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Soft Tissue Changes After Mandibular Setback And Malar Augmentation For Class III Skeletal Patient-Case Report

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ABSTRACT

A cephalometric study of Class III Skeletal patient treated by BSSO mandibular setback and malar augmentation was undertaken to assess the results of treatment and to evaluate the soft tissue changes. It was concluded that: (i) the orthognathic profiles achieved were brought about by a combination of mandibular setback and malar augmentation (ii) a strong correlation in the horizontal direction occurred between all the selected landmarks of the lower lip and chin the ratios of soft tissue to corresponding hard tissue movements in lower lip and chin approached 1:1; (iii) in the vertical direction, a strong correlation occurred in the lower lip and chin. The most reliable horizontal and vertical soft tissue changes are tabulated for application in BSSO mandibular setback and malar augmentation for the Class III patient.

INTRODUCTION

Orthognathic surgery aims to achieve functional, aesthetic, and stable outcomes, necessitating a multidisciplinary approach involving oral and maxillofacial surgery, orthodontics, and psychiatry. Despite its importance, the impact of orthognathic surgery on both static and dynamic soft tissue

positions remains inadequately explored. Understanding the relationship between facial soft tissue movement and underlying skeletal changes is crucial for determining aesthetic outcomes[1].

Orthognathic procedures can significantly affect the size and shape of the pharyngeal and nasal airways, as well as the facial soft tissue drape[2-3]. However, certain surgeries may also negatively impact facial soft tissues, particularly in the nasal and submental regions. It is imperative to anticipate and minimize these effects while ensuring patients are fully informed about potential implications during the planning and consenting stages[4-5].

The forthcoming case report illustrates soft tissue changes following a surgery-first orthodontic approach.

Diagnosis and Treatment plan

A 18 year old male presented with chief complaint of forwardly placed lower jaw.

On clinical examination patient had class III molar relation on both left and right side with reverse overjet of -6 mm. Open bite and tongue thrusting was present.Profile was

Concave with anterior divergence.

TREATMENT PLAN 1:- CONVENTIONAL APPROACH

-Extraction of 14,24,35,45

-Decompensation,levelling and aligning,space closure

-BSSO Mandibular setback,Le Fort maxillary advancement

-Settling,finishing and detailing.

TREATMENT PLAN 2:-Surgery First Orthodontic Approach

-Strap up with 0.22 MBT Slot

-BSSO Mandibular setback,malar augmentation

-levelling and aligning

-Settling,finishing and detailing.

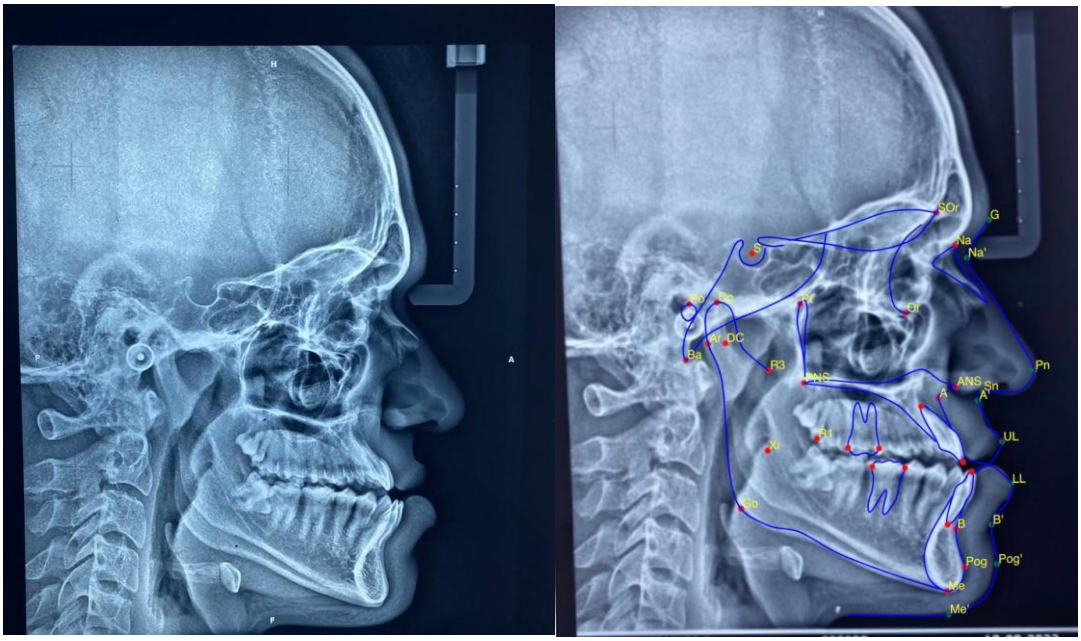
TREATMENT PROGRESS

Bonding done with .022 slot MBT brackets.Mild rotations were corrected with 0.016 Niti.BSSO Mandibular setback was done (5mm right and 7 mm left).Since patient had maxillary deficiency malar augmentation was done with Cortical bone grafts secured in paranasal region.Post surgically settling was done with vertical elastics.

