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A RANDOMIZED CONTROLLED TRIAL OF THE USE OF TISSUE EXPANDER FOLLOWED BY AUTOGENOUS BONE GRAFT VERSUS AUTOGENOUS BONE GRAFT ONLY FOR RECONSTRUCTION OF ANTERIOR REGION OF THE MANDIBLE

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ABSTRACT

Introduction: Soft tissue expansion with percutaneous distensible expanders gained popularity for reconstructive surgery in the face and neck.

Purpose: The aim of this study was to compare by using tissue expander with autogenous bone graft versus autogenous bone graft only for reconstruction of anterior region of the mandible.

Materials and Methods: The study included 20 patients with anterior mandibular bony defects. Patients were randomly divided into 2 groups. Patients in group I, underwent mandibular augmentation with tissue expander followed by autogenous bone graft. While in group II, autogenous bone graft was used only. Preoperative and six months postoperatively; computed tomography and lateral cephalometric views had been performed in all cases in both groups. Cephalometric points, landmarks and measurements are recoded to compare between both groups regarding pre and post-operative results.

Results: In both groups, comparison between pre and post-operative variables showed; significant difference of the mandible in the anteroposterior direction and non-significant change in the vertical measurements. Soft tissue profile showed significant increase in the position of the upper and lower lip and soft tissue pogonion. While, the nasolabial angle, the pronasale, and soft tissue A point showed non-significant changes. Comparison between both groups showed significant improvement of the horizontal direction of the mandible, mandibular length and soft tissue profile in group I than group II. P-value (> 0.05) was considered non-significant.

Conclusion: Tissue expansion has become a popular procedure in the reconstruction of face and neck lesions.

KEYWORDS: Mandibular continuity defect, CBCT, tissue expander, autogenous bone graft, cephalometry.

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INTRODUCTION

Mandibular continuity defects are frequently caused by tumor removal or significant trauma. The reconstruction of these defects can be challenging. Multiple techniques had been evolved for management of this problem. For defects with extensive hard and soft tissue loss, microvascular free tissue transfer often provides an excellent reconstructive option. However, significant site morbidity, as well as non-ideal bone stock for implant placement, can occur. On the other hand, mandibular continuity defects does not associated with significant soft tissue loss, the non-vascularized autogenous bone has been shown to provide excellent results. The advantages compared with microvascular free-tissue transfer include a more limited donor site and the ability to provide excellent height and width for subsequent dental implants. Autogenous bone grafting is considered the reference standard for reconstructing mandibular defects. [1]

After its introduction in 1982 by Radovan[2], the technique of soft tissue expansion with percutaneous inflatable/distensible expanders gained popularity for reconstructive surgery of extensive scar contractures not only the extremities and trunk, but also in the face and neck. Tissue expanders are used to create transplantable tissue by expansion. Depending on the indication, tissue expanders are available in different shapes, volumes and surfaces. Internally, all expanders are equipped with a reinforced base to increase the stability of the posterior contact area and to support the directional expansion. [3, 4]

Expanded tissue flaps have the advantage of increasing both the amount of tissue and the vascularity of the capsule that surrounds the expander and the adjacent skin. There was an increase in the epidermal thickening as well as thinning of the corresponding dermis and the subcutaneous tissue. Also, proximity to the defect, and similarity of color and texture have been obtained. Moreover, tissue expansion precludes the need to advance flap from distant site. Therefore, useful in facial bony and soft tissue reconstruction where esthetics as well as function are prime considerations. [5-7]

Two years following the cessation of expansion both the dermis and subcutaneous tissue assumed a thickness similar to that before expansion. The previously atrophic adipose tissue was also restored, and the capsule underwent resorption [8].

Cherry et aL [9] demonstrated a statistically significant increase in the length of viable flaps obtained from expanded tissue when compared with acutely raised flaps. Among the factors needed for bone graft to maintain its size under function was adequate vascularity of the host soft tissue bed. The increased vascularity of expanded tissue would seem to indicate that the presence of such tissue may enhance bone graft survival.

Bone grafting, however, had to be delayed because of the need to wait until decreasing of the inflammatory reaction that persists following removal of the expander. The survival of a bone graft in expanded tissue appears, to be possibly enhanced by an increase in the vascularity of both the capsule adjacent to the implant as well as the expanded skin. [10]

The aim of this study was to compare the use of tissue expander with autogenous bone graft versus autogenous bone graft only for reconstruction of atrophied anterior region of the mandible.

