Combined orthodontic and anterior segmental osteotomy – a case report

Ashish Chopra,[1] Sameer Patil,[2] Puneet Batra,[3] Gaurav Singh.[4]

[1]Reader,
[2]Principal, Professor and Head, Department of Orthodontics, Sinhgad Dental College & Hospital, Maharashtra, INDIA
[3]Vice Principal, Professor and Head,
[4]Postgraduate student,
Institute of Dental Studies and Technologies (IDST), Modinagar, Uttar Pradesh, INDIA

Address for Correspondence:
Ashish Chopra,
Reader, Department of Orthodontics, Institute of Dental Studies and Technologies (IDST), Modinagar, Uttar Pradesh, INDIA
E-mail: drashishchopra@yahoo.co.in

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ABSTRACT

Case report of 19 year old female patient with dentoalveolar excess treated with combined orthodontics and anterior maxillary osteotomy.

Key words: Anterior, Maxilla, Segmental, Osteotomy

INTRODUCTION

Maxillary excess can be either anterior or complete. Both show excessive gummy smile with increased over jet and deep overbite. In the anterior maxillary excess there is labial inclination of the maxillary anterior teeth and convexity in the facial profile which is limited to the upper lip region. Whereas in the complete maxillary excess in addition to above there is convexity of the inferior orbital rims and nose also. Le fort I osteotomy is done for the treatment of complete maxillary excess whereas anterior maxillary segmental osteotomy is done for anterior maxillary excess cases. The first report of an anterior segmental maxillary osteotomy (ASMO) was published by Cohn Stock in 1921.[1] The usual indications for ASMO are excessive vertical or sagittal development of the maxillary alveolar process in patients where the relationships between the posterior teeth are acceptable.[2,3] This clinical case presents report of orthodontic treatment combined with ASMO for improving the skeletal, dental, soft tissue and over all aesthetics of a 19 year old female patient.

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Diagnosis

A 19 year adult female patient reported with a chief complaint of forwardly placed upper front teeth. Extra orally patient had mesoprosopic facial form, increased incisor display with gummy smile, convex profile, and incompetent lips. (Fig. 1a) Intra orally patient had class II molar and canine relation with over jet of 6 mm, overbite of 5mm, crowding of 5 mm and increased curve of spee in the mandibular arch.(Fig. 1b) Cephalometric analysis (Table I) revealed class II skeletal pattern with and increase in maxillary length with vertical growth pattern and dentoalveolar protusion with protuded maxillary and mandibular anteriors. Soft tissue revealed acute nasolabial angle, forwardly placed upper and lower lip in relation to E line.

