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Original Article

Change in the Quality of Scar Following Release of Contracture – A Study of 50 Cases

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Abstract:

Background: Thick tender scars are commonly associated with contractures. There is a difference of opinion on how they should be addressed. The study was designed to find out how the scars respond to release of tension.

Methods: 50 cases with thick contracted scars were treated by release of contractures. Thickness and tenderness of the scars were measured pre-operatively, 2 weeks after surgery and 6 weeks after surgery to record the changes of the scar.

Results: The scars demonstrated significant reduction in thickness and tenderness within 6 weeks of surgery.

Keywords: thick scar, contracture, tenderness

Introduction

Contracture is defined as an abnormal permanent shortening of tissue that has been replaced by scar tissue resulting in distortion or deformity, especially of a joint of the body. It is one of the complications of burn or trauma when healing has occurred by second intention. Reconstruction of these deformities is fundamentally about the release of contractures and the correction of contour abnormalities.[1]

Scars under tension are angry and respond with erythema, hypertrophy, pruritus, pain and tenderness. Relaxed scars are happy scars. They respond by flattening, softening and becoming pale and asymptomatic. Directing reconstructive surgery towards relieving tension is practical, achievable and can result in great improvement.[1]

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There are multiple studies available in international journals that support release of contracted scars as opposed to excision of contracted scars. But there has not been adequate research on this topic in Bangladesh. This study intends to evaluate the results of such maneuver among the population of this country.

Patients and Methods

This prospective interventional clinical trial was conducted over a period of 5 years from January 2010 to December 2014 in the Department of Plastic Surgery of Dhaka Medical College Hospital and Popular Medical College Hospital. The contractures were released by subcutaneous pedicled rhomboid flaps and Z-plassties on 50 cases. No skin graft was used in any of the cases. No topical or intralesional steroid was used in any stage.

The thickness of the scar was evaluated before the surgery, on the 14th post-operative day and on the 42nd post-operative day. The changes in thickness of the scars were assessed by projecting the results on a Visual Analogue Scale (VAS) where 1 would indicate a scar which is as thin as the normal skin and 10

would indicate scar thickness before surgery. In case of thick, elevated scars the pre-operative value was determined as 10 irrespective of the measurement of thickness. The scale was used during follow up on 14th POD and 42nd POD to determine thickness in comparison to pre-operative status. The patient was asked to compare the post-operative scar with the pre-operative scar and rate the post-operative thickness on a scale of 1-10.

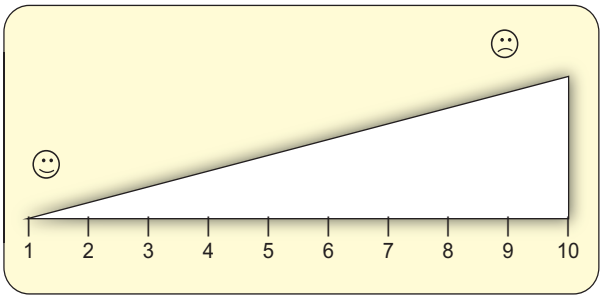

Figure 1: *Visual Analogue Scale to assess thickness of scar*

Another Visual Analogue Scale was used to record the tenderness in the scars on a scale of 0-5, where 0 would indicate no tenderness and 5 would indicate severe tenderness. The same scale was used to measure tenderness during pre-operative evaluation, on 14th POD and 42nd POD.

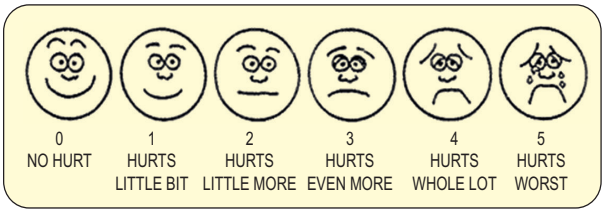

Figure 2: *Visual Analogue Scale to assess scar tenderness*

Results

A total number of 50 procedures were performed to release contractures in different parts of the body. Each procedure has been calculated as an individual case.

The mean age was 13.46(±5.15) years. There were 19 cases (38%) within the 6-10 years age group, 16 cases (32%) within 11-15 years age group and 15 cases (30%) within 16-20 years age group

More procedures were performed on female patients. 32 (64%) patients were female compared to 18 (36%) male patients.

