

## Short Term Outcome of Facial Reconstruction of Burn Patients with Tissue Expanders

Abrar ul Hassan Pirzada, Naveed A Khan, Muhammad Saad Faisal, Sidra Dil Muhammad

### ABSTRACT

**Objective:** To observe the short term and cosmetic outcome of facial reconstruction of burn patients with tissue expanders.

**Methodology:** This study was conducted in Sharif Medical City Hospital, Lahore from June 2010 till June 2013. A total of 20 patients of age 17-30 years with facial and neck burn were selected after informed consent. All the patients received treatment with tissue expanders. All surgeries were done under general anaesthesia. All the patients were followed up to 6 week after reconstruction for any complications (expander extrusion, expander site infection, hematoma or necrosis of injection port site). Patients having no complications were labeled as success. The cosmetic outcomes based on assimilation of color and thickness with surrounding skin color and satisfaction were also measured.

**Results:** Indications for tissue expansion were, fire burn in 13 (65%) patients and acid burn in 7 (35%) patients. Out of 20 patients, 15 (75%) were females and 5(25%) were males. Most common complication was infection in 2 (10%) patients, for which expander had to be removed. There was no other complication. The donor site was covered in 18 (90%) cases and hence the success was achieved in 18 (90%) patients. Flap color and texture assimilation was achieved in 18(90%) patients. Satisfaction was very good in 16(80%) patients.

**Conclusion:** Tissue expansion is a safe and feasible technique with high success rates for faces and neck area reconstruction.

**Keywords:** *Tissue expander. Acid burn. Grafts.*

### INTRODUCTION

Tissue expansion has become a routine procedure in plastic surgery.<sup>1</sup> Neumann in 1965 was the first one to recognize the potential of tissue expansion in reconstructive surgery.<sup>2</sup> Radovan used tissue expanders for breast reconstruction after mastectomy.<sup>3</sup> Subsequently, tissue expansion has become the treatment method of choice for many congenital and acquired defects in children and adults.<sup>4,5</sup> Expanders are silicone envelopes that have self sealing injection ports through which saline is injected progressively through the port at twice weekly intervals which enlarges the expander.<sup>1</sup>

At the cellular level, the epidermis undergoes mitotic changes in the expanded skin and there is recruitment of adjacent tissue.<sup>1</sup> The dermis thins but there is a thick fibrous tissue that focuses around the capsule.<sup>6,7</sup> Skin expansion allows the surgeon to generate additional precious tissue.<sup>2,5</sup> This enables the surgeon to cover defects using local skin of appropriate color, texture and adnexal structure, especially the face where we want near perfect match.<sup>8</sup> Distant donor site complications can be avoided.<sup>1</sup> Hair bearing skin can be expanded and used for specialised areas of facial

reconstruction like eyebrows.<sup>6</sup> Asian faces tend to scar badly after burn injury. Fire and chemical burn to face are practically challenging without satisfactory results with traditional techniques. Grafts, local flaps, pedicle flaps and microvascular free tissue transfer are other methods of facial reconstruction.<sup>9</sup>

### METHODOLOGY

This prospective study was carried out in Plastic Surgery Department at Sharif Medical City Hospital, Lahore. This study included 20 patients of ages between 17-30 years with burns on face and neck area. All patients were counseled about the procedure and possible complications of the procedure and were included in the study after informed consent was signed by the patients. Standard photographs were taken before and after surgery. All cases were done under general anaesthesia and as a day case. Before incision, a prophylactic antibiotic (Injection Ceftriaxon in a dose of 1 gram through intravenous route) was given. A small incision was made in the area where the pocket for the expander had to be placed adjacent to the burned area after the skin was prepared with povidone-iodine. Blunt dissection was done below the skin and subcutaneous tissue. Meticulous homeostasis was achieved. The expander was examined for its safety and leakage. The expanders were placed in the pocket created and another small pocket was created separately for the port in subcutaneous plane. Skin was closed with prolene 4/0 in a mattress fashion. Pressure dressing was applied for 24 hours. After the operative scar had healed by 8th – 10th day, twice weekly inflation of expander with

Sharif Medical and Dental College  
Sharif Medical City Road, Off Raiwind Road, Jati Umra,  
Lahore 54000, Pakistan.