MATERIALS AND METHODS

From January 2018 through April 2019, the study of 20 cases were documented of bone grafts; 10 of them (group I) underwent mandibular augmentation with tissue expansion and the other 10 (group II) without tissue expansion. Panoramic views for twenty qualifying patients with mandibular diffiency of 6-mm height or less at anterior region of the mandible were entered into this study. Bone height

was assessed with a cone beam CT radiograph using exposures recommended by the manufacturer based on age and size. Individuals with a history of oral cancer surgery, radiotherapy, or chemotherapy were excluded, as were individuals with active infections or continuity defects. Qualifying patients uniformly exhibited an inability to wear a mandibular prosthesis at all or use an existing prosthesis with soft diet.

In group I, the mean expander size used was 60 cc. All expanders were overexpanded by 20%, and the mean interval from insertion of the tissue expander until the end of the inflation period was 2 weeks. The technique was accomplished as 2-stage procedures from a transcutaneous submental approach between the regions of the mental foramen. The periosteum is reflected from only the buccal and occlusal surfaces, leaving the lingual and inferior border periosteal blood supply intact. The buccal reflection was carried posteriorly to the masseter anterior border. The occlusal reflection was carried out all the way of the anterior region till the region of the mental foramen, which was commonly seen to be posteriorly relocated to the first or even second molar region due to resorption, the reflection was carried around the nerve from anterior to posterior. The nerve does not require further unroofing or transposition. This part of the surgery created sufficient soft tissue expansion and matrix for the graft. The expander (POLY smoooth™ I POLYtxt®, Silicone-shell)* had smooth or textured surface and a remote valve, introduced for two weeks then removed (Fig. 1).

The selection of tissue expanders is based on the size of the 'true' skin defect and not on the measured size of the skin lesion. If there is no adequate space for insertion of such a selected expander, we choose a size close to the estimate or, alternatively, perform serial expander implantation. To achieve tissue expansion of the anterior region of the mandible, a 60 ml expander (2 X6 X5 cm) was expanded over 2 weeks, (5mm saline injection 2 times per week).

After removal of expander, the maintenance of this expanded soft tissue matrix was accomplished by using bone graft which obtained from the anterior iliac crest to gain uncompressed cancellous marrow. The graft was placed from the posterior on each side forward toward the midline. The closure was a simple layered closure of soft tissue. The oral tissues, which was expanded but had not been surgically incised, was allowed to heal for 2 weeks until the cellular and vascular ingrowth

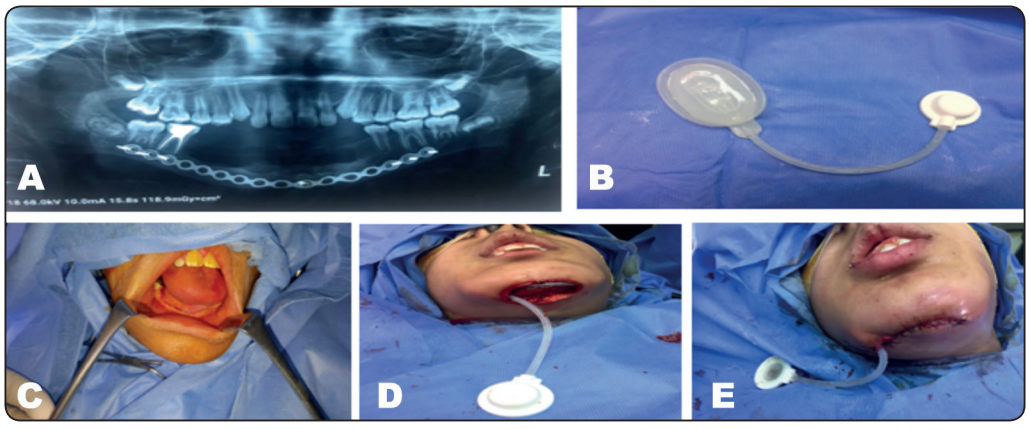

Fig (1), Group (1), (A) Pre-operative panoramic view showing pre-reconstruction mandibular bony defect. Photographs showing: (B) Expander (C) Atrophied mandible (D) Submental incision with expander insertion. (E) Suturing of the incision.

* Implants made by POLYTECH-QUALITY made in Germany

phase of bone graft regeneration was completed and will therefore permit wearing of a temporary or provisional prosthesis (Fig 2).

