

RECONSTRUCTION OF SUPPLE SCAR OF POST BURN CONTRACTURE OF NECK BY Z-PLASTY

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ABSTRACT: Denonvilliers in 1856 was the first one to describe Z-plasty technique as a surgical correction for lower lid ectropion and it was McCurdy who made the first reference to this technique in the American Literature in 1913 for treatment of contracture at the oral commissure. In 1929 Limberg came up with a more geometric description but geometric details showing optimal angles and length were provided by Davis in 1946.¹ Z-Plasty is one of the most versatile and widely used technique after number of modifications namely multiple serial,² four-flap,³ five-flap,^{4,5} and six-flap,⁶ double-opposing Z-plasties, and other, less commonly used modifications.^{7,8} These are not just theoretical extensions of the Z-Plasty, but practical and applicable procedures. Z-plasty was chosen in our studies to release contracture of the neck scar. In our case we have performed the release of contracture of the neck for improving functional and cosmetic appearance of post burn contracture of the neck. Through multiple Z-plasty technique without excision of Supple Scar, it is possible to lengthen the contracted scars due to burns through changing the direction of the scar. This technique has helped to interrupt and break the scar for better camouflage. The paper describes correction of 20 post burn cases of scar contracture in the neck. The majority of the cases happen to be female who sustained flame burns while cooking. The major disability of limitation was of neck movement as well as of the lower jaw was effectively addressed through this technique by creating longer final gain in length of the contracted scar. The final results obtained by changing the direction of the scar and aligning it with the skin tension lines gave excellent camouflage and cosmetically acceptable outcome. This technique has given the following advantages: Achieve good extension of the neck to normal. There is no chance of recurrence of contracture of neck.

KEYWORDS: (1) Scar contracture, (2) Prepped, (3) Betadine, (4) Contracture, (5) supple scar.

INTRODUCTION: Z-Plasty is a plastic surgery technique used in our study to improve the functional and cosmetic appearance of post burn contracture having supple scar. This technique was used to redirect the scars with the natural skin fold or the lines of least tension to allow skin relaxation and lengthening. It involves transposing the two inter-digitizing flaps of skin formed by the incision.

SPECIFIC AIMS AND OBJECTIVES: There are three main objectives when performing Z-Plasty in dealing with linear band contracture caused by burns in the neck.

- a) To lengthen contracted scar.
- b) To change direction of the scar so that it is better aligned with relaxed skin tension lines.
- c) To interrupt and break and scar for better camouflage.

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METHODS: In this technique, the triangular flaps are created using an angle from 30 to 60 degrees (Fig 1). Theoretically, this angle can lengthen a contracted scar by up to 75 percent and reorient the direction of the central wound by 90 degrees. In practice, the lengthening and reorientation will be less, owing to increased wound tension.^[9] The study was carried out over a period of 30 months and the minimum follow-up was six months after the date of surgery.

This technique allows two adjacent undermined triangular flaps, constructed using the same central axis to transpose over each other and to lie in the other's originating bed. The transposition flap having two triangular flaps are transposed from the areas of comparatively excess into areas of relatively deficient, whereby eventually lie at near right angles to the original central axis.^[10] In this process reorientation of the scar is done into a more favorable direction while at the same time breaking up the length of the scar making it less detectable. In this technique contracted scar length is increased which results in the decrease of the prevailing scar contracture force thereby allowing better conformation to contoured surfaces. The final length of the scar is covered by the angle with the lateral limbs subtend with the central limb; essentially as the angle increases. As presented below a 60° angle z-plasty produces a 75% length increase, 45° angle increases 50% length and the 30° angle a 25% length increase as presented below:^[11,12,13] Depending on the contracture we had used 60° to 45° angle to obtain the maximum increase in length.

