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Trapeze Flap for Post Burn Contractures

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I. Introduction

Trapeze flap is a technique in releasing the contractures following burns at joints. Often, in joint contractures, the contractural band, confined to either to medial or lateral side with tenting of nearby normal tissue is observed restricting the movement of the joint desired. Many procedures are applied ranging from release with split thickness skin grafting to free tissue transfer with their own merits and demerits. Here, we are sharing 8 cases, where the technique of 'Trapeze' flap applied at various occasions over joints to release post burn contractures with satisfactory outcome.

II. Method

Pathophysiology

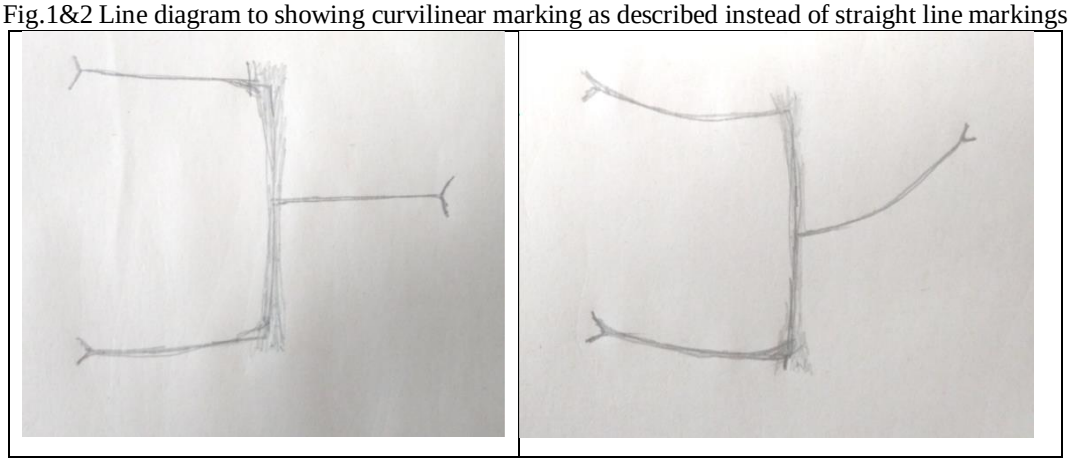
When a person gets exposed to the heat - burns occur. Due to protective reflex phenomenon, to guard against the heat, the joints move into flexion position, resulting- burn over surrounding skin, sparing flexor surfaces to variable degree. This burn area when allow it to heal by secondary intention, in superficial burns it heal uneventfully. In deep to full thickness burn it heals by a scar, which later gets hypertrophied to form thick non elastic tissue thus restricts normal joint movement. However in due course of time, with continuous efforts of the patient to overcome the mobility restriction, the scar edge with normal skin on flexor surface migrates forward to form a 'contractural' band, thereby limit the joint mobility further. This type of contractural bands was observed in 85% of cases (Grishkevich et al).

Releasing contracture and to restoration of normal joint function with acceptable aesthetic appearance with minimal morbidity is the goal. 'Trapeze' flap is one such technique to achieve all these parameters in a single go.

Surgical technique

- Mark central line over contracture band from one end to other.
- Identify and mark the joint line axis (junction of flexion and extension), on either side of the joint.
- Then 'Trapeze' was marked over the normal skin side of the central line, starting from on either ends of central line radially. While marking the natural crease lines and folds (convex or concave), were followed instead of straight lines (Fig. 1).
- Over the scar side, single line was drawn radially from the midpoint of the central line, following again the natural crease line and folds.
- All the radial lines on either side of central line end at joint axis line with 'fish tailing'.
- After completing the markings, under tourniquet control (where ever possible), incisions were made.
- Diathermy was used to secure haemostasis, instead of cutting skin.
- Flap elevation was made strictly following surgical planes of that particular region, with judicious undermining of the normal skin rather on the scar side.
- After elevation, flaps were transposed, advanced and sutured in two layers.
- Drains were not used routinely.
- Splints were applied in all the cases, except over neck and axilla.
- Sutures were removed after 3 weeks and joint mobility with physiotherapy initiated.

Fig.1&2 Line diagram to showing curvilinear marking as described instead of straight line markings



III. Results

This technique of 'Trapeze' flap was applied in various case scenarios to release contractures over neck (2), axilla (1), elbow (2), knee (2), foot (1), in total 8 cases. The age group range from 3 year to 28 years. Most of them were females (6) than males (2). The results were gratifying. The effective gain in length was more than 120%.in all the cases. The range of movement was near total. Often, superficial epidermal peelings especially over scar flaps were not uncommon. Even though wound gaping is one of the common complication, however not interfered with outcome-healed uneventfully. Flap necrosis either partial or total was not observed in any case, not even with scar flaps. Overall patient satisfaction is good.

Fig.2: Post burn contracture neck with marked flap-showing post surgical result

Fig.3: Post burn contracture axilla- release showing trapezoid defect-sutured wound showing gain in length

Fig.4: Post burn contracture knee- surgical results with gained length-healed wound

IV. Discussion

Viktor M Grishkevich, described this technique of 'Trapeze flap' elaborately for the first time in his articles and text book 'Plastic and Reconstructive surgery of burns-An atlas of new techniques and strategies'. According to him the surgically recreated defect after contracture release resembles like a 'Trapezoid'. Hence there is a need for a Trapezoid like flaps, rather triangular flaps. So he has designed trapezoid flaps, from one to many according to the scar length, and closed the defect primarily in majority, with minimal donor site morbidity, and zero flap necrosis. His results were aesthetically appealing and minimal recurrence.

In our observation, we also have noticed that, the results are reproducible, as described by original author. The overall gain in length is more than 120%. This is not observed with any local advancement/ transposition flaps of 'Triangular' design. The tip necrosis which is very common with triangular flaps, are totally absent in these flaps. The joints are covered with thin, stretchable elastic skin.

To repeat the results, we would like to suggest few key points. Prior planning with proper marking is a

must and helps to ease our execution. While marking, following the natural skin crease lines and anatomical land marks are essential instead of simply drawing straight lines. In our series we have applied single trapezoid flap in our cases, however, if necessary multiple Trapezoids could be planned accordingly. Diathermy should never be used for skin incision as this cause superficial epithelial necrosis of scar tissue, which often delays wound healing, and might leads to wound gaping. Wide extensive undermining of the normal skin is the key for successful primary closure of the wound. While elevating the flaps, dissection should be done in appropriate surgical planes of that particular region, otherwise there is imminent chance of flap necrosis. Where ever possible, two layer closure of suture line is preferable than single layer. Keeping drain is optional rather than necessity. Splint should be applied n the flexor aspect and is must over peripheral joints, than central, like neck. However conventional method of splinting for months is not required in any case. Suture removal is delayed at least for two weeks.

The overall gain in length is always more than predicted. This additional gain in length probable could be from existing excess skin due to tenting, inherent skin elasticity plus wide undermining of tissue. As our follow up period is not long enough, it is difficult to comment on recurrence. But we presume that, the rate of recurrence would be minimal than expectation because of normal skin over joint.

V. Conclusion

Overall outcome is quiet satisfactory. When weighed in terms of functional and aesthetic appearance, both patient and surgeon satisfaction are equal rather any one- which often happens. This is one procedure where unless the surgeon has a prior vision, ultimate outcome could not be predictable with certainty.

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