In group II, the surgical technique for reconstruction was performed via the procedures in a similar fashion as above but without tissue expansion (Fig 3).

All the patients was then allowed to wear a relined prosthesis and was recommended to maintain a soft diet consistency. After 6 months standard dental implants were inserted that will also serve for prosthetic retention and stability once osseointegrated.

Bony prominences, such as the nasofrontal junction, anterior nasal spine, mandibular angle and other cephalometric points and angles (table 1&figure 1) are used as reference points, since these points are not displaced by soft tissue contracture. The selection of reference points is based on the location of the skin lesion.

Preoperative and six months postoperatively, computed tomography and lateral cephalometric views had been performed in all cases in both groups. These assessments provide baseline data for measurements taken during and after the process of tissue expansion. [10]

Cephalometric Analysis

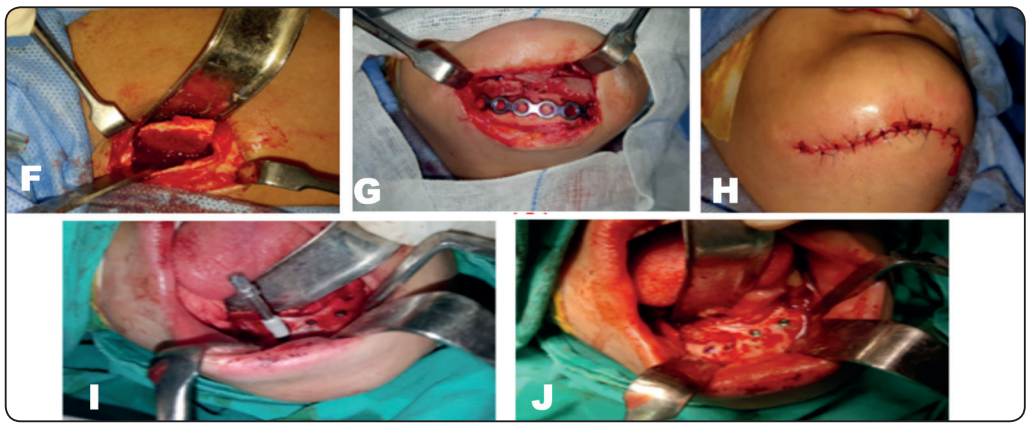

Fig. (2) Group (1) Continuous; Photographs showing (F) Harvesting of corticocancellous bone from anterior iliac crest. (G) Adaptation of bone graft with reconstructive plate.(H) Suturing with expander removal & (I) & (J) Implant insertion.

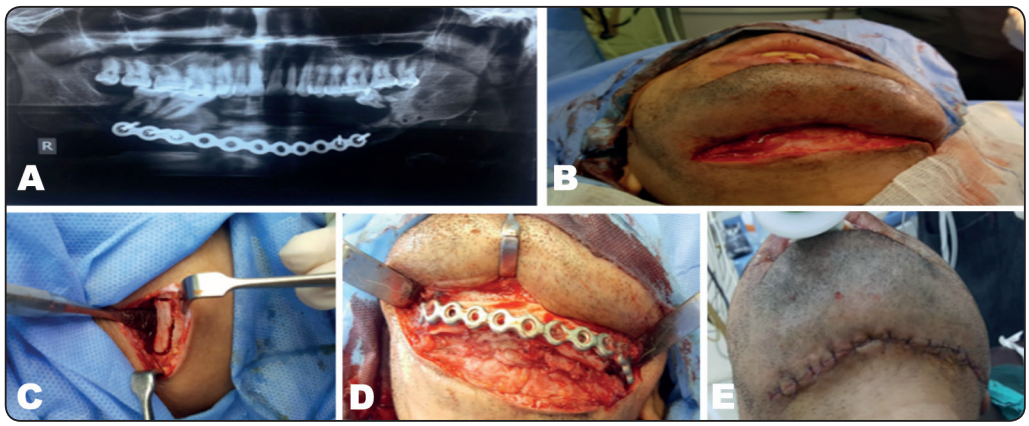

Fig. (3) Group (II) (A) Pre-operative panoramic view showing pre-reconstruction mandibular bony detect Photographs showing: (B) Submental incision (C) Harvesting of corticocancellous bone from anterior iliac crest. (D) Adaptation of bone graft with reconstructive plate.(E) Suturing of the incision.

