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Case Report

The beauty of balance: Non-surgical facial asymmetry correction by mandible repositioning splint and orthodontic camouflage

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ABSTRACT

These days, the demand for correcting facial asymmetry has been increasing, even when the extent of asymmetry is small. This case report describes successful nonsurgical orthodontic treatment for facial asymmetry in a 21-year-old female patient presented with buccal segment crossbite and buccally placed upper left permanent canine, with the usage of mandibular repositioning occlusal splint along with fixed mechanotherapy.

1. Introduction

Facial asymmetry is defined as a status of unequal facial features between the left and right sides relative to the mid-sagittal plane.[1] Chin deviation predominantly influences asymmetry, and concerning this matter, orthodontists tend to be the most discerning, trailed by general dentists and laypersons.[2] However, recently, patients have become highly interested in correcting facial asymmetry for esthetics, even when the extent of asymmetry is small.[3,4]

For adult patients with moderate to severe facial asymmetry, improving facial asymmetry usually requires orthognathic surgery.[5,6] In the case of mild asymmetry, surgery is typically not accepted by patients; hence, an orthodontic approach should be sought.

One of the common clinical complaints occurs because of mandibular deviation. But it is a tricky treatment modality because it involves both or either orthodontic or orthognathic treatment. The conventional approach for reducing chin deviation in facial asymmetry treatment involved the facilitation of mandibular position changes after the intrusion of the maxillary teeth on the nondeviated side.[7,8] Compensatory tooth movement occurs when the mandible has deviated. A detailed diagnosis involving especially functional examination is an important step as inaccurate diagnosis can lead to unstable and unacceptable treatment results.

2. Case Report

This is a case report of a 21 year old healthy female patient who attended the orthodontic OPD of an institution with the chief complaint of irregularly placed teeth and buccally placed upper left canine. On facial evaluation, a mandibular deviation on the right side and facial skeletal asymmetry was observed. She had endomorphic built, dolichocephalic skull type, leptoprosopic facial form and orthognathic facial profile (Figure 1). On intraoral examination, she had no soft tissue abnormality and satisfactory oral hygiene. She had asymmetrical V shaped maxillary arch and apparently

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asymmetrical U shaped mandibular arch. Angle's class I molar relationship bilaterally with complete right segment crossbite, buccally placed 23 with differential overjet of -1mm on right side, +1mm on left side and differential overbite of -4mm on right side, +6mm on left side. Upper dental midline shift wrt soft tissue was towards left side by 3mm and lower skeletal midline shift was towards right side by 7mm (Figure 2). On TMJ examination, she presented functional shift toward right side.

Figure 1: Pre-treatment extraoral photographs

Figure 2: Pre-treatment intraoral photographs

On study cast analysis, Bolton's analysis illustrated mandibular tooth material excess. Arch perimeter analysis and Carey's analysis showed there is no need of extraction in upper and lower arches.

The pre-treatment radiographs taken were lateral cephalogram, orthopantomogram (OPG), posteroanterior view (P.A. view) and intraoral periapical radiographs of upper and lower incisors. Cephalometric findings illustrated skeletal class III malocclusion, ANB = -3° and Wits appraisal = -7mm with SNA = 80° and SNB = 83°; with horizontal growth pattern, SN-MP = 26°, FMA = 18°, Jarabak ratio = 68% and Bjork Sum = 391° (Figure 3, Table 1). Pre-treatment PA view findings measured with reference of Mid-Sagittal Reference Line at Crista Galli (MSR) showed asymmetry between right and left skeletal halfs (Figure 4, Table 2).

Figure 3: Pre-treatment lateral cephalogram

Figure 4: Pre-treatment P.A. view

Table 1: Cephalometric summary

Variable	Pre – treatment reading	Mid – treatment reading	Post – treatment reading
Sagittal skeletal relationship			
SNA	80°	80°	81°
SNB	83°	82°	82°
ANB	-3°	-2°	- 1°
Wits appraisal	-7mm	-5 mm	-3 mm
Dental base relationship			
Upper incisor to SN plane	110°	115°	120°
IMPA	90°	92°	90°
Dental relationship:			
Interincisal angle	134°	126°	120°
Overbite	+ 2 mm	-	+ 2 mm
Overjet	0 mm	+2mm	+ 2 mm
Vertical skeletal relationship:			
SN plane – Mandibular plane	26°	28°	30°
Lower anterior facial height	65mm	66 mm	68mm
Jarabak's ratio	68%	68%	69.4%