Fig. 1a: Pre-treatment extraoral photographs

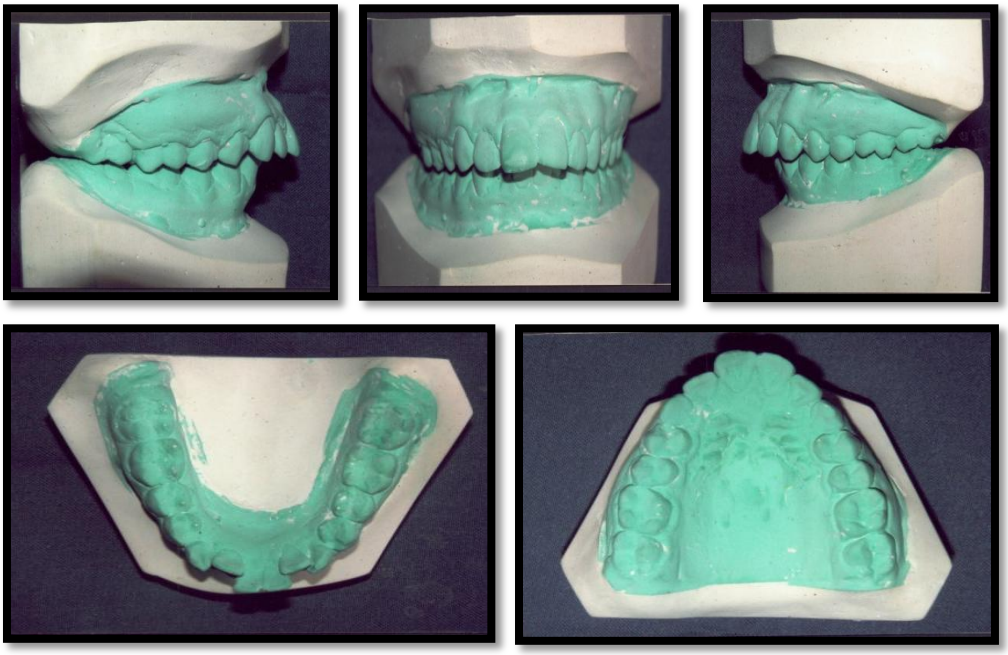

Fig. 1b: Pre-treatment intraoral model photographs

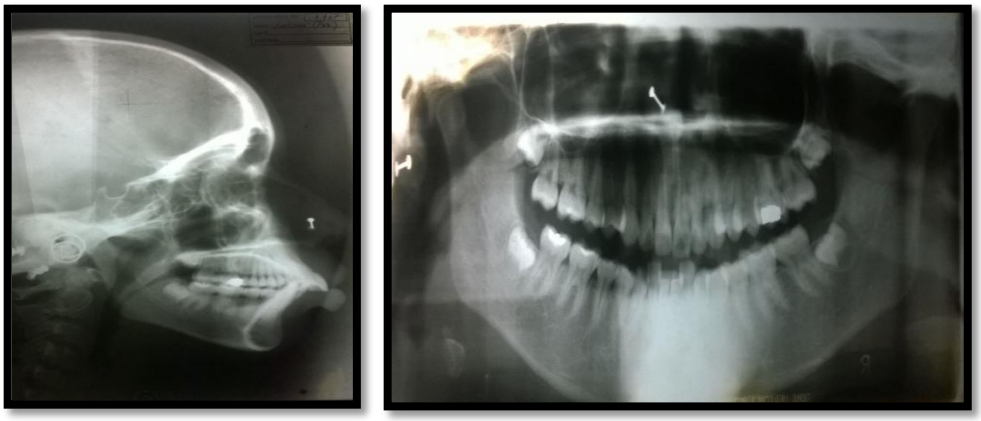

Fig. 2: Pre-treatment radiographs

Treatment Plan

Treatment objectives were to improve the positioning of the anterior maxilla with a reduction in the gingival exposure, to achieve an ideal overjet, overbite, to correct lip incompetency and achieve an aesthetic profile. The maxillary excess was limited to anterior maxillary region.

As the patient was 19years, a combined orthodontic and surgical mode of treatment was planned. It was decided to do extract the first premoalrs and followed by ASMO to position anterior maxilla posteriorly by 5 mm and superiorly by 3mm.
In the mandibular arch it was planned to correct crowding, molar relation, curve of spee and proclination via extraction of the mandibular first premolars. Retraction of lower anteriors was planeed to create sufficient over jet to facilitate surgical correction.The patient was informed and consent was taken for the procedure.

Treatment Progress

Pre surgical orthodontics
0.022" preadjusted brackets (MBT -3M unitek) was bonded. A continuous maxillary archwire of 0.016" nickel titanium was inserted. The archwire size in the maxilla was gradually increased until 0.019 X0.025" stainless steel wire was reached. In the mandibular arch after extraction of first premolar initial alignment wire was started with 0.016" nickel titanium wire and was gradually increased to 0.019X0.025" stainless steel wire.

After 9 months of presurgical orthodontics, lateral cephalogram was taken and prediction tracing was done. Mock surgery was performed on the articulated models by removing the maxillary first premolars and the anterior maxillary segment was positioned backwardly and superiorly as planned.(Fig. 2, 3)

Surgical Procedure
Under general anesthesia extraction of 14 and 24 was done, followed by ASMO with superior and posterior positioning of pre-maxillary segment was done.(Fig. 4) Postoperatively the wound was checked daily for one week for signs of ischemia. The splint was kept in place for 4 weeks, and the patient was placed on a liquid diet.

Postsurgical Orthodontic Treatment
Postsurgical orthodontics in the maxillary arch was to close minor spaces distal to the cuspids and also leveling of vertical level between canine and premolar. Occlusal function and settling was done through the use of intermaxillary elastics (Fig. 5). After completion of the post-surgical finishing and detailing, the appliance was debonded (Fig. 6). Fixed bonded retainer was given in both arches for retention. The postsurgical phase of orthodontic treatment continued for 5 months so the total treatment duration was 1year 4 months.

