

Management of Post Burn Contracture of Upper Limb Using Five Flap 'Z' Plasty - Our Experience

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Abstract: ***Aim and Objective:** To share our experience in correction of post burn contracture of upper limb using five flap 'Z' plasty. **Methods:** 25 patients with post burn contracture involving upper limb attending outpatient centre between June 2017- May 2018 were assessed for various factors like scar tissue pliability, passive joint mobility and local skin availability and taken up for five flap 'Z' plasty. The patients were followed up regularly in the post operative period. **Results:** Of the 25 patients, 4 patients were males and 21 patients were females. There were various levels of post burn contracture present. The age group was between 12 yrs and 55 yrs. Five flap 'Z' plasty was done in all cases. Flap tip necrosis presented in 4 cases. **Conclusion:** In our experience, the use of five flap 'Z' plasty appears to be the best choice with good functional outcome in linear burn contractures of upper limb.*

Keywords: 'Z' plasty flap, contracture, hand, burn

1. Introduction

The incidence of post-burn contractures is extremely high in our country. Usually, in a given patient they are not only multiple but severe and diffuse. One of the most frequent sites of burn scar contracture deformity is the hand [1]. Bilateral hand deformities following post burns, can make a burn survivor a disabled person. There is a high frequency of occurrence of hand burns and if bilateral, then the occurrence of a deformity is very common [2].

2. Materials and Methods

The patients with post burn contracture attending the outpatient department were examined. Of these patients, those having contractures involving upper limb were segregated and of those, 25 patients with post burn contracture either unilateral or bilateral were taken up for study. The inclusion criteria were linear band of scar contracture involving axilla, elbow, fingers, wrist or web space. Exclusion criteria included h/o previous surgeries, acute burns, immature scar formation, 'Z' thumb deformity, diffuse scar contracture.

3. Results

Of the 25 patients, 21[84%] patients were females and 4[16%] patients were of male gender. The age group was between 12 yrs and 55 yrs with mean age gp of 33.5 yrs. Among these, 6[24%] patients had post burn scar contracture involving the both upper limb in various degrees and 5 [20%] patients were having scar contracture in anterior axillary fold, 6 [24%] patients involving elbow, 4[16%] patients had contracture in volar aspect of wrist, 3[12%] patients involving first web space and thumb and 7[28%] patients involving rest of the fingers and web spaces.

region \ gender	Male 4 [16%]	Female 21[84%]
Axilla	-	5
Elbow	-	6
Wrist	-	4
Hand	4	6



Fig 1: post burn contracture in anterior axillary fold – five flap z plasty



Fig 2: post burn contracture elbow - five flap z plasty

Table 1: Anatomical distribution

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Fig 3: volar contracture band in wrist – five flap z plasty



Fig 4: I web space – five flap z plasty

The time of surgery was minimum of 3mon to maximum of 5yrs following burn trauma. Some of these patients had burn contracture of other anatomical regions in addition to upper limb and they were released sequentially.

Follow up was done for a period of 6mon to 1year in some cases. There was no recurrence. Except in 4 patients with flap tip necrosis, all other flaps settled well. All patients underwent physiotherapy based on the level of contracture. Temporary splint in the form of plaster of Paris splint was given to all patients for a period of 2-3 wks. Night splint was NOT necessary.

4. Discussion

Injury due to burns is a very common occurrence among the domestic accidents especially in developing countries [3]. Depending on the thickness of the burns, the scar formation may form contracture bands which if not treated adequately may lead to disability and increased morbidity, especially in upper limbs where it may lead to cripple. These patients experience social stigma and difficulty in performing daily activities[4].

In upper limb contractures of our patients, the medial border of elbow and radial border of wrist were predominantly involved along the anterior axillary fold. The management

of post burn scar should be individualised and initiated in a very early stage. If not done adequately or neglected, may lead to contracture band formation. Various treatment options are available for correction of contractures. In the ladder of skin reconstruction, the gold standard technique will be the use of local skin flaps based on Gilles principle of “like with like”. But the availability of the local flaps is limited to the size of the surface area involved following burns, adjacent normal skin, and the vascularity of the scar tissue[6-8].

The surgery is usually performed when the scar becomes mature, but this waiting period may be 6 months in some patients. De Lorenzi et al. have reported waiting for 2 or 3 weeks following acute burns, before considering surgery for release and free flap covering with success rates of 94% [9]. Flap surgeries are preferred to use of skin grafts as they provide better aesthetic outcome [10, 11].

In contracture of extremities, Hudson et al. divided them into mild and severe based on the % of ROM [12]. ‘Z’ plasty can be used for lengthening and transposition of scar tissue. There are many variations of ‘Z’ plasty, of which we have used five flap ‘Z’ plasty in our patients.

Five flap ‘Z’ plasty is the combination of double opposing ‘Z’ plasty with Y-V advancement [17]. We have a common central limb, with ‘Z’ plasty marked at $60^\circ - 70^\circ$ angle and ‘Y’ flap marked in the centre bisecting the two opposing ‘Z’ plasty with 45° angle. By transposing the flaps, the central limb is lengthened and there is redistribution of the skin tension [13]. This flap is also referred as “JUMPING MAN FLAP”.

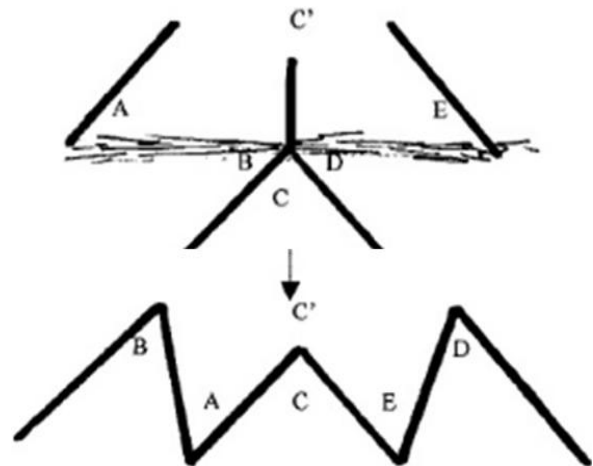


Figure 5: Five flap ‘Z’ plasty courtesy: medical blog-burn reconstruction

The flap necrosis can be avoided by placing the Z’ plasty angle is more obtuse at 70° and ‘Y’ marking with shorter central limb, so that the vascularity to lateral flaps is not compromised [14-15]. Adrenaline saline injection to be avoided. Many modifications are executed on the basis of similar principles [18].

Postoperatively, the patient was provided temporary splint for 2-3 wks with suture removal at 14 – 21 days followed by gentle physiotherapy. In some patients involving elbow, elastocrepe bandage was applied. Daily wound care is easily

done by the patient by local application of ointment with simple dressing. Joint mobilisation exercises along with scar massage was given[16] up to 6-8 wks.

The flaps settled well except in 4(16%) patients, which were managed conservatively. This could have been due to extensive undermining of the flaps from scar bed. Some of the limitations of the study were: it is a single centre study, not done by a single surgeon (so results were variable) and observer bias could not be eliminated completely.

5. Conclusion

Five flap multiple Z plasty is easy to perform and can be used in both linear scar and web contractures. Overhead shoulder abduction, full range elbow extension with wrist and finger mobility were achieved. Breast contour is achieved in release of axillary contractures. Donor site morbidity is less as flaps from surrounding skin were used. Less hospital stay and early return to daily activities. Recurrence rate is very less and post operative patient functional outcome is satisfactory. The disability is very likely to be prevented if treated at the correct time and it greatly improves the patient's lifestyle and boosts the level of confidence.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal.

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