Table I : *Change in the thickness of the scar*

Variables	Mean	Std. Deviation	N
Thickness before surgery (VAS)	7.4286	4.14039	50
Thickness 2 weeks after surgery (VAS)	4.1429	2.75834	50
Thickness 6 weeks after surgery (VAS)	2.4286	1.59695	50

The mean thickness of the scars before surgery was 7.4286. The thickness of the scar reduced in all 50 cases after surgery. The mean thickness of the scar 2 weeks after surgery was 4.1429 which is 44.23% lower than the pre-operative mean thickness. The mean thickness was even lower after 6 weeks which was 67.3% lower than the pre-operative mean thickness and 41.38% lower than 2 weeks post-operative.

Table II : *Change in the tenderness of the scar*

Variables	Mean	Std. Deviation	N
Tenderness before surgery (VAS)	.8571	.93152	50
Tenderness 2 weeks after surgery (VAS)	.8571	1.07890	50
Tenderness 6 weeks after surgery (VAS)	.1071	.31497	50

The mean tenderness was 0.8571 before surgery according to VAS. Tenderness 2 weeks after surgery remained the same in 30 patients, increased in 7 patients and decreased in 13 patients. Therefore, there was no significant change in mean tenderness within 2 weeks after surgery. But the tenderness reduced in all patients with 6 weeks of surgery and the mean tenderness decreased significantly after 6 weeks which was 0.1071.

Discussions

The findings of this study demonstrate that simple release of tension in contracted scars leads to a rapid and substantial improvement in scar thickness and tenderness. This supports the long-recognized principle in burn reconstruction that tension is one of the primary drivers of scar hypertrophy and

symptomatology. Donelan emphasized that scars under mechanical stress tend to remain erythematous, pruritic, and painful, while relieved scars progressively soften and become asymptomatic.[1] The results of the present study align strongly with this biomechanical understanding.

The Visual Analogue Scale (VAS) assessment of the thickness of the scars showed 44.23% reduction in mean thickness of the scars in 2 weeks after surgery and 67.3% reduction in 6 weeks after contracture release. This rate of improvement is notably accelerated compared with standard scar maturation, which typically occurs over several months. The early improvement is consistent with the work of Longacre et al., who documented measurable collagen reorganization and reduction in scar bulk as early as 10th post-operative day following Z-plasty redistribution of tension.[2] Pathologically, scar tissue under tension maintains elevated fibroblast activity, increased collagen deposition, and persistent inflammatory signaling. When mechanical load is eliminated, fibroblasts revert toward a quiescent phenotype, collagen remodeling accelerates, and the scar begins to normalize. This cellular response likely explains why improvement continued between the second and sixth postoperative weeks in all patients.

Ertas et al. used compression garments and silicone gel sheet post-operatively to soften and flatten the post-operative scars.[3,4,5] However, he did not record the rate of reduction of thickness or the time required for each case, but mentioned that all the patients had satisfactory scars at the end of a six months follow-up period.[3,4,5]

The present study fills that gap by offering objective, time-bound data. Unlike techniques that rely on scar excision or skin grafting, the method used in this study emphasizes preservation of scar tissue and redistribution of mechanical load, which avoids graft-related problems such as color mismatch, secondary contracture, and donor site morbidity. The absence of topical or intralesional steroid use also confirms that improvements were primarily tension-related rather than pharmacologically driven.

The tenderness in the scars did not show much improvement after 2 weeks (p=1.00). But when it was re-evaluated after 6 weeks, there was little or no tenderness in the scars (VAS; Mean ± SD = 0.1071 ± 0.31497). This delayed improvement is expected, as nociceptive symptoms often persist temporarily after tissue manipulation but diminish as local inflammation resolves and mechanical stress decreases. The universal improvement in tenderness further supports Donelan's assertion that all burn scars become asymptomatic once tension is relieved.[1]

Conclusion

It can be concluded from this study that releasing a contracture provides significant improvement in the thickness of the scar as well as reducing scar tenderness. In Bangladesh, where delayed presentations and longstanding post-burn deformities are common, surgeons often debate whether to excise thick scars or simply release them. This study provides evidence that scar excision is frequently unnecessary, even when hypertrophy is pronounced. Given the simplicity, low morbidity, and reproducibility of flap-based tension-relieving techniques, this approach may be particularly suitable for resource-constrained settings.

Conflict of interest

The authors declare that they have no conflict of interest.

Ethical considerations

The authors declare that there are no ethical concerns related to this work.

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