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Anterior maxillary osteotomy for correction of gummy smile: A case report of two year follow up

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***Abstract*---**Repositioning of the anterior dento-osseous segment posteriorly is carried out with the Anterior Maxillary Osteotomy (AMO) procedure. Maxillary excess can be corrected by a combined orthodontic and orthognathic approach. Anterior Maxillary Osteotomy has been performed since its inception in 1921 by Cohn Stock wherein, elastic force was used to retract the anterior maxillary segment. Wassmund, Wunderer and Cupar proposed modifications for AMO. This article gives an insight of a case treated by anterior maxillary osteotomy along with fixed orthodontic treatment for correction of maxillary anterior excess.

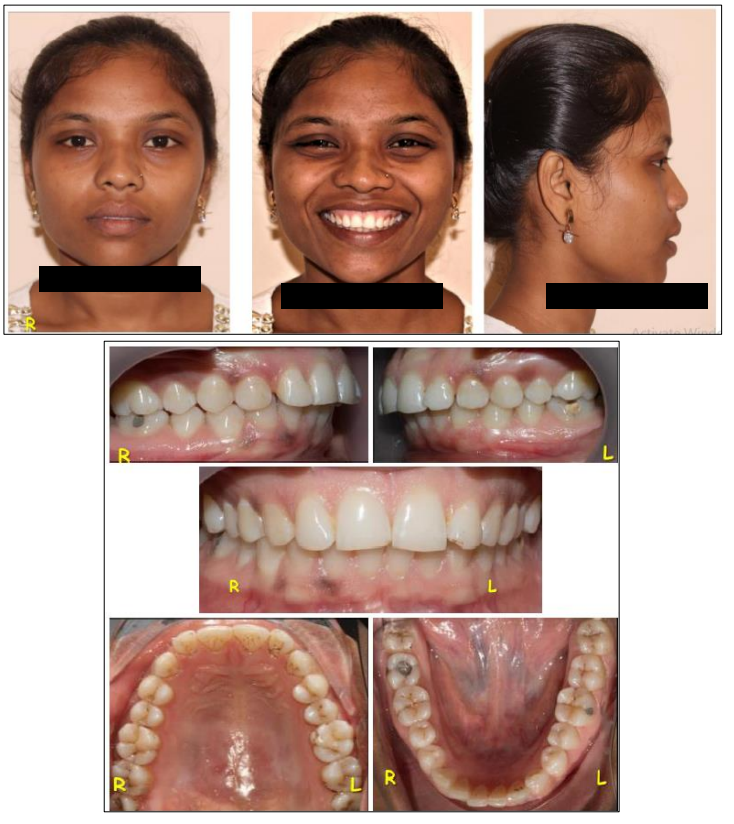
***Keywords*---**Anterior Maxillary Osteotomy, Orthognathic Surgery, gummy smile.

Introduction

Dentoalveolar correction with premolar extractions does not completely satisfy patient's need of facial aesthetics. Patients at times are skeptical for undergoing major orthognathic procedures. Considering the morbidity and complications of various orthognathic procedures, a treatment plan that best suits the patients need with minimal invasion is the priority set by patient as well as the operator. Orthognathic procedures have been used for correction of skeletal and facial deformities. Anterior Maxillary Osteotomy has been used traditionally for correction of anterior open bite as well as for correction of skeletal discrepancy[1,2]

Case Presentation

This case report presents anterior maxillary osteotomy done in maxillary arch for correction of gummy smile (having component of anterior maxillary excess). A 25 year old female patient reported to the department with skeletal class II maxillomandibular relationship having prognathic maxilla and retrognathic mandible with decreased lower third facial height, average maxillary posterior height and average growth pattern, with end on molar relation bilaterally, class I Canine relation bilaterally with retroclined maxillary Incisors and proclined Mandibular Incisors with 2mm overjet, 2mm overbite, 1.5mm spacing in Maxillary arch and gummy smile especially in anterior region (Fig. 1)