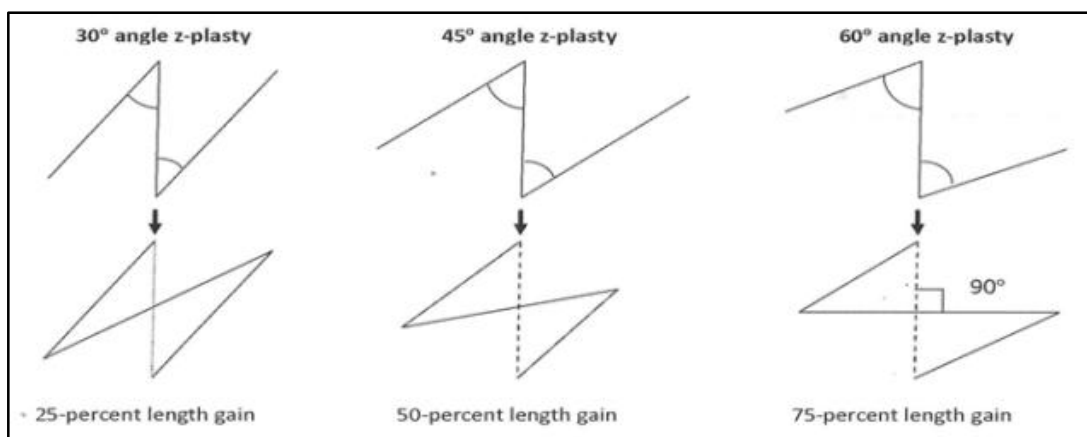


Fig. 1: Lengthening of contracture. Gain in length on realignment of scar based on different angles of Z-plasty

INTRA-OPERATIVE PROCEDURE: The site for surgery is prepped with an antibacterial solution, such as povidone-iodine (Beta-dine), and sterile drapes are applied. At each end of the linear scar two arms are drawn inscribing the angle of 60 degree to the scar. The central scar and the site arms need to be exactly equal in length having the same angle. Full-thickness skin flaps are undermined at the level of subcutaneous fat, creating two triangular flaps of equal size and shape.^[14] Adequate undermining of surrounding subcutaneous tissue is performed to achieve proper mobilization of the flaps.^[15]

The two flaps are then transposed around each other, changing the direction of the original scar as shown in Fig 2.