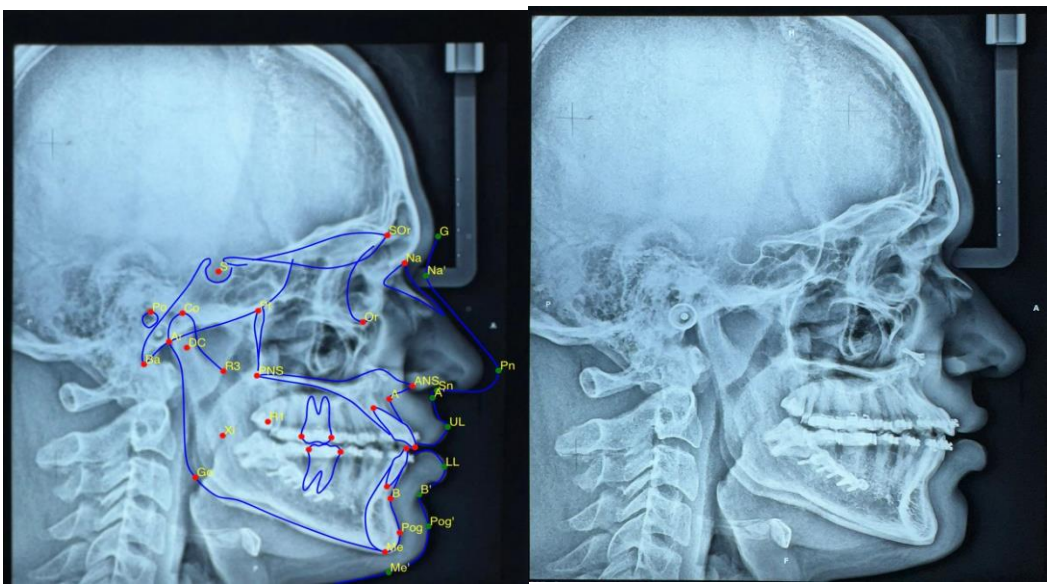
Retention:-Wrap around retainers in both upper and lower arch

Miniscrew implants(Titanium-size 1.5 x 8mm) placed between 15&16,25&26,32&33,42&43 for Class 3 elastics placement.

Pre-treatment photographs and lateral cephalogram



Post treatment photographs and lateral cephalogram



Soft Tissue Changes with Mandibular Surgery

Mandibular Setback

With the mandibular setback, one may also expect a reduction in facial concavity, a reduction in submental length,increase in submental soft tissue sag, and an increase of the lower lip-chin-submental plane angle. Although mandibular Setback does not affect absolute nasal dimensions, setting back the chin point may increase the relative prominence of the nose in comparison to the forehead and chin point.

Holdway analysis shows positive skeletal profile convexity postsurgically,reduced upper and lower lip strain. Lower lip-H line was significantly reduced(0 mm) .Soft tissue chin thickness reduced from 15 mm to 12 mm.

Cogs soft tissue analysis shows positive facial convexity angle,favourable maxillary prognathism,reduced mandibular prognathism and increased lower face-throat angle.Upper lip protrusion increased by 1mm.Lower lip protrusion reduced from 5mm to 3mm and there was significant exposure of maxillary incisor.

Arnett analysis shows decreased upper lip angle by 2^0,decreased interlabial gap(8 mm to 5 mm),increased upper lip anterior length and decreased lower lip anterior length.

TABLE 1: COGS SOFT TISSUE ANALYSIS

Parameters	Pre-op values	Post op values
Facial form		
Facial convexity angle	-5	4
Maxillary prognathism	-2	4
Mandibular prognathism	10	5
Lower face-Throat angle	80	120
Lip position and form		
Nasolabial angle	85^0	80^0
Upper lip protrusion	3 mm	4 mm
Lower lip protrusion	5 mm	3 mm
Mentolabial sulcus	4 mm	2 mm
Maxillary incisor exposure	-8 mm	5 mm
Interlabial gap	7 mm	3 mm

TABLE-2 HOLDWAY SOFT TISSUE ANALYSIS

PARAMETERS	Pre-op	Post op
Straight Facial angle	99^0	90^0
Nose Prominence	12 mm	12 mm
Superior sulcus depth	5 mm	6 mm
Soft tissue (subnasale to H line)	-8 mm	2 mm
Skeletal profile convexity	-7	4
Upper lip thickness	16 mm	15 mm
Upper lip Strain	14 mm	12 mm
H angle	6^0	6^0
Lower lip-H line	5 mm	0
Inferior sulcus to H line	2 mm	5 mm
Soft tissue chin thickness	11 mm	12 mm

TABLE 3: ARNETT ANALYSIS

SOFT TISSUE STRUCTURE	Pre-op	Post op
Upper lip thickness	13 mm	14 mm
Lower lip thickness	20 mm	15 mm
Pogonion-pogonion`	10 mm	8 mm
Menton-Menton`	8 mm	8 mm
Nasolabial angle	85^0	82^0
Upper lip angle	15^0	13^0
Facial length		
Nasion`-Menton`	118mm	118 mm
Upper lip length	16 mm	16 mm
Lower lip length	45 mm	45 mm
Interlabial gap	8 mm	5 mm
Lower 1/3 of face	68 mm	68 mm