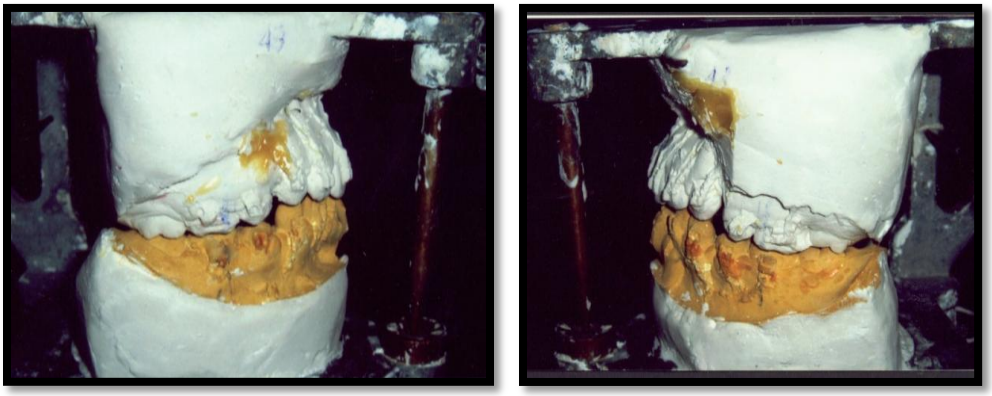

Fig. 2: Mock surgery

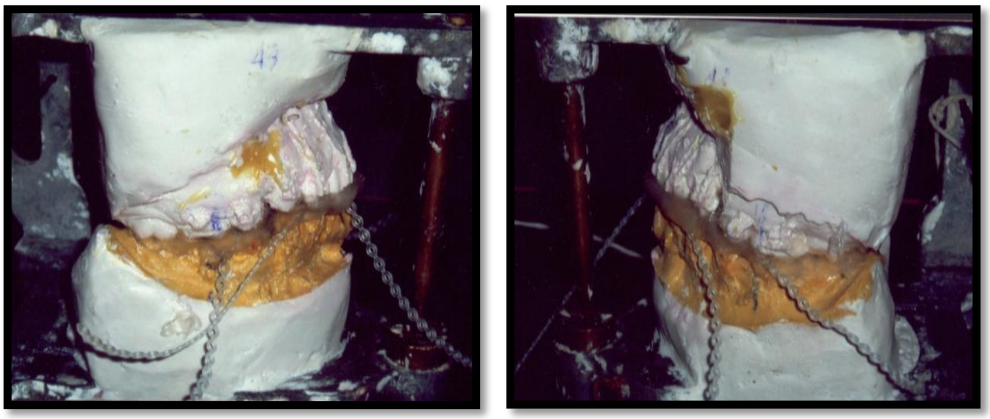

Fig. 3: Surgical splint

Fig. 4: Pre-maxillary osteotomy

Fig. 5: Settling elastics

RESULTS

There was improvement in facial esthetics with improved lip competency, decreased gingival exposure on smile and rest. The patient was very satisfied with the results of treatment. The excessive vertical dysplasia was dramatically reduced, and most of the cephalometric values were brought into the normal range. Class I molar relation, with 2mm of over jet, overbite and 1mm of curve of spee was achieved.

Fig. 6: Post-Surgical Extraoral and Intraoral Photographs

Fig. 7: Post-Surgical radiographs

(a)

(b)

(c)

Fig. 6 a, b, c: Pre and Post extraoral photograps

Table 1: Pretreatment, mid-treatment and post-treatment cephalometric values

	Mean	Pre-Treatment	Mid-Treatment	Post-Treatment	Difference
Maxilla to Cranium					
SNA ANGLE	82±2	85°	82°	80°	5°
N Perp.- Pt A (mm)	0±1 mm	+3.5mm	0	-2mm	5.5mm
Eff. Max Length (mm)		95mm	90mm	90mm	5mm
Mandible to Cranium					
SNB Angle	80±2	76°	76.5°	75°	1°
N Perp- Pog (mm)	0 mm	-9.5mm	9mm	8mm	17.5mm
Eff. Man. Length (mm)		108mm	112mm	112	4mm
N Pog- F. H. Angle	90	85°	85°	85°	0
Maxilla to Mandible (Skeletal)					
ANB Angle	2±2	9°	5.5°	5°	4°
Wits (mm)	0 mm	3mm	2mm	2mm	1mm
Difference between Co Gn-Co A (mm)		13mm	22mm	22mm	9mm
Verticle Relationship					
Y-Axis Angle	53-66	68°	67°	67°	1°
Facial Axis Angle	90	90°	90°	90°	0
FMA Angle	25	32.5°	30°	27°	5.5°
GoGn-SN (Angle)	32	35°	32°	30°	5°
Occlusal to SN Angle	14	19°	15°	15°	4°
UFH: LFH	0.7	0.79	0.73	0.73	0.06