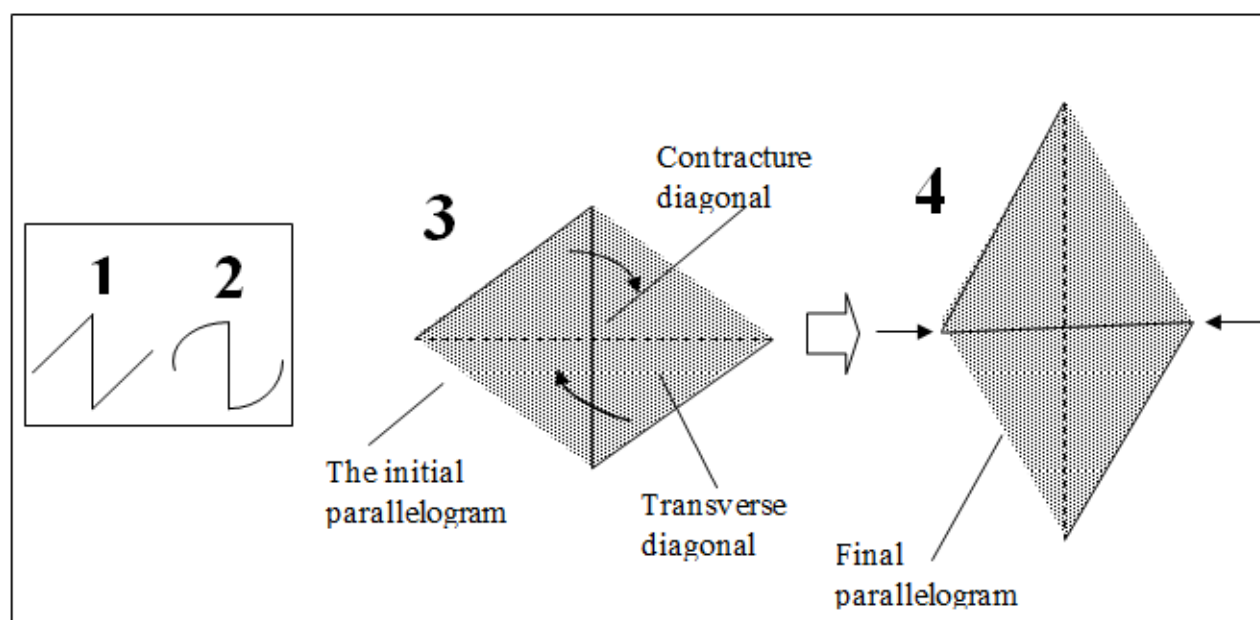


Fig. 2: Lengthening of contracted scars. Difference in length gain and realignment of scar with different Z-plasty angles with increased angles of Z-Plasty.

OBSERVATIONS: Twenty post-burn cases of scar contracture in the neck were treated. The age, sex, percentage of burn and cause of burn are shown in Fig 3 and 4.

A graph showing the gender and age distribution of burn cases is presented in figure 3 and 4. It was observed that majority of the cases were female and sustained flame burns while cooking. There were 71% female cases and the rest male. Of the female cases, the patients suffering burn was in the age group of 10-20 years (Fig 5).