Lateral cephalometric were taken in natural head position before treatment (T1) and after treatment (T2) with exposure values of 60 KVp, 10 mA, and 0.12 seconds. All cephalometric landmarks were traced and the lines and the angles were measured to the closest to 0.01 mm and 0.1 degrees. A vertical references plane (VRP) was drown perpendicular to SN plane at S point. The anteroposterior skeletal relationship was determined by SNA, SNB, ANB, SNPg, MXUL (maxillary length) and MdUL (mandibular length). The vertical relationship was determined by FMA, SN-MP, pal-MP, PFH, LFH and TFH. The soft tissue profile determined by the distances from the vertical reference plane (VRP) to Pn, As, Ls, Li, Bs and pos. All cephalometric points, landmarks and measurements are shown in (Table 1 & Fig. 4).

TABLE (1) Definition of the cephalometric measurements

Variables		**Definition**
Planes	VP	Vertical reference plane perpendicular to SN plane
Anterioposterior Relationship	SNA	Angle between the anterior cranial base(SN)and (NA) Line
	SNB	Angle between the anterior cranial base(SN)and (NB) Line
	ANB	Angle between NA line and NB line.
	SNPg	Angle between SN and facial plane.
	MXUL	Maxillary unit length(distance between condylone and subnasale)
	MdUL	Mandibular unit length(distance between condylone and Gnathion)
	A-VP	Distance between The VP and A point.
	B-VP	Distance between The VP and B point.
	Pg-VP	Distance between The VP and Pogonion point.
Vertical Relationship	SN-MP	Angle between SN and mandibular plane
	FMA	Angle between FH and mandibular plane
	Pal-MP	Angle between Palatal plane and mandibular plane
	PFH	Posterior facial height (S-GO)
	LFH	Lower facial height (ANS-Gn)
	TFH	Total facial height (Na-Gn)
Soft tissue profile	Pn –VP	Distance from vertical plane to nose prominence
	As -VP	Distance from vertical plane to soft tissue A point
	Ls -VP	Distance from vertical plane to the most anterior point of the upper lip
	Li -VP	Distance from vertical plane to the most anterior point of the lower lip
	Bs -VP	Distance from vertical plane to soft tissue B point
	VP-Pos	Distance from vertical plane to soft tissue pogonion
	Pog-Pos	Distance from pogonion to soft tissue pogonion
	E-line	Line tangent to nose prominence and most anterior point of the chin
	Ls-E plane	Distance from Ricketts line to the most anterior point of the upper lip Distance from Ricketts
	Li-E plane	line to the most anterior point of the lower lip
	Sn-A	Distance from subnasale to A point
	NLA	Nasolabial angle