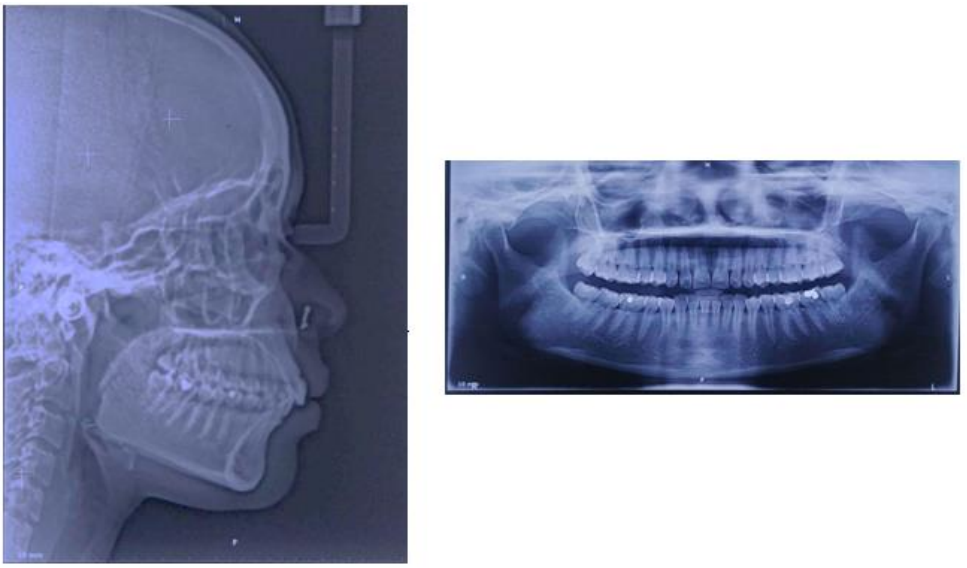


Fig. 1: Pre Treatment Extra oral, Intra Oral Photos and Radiographs

Treatment Objectives:
Pre Surgical

1) Correction of proclination of lower incisors
2) Closure of interdental space available in maxillary arch
3) Creation of overjet for anterior maxillary setback

Surgical:

1) Reduction of gummy smile

Post-surgical:

1) Final tooth alignment and root parallelism
2) To maintain ideal overjet and overbite

Treatment progress

A written informed consent was taken from the patient before starting the treatment.
Bonding:

- The brackets of (13,15,23,25) in the Maxillary arch were positioned in such a way to tip the roots of upper canines mesially and that of upper premolars distally to create space for osteotomy cuts
- The roots were diverged so as to prevent any damage to them during osteotomy procedure

Extractions:
34 and 44 were extracted under local anaesthesia before bonding of fixed appliance
Alignment and levelling were completed in Maxillary and Mandibular Arch followed by en-masse retraction of mandibular anteriors. (Fig. 2) En- masse retraction of lower anteriors ensured sufficient amount of positive overjet to be established for setback of anterior maxillary segment.

After retraction was completed in the Mandibular arch, upper and lower impressions were taken. Bite registration was done to mount the Maxillary and Mandibular casts followed by stimulation of mock surgery on the cast and a splint was fabricated that would serve as a guide for the Maxillofacial Surgeon with the amount of setback that was required to correct her gummy smile due to her anterior maxillary excess. (Fig.3)