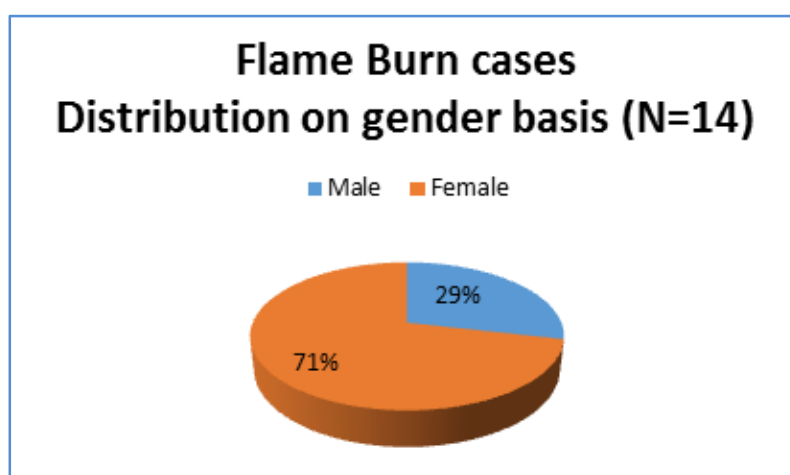


Fig. 3: Genderwise distribution of flame burn cases

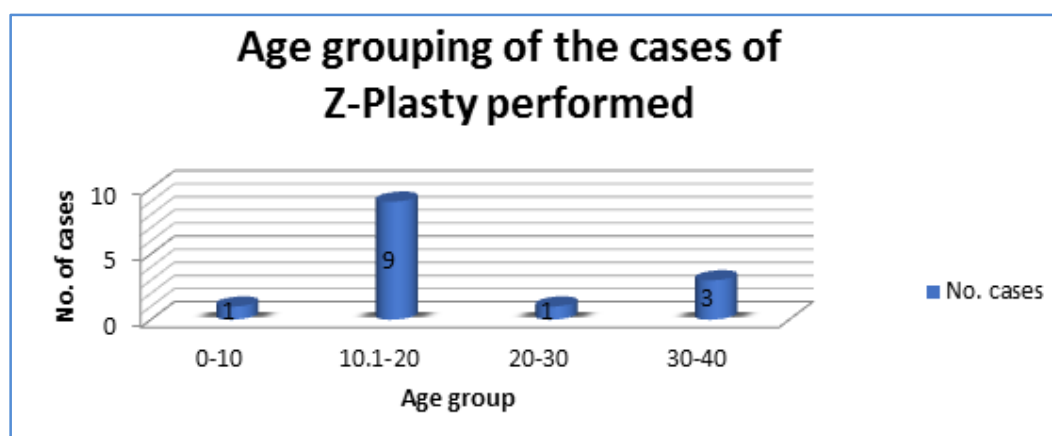


Fig. 4: Age groupwise distribution of flame burn cases

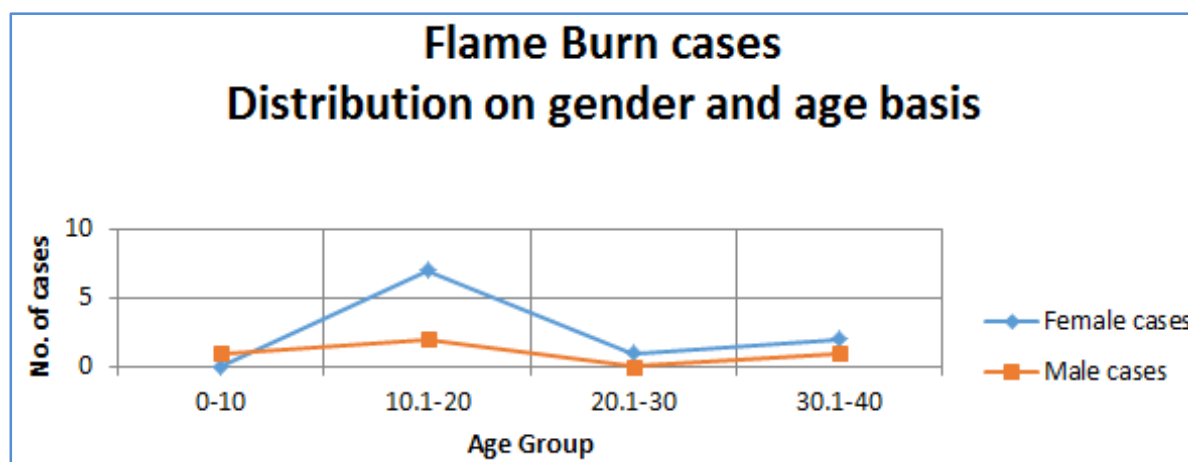


Fig. 5: Distribution based on age and gender of burn cases

The male: female ratio was 4:10 in the age group of 9 to 40 years with majority of the female patients getting flame burns while cooking.

TECHNIQUE: PRE-OPERATIVE, INTER-OPERATIVE AND POSTOPERATIVE: Four sets of slides (Slide 1 Pre-operative, 2 Inter-operative, 3 and 4 Post-operative) are presented below to show severe neck contracture prior to Z-Plasty and post-operative contracture releases using the procedure. In 18 cases there was no flap necrosis and only in 2 cases the triangle tips became depressed and there was marginal necrosis which healed on its own and post-operative recovery was uneventful.



Fig. 6: Slides showing the Pre-operative, Inter operative and post-operative stages of the surgery

PROVISION OF COLLARS: In order to sustain the benefit of the removal of contracture as a result of the Z-plasty all treated patients were provided with collars for continued use for a period of 3-6 months and a typical collar used in the surgery are placed in Slide No. 5.



Fig. 7: Slide 5 – Use of collars for preventing new contracture

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DISCUSSION: In our study multiple contiguous Z-plasty has been used to integrate the flap with surrounding skin which help in providing an aesthetically pleasing skin. The majority of patients had their contracture due to flame burn. The complications were generally mild which included marginal necrosis on flap. The neck is one of the vital areas of the body and when it is involved in contracture it lead to a great disability as there would be limitation of neck movement as well as the lower jaw. The angles of the Z varied from 30 to 90 degrees, with larger angles creating longer final gain in length.^[16] Angles of 60 degrees were most commonly used since larger angles have a tendency to produce greater tension on the surrounding tissues.^[17]

The surgical treatment comprises of release of the contracture and Z-plasty appears to give the appropriate answer in most cases.^[18]

All standard postoperative care protocols were adopted pertaining to wound healing, nutrition, and control of diabetics in specific cases and prohibition of smoking during the recovery stage.

CONCLUSION: Z-Plasty is reliable technique for dealing with linear band burn contracture in the neck as it was possible to lengthen the contracted scar, changing direction of the scar for aligning it with the skin tension lines and giving a good camouflage.

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