PFH: AFH	62.65%	63.24%	62.80%	60.93%	2.31%
SOP	396±6	395°	400°	397°	2°
Maxillary Dental					
U1 to NA (Angle)	22	28°	12°	10°	18°
U1 to NA (mm)	4 mm	9mm	4.5mm	4mm	5mm
U1 to Pt. A Verticle (mm)	5 mm	3.5mm	3mm	4mm	0.5mm
U1 to SN (Angle)	102±2	115°	94.5°	97°	18°
Mandibular Dental					
L1 to NB (Angle)	25	46°	32°	30°	16°
L1 to NB (mm)	4mm	13mm	8mm	6mm	7mm
L1 to A Pog (mm)	1 mm	8mm	6mm	4mm	4mm
IMPA (Angle)	90±5	110°	96.5°	93°	17°
Maxilla to Mandible (Dental)					
U1 to L1 (Angle)	130	95°	128°	130°	35°
Soft Tissues					
G SN Pg' (Angle)	12±4	22.5°	41°	20°	2.5°
Nasolabial Angle	102±4	93°	90°	92°	1°
Ricketts E Line- U (mm)	0±1mm	7mm	0mm	0mm	7mm
Ricketts E Line- L (mm)	2±1 mm	10mm	2.5mm	3mm	7mm

DISCUSSION

A team approach with the orthodontist and surgeon, with both having input before the initiation of treatment is the best way to achieve stable, functional, and esthetic results.

In the present case there was, facial convexity which was limited to the upper lip region but there was no convexity of the inferior orbital rims. There was an excessive gingival display on smiling. The cepholometeric analysis revealed labial inclination of the maxillary and mandibular anterior teeth, increase in the anterior maxillary region and normal posterior maxilla. Therefore the case diagnosed as maxillary dento alveolar protusion. The usual indications for ASMO are excessive vertical or sagittal development of the maxillary alveolar process in patients where the relationships between the posterior teeth are acceptable.[4,5] Therefore it was planned to do anterior maxillary segemental osteotomy rather than Le fort I osteotomy for entire maxillary arch. Segmental osteotomy provides a means of selective surgical-orthodontic correction of a dentoalveolar malocclusion. The lip competency, gingival exposure on smile and facial contour was significantly improved. The patient was extremely satisfied with the results of treatment. The excessive vertical dysplasia was dramatically reduced. However injury to the apices of the teeth is a potential complication, especially the canines as these as have the longest roots and are the most apt to be injured. In the present case 5mm of bone was preserved beyond the canine roots, there was no injury observed in any of the tooth. Careful apposition of the alveolar bone adjacent to the interdental osteotomy decreases the risks of excessive alveolar bone loss and subsequent peridontal problems. There was no surgical complication observed in the present case. Relapse is an unpredictable risk of orthognathic surgery. Relapse may be dental or skeletal or both.[3] The stability of maxillary osteotomies affected by the magnitude of the anterior movement and the magnitude of the inferior repositioning of the maxilla, the adequacy of mobilization of the down fractured maxilla at surgery, the extent of bone contact in the newly established position of the maxilla and the type of fixation. The most stable maxillary procedure is superior repositioning, and forward movement is also reasonably stable. There was no relapse observed in the present case over a period of 6 months after treatment was completed.[6]

In the mandibular arch lower first premolar were extracted to achieve correction of crowding, molar relation, proclination and curve of spee. The total duration of treatment was decreased to 1 year and 4 months which is less than a normal orthodontic treatment time for such cases.

CONCLUSION

Through the combined approach by orthodontist and oral surgeon, the patient had a dramatic skeletal, dental, and occlusal improvement. This case illustrates that orthodontic treatment with ASMO achieved stable, functional, and esthetic result. Patient also reported a better self-esteem. The overall treatment time was reduced.

REFERENCES

1. Leibold D, Tilson HB, Rask K. A subjective evaluation of the re-establishment of the neurovascular supply of teeth involved in anterior maxillary osteotomy procedures. Oral Surg Oral Med Oral Pathol 1971;32(4):531-34.
2. Rosenquist B. Anterior segmental maxillary osteotomy: A 24-month follow-up. Int J Oral Maxillofac Surg 1993;22(4):210-13.

3. Jayaratne YSN, Zwahlen RA, Lo J, Cheung LK. Facial soft tissue response to anterior segmental osteotomies: A systematic review. Int J Oral Maxillofac Surg 2010;39(11):1050-58.
4. El-Hadidy Al-Moddather M. Premolar Maxillary Set Back Osteotomy Long Term Results. Egypt J Plast Reconstr Surg 2005;29(2):105-11.
5. Suma T, Shashikumar HC, Lokesh NK. Arya S, Shweta GS. Orthodontic Surgical Treatment of Gummy Smile with Vertical Maxillary Excess, IOSR J Dent Med Sci 2014;13(10);68-74.
6. Joby P, Rhea MJ. Anterior maxillary excess correction with ASMO – a case report. Int J Dent Clin 2011:3(3):65-66.

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