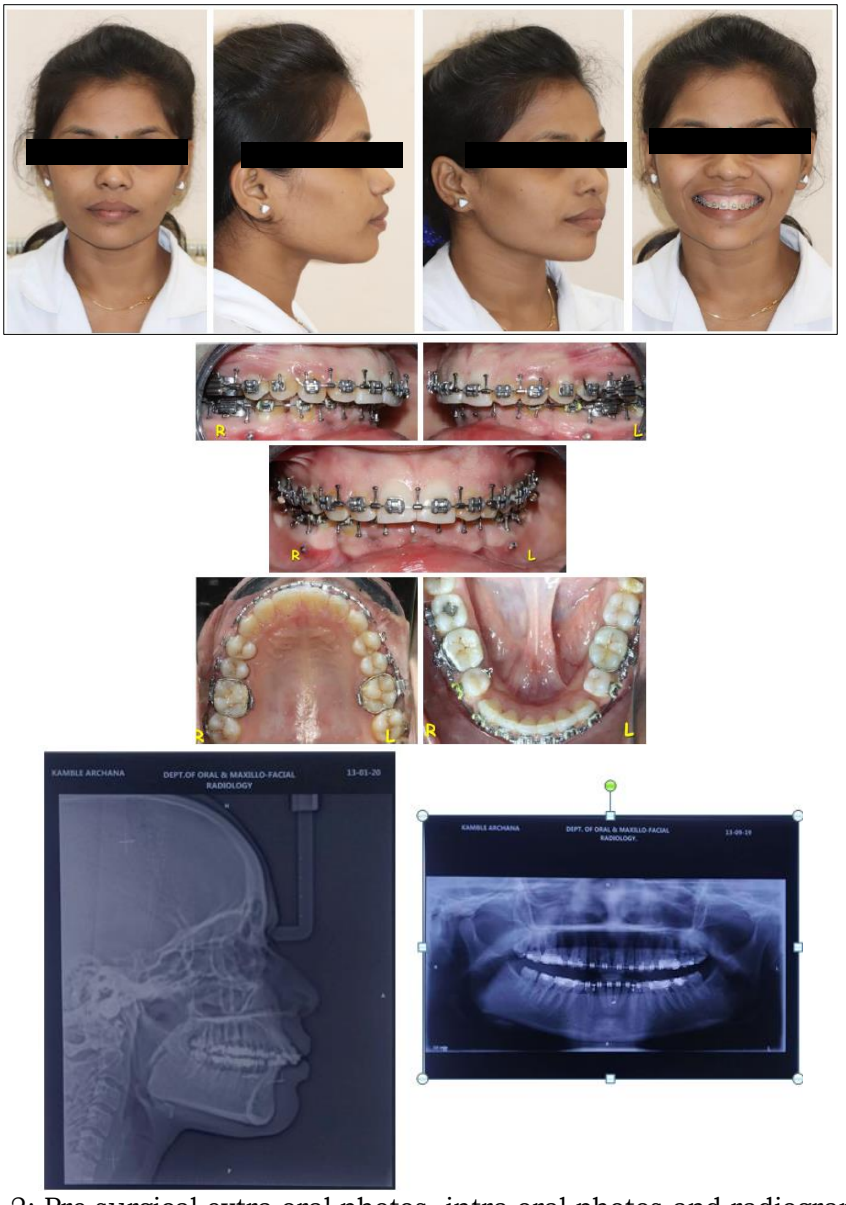


Fig. 2: Pre surgical extra oral photos, intra oral photos and radiographs

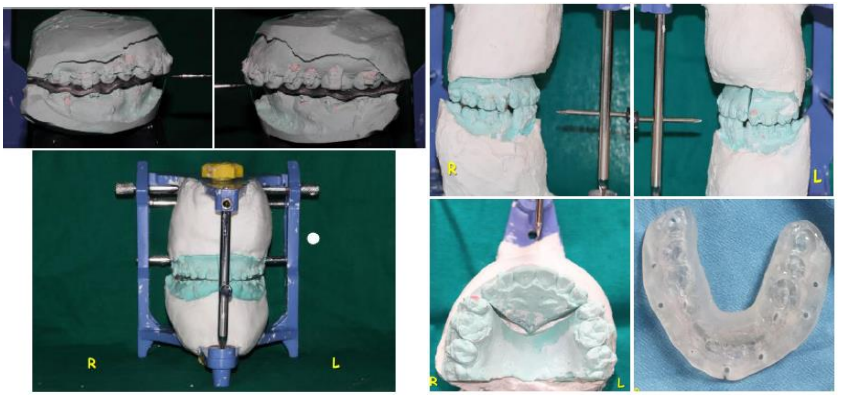


Fig. 3: Mock surgery and splint fabrication

Pre surgical preparation:

- Crimpable hooks were placed in the U/L wire interdentally between each teeth.
- An OPG was assessed to confirm the divergence of 13,15 and 23, 25
- The splint prepared had some holes incorporated in it to assist in intermaxillary fixation. (Fig. 3)

Surgical procedure: (Fig. 4)

- After obtaining adequate anaesthesia, on table extractions of 14,24 were carried out and horizontal osteotomy cut were placed 5mm above the canine roots in maxillary arch
- Anterior Maxillary setback was carried out
- Rigid fixation of osteotomised segments was done with miniplates and screws.

