Case Report

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An Alternative Treatment for Correcting Transverse Maxillary Cant

Abstract:
Orthognathic surgery and orthodontic therapy are desired by patients for a number of reasons, including facial asymmetry. The maxillary occlusal cantis commonly associated with asymmetry.Orthognathic surgery combined with orthodontic treatment has been the treatment of choice for correcting an occlusal cant. However, not all patients with facial asymmetry are surgical candidates, patient assessment and selection remain critical components of diagnosis and treatment planning.In this case report, the patient declined any invasive treatment; hence, we opted to treat this facially asymmetrical patient with orthodontic therapy using straightforward mechanics via TADs, which resulted in an exceptional success.

Key-words: Transverse maxillary cant, TADs

Introduction:

Patients seek orthodontic therapy and orthognathic surgery for a variety of reasons, including facial asymmetry. A mandibular deviation to the right or left that occurs significantly from the upper to the lower face is a common characteristic of facial asymmetry. This is frequently related to a maxillary cant and the maxillary occlusal plane.[1] An asymmetry pattern of skeletal and/or dentoalveolar development might cause an occlusal cant.[2-5] It might also be iatrogenic as a result of inadequate orthodontic therapy.[6]

Clinical examination, frontal photos, PA view radiograph, and 3-dimensional imaging techniques are used to assess patients with OC (Occlusal Cant). A tongue blade can often be used to evaluate the posterior or anteriorocclusal cant by placing it over the canines or first molars during the clinical examination.[7]

For the correction of an occlusal cant, orthognathic surgery augmented with orthodontics treatment has been the therapy of choice. As a result, bilateral sagittal split ramus osteotomy and LeFort I osteotomy are commonly used to address the problem. Case reports have been published demonstrating non-orthognathic correction of the maxillary cant before orthognathic surgery.[8,9] Orthodontic molar intrusion and occlusal plane canting correction with minimum surgical intervention have been observed with the introduction of temporary skeletal anchorage devices (TSADs).[10,11] Kang et al[9] used TSADs to create a rhythmic arch system that resulted in a significant canting correction. Jeon et al[8] demonstrated that mandibular prognathism may be corrected with just mandibular surgery, with maxillary asymmetry corrected by the unilateral intrusion of maxillary molars utilizing TSADs. Nonsurgical therapeutic methods like high-

[1]SHARMA MADHUR, [2]GOYAL MANISH, [3]KUMAR MUKESH, [4]ABRAR MD, [5]SHAHA KALPIT, [6]MADHOK SAKSHAM

[1-6]Department of Orthodontics and Dentofacial Orthopaedics, Teerthanker Mahaveer Dental College, Moradabad

Address for Correspondence: Dr. Madhur Sharma
Post Graduate Student, Department of Orthodontics and Dentofacial Orthopaedics, Teerthanker Mahaveer Dental College, Moradabad, Uttar Pradesh.
E/309, Supertech Society, New Moradabad Road, Moradabad, India – 244001.
Email : sharmamadhur1311@gmail.com

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pull headgear, posterior bite blocks, and active magnetic vertical correctors have been described.[12-14] Soft tissue cant affects the majority of people with skeletal OC.[15] Lip cant is also a common complaint among these individuals, and it can be seen when looking at their face structure. A lip lengthening surgery can enhance a gummy smile, soft-tissue facial profile, and upper lip length dramatically.[16]

Since not all patients with facial asymmetry are surgical candidates, patient assessment and selection are still important aspects of diagnosis and therapy planning.[17]

This case report delineates the management of an adult patient with significant maxillary anterior protrusion andmaxillary cant without any invasive procedureor surgical intervention.

Diagnosis and Etiology:

A 19-yearold female patient presentedwith facial asymmetry and unevenly positioned teeth as her main complaint. Based on the information given by her parents and the patient, no medical problem or dental history no could be concluded. Extraoral examination revealed that the patient had an asymmetrical face with a convex profile, mesocephalic head shape, chin deviation towards the right side and incompetent lips (fig. 1). The visibility of the incisors on posed smiling was 100% with excessive gingival display and also during smiling, the patient had a cant of the occlusal plane (fig. 1). There was a displacement of the mandible towards the right while examining the lower border of the jaw. During the inspection, the left lower border of the mandible was longer than the left lower border. No symptoms of the temporomandibular joint were found during the examination.

Upon intraoral examination, the patient had a Class I molar relationship on left side and end on right side with end on canine relationship bilaterally with 9mm of overjet, 6 mm overbite, considerable crowding in the lower arch (fig.4).