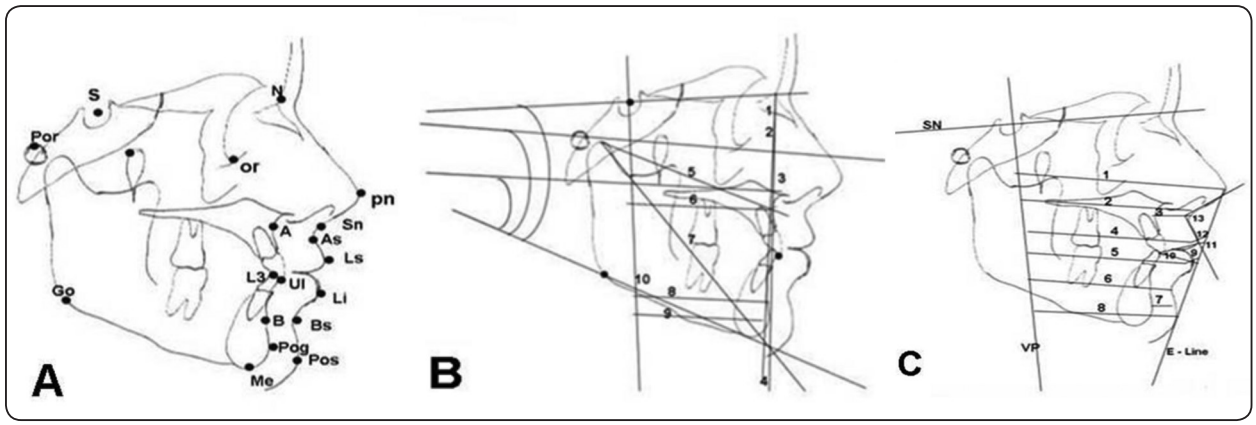

Fig (4): (A) Cephalometric soft tissue points (B) Cephalometric skeletal measurements; (1)SNA, (2)SNB, (3) ANB (4) SNPg, (5) Maxillary length, (6) A-VP, (7) mandibular length, (8)B-VP, (9) Pg-VP, (10) Vp (C) Cephalometric soft tissue profile; (1) Pn-VP, (2) As-VP, (3)Sn-A, (4) Ls-VP, (5) Li-VP, (6) Bs-VP, (7) Pg-Pos, (8)Pos-Vp, (9) Li-E Plane, (10) Li-L1, (11) Ls-E plane , , (12) NLA

Statistical analysis

The data were calculated and analyzed using SPSS software (statistical package for social science). Descriptive statistics (mean and standard deviation) were calculated for each parameter before treatment (T1) and after treatment (T2). The differences between the parameters were analyzed using paired T- test.

RESULTS

The study included 20 patients with anterior mandibular bony defects as a result of tumor resection where there is no need for radiotherapy or chemotherapy .They were divided randomly and equally into 2 groups. The defects were treated by bone graft with preoperative planning. In group I, expander was used. While in group II, bone graft without expansion was performed. All patients were operated on by the same surgeons working as a team. Preoperative data were collected; Patients' mean age was 36.400 ± 7.397 years in group I and 35.900 ±7.156 years in group II, with no significant difference between both groups (P = 0.880). The gender distribution showed women comprised 40% of group I and 60% of group II (P = 0.371) (Table 2).

TABLE (2) Distribution of patients' data between groups:

Characteristics	Group I	Group II	P Value
Number of patients	10	10	
Age (year), mean	36.400± 7.397	35.900± 7.156	0.880 *
Gender, %			0 .371*
Men	60	40	
Women	40	60	

**** P > 0.05: Non significant***

***** P ≤ 0.05: Significant***

****** P ≤ 0.01: Highly significant***

In both groups, comparison between pre and post-operative variables showed significant differences in sagittal skeletal measurements of the mandible in SNB, SNPg, ANB , Mdul (mandibular length), B-VP, and Pg-VP which indicated that there was an increase in the mandibular length in the anteroposterior direction. The vertical measurements showed non-significant changes. The soft tissue profile showed significant increase in the position of the upper lip (Ls-VP), (Ls-E Plane), and significant increase in the position of the lower lip

(Li-VP)and (Li-E plane). The thickness of chin was increased as indicated by the significant increase of soft tissue pogonion (Pos-VP) and (pog – pos). The nasolabial angle, the pronasale, and soft tissue A point showed non-significant changes (Table 3 & 4)**.**

Comparison between both groups showed significant improvement of the mandible in group I than group II as indicated by significant increase of SNPg (2.2^0) in group I than group II (0.60) and significant increase of the mandibular length (MdU) of group I than group II by (0.1 mm). While the soft tissue profile showed that a significant improvement of the lower lip of group I (Li-VP 4.5mm) than group II (Li-VP 3.4mm) by (1.1 mm) and improvement of the lower lip relation to E-line of group 1 (Li – E line 3.3 mm) than group II (Li – E line 2.9 mm).

TABLE (3) Comparison between pre-treatment and post-treatment of the skeletal, and soft tissue cephalometric variables of group 1 :