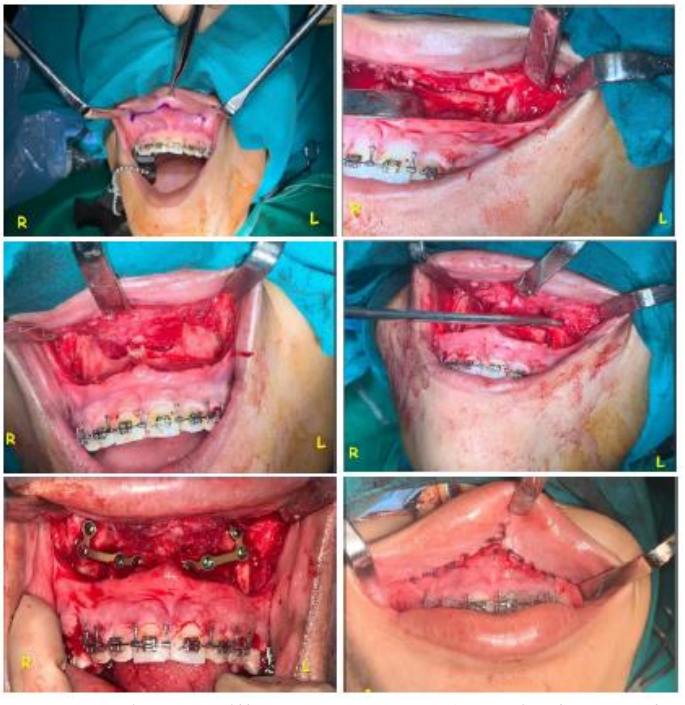
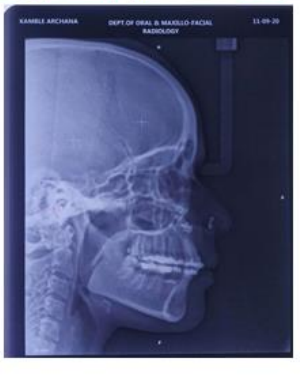
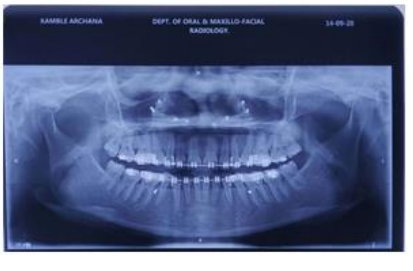


Fig. 4: Anterior Maxillary Osteotomy (Surgical Procedure)





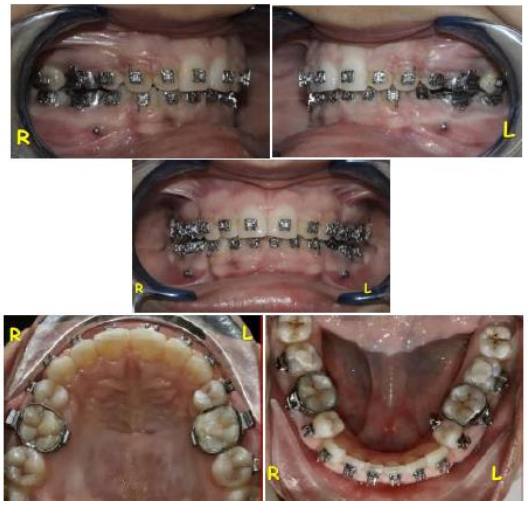


Fig. 5: Post Treatment (With Fixed Strap Up)

Post-surgical Procedure:
Round 0.016 Niti was placed 4 weeks after surgery to correct the vertical discrepancy between canine and second premolar. Also the regional acceleratory phenomenon which occurs after orthognathic surgery helped to hasten the tooth movement. After few weeks, patient was switched onto rectangular Niti wire. Due to surge of Covid 19 pandemic, patient was not able to report to the department for 6 months. After the patient reported, the patient was switched to rectangular 0.019*0.025 SS wires. Pt was not ready to continue with further treatment due to ongoing covid 19 pandemic situation and was quite satisfied with the outcome of treatment. Hence some settling of occlusion was not completed and after taking written consent from the patient, debonding was carried out. (Fig. 5) Later 2 years follow up was carried for the patient. The aesthetics of the patient have significantly improved after her treatment.

Treatment result: At the end of the treatment the patient's gummy smile had significantly reduced. The osteotomy sites had healed significantly at the end of treatment. The 2 year follow up of the patient revealed no post-surgical complications. (Fig. 7)