Fig. 1 Pre-treatment extraoral and intraoral photographs.

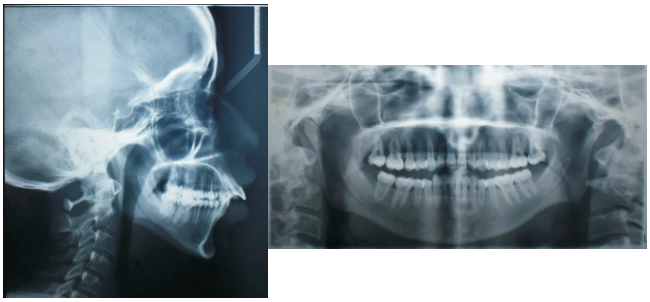

Fig. 2 Pre-treatment lateral cephalogram and OPG

Fig. 3 PA view showing skeletal asymmetry.

The patient exhibited a vertical growth pattern with proclined upper incisors and slightly proclined lower incisor (IMPA-97°), Sella-Nasion-Point A (SNA) of 77°, Sella-Nasion-Point B (SNB) of 73°, skeletal class II owing to maxillary to mandibularsaggital and verticalmal-relationship (Table 1). All permanent teeth, excluding third molars, were present clinically and on orthopantomograms (OPG) (fig. 2).The condylar heads were found to be normal in size, shape, and positioning with TMJ. To assess the asymmetry of the case, a posteroanterior (PA) radiograph was performed and revealed asymmetry in the upper arch. The linear distance of the menton from mid-sagittal reference plane was 3 mm towards the right in the facial asymmetry analysis, however, the antegonial notch on the left side was 35mm at a distance from the mid-sagittal reference plane by 35 mm, whereas it was 40mm on the right side (fig.5 and table 2). When compared to the mid-sagittal reference plane, both skeletal and dental midlines were displaced 2mm towards the right.

Variables	Normal Value	Pre -treatment	Post-treatment
SNA	82°	77°	77°
SNB	80°	73°	73°
ANB	2°	4°	4°
U I- N-A(mm)	4mm	8mm	5mm
L I- N-B(mm)	4mm	10mm	7mm
IMPA°	90°	97°	90°
S-line toUL	0-2mm	5 mm	3mm
S-line to LL	0-2mm	4 mm	2mm

Table 1 Cephalometric comparison.

Fig. 4 Pre-treatment models.

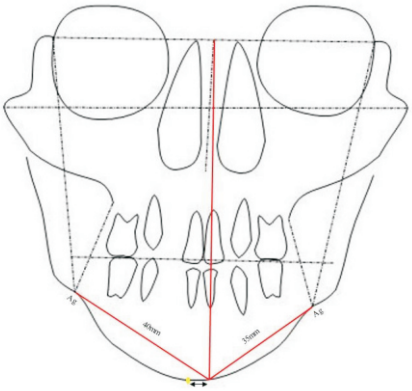

Fig. 5 Diagrammatic presentation showing the distance Ag (Antigonial notch, Red) to MSR (Mid-Sagittal Reference Line, Red) right and left and from MSR to Menton (yellow) via black arrow.

Treatment objectives:

- Achieve ideal leveling and alignment of both the arches.
- Achieve ideal overjet and overbite.
- To achieveclass I molar relation bilaterally.
- To achieve class I canine relation bilaterally.
- Correction of Occlusal cant
- Correction of the midline
- To improve facial esthetics

Treatment alternatives:

Following treatment options were examined based on the diagnosis and treatment objectives:

1. After dental decompensation, LeFort I osteotomy being followed by differential repositioning of the maxilla and with vertical reduction and augmentation genioplasty.
2. Extraction of the maxillary and mandibular first premolars to retract the anterior teeth and to correct the overjet and overbite. Use of TADs to offer absolute anchorage for maximal retraction of the proclined maxillary teeth and maxillary posterior intrusion to correct the cant. To reduce the gummy smile and enhance the profile a lip lengthening procedure also recommended.

The patient picked the second choice after options were explained to her. She didn't realise the about the benefits of orthognathic surgery which was our first option.

Treatment progress:

After the restoration of the mandibular left first molar and the removal of the maxillary and mandibular first premolars, pre-adjusted 0.022-in brackets (3M Unitek™ Gemini Metal, USA) were bonded to all teeth and banding was done in all permanent first molars. Alignment and leveling were achieved in 5 months using 0.014-in, 0.016-in NiTiarch wire gradually reaching 0.017 × 0.025-in NiTiarch wires followed by 0.017x0.025-in SS archwire.

