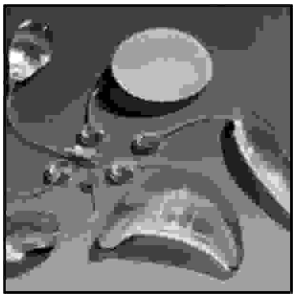
ORIGINAL PROF-988

TISSUE EXPANSION;
A VERSATILE ADJUNCT FOR RECONSTRUCTION



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ABSTRACT... sumi1@aitibd.net **Objective:** To study the use of tissue expansion for reconstruction in various sites of the body. **Design** :Retrospective study. **Data source:** Hospital records of plastic surgery dept of Dhaka Medical college Hospital. **Setting:** Dhaka Medical College Hospital. **Period:**Jan2001-Dec2004. **Materials and Methods:**12 patients with various amount of tissue loss undergone tissue expansion to cover the defect. **Results:** In this study successful reconstruction was possible in 10 out of 12 cases. In 2 case expander had to be taken out **.**It was possible to use expander in almost all sites of the body. Complication occurred in 7patients ,of which major complication occurred in 3 cases.

Key Words: Tissue expansion ,adjunct, reconstruction.

INTRODUCTION

Tissue expansion is an important and valuable addition to reconstructive armamentarium of Plastic surgeons. It is an important tool for producing donor skin that is an optimal match in terms of skin color, texture, sensation and hair bearing characteristics. It has enjoyed spectacular success especially in the field of breast reconstruction & scalp defect treatment.

Tissue expansion dates back in time to antiquity when our ancestors began to expand ear lobes or lips by inserting objects of large diameter. In current century Charles Neumann described the use of air filled subcutaneously placed Implant in an attempt to reconstruct an external ear deformity. This work was published in 1957.[1]

In 1975 Chedomir Radovan and Austad, working independently, developed the concept of tissue expansion with a silicon implant. Three years later after considerable laboratory and clinical experience and subsequent presentations at local meetings by Radovan, Argenta and other surgeons, tissue expansion gained wide clinical acceptance.[2]

Expanders are silicon envelopes that have self-sealing injection ports. At weekly intervals, saline is progressively injected through the port and passes into

the expander, which enlarges. As the volume inside the implant increases, tension placed on the overlying tissue increases.[3] The expanded skin undergoes histological changes that are well documented. The epidermis exhibits increased mitotic activity there is recruitment of adjacent tissue, which is believed to contribute to the additional skin, the dermis thins considerably but this] is often masked clinically by the thick fibrous capsule that forms around the implant.[4]

Despite the great benefit conferred by tissue expansion, it has resulted in some morbidity. Therefore patients with risk for complication should be identified. A retrospective review of the success, failure & complication rate of tissue expansion experience at Plastic surgery department of Dhaka Medical College Hospital was undertaken and its presentation is the purpose of this paper.

PATIENTS AND METHODS

The data were retrieved in the form of a retrospective case note study spanning a 4 year period (2001-2004). The study included 12 expansion procedures performed in12 patients. All tissue expansion patients were operated by the senior author.

Only well-motivated persons were considered as candidate. Expansion was performed for variety of indications, however it was not used for open wounds, pressure sores or ulcers.

The medical records and operative reports of all patients were analyzed. Each patient was studied with regards to indication, location, time of operation, time of full expansion and complications.

SURGICAL TECHNIQUE

Preoperative measurement of the defect and donor site selection was done in every patient. Expanders with remote valve ,both circular and crescentric ,oval were used. Single expander was used in each case. Expander was reused in 3 cases, one of those was taken out due to implant exposure.

A pocket was created about 1 cm larger than the expander base to accommodate the expander . Plane of dissection were different for different sites. The remote valve was embedded about 5 cm away from the expander and was easily palpable. The integrity of the expander was tested by injecting 50 cc normal saline. It was left in place to allow obliteration of dead space and hematoma collection. Lastly wound was closed over a suction drain to be removed 24 to 48 hrs later.

The expander was serially filled starting 2 to 3 weeks post operatively. Expansion was usually carried out twice-weekly based on patients tolerance and tissue response. The end of tissue expansion was reached when the measured length of expanded flaps gave the needed advancement to reconstruct the defect. At the second operation expander was removed and reconstruction was done using the expanded flap. A course broad spectrum antibiotic was prescribed for all patients during and after each surgical intervention.

RESULTS

In this series it was possible to completely reconstruct the defect in 10 out of 12 patients after the 2nd operation using tissue expansion. In two patients the wound site was infected. Expander had to be removed in one of these two patients and the other responded to conservative treatment. Indications for tissue expansion is shown in Table I.

Table-I. The indications for tissue expansion (n=12)

Indication	No of Patients
Post burn scarring	7
Neurofibroma	2
AVM	1
Post burn alopecia	2

Ages of the patients ranged from 15-25 yrs. 8 patients were female and 4 were male. The anatomic sites of expansion included the scalp, maxillary region of face, neck, supra clavicular region, trunk and buttock.

Total operating time required for placement of expander ranged from 40 minutes –2 hours. Average time of full

expansion was 2-3 months. Complication occurred in 7 patients. Complications were divided into major and minor categories. Major is defined as that resulting in a premature loss of expander that required additional surgery.

Expander in buttock

One expander that was reused had to be taken out for pressure necrosis of overlying skin and implant exposure.

Another patient with scalp expansion had suture dehiscence which was managed by deflation, re-suturing and re-inflation.

No case had implant failures like port failure, expander rupture, expander perforation.