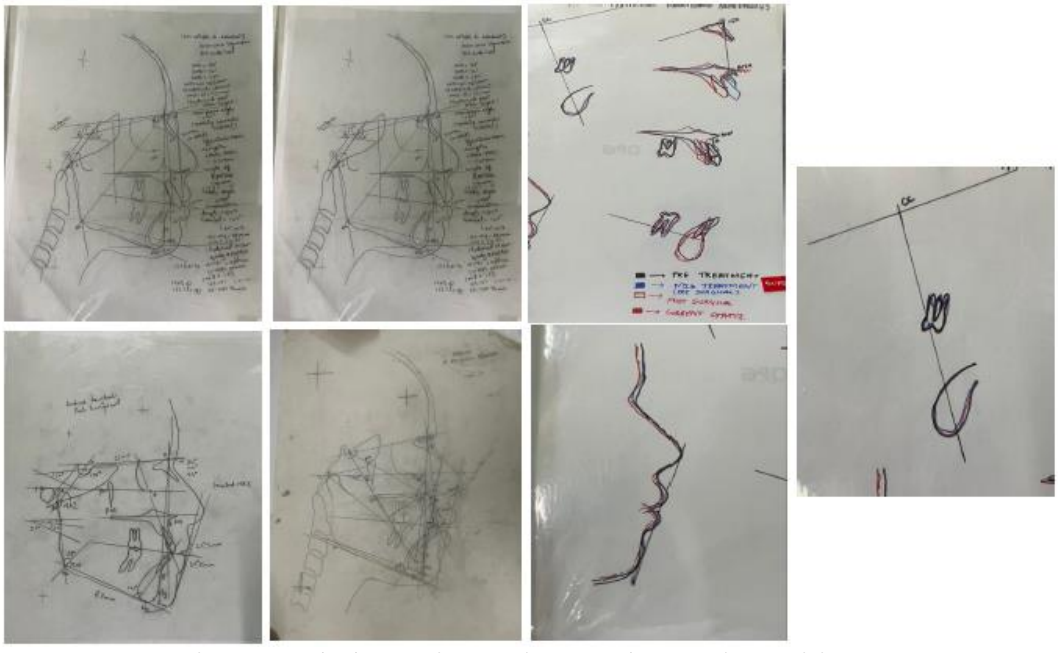


Fig. 6: Cephalometric Tracings and Superimpositions

Fig. 7: Two Year Follow Up (Extra Oral, Intra Oral Photos and Radiographs)

Table 1: Cephalometric values during the treatment duration

	Pre	Mid	Post	Follow up
Maxilla to cranial base (SNA)	85°	85°	82°	82°
Mandible to cranial base (SNB)	79°	78°	78°	78°
Maxillomandibular (ANB)	6°	+6°	+4°	+4°
SN-MP	32°	30°	30°	30°
FMA (MP-FH)	25°	23°	23°	23°
U1-NA (mm)	6	6	3	3
U1-NA	26°	26°	22°	22°
U1-SN	107°	107°	100°	100°
L1-NB	31°	26°	25°	25°
L1-NB (mm)	8	6	5	5
Interincisal angle	137°	128°	126°	126°
L1-MP	112°	102°	102°	102°
Soft tissue-lower lip to E-plane (mm)	3	1	1	1

Discussion

The aim of this case report was to describe anterior maxillary osteotomy as an orthognathic procedure used in conjunction with conventional orthodontic treatment for correction of gummy smile. Camouflage treatment causes more of dentoalveolar correction. Since patient wanted a significant correction of her gummy smile, Anterior Maxillary Osteotomy was decided in her treatment plan after consultation with patient and also opinion from Oral and Maxillofacial Surgeon was procured for the same. The vertical excess in the anterior region contributed to gummy smile. Correction of gummy smile just by moving the Anterior Maxillary segment was considered rather than le forte I Osteotomy as the cephalometric analysis revealed anterior vertical excess to have contributed to increased gummy smile. Risk of iatrogenic damage to vascular structures posterior to maxilla which is seen with Le forte I Osteotomy was avoided by just restricting the surgical setback to anterior maxillary segment only. Anterior Maxillary Osteotomy has the advantages of having open surgical field, stable occlusal molar relation, almost no impact on temporomandibular joint and low rate of relapse. The treatment period by this method is short with low incidence of complications; the occlusal relationship of the posterior teeth was not altered.[2,3] Skeletal and dental bimaxillary protrusion is one of the most factor for which patients seek orthodontic treatment. [4] Posnick et al. in their study reported no direct surgical injury the roots in segmental and non- segmental cases. Morgan and Friedrich reported increased periodontal sequels with increase in the probing depths at the osteotomy sites as compared to other neighboring sites.[5] Orthognathic procedures involving anterior subapical osteotomies and extraction of premolars can be considered as an option to correct sagittal excess of Maxillary/ Mandibular Jaw Bones and its associated anomalies.[6] Certain minor drawbacks of AMO include loss of teeth vitality, persistent periodontal defects,

communication with nasal antrum. The 2 year follow up of this case did not reveal any such complications. Various authors have proposed modifications of Anteior Maxillary Osteotomy Procedure. Single Piece bird wing osteotectomy have been proposed to reduce the duration of the surgical procedure and ensure reduction of kinking effect to the palatal pedicle and provide sufficient vascularity to the anterior osteotomised segment.[7]

Conclusion

Meticulous treatment planning with a sound interdisciplinary approach can help manage complex skeletal issues. Anterior Maxillary Osteotomy along with conventional Orthodontic mechanotherapy helped to resolve skeletal discrepancies in the aforementioned case and helped deliver results to meet to the patients expectations

Declaration of patient consent:

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient has given consent for her image and other clinical information to be reported in this journal.

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Conflicts of interest: There are no conflicts of interest

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