Correspondence: Dr. Naveed A. Khan  
Assistant Prof. Department of Plastic & Reconstructive Surgery  
Sharif Medical and Dental College  
E-mail: drnaveed.nk49@gmail.com

Received: July 15, 2016; Accepted: Nov 12, 2016.

normal saline was started for over a period of 6 to 8 weeks. At the end of which tissue expander was removed and the reconstruction of the face and neck done at the same time. All patients were followed up for 6 months after surgery for any complications (expander extrusion, expander site infection, hematoma or necrosis of injection port site). The outcome were labeled in terms of success as 'yes' if there was no complication and the donor area was adequately covered at the end of 6 week follow up. The cosmetic outcome were also assessed. The color assimilation was labeled as very good, good or satisfactory based on matching previous preoperative photographs with postoperative photographs. Flap texture was labeled as very good, good and satisfactory by comparing the texture of adjacent skin with that of reconstructive site through physical examination. Donor or recipient site scar formation was poorly accepted or fully accepted which was based on patient's own subjective

perception. Satisfaction of the patients was a subjective parameter which was based on patient's overall experience and was labeled as very good, good or satisfactory. All the data was collected in specially designed proforma. The data was analysed through SPSS version 20. The study was approved by hospital ethics committee.

## RESULTS

The age group was from 17-30 years. There were 15 (75%) female patients and 5 (25%) male patients. The indications of surgery were fire burn in 13(65%) patients and acid burn in 7(35%) patients. The patients were also distributed according to anatomical site which is given in Table 1. The frequency of complications is given in the Table 2. The donor site was adequately covered in 18 (90%) patients, so the success was achieved in 18 (90%) patients. Cosmetic outcomes of the procedure were shown in Table 3.

**Table 1: Anatomic sites**

Anatomic site	Frequency (N) & Percentage (%)
Face	16 (80%)
Neck	4 (20%)

**Table 2: Complications of expanders**

Complications	Frequency (N) & Percentage (%)
Expander extrusion	0(0)
Expander site infection	2(10)
Hematoma	0(0)
Necrosis of injection port site	0(0)

**Table 3: Cosmetic outcome of the procedure**

Parameters	Number (n)		Percentage(%)
Color assimilation of flap with the adjacent skin	Very good	18	90
	Good	1	5
	Satisfactory	1	5
Texture assimilation of flap with adjacent skin	Very good	18	90
	Good	1	5
	Satisfactory	1	5
Donor site scar formation	Fully acceptable	18	90
	Poorly acceptable	2	10

Recipient sites scar formation	Fully acceptable	18	90
	Poorly acceptable	2	10
General satisfaction	Very good	18	90
	Good	1	5
	Satisfactory	1	5
Donor site scar formation	Very good	16	80
	Good	2	10
	Satisfactory	2	10

## DISCUSSION

The ability to increase local tissue by controlled soft tissue expansion has led to a rapid increase in the use of tissue expanders in plastic surgery.<sup>2</sup> As a well established principle in facial reconstruction surgery, one should use local tissue wherever possible to provide the best tissue for color and texture match and sensation maintenance.<sup>1</sup> The lack of mismatch of soft tissue is a common challenge facing the reconstructive surgeries especially when it comes to facial reconstruction.<sup>10</sup> Tissue expansion in facial reconstruction provides skin with near perfect match in color and texture as well as sensation.<sup>1,11</sup>

With tissue expansion there is no new unduly disfiguring defects and there is avoidance of distant flaps as well.<sup>1</sup> Whereas, skin grafting may suffer from mismatch of color, skin thickness and lack of proper contour in relation to neighbouring tissue.<sup>8</sup> Also, skin grafting causes scar contracture leading to disfiguring of important structure such as eyelids and corners of mouth.<sup>12-14</sup>

Even with its disadvantages like temporary cosmetic deformity during expansion phase, prolonged periods of expansion and the need for multiple procedure, the results of tissue expansion are superior to the traditional methods of skin grafting.<sup>2,9,15</sup> With proper control of infection with intravenous antibiotics and increased operative experience, the major complication such as infection and early expander exposure are reduced to the minimum.<sup>1,2,7,16</sup>

The overall decrease in complication is the likely result of increased operative experience and the use of antibiotics.<sup>7</sup> While complications like infection, implant exposure, deflation, hematoma and seroma may occur and alter the timing of reconstruction, they barely compromise the results.<sup>2,3</sup>

We achieved meticulous homeostasis, so did not see any hematoma or expander extrusion during follow up. In a study of Bakhshaeekia, a total of 78 patients underwent facial reconstruction by insertion of a tissue expander in the cheek or the neck due to burn scar, traumatic scar, leishmaniasis or large pigmented nevi, the rate of infection was 2.6%.<sup>17</sup> In a study of Yamin of

36 patients, 77.78% patients were satisfied with reconstructive surgery of extensive face and neck burn scars using tissue expanders.<sup>18</sup> While in our study we got very good cosmetic outcomes in 18(90%) patients and the overall satisfaction was achieved in 80% patients. We measured the satisfaction by asking the patients a simple question that how satisfied are you with the treatment. This was based on a subjective criteria. And patient's recall bias may be involved. However, we could not find any other authenticated criteria for describing satisfaction in a measurable term. Previously, Yamin also used the similar outcome parameters.<sup>18</sup> In their study, they also described satisfaction based on personal experience of the patients. However, there is need to develop scales which can objectively measure the satisfaction of the patients after reconstruction of face and neck with tissue expanders. One of the limitation of our study was a limited sample size.