Thereafter, 0.019 x 0.025-in SS (Stainless Steel) wire with power arm (8mm) on maxillary archwire between the maxillary lateral incisor and canine teeth was placed. However, anchorage requirement in the upper arch was Group A anchorage. Therefore to achieve thisself-drilling SS micro implants (1.5x8 mm; SK Surgical, Pune, Maharashtra, India) were placed bilaterally 3 mm occlusally to the buccal frenum between the roots of the maxillary second premolars and first molars.[18] To retract the maxillary anterior, mini-implants were engaged immediately using an e-chain (Short linked) horizontally with a suitable force of 150 g on each side with an extra e-chain (continuous linked) vertically on the left side implant for posterior teeth intrusion to correct canting. Vertical control was achieved by inserting a third mini screw between the two upper central incisors at the mucogingival junction, which was connected vertically by an e-chain (fig.6).

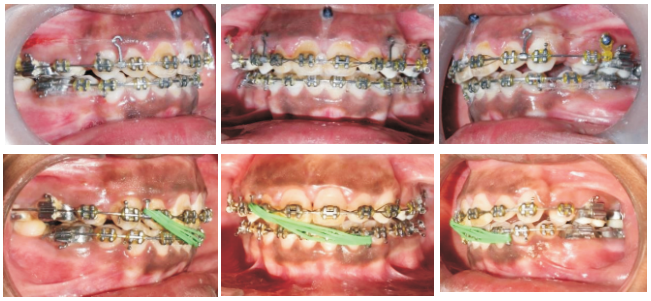

Fig. 6 Progress intraoral photographs showing retraction as well as intrusion and mid-line correction.

At the end of 19 months, the maxillary left posteriors intruded and bilaterally space closed significantly. However, to correct the mid-line, cross elastics (5/16-in/4.5 oz) were used for 3 months. The space between maxillary left canine and maxillary left second pre-molar was used for mid-line correction. At the finish stage of the treatment, settling elastics were administered. The Essix retainer was given for full-time (24 hours) immediately after the brackets[19] were removed for extended duration to prevent relapse of tranverse cant, coupled with fixed retainer in the upper and lower arches.

Treatment results:

Considerable retraction of the anterior teeth resulted in a notable change in lip profile in the post-treatment photos (fig.7). Meanwhile, during the post-treatment clinical assessment, there was an improvement in the smile and facial esthetics. Class I canine and molar relationships were evident in the post-treatment intraoral pictures (fig.7 and 11) with appropriate overbite and overjet. Figure8 and 9 shows the post-treatment cephalogram and panoramic radiograph. Superimposition of lateral cephalogram shows maxillary incisors were retracted, and the maxillary posterior teeth intruded (fig.10). The midlines of the maxillary and mandibular arches were matched (fig.7). However, the final cephalometric analysis (Table 1) showed that the skeletal discrepancy between the maxilla and the mandible remained unchanged but skeletal maxillary cant improved (Table 2 and fig.8).The patient was also suggested a vertical reduction and advancement genioplasty, however she refused.

Fig.7 Post-treatment extraoral and intraoral pictures.

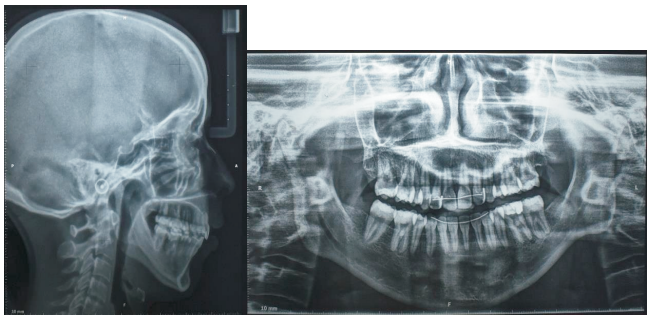

Fig.8Post-treatment lateral cephalogram and OPG.

Fig.9 Post-treatment PA view.

