

RECONSTRUCTIVE SURGERY OF HEAD AND NECK BURN SCARS USING TISSUE EXPANDERS

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ABSTRACT

Objective: Grotesque head and neck scars cause significant restriction of neck movement while facial scars are a cause of social dejection. We aimed to correct these unsightly scars using tissue expanders.

Methods: This descriptive prospective study was conducted on 5 patients with extensive burn scars on neck and head presented in Plastic Surgery OPD from January 2017 to December 2018. Tissue expanders were placed in these patients after adequate tissue dissection.

Results: Out of the 5 cases in study 2 had scald burns, 2 had flame burns and one had chemical burn and were mostly male (n=4). The scar was mostly in the head (1 in scalp, 2 on face). Rectangular expander was used in three cases mostly in the neck region while crescent-shaped was employed in the scalp. One cylindrical was placed in the facial region. Tissue expansion started 2-3 weeks depending on wound healing. Color matching was favorable in all the cases of successful tissue expansion and coverage. After adequate tissue expansion, expander was removed and lesion excised. Complication being expander extrusion was observed in one case in which expander was removed and flap was advanced to cover the defect.

Conclusions: Using tissue expander in tissue reconstruction of extensive neck and facial burn scars results in desirable outcomes in terms of tissue matching and patient satisfaction. However, caution should be exercised to prevent infection, dehiscence and prosthetic extrusion.

Key Words: Reconstructive, Head, Neck, Burn, Tissue Expand.

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INTRODUCTION

There is an immense disease burden of burn in the world, especially in developing nations like Pakistan.¹ According to WHO, 180,000 deaths occur annually due to burns.² Around, 48% of all burn cases involve the head and neck area. Burns leaves patients scarred for life, ever-longing to return to their pre-burnt state.³

Where skin grafting is a quick and effective method for removing burn scars and contractures, poor color matching remains a major disadvantage giving a patchwork effect.³ Due to similarity in color, thickness and texture adjacent tissues are always favorable, so the use of local tissue remains the most suitable substitute. Incision/excision followed by skin grafts or transposition of local skin flaps were mainly used for treating larger burn areas.² Both of these techniques have issues with more or less donor site

availability. There is a risk of flap necrosis, issues with skin graft retraction, contractures causing unpleasant cosmetic appearance. In the last years, tissue expansion technique has improved the postoperative results in these cases.

In tissue expansion, skin generates under the influence of the underlying silicon prosthetic to restore the tension to baseline. This occurs by two methods; by the stretch of the cells themselves (mechanical creep) and by the mitosis of cells due to disruption of gap junctions between them (biological creep). This is an analogy to skin expansion that occurs in pregnancy over the expanding to the underlying uterus as the body's adaptation of a tissue placed under tension over time.⁴

The use of tissue expansion to remove scars is based on Millard's principle of

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plastic surgery to replace like tissue with like. Hence, adjacent tissue is stretched to cover the scarred area providing the best match for the scarred skin avoiding the need for complicated surgeries, distant flaps or allografts.⁵

METHODS

A total of 5 patients were employed in the study who presented with post burn scarring on head or neck area in Plastic Surgery OPD from January 2017 to December 2018. Patients who were willing for a multi-staged procedure, affording and ensured proper compliance to follow up visits were enrolled in the study after informed consent. Patients who lacked adjacent donor tissue, or had any systemic illness were excluded from the study. For each patient, defect size was measured and adequate tissue expander was chosen with base the size of the defect, with a capacity to expand overlying skin to twice the original in order to cover both the donor area and

the defect to be covered after scar revision.

Distal port tissue expanders were selected in all cases. Tissue expander was placed under a pocket created in the donor area and was initially inflated fill out any dead space and to smooth out any kinks in the expander. Skin was closed in layers using subdermal vicryl and protein for cuticular closure. Sutures were removed on 10-14th day to allow maximal scar strength to prevent wound dehiscence. Inflation was then done on a biweekly schedule 10-15cc over a period of 9-15 weeks depending upon blanching of overlying skin and pain tolerance of the patient. Once the expansion was of adequate size to cover the scarred area additional 2 weeks were given to for consolidation of the tissue and then the second surgery was done. Scar was excised and the expanded skin was used to cover the defect. Wound was allowed to heal and suture removal sutures was done in 7-10 days.

RESULTS

Case 1: A 8 -year-old boy presented with post burn alopecia after scald burn affecting left side of scalp. Remaining scalp expansion was performed using a crescent shaped expander which was

placed centered at scalp occiput. Expander was inflated over the period of 11 weeks. At the second stage of reconstruction, expander was removed and a rotational scalp flap was done to cover most of scalp scar. Small skin graft was used to cover forehead. After six months of surgery, the hair growth was sufficient to cover any remaining scar particularly on forehead.