## CONCLUSION

Tissue expansion is a safe and feasible technique with high rate of success and achieves a high level of satisfaction among patients for facial reconstruction of burn patients. So, it may be opted as a first line treatment option for neck and face burns.

## REFERENCES

1. Cunha MS, Nakamoto HA, Herson MR, Faes JC, Gemperli R, Ferreira MC. Tissue expander complications in plastic surgery: a 10-year experience. *Rev Hosp Clin Fac Med Sao Paulo*. 2002 May-Jun;57(3):93-7.
2. Neumann CG. The expansion of an area of skin by progressive distention of a subcutaneous balloon: Use of the Method for Securing Skin for Subtotal Reconstruction of the Ear. *Plast Reconstr Surg* (1946). 1957 Feb;19(2):124-30.
3. Radovan C. Breast reconstruction after mastectomy using the temporary expander. *Plast Reconstr Surg*. 1982 Feb;69(2):195-208.
4. Akamatsu T, Hanai U, Kobayashi M, Nakajima S, Kuroki T, Miyasaka M, et al. Cranial Reconstruction in a Pediatric Patient Using a Tissue Expander and Custom-made Hydroxyapatite Implant. *Tokai J Exp Clin Med*. 2015 Jun 20;40(2):76-80.

5. Iconomou TG, Michelow BJ, Zuker RM. Tissue expansion in the pediatric patient. *Ann Plast Surg.* 1993 Aug;31(2):134-40.
6. Gibstein LA, Abramson DL, Bartlett RA, Orgill DP, Upton J, Mulliken JB. Tissue expansion in children: a retrospective study of complications. *Ann Plast Surg.* 1997 Apr;38(4):358-64.
7. Spence RJ. Clinical use of a tissue expander--enhanced transposition flap for face and neck reconstruction. *Ann Plast Surg.* 1988 Jul;21(1):58-64.
8. Heller L, Cole P, Kaufman Y. Cheek reconstruction: current concepts in managing facial soft tissue loss. *Semin Plast Surg.* 2008 Nov;22(4):294-305.
9. Joethy J, Tan BK. A multi-staged approach to the reconstruction of a burnt Asian face. *Indian J Plast Surg.* 2011 Jan;44(1):142-6.
10. Hamdy B. Full thickness skin graft for burned face. *Egypt J Plast Reconstr Surg* 2005 Jan; 29(1):1-4.
11. Chun JT, Rohrich RJ. Versatility of tissue expansion in head and neck burn reconstruction. *Ann Plast Surg.* 1998 Jul;41(1):11-6.
12. Clayton NA, Ward EC, Maitz PK. Full thickness facial burns: Outcomes following orofacial rehabilitation. *Burns.* 2015 Nov;41(7):1599-606.
13. Pisarski GP, Mertens D, Warden GD, Neale HW. Tissue expander complications in the pediatric burn patient. *Plast Reconstr Surg.* 1998 Sep;102(4):1008-12.
14. Handschel J, Schultz S, Depprich RA, Smeets R, Sproll C, Ommerborn MA, et al. Tissue expanders for soft tissue reconstruction in the head and neck area—requirements and limitations. *Clin Oral Investig.* 2013 Mar;17(2):573-8.
15. Tzolova N, Hadjiiski O. Tissue expansion used as a method of reconstructive surgery in childhood. *Ann Burns Fire Disasters.* 2008 Mar 31;21(1):23-30.
16. Li X, Xia Y, Wang Y. Repair of skin soft tissue defects with new overlapping tissue expansion techniques. *Zhongguo Xiu Fu Chong Jian Wai Ke Za Zhi.* 2006 May;20(5):544-6.
17. Khalatbari B, Bakhshaeekia A. Ten-year experience in face and neck unit reconstruction using tissue expanders. *Burns.* 2013 May;39(3):522-7.
18. Ashab Yamin MR, Mozafari N, Mozafari M, Razi Z. Reconstructive Surgery of Extensive Face and Neck Burn Scars Using Tissue Expanders. *World J Plast Surg.* 2015 Jan;4(1):40-9.