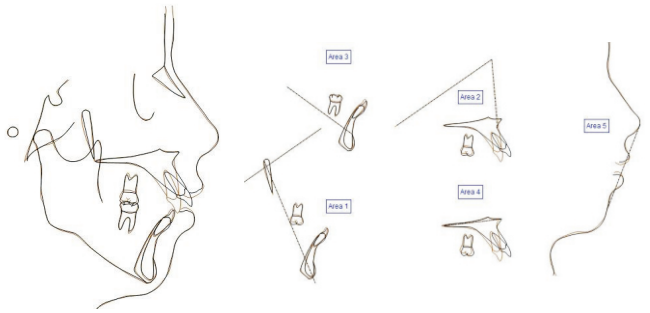

Fig.10 Superimposition of pre (Black color) and post-treatment (Red color) cephalogram and area-wise distribution.

Table 2 Posteroanterior cephalometric comparison.

Variables (in mm)	Pre-treatment	Post-treatment
Co-Ag (right)	47 mm	45 mm
Co-Ag (Left)	49 mm	46 mm
Ag-MSR (right)	40mm	37mm
Ag-MSR (Left)	35mm	38mm
Co-MSR (right)	41 mm	40mm
Co-MSR(Left)	40 mm	41 mm

Fig. 11Post-treatment models.

Discussion:

The extent of the asymmetry, the treatment demands of the case, and the individual's esthetic awareness all play a role in how patient with facial asymmetry are treated. A mixture of skeletal, dental and soft tissue components contributes to facial asymmetry. Individuals may acquire facial asymmetry as a result of traumatic, congenital, or developmental abnormalities.[20] Idiopathic reasons may be associated with developmental abnormalities, which may lead to definitive facial asymmetry over time.[21] In order to establish a treatment plan that is appropriate for each patient with facial asymmetry, a thorough diagnosis is essential.[22,23] Therefore, depending on the cause of the asymmetry, the treatment objective for the cases with mild to moderate facial asymmetry may be treated with minimal orthodontic therapy.[24] Orthodontic and orthognathic treatment are required for more extreme asymmetries.[25] In this scenario the patient hada surgical treatment option, but she was unwilling to accept any surgical intervention or any invasive procedure. As a consequence, after thoughtful consideration, orthognathic surgery was abandoned. As a result, the maxillary anterior teeth required to be retracted with group A anchorage, therefore, we stressed on skeletal anchorage throughout the therapy to achieve this goal. We decided to adopt TADs between the maxillary second premolars and first molars and a constant force delivered through the center of resistance of the six anterior teeth.[26-29] A horizontal force for retraction of the protruding maxillary anteriors and a smaller vertical force also applied for posterior teeth cant correction. The vertical force was adequate to fulfill the requirement for posterior teeth intrusion. This mechanism seemed straightforward and effective for treating individuals with maxillary occlusal cant. However, Kumar et al. proposed another approach in which the brackets are gingivally placed in the lower quadrant to compensate for the occlusally placed brackets in the upper quadrant for maxillary OC correction.[30]

In our patient, although, a mid-line mini-implant was also employed, which was connected vertically by an e-chain for torque control of the anterior teeth. Sung S et al, however in their study of TADs showed even when the whole force traveled through the center of resistance of the six anterior teeth for en-masse retraction revealed that the incisor's inclination would be decreased without torque control.[31] Following Kokich VG et al, the roots were restricted from approaching the cortical plate by torque management of the anterior teeth, which, when coupled with constant mild retraction forces, successfully decreased root resorption.[32]

The most contentious aspect of this report is the short lip, which improved after occlusal cant and bimaxillary protrusion were corrected, and the soft tissue chin also improved after occlusal cant was improved. We agree with Kumar M et al[16] study that a short upper lip is one of the key reasons fora gummy smile owing to neuromuscular abnormalities, and that lip lengthening allows the lip to remain in the proper position, reducing the gummy smile. The patient in this case, on the other hand, refused to undergo any invasive treatment.

Settling elastics were continued for two months to allow the occlusion to settle into a Class I relation. Excessive usage of elastics might induce occlusal plane canting and temporomandibular problems; thus, they should only be used for a limited time (TMDs).[33] Previous research has revealed that following orthodontic treatment, the condyle acquires a concentric orientation. Furthermore, there was no evidence that orthodontic therapy increased TMD.[34,35]

At the end of the treatment, the patient's facial appearance had significantly improved. The asymmetry in the face was significantly reduced. Retainers were provided to the patient in order to keep the corrected midline.

Conclusion:

This patient exhibited facial asymmetry and a Class II skeletal profile, which was effectively corrected with straightforward orthodontics. Satisfactory overjet, overbite, and alignment were achieved. The patient's appearance, both facially and dentally, had significantly improved. Camouflage orthodontic treatment can be used to address mild to moderate instances of facial asymmetry.

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