successful method to manage such a challenging case using APRP injection and JESS distraction.

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