Table-II. Anatomic sites (n=12)	
Site	**No of patients**
Scalp	3
Face	1
Neck	4
Supra clavicular region	1
Chest	2
Buttock	1

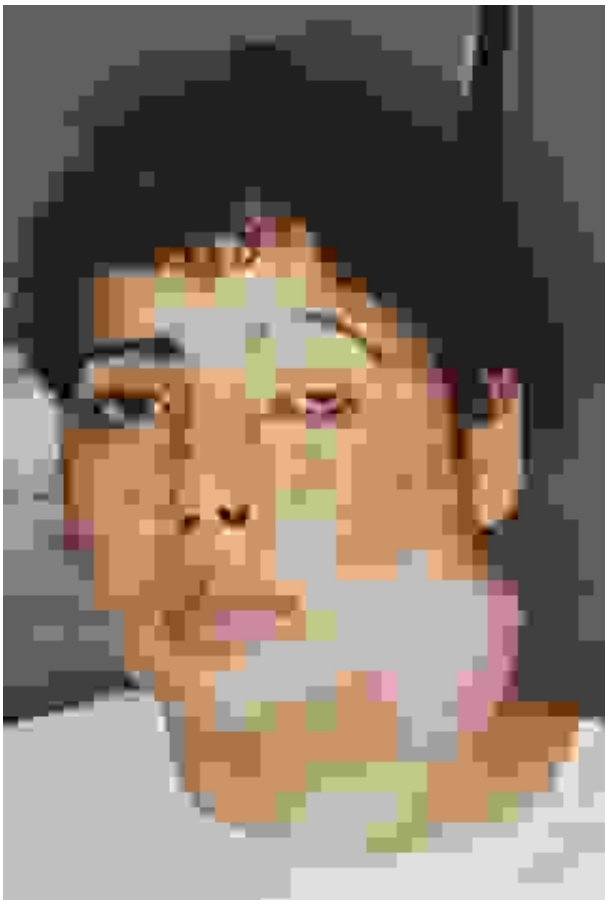
Table-III. Complications (n-7)		
Complication	**No of pts**	**%age**
Massive infection with expander extrusion	1	14
Pressure necrosis with expander extrusion	1	14
Suture dehiscence with implant exposure	1	14
Flap tip necrosis	2	28
Flap epidermis loss	1	14
Postoperative bleeding	1	14

Expander in scalp

DISCUSSION

Use of tissue expansion in the treatment of burn is popular and tissue expansion is a versatile adjunct for

correction of burn and other congenital and acquired deformity in various anatomical sites.



Expander placed in face

This series includes a small number of patients because high cost of tissue expander in this country precludes its use.

No other tissue in the body has the hair bearing quality of scalp. Post burn alopecia can be corrected by expanding and rearranging the remaining hair bearing tissue.[5]New follicles are not created but individual follicles can be widened by a factor of 2 ,doubling the size of scalp without alopecia .In this series there are 2 cases of postburn alopecia and one case of plexiform neurofibroma scalp.

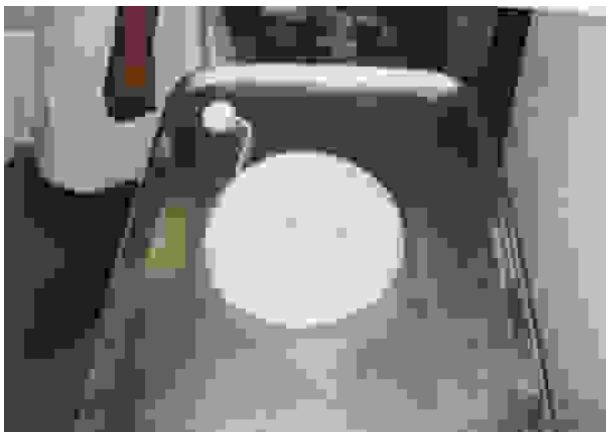
Expander in neck

Tissue expansion has proved to be valuable in neck and facial defect. Reconstruction provide skin colour , thickness, texture of similar nature. Platysma in neck provides extra layer of support. Defects in chest and abdomen are best approached with multiple expanders above fascia.[6]

Extremity skin soft tissue also adapt well with tissue expansion. In this series there is no report on limb expansion.

Expander with remote port before inflation

Successful reconstruction was possible in10 patient (80% success) which correlates well With published reports.[7]



Expander with full expansion

With experience degree of severity complications have decreased but still occur. This series also reports few major (22%) and some minor complications(33%) that is comparable with other series[8]. Reported overall complication rate is 13-40 %. Long term complications like persistent edema, widening of scar, loss of sensation bone defect are not yet found are not yet found in any of our patient (average length of follow up 6months - 3yr).

Some authors adapted accelerated approach for expansion with good results[9]. Sally Oak Hospital study revealed a practice of home inflation of expander followed by successful reconstruction, that is a safe, cost-effective and less stressful alternative[10].

Endoscopic implantation of expander is being tried with good results in terms of reduced time for expansion and reduced rate of complication[11]. Tissue expansion has several advantages over many conventional plastic surgery technique.

* It provides ideal match of skin.
* No donor defect.
* Reliable well vascularized delayed flap.
* Cost effectiveness.

But it also has some disadvantages.

* Multiplicity of stages.
* Objectionable change in normal body contour during expansion period.
* Sometimes expected or calculated increase in surfaces are often falls short of clinical requirement.
* Formation of scar tissue in capsule may decrease skin elasticity and post operative retraction of expanded skin.

CONCLUSION

Tissue expansion is a breakthrough in reconstructive surgery. It is a versatile adjunct of achieving reconstruction of any site of body where there is little available tissue. The best result depend on careful patient selection, meticulous attention to detail and multi disciplinary team.

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