Case 2: A 38 years old female presented with post burn neck contracture surrounded with scar. In phase I, a rectangular shaped tissue expander was selected to expand normal skin. After serial injection of normal saline over 13 weeks, second phase of surgery was planned and patient was admitted. Tissue expander was approached from the previous scar and tissue expander was removed carefully. Expanded skin was used to cover the defect at anterior neck. Neck was placed in splint and physiotherapy was initiated as well. She obtained an effective range of motion a neck and she was satisfied with cosmesis as well.

Case 3: A 17 years old male, who had a bad facial scarring after chemical burn. He was counselled for tissue expansion. Rectangular shaped soft tissue expander was used in first stage of reconstruction. Expansion was done for nine months on

routine OPD basis. Extrusion was observed which lead to early second stage reconstruction. Most of check scar was excised and expanded skin flap was sutured without ectropion at lower lid. Patient was satisfied with post-operative result.

Case 4: A 24 years old male was presented with post burn neck contracture. Rectangular shaped soft tissue expander was used to expand surrounding skin of neck area. Serial tissue expansions over the period of 15 months lead to second stage of reconstruction. Lateral and anterior neck was covered with expanded skin. Post-operative neck splintage was done. Patient was satisfied with overall cosmesis and improved mobility at neck.

Case 5: A 33 years male presented with flame burn scarring at face. It was planned that tissue expansion should be done. A 12 months of serial expansion of tissue expander gave sufficient expanded skin for a second stage reconstruction. In second stage of reconstruction, whole side of scarred skin was excised and expanded viable skin was anchored to medial canthus. Follow up result was satisfactory without ectropion. Patient was satisfied with facial cosmesis.

Table 1: Characteristics of the patients (n=5)

Case	Age (y)	Gender	Mechanism of Burn	Involved Area	Dimensions of Lesion (Cm)	Expander Used	Filling Capacity (Cc)	1 st Surgery (Min)	Expansion Duration (Weeks)	2 nd Surgery	Complications	Flap Color Matching
1	8	M	Scald	Scalp	26.3x 17.5	Crescent	250	41	11	64	None	Good
2	38	F	Flame	Neck	16.4x 11.2	Rectangular		63	13	53	None	Excellent
3	17	M	Chemical	Face	8.3x9.4	Rectangular		52	9	41	Extrusion	Fair
4	24	M	Scald	Neck	8x13.8	Rectangular		37	15	44	None	Good
5	33	M	Flame	Face	7.7x14.4	Cylindrical		54	12	72	None	Excellent

DISCUSSION

Tissue loss followed with trauma needs adequate coverage, preferably from adjacent tissues owing to the similarity in color, thickness, and texture. In the past, the treatment of large area post-burn sequelae consisted mainly of incision/excision followed by skin grafts or transposition of local skin flaps. Frequently encountered problems were skin graft retraction with the functional

deficit and unpleasant cosmetic aspects, or insufficient local resources for covering the remaining skin defects after scar excision.⁶ Use of free tissue transfer is a tedious procedure, with more or less donor site availability and morbidity and a higher risk of flap necrosis. Recently tissue expansion technique has improved the postoperative outcome. Tissue expansion reconstruction was first done by Neumann in 1957 who used it to reconstruct the defect left on the upper

two-thirds of pinna following traumatic injury. It primarily developed In 1982, Radovan initially published his results with skin expanders for breast reconstruction.⁽⁶⁾He described a technique to allow for the gradual expansion of the skin to replace the tissue lost from mastectomies. Motamed S et al showed satisfactory results in post-burn head and neck reconstruction. They mentioned that if tissue expansion is carefully planned and executed, it can be

the treatment of choice for treating post-burn scars of the head and neck.⁷ In another study, researchers used 2 tissue expanders in the scalp for coverage of post-burn alopecia with a desirable outcome.⁸ Kumaran et al proposed a cost effect tissue expander for post-burn neck contracture using the Foley's catheter with an inflatable bulb for tissue expansion to facilitate the primary closure of the wound. Our study employs the use of standard tissue expanders available in the market which were very costly. We encountered prosthesis extrusion followed by infection in one case, similar data from the literature found it to be the most frequent complication during tissue expansion in the cervical region.⁹ At this level, it is better to use free tissue transfer or expanded supraclavicular flaps, especially when the scars are extended to the anterior chest area or in the supraclavicular region.

CONCLUSION

Using tissue expander in tissue reconstruction of extensive neck and facial burn scars results in desirable outcomes in terms of tissue matching and patient satisfaction. However, the extensive length of time needed for this method for reconstruction, cost, care of the expander and patient compliance are the main hurdles in its practice, which demands further research.

Tissue expansion is a valuable tool in our reconstructive armamentarium which when done meticulously and with proper patient selection can provide aesthetically favorable results in treating scars in post burn patients and result in high rate of patient satisfaction. However, caution should be exercised to prevent infection, dehiscence and prosthetic extrusion.

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