Mx1 exposure	11 mm	15 mm
Maxillary height	20 mm	18 mm
Mandibular height	45 mm	48 mm
PROJECTIONS to TVL		
Glabella	2 mm	2mm
Orbital rims	30 mm	30 mm
Cheek bone	32 mm	32 mm
Subpupil	17 mm	17 mm
Alar base	14 mm	14 mm
Nasal projection	16 mm	16 mm
Subnasale		
A point`	0 mm	0 mm
Upper lip anterior	3 mm	5 mm
Lower lip anterior	8 mm	4 mm
B point`	1 mm	3 mm
Pogonion`	1 mm	1 mm

Discussion

The data are arranged in Table 1,2,and 3 indicating the soft tissue points which relate well to one another in terms of response and which can be utilized in surgical planning and prediction.

The post-surgical values showed that an orthognathic profile had been achieved by bilateral saggital split osteotomy of mandible and malar augmentation in paranasal region.

The lower lip in this study responded at a ratio between 0.9 and 1 to the corresponding hard tissues. This is much greater than the ratio found in previous investigations (Hershey and Smith, 1974; Lines and Steinhauser, 1974), which ranged from 0.6–0.75 to 1. The ratio of superior labial sulcus to point A was less than that of lower lip and chin. In the lower lip and chin area the correlationwas stronger pre and post surgically.

Vertically, the responses of the nasal base and subnasale after surgery shows weak correlation to the hard tissue changes in this case,which is similar to previous reports (Mansour *et al.*, 1983; Carlotti *et al.*, 1986; Rosen, 1988;

Jensen *et al.*, 1992). The vertical correlation coefficients of the soft to hard tissue movement are not so strong as those for horizontal change. The ratios are also more variable. Lin (1995) found that these may account for the increased difficulty in predicting change in this dimension accurately.

Moss et al. (1988) have pointed out that the various types of operation and morphology of the anatomic structures must be considered in predicting the outcome of facial surgery. Further investigations on other types of malocclusion and methods of surgical correction are essential to widen the database for planning prediction.

CONCLUSION

Due to the improvement in orthodontic and surgical techniques during the last two decades, a combined approach has been widely accepted as the preferred method to correct moderate to severe skeletal deformity. Orthognathic surgery also allows orthodontists to solve the problems for which orthodontic treatment alone would do little to improve facial form.

The recognition of aesthetic factors and the prediction of the final facial profile play an increasingly significant role in orthognathic treatment planning, since the facial profile produced by orthognathic treatment is of great significance for patients.

Great investment has been made in research and development of digital orthodontics and 3D simulation of orthognathic surgery. Besides, automated treatment planning and customized surgical set up planning led to improved diagnostic precision.

References

1. Dalijit et al The Facial Soft Tissue Effects of Orthognathic Surgery Facial Plast Surg 2017;33:519-525.
2. Jensen AC, Sinclair PM,Wolford LM. Soft tissue changes associated with double jaw surgery. Am J Orthod Dentofacial Orthop 1992; 101(03):266-275
3. Mobarak KA, Espeland L, Krogstad O, Lyberg T. Soft tissue profile changes following mandibular advancement surgery: predictability and long-term outcome. Am J Orthod Dentofacial Orthop
4. 2001;119(04):353-367.
5. Mankad B, Cisneros GJ, Freeman K, Eisig SB. Prediction accuracy of soft tissue profile in orthognathic surgery. Int J Adult Orthodon Orthognath Surg 1999;14:19-26.
6. Gerbo LR, Poulton DR, Covell DA, Russell CA. A comparison of a computer-based orthognathic surgery prediction system to postsurgical results. Int J Adult Orthodon Orthognath Surg 1997;12:55-63.
7. McCollum AGH, Dancaster JT, Evans WG, Becker PJ. Sagittal soft tissue changes related to the surgical corrections of maxillary deficient class III malocclusions. Semin Orthod 2009;15(03):172-184.
8. Lin SS, KerrWJ. Soft and hard tissue changes in Class III patients treated by bimaxillary surgery. Eur J Orthod 1998;20(01): 25-33.
9. Joss CU, Joss-Vassalli IM, Berge SJ, Kuijpers-Jagtman AM. Soft tissue profile changes after bilateral sagittal split osteotomy for mandibular setback: a systematic review. J Oral Maxillofac Surg. 2010;68:2792-2801.
10. Marsan G, Oztas E. Kuvat SV. Cura N, Emekli U. Changes in soft tissue profile after mandibular setback surgery in Class III subjects. Int J Oral Maxillofac Surg. 2009;38:236-240.
11. Mobarak KA, Krogstad O. Espeland L, Lyberg T. Factors influencing the predictability of soft tissue profile changes following mandibular setback surgery. Angle Orthod.
12. 2001;71:216-227.
13. 11. Ingervall B, Thuer U, Vuillemin T. Stability and effect on the soft tissue profile of mandibular setback with sagittal split osteotomy and rigid internal fixation. Int J Adult Orthodon Orthognath Surg. 1995;10:15-25.