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SURGICAL TECHNIQUES AND INNOVATIONS

Role of Square Flaps in Finger Contractures

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Abstract

Reconstruction of finger contractures is a challenge for the plastic surgeon. It is important to restore the length, function, along with providing a good quality skin cover (Sridhar and Hariharan in Int J Sci Stud 5(2):55-58, 2017). This study is aimed to show use of square flap in finger contractures along with determining its functional outcome. Three cases of finger contractures were reconstructed between May 2020 and December 2020 in a tertiary care hospital in north India. Departmental clearance was done. Written informed consent was taken. Results were analyzed as per successful reconstruction, type of reconstruction and stages, complications, and functional outcome. The surgical outcome has shown improvement in overall function. Square flap has proven to be a useful flap in post-burn/trauma finger reconstruction.

Keywords Fingers · Post-burns contracture · Post trauma contracture · Reconstruction

Introduction

Hands are a mirror image of mental health of a person. Hands are involved in more than 80% of severe burns/trauma. Each hand is < 2–3% of the total body surface area. Hand burns are considered as major burns [1].

In the treatment of burned hand, along with a multidisciplinary approach, early excision and grafting followed by early initiation of physical therapy, splinting, and exercises are indicated to minimize finger contractures [2].

Post-burn deformities occur even in a well-managed case and remain the most common cause of finger contractures [3]. Reconstruction of finger contractures is a challenge for the plastic surgeon. It is important to restore the length, function, along with providing a good quality skin cover [4].

Numerous methods have been suggested by various authors for surgical management of contractures at axilla, elbow, and fingers: skin grafting; Z-plasty, Y-V plasty, and their modifications; other local-flap plasty's; fasciocutaneous and musculocutaneous pedicled, and free flaps.

This study is aimed to show use of square flap in finger contracture along with determining its functional outcome.

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Patients and Methods

Three cases of finger contractures were reconstructed between May 2020 and December 2020 in a tertiary care hospital in north India. Departmental clearance was done. Written informed consent was taken. Patients with either post-burns of traumatic contractures involving single digit were chosen.

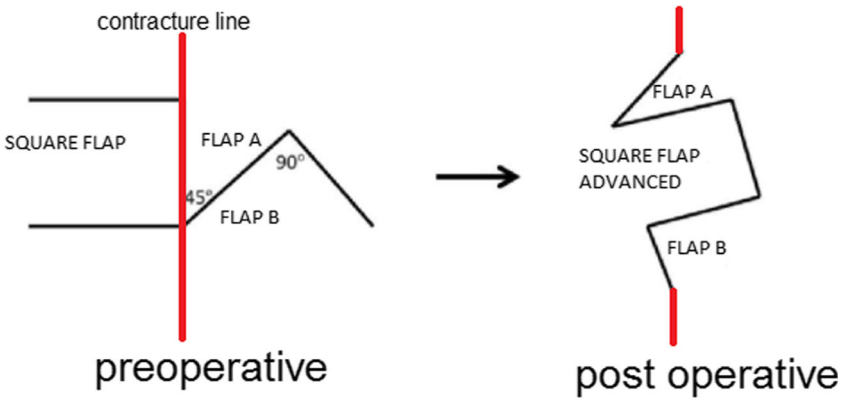
All the flaps were done under tourniquet guidance and local anesthesia/brachial block by resident surgeons. Average time taken was 40–50 min.

Along the line of contracture, the square is designed on the side from where the tissue is pliable and can be advanced with ease. On the other side, two triangular flaps are marked. Angles are kept 45° for the 1st one and 90° for the second one. All the limb lengths of square and triangular flaps kept equal (Fig. 1).

Incisions made along the marked line and the contracture are released up to permissible limit. Three flaps are elevated. Tourniquets are released where applied. Square flap is then advanced across the previous contracture line; the two triangular flaps are transposed and sutured on either side of the square flap, where the raw area was more additional split thickness skin graft used to cover the defect. Dressing of the wound done according to our hospital protocol (Image 1).

Sutures were removed after complete healing at 10–14 days. Postoperative splint was given for 14–21 days. Pressure garments advised for 3–6 months to soften the scar and to reduce possibility of scar hypertrophy. Any postoperative complications were noted and managed accordingly.

Fig. 1 Line diagram



Regular physiotherapy was started postoperatively. Follow up visits were scheduled for minimum period of 6 months and range of motion and pre- and postoperative photographs were taken. Patient and surgeon satisfaction was recorded (Image 2).

Results

There were total three cases of contracture of finger. There were two gentlemen and one lady. Two of the patients were below 20 years of age. Two cases were post traumatic and one case was post-burn finger contracture.

All patients underwent release with square flap. Two patients required Split Skin grafting. There were no complications.

There was an overall improvement in range of motion in postoperative follow up. The patients were followed up for 6 months (Table 1).

Discussion

The square flap is a type of local flap that is appropriate for the surgical release of a single linear band contracture at various locations that have adjacent healthy tissue [5]. The original design of the square flap had a square and two adjacent

Image 1 Case 1

Image 2 Follow up picture of case 1

triangular flaps that are at an acute angle. This design was later modified in 1987. The author made one of the triangular flaps to a right angle flap which resulted in better lengthening [6].

In our study, we have used the square flap technique to release finger contractures. There were total three cases of contracture of fingers. There were two gentlemen and one lady patient. Two of the patients were below 20 years of age. Two cases were post traumatic and one case was post-burn finger contracture.

All the designed square flaps gave adequate lengthening of the contracture bands. Many local flap methods have been described previously in the literature for release of scar contractures of the finger. Z-plasty gives a good overall lengthening but large flaps are susceptible to more transverse tension. Modifications such as multiple Z-plasty in series, four-flap, five-flap, and seven flap Z-plasties provide suitable lengthening with lesser transverse tension [7].

Advantages of using the square flap in contracture release are that it creates a larger flap area to interpose a normal skin flap between the scarred burn flaps for optimal length gain. It is associated with the less physiological tension, which means that the deformity and the dependence on the laxity of the adjacent skin are minimal [8].

The square flap technique is a simple, easy technique which provides good lengthening, effective release of the contracture band with overall good cosmetic outcome [5]. It can be used in fingers, axilla, elbow, knee, etc.

The limitation of this study is the small number of patients and short follow up period. More cases and an extended follow up interval are required to confirm the efficacy of the square flap technique for the release of finger scar contractures.

Table 1 Patients details

Case	Age	Sex	Cause	Complications	Procedure	Finger angle (in degree)	
						Preoperative	Postoperative
1 (Images 1 and 2)	12	M	Trauma	Nil	Square flap + full thickness skin graft	60–70	140–150
2	18	M	Burns	Nil	Square flap + split thickness skin graft	80–90	160–170
3	27	F	Trauma	Nil	Square flap	110–120	Full range

Conclusions

The square flap technique is a simple, easy technique which provides good lengthening, effective release of the contracture band.

Author Contribution All authors contributed equally to the case.

Declarations

Conflict of Interest The authors declare no competing interests.

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