	Pre-treatment (T1)		**Post-treatment (T2)**		**Mean Differences**	**T-value**	**P-Value**
	Mean	**SD**	**Mean**	**SD**			
Anterioposterior							
SNA	82.3	0.94	82.7	1.05	0.4	0.78	.446*
SNB	75.9	1.1	78.7	1.25	2.8	5.31	.000***
ANB	6	1.13	4.6	0.84	-1.4	-3.13	.006**
SNPg	76.6	1.26	78.8	0.92	2.2	4.45	.000***
MXUL	79.35	1.24	80.7	1.25	1.35	2.41	.067*
MdUL	111.8	1.47	118.4	0.84	6.6	12.27	.000***
A-VP	60.4	0.96	60.9	1.28	0.5	0.98	.339*
B-VP	51.5	0.97	55.2	0.91	3.7	8.74	.000***
Pg-VP	53.3	0.94	56.9	1.12	3.6	7.83	.000***
Vertical Relationship							
SN-MP	36	1.15	35.5	0.96	-0.5	-1.04	.309*
FMA	28.2	1.22	28.9	1.44	0.7	1.16	.259*
Pal-MP	28	1.15	28.1	1.1	0.1	0.19	.845*
PFH	65.4	13.2	70.2	0.91	4.8	1.14	.266*
LFH	65.4	.96	63.4	0.84	-2	-2.93	.06*
TFH	107	1.79	105.5	0.97	-1.5	-2.48	.073*
Soft tissue profile							
Pn-VP	85.6	1.42	86.9	1.1	1.3	0.27	.035*
As-VP	74.2	1.31	75.2	1.13	1	1.81	.086*
Ls-VP	78.6	1.17	80.1	1.1	1.5	2.94	.009**
Li-VP	68.9	1.37	73.4	0.84	4.5	8.84	.000***
Bs-VP	60.2	1.13	63.2	0.91	3	6.49	.000***
Pos-VP	58.4	1.17	64.7	1.41	6.3	10.8	.000***
Pog-Pos	12.4	1.57	23.9	1.28	11.5	17.86	.000***
Ls-E plane	1.6	0.51	-1.9	0.75	-3.5	-12.28	.000***
Li-E plane	-2.2	0.91	1.1	0.73	3.3	8.85	.000***
Sn-A	13.3	1.49	14.4	0.84	1.1	2.02	.068*
NLA	102.1	1.9	104.2	1.39	2.1	2.75	.083*

**** P > 0.05: Non significant*** ***** P ≤ 0.05: Significant*** ****** P ≤ 0.01: Highly significant***

There was an improvement of the labio-mental sulcus of the group I than group II as a results of increase of soft tissue B (Bs-Vp 3mm) in group I than group II (Bs-Vp 0.9 mm) by 2.1mm and increase of the thickness of the chin of group I than group II as a results of increase of the thickness of the soft tissue pogonion (Pos-Vp 6.3mm) of group I than group II (Pos-Vp 3.2 mm) by 3.1mm and increase of distance between the pogonion and soft tissue pogonion in group I (pog – pos 11.5mm) than group II (pog – pos 10.1mm) by 1.4 mm (Table 5 & Fig. 5).

TABLE (4) Comparison between pretreatment and post- treatment of the skeletal, and soft tissue cephalometric variables of group II :

	Pre-treatment (T1)		Posttreatment (T2)		Mean Differences	T-value	P-Value
	Mean	SD	Mean	SD			
Anterioposterior							
SNA	82.1	0.99	82.8	0.92	0.7	1.63	.119*
SNB	74.1	1.4	76	1.24	1.9	3.61	.002**
ANB	8.3	0.94	7.7	0.84	-0.6	-1.51	.148*
SNPg	74.1	1.2	74.7	0.82	0.6	1.38	.184*
MXUL	94.5	1.26	95.4	1.26	0.9	1.58	.130*
MdUL	104	1.1	110.6	1.17	6.6	12.77	.000***
A-VP	71.2	0.918	73	1.24	1.8	3.67	.002**
B-VP	51.2	0.91	55.4	0.84	4.2	10.64	.000***
Pg-VP	47.6	1.07	50.8	1.03	3.2	6.78	.000***
Vertical Relationship							
SN-MP	31.3	1.06	30	1.15	-1.3	-2.62	.017*
FMA	24	1.15	25.2	0.92	1.2	2.57	.019*
Pal-MP	24	1.16	23.3	0.82	-0.7	-1.56	.136*
PFH	87.5	0.97	87.9	0.73	0.4	1.03	.314*
LFH	74.4	0.84	73.2	0.78	-1.2	-3.28	.064*
TFH	118.5	1.5	119.2	1.04	0.7	1.21	.242*
Soft tissue profile							
Pn-VP	106.7	1.41	107.8	0.95	1.1	2.05	.154*
As-VP	72.1	1.7	73.3	1.07	1.2	2.48	.073*
Ls-VP	88.2	1.22	90	1.33	1.8	3.13	.006**
Li-VP	77.3	1.25	80.7	1.06	3.4	6.55	.000***
Bs-VP	66.9	1.2	67.8	0.63	0.9	2.24	.038*
Pos-VP	68.8	0.92	72	1.05	3.2	7.23	.000***
Pog-Pos	15.1	1.1	25.2	0.92	10.1	22.2	.000***
Ls-E plane	1.2	0.42	1.71	0.49	0.51	2.46	.024*
Li-E plane	-1.2	0.43	1.7	0.48	2.9	14.3	.000***
Sn-A	16	0.94	17.3	0.82	1.3	3.28	.07*
NLA	97.7	1.7	102	2.58	4.3	4.39	.08*

**** P > 0.05: Non significant*** ***** P≤ 0.05: Significant*** ****** P ≤ 0.01: Highly significant***

TABLE (5) Comparison between the skeletal, and soft tissue cephalometric variables of group 1 and group II :

	Group I (T2- T1)		Group II (T2- T1)		Mean Differences	T-value	Sig.
	Mean	SD	Mean	SD			
Anterioposterior							
SNA	0.35	1.14	0.7	1.35	-0.35	-0.47	.113*
SNB	2.8	1.92	1.9	1.34	0.9	0.87	.215*
ANB	-1.4	1.3	-0.6	2.94	-0.8	-1.14	.628*
SNPg	2.2	1.58	0.6	1.41	1.6	1.69	.05*
MXUL	1.35	1.61	0.9	1.43	0.45	0.47	.164*
MdUL	6.6	1.31	6.5	1.64	0.1	1.21	.05*
A-VP	0.5	1.32	1.8	1.84	-1.3	-0.16	.334*
B-VP	3.7	1.41	4.2	1.53	-0.5	-0.66	.264*
Pg-VP	3.6	1.53	3.2	1.49	0.4	0.48	.154*
Vertical Relationship							
SN-MP	-0.5	1.32	-1.3	1.24	0.8	0.97	.017**
FMA	0.7	1.36	1.2	1.78	-0.5	-0.66	.019**
Pal-MP	0.1	1.72	-0.7	1.97	0.8	0.99	.136*
PFH	4.8	1.23	0.4	1.81	4.4	5.33	.05*
LFH	-2	2.93	-1.2	1.37	-0.8	1.24	.454*
TFH	-1.6	1.37	0.7	1.39	-2.3	-2.81	.242*
Soft tissue profile							
Pn-VP	1.3	1.34	1.1	1.61	0.2	0.24	.214*
As-VP	1	2.38	1.2	1.89	-0.2	-0.36	.456*
Ls-VP	1.5	1.28	1.8	1.77	-0.3	-0.35	.271*
Li-VP	4.5	1.34	3.4	1.93	1.1	7.83	.000***
Bs-VP	3	1.78	0.9	1.37	2.1	2.23	.035**
Pos-VP	6.3	1.83	3.2	1.64	3.1	3.75	.000***
Pog-Pos	11.5	1.75	10.1	1.78	1.4	2.4	.01**
Ls-E plane	-3.5	1.54	0.5	1.83	-4	-4.87	.022**
Li-E plane	3.3	1.68	2.9	1.71	0.4	1.48	.05*
Sn-A	1.1	1.34	1.3	1.42	-.2	-0.23	.06*
NLA	2.1	1.46	4.3	1.49	-2.2	-1.57	.05*

**** P > 0.05: Non significant*** ***** P ≤ 0.05: Significant*** ****** P ≤ 0.01: Highly significant***

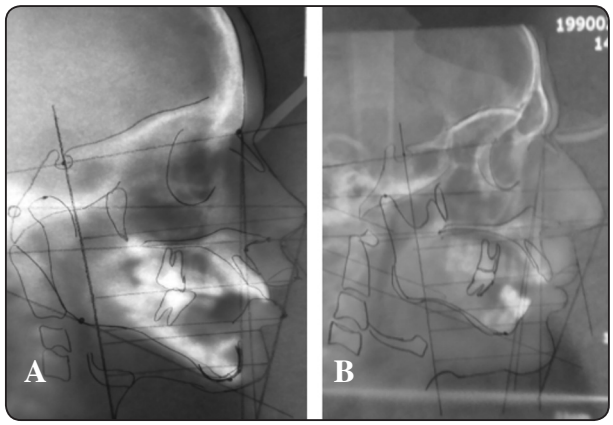

Fig. (5) Post-operative lateral cephalometric radiograph of the patient; (A) Group (I), after expantion ; (B) Group (II) without expantion

Complications arose in 3 reconstructions (15%). Two days prior to the proposed reconstruction in patient 4 group I, the expander became infected and was removed. Reconstruction was then completed 2 weeks later, after resolution of the infection. Patients 9 and 10 in group II had hematomas evacuated but this did not influence the outcome. Each patient required between three and four treatment sessions and the follow-up for these patients for 1 year. The final results were assessed according to the grading system shown in table (2&3). The result was excellent in 6 cases, good in 11 cases and fair in 3 cases.

DISCUSSION

Tissue expansion has become a widely used adjunct in reconstruction of the skin. Many publications have focused on the technical contrivance in repairing the skin lesion itself.[11,12] Nevertheless, how to obtain adequate skin to cover the insufficient and unaesthetic appearance and functional status of the involved area has seldom been exclusively discussed. Successful matching of skin colour, texture and hair-bearing characteristics often eludes annoying the plastic surgeon. Such mismatches are most visible in the area of the face and neck. Our early experience with tissue expansion in these area presented some problems. An important issue of tissue expansion in this area is to evaluate the flap extension required to cover the skin defect without tension. Usually, there is a tendency to underestimate the required expander volume.[13,14] The natural shape of the mandible & neck is curved inward. A three-dimensional estimation of the size of skin defect is difficult.

In addition, the normal architecture of skin in the affected area, especially when densely scarred, may be altered substantially due to contracture. Thus, the size of skin defect created by removing the scar and releasing contracture is assumed to be much larger than that of the scar itself. Therefore, discrepancies exist between the 'observed' skin defect and 'true' skin defect and necrosis may occur .Lastly in some limited cases, skin cover was achieved using a Z-plasty. [11]

This discrepancy must not be neglected if we wish to regain the original functional and cosmetic status of the involved area rather than 'repair' the skin defect. To judge if adequate tissue lengthening has been achieved for reconstruction is another difficult problem. Over the years, most plastic surgeons have chosen expanders with a width twice the lesion size. These principles are successfully applied in most cases. However, in the cervicofacial area and unlike elsewhere, the capability of the selected tissue expander after implantation and the actual flap size gained with tissue expansion is usually unpredictable. It is difficult to know whether adequate expansion has been achieved to reconstruct the defect without tension to restore the original aesthetic appearance and function of the involved area. [9] Thus achievement of a flap that is 30–50% longer than the calculated requirements as a rough guide to decide the time of stopping the expansion or even by preparing the patient for a possible secondary expansion is the only way that most surgeons can feel secure.[15-17]

This study was a retrospective study in which there is a significant differences in sagittal skeletal variables of the mandible in anteroposterior

direction in both groups when were compared between pre-treatment and post-treatment. While, non significance changes in vertical measurements. Soft tissue profile showed significance difference between pre and post-treatment in most of cephalometric variables of both groups. As regard to the comparison between both groups, it shows significant improvement of both skeletal and soft tissue cephalometric variables in group I than group II.

Our study exists harmonious results with Hsiao et al [18]: who say that the anticipated results were achieved because sufficient skin expansion was obtained as a result of accurate preoperative assessment. Planning with the patient and detailed counselling before expansion will bring dividends as the expansion proceeds. We can strengthen the patients' confidence by sharing the news of progress with them.

There exists conflicting results in previous studies Martha et al [19]; who noted on that review a wide range of complication rates which varied according to site of expander as well as indication. For example, the lower limb appeared to have a complication rate between 20% and 80% owing the higher complication rate to the thinner protective overlying tissue. In contrast to the head and neck whose complication rates ranged from 1% to 32%. Bozkurt [20] noted that volume and anatomical location of the expander affected the failure rate whereas other factors e.g.: age, gender, expander quantity per patient and shape of expander appeared to have no statistical correlation to the failure rate.

In summary, Tissue expansion has become a popular procedure in the reconstruction of certain large face and neck lesions. Benefits of the technique include the ability to optimise the matching of skin colour and texture when replacing the defect with the expanded tissue and avoids the high infrastructure requirements of micro- surgery for free flap transfers .[19] Moreover, the versatility of tissue expansion can be increased when combined with other techniques for re- construction [21], but many problems still exist. Prudent pre-expansive evaluation and preoperative design are indispensable for a successful reconstruction [18]. Naturally, no technique is free of disadvantages. The seemingly bearable but high complication rates as well as the long process which includes an additional but temporary disfigurement may prevent patients from opting for this technique. However, complication rates are not reported consistently and further specific studies will be required to ascertain these and classify them according to indication, location in body, age, number of expansion sessions if more than one etc. in order to gain a deeper understanding and prevention strategies.[19]

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