Table 2: Comparison of pre-treatment and post-treatment P.A. view parameters

Variable	Pre – treatment reading		Post – treatment reading	
	Right	Left	Right	Left
Co – MSR	51 mm	39 mm	53 mm	50 mm
NC- MSR	14 mm	10 mm	13 mm	13 mm
J- MSR	33 mm	30 mm	33 mm	33 mm
Ag- MSR	40 mm	37 mm	42 mm	42 mm
Me- MSR	1 mm	-	-	1 mm
J- Occ plane	21 mm	25 mm	31 mm	34 mm
Co- Ag	64 mm	64 mm	68 mm	66 mm
Ag- Me	43 mm	42 mm	48 mm	48 mm

2.1. Diagnostic summary

Angle's class I malocclusion with skeletal class III relationship (ANB = -3° and Wits appraisal =

-7mm) with Horizontal growth pattern and buccally placed 23. Space requirement according to Arch perimeter analysis is 5mm in maxillary arch and Carey's analysis is 3mm in mandibular arch.

2.2. Problem list

1. Asymmetrical upper arch.
2. V shaped upper arch.
3. Crowding in upper arch (Buccally placed 23) and in lower arch (2mm).
4. Differential overjet (right = -1mm, left= +1mm).
5. Non coinciding dental midlines, upper dental midline shift towards left side by 3mm.
6. Right segment crossbite till 2^{nd} Premolar.
7. Skeletal class III relation.
8. Non coinciding skeletal midlines, lower skeletal midline shift towards right side by 7mm.

2.3. Treatment objectives

1. Mandibular reprogramming
2. Correction of midline discrepancy
3. Alignment of buccally placed 23
4. Leveling and alignment of both the arches
5. Correction of right segment crossbite
6. Establishment of ideal overjet
7. Finishing and detailing of occlusion

2.4. Treatment plan

1. Fixed mechanotherapy
2. MBT 0.022" slot
3. Non – extraction case
4. Occlusal splint therapy for Mandible repositioning.

2.5. Retention plan

Fixed lingual bonded retainer in upper arch from right canine to left canine and in lower arch from right canine to left canine.

2.6. Treatment progress

Upper and lower arches were bonded and banded till 2^{nd} molars with MBT 0.022" prescription. The upper and lower arches were leveled and aligned using 0.014" Niti wires, followed by 0.016" Niti wires. Then, 0.018" SS extended wire with Niti open coil spring between 22 and 24 was ligated to regain space for 23 and 0.018" SS wire was ligated in lower arch. Subsequently, 0.016 x 0.022" SS wire with piggyback wrt 23 was ligated in upper arch for leveling and alignment of 23 and 0.016 x 0.022" SS wire was ligated in lower arch. Furthermore, 0.017 x 0.025" SS wire was ligated in both the arches alongwith mandibular repositioning occlusal splint in upper arch which was given for 3 months (Figure 5). Monthly follow ups were done to note down the progress (Figures 6, 7 and 8). Lastly, 0.019 x 0.025" SS wires were ligated in both the arches and settling elastics were placed for finishing and detailing.

Figure 5: Occlusal splint photographs

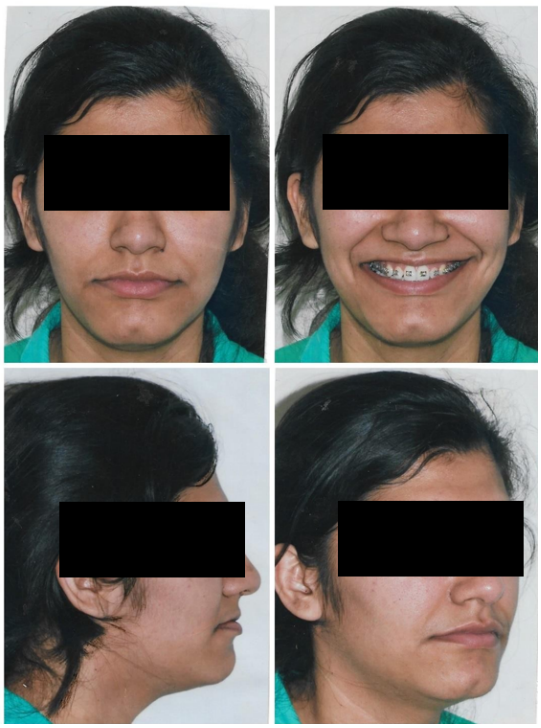

Figure 6: Mid-treatment extraoral photographs

Figure 7: Mid-treatment intraoral photographs

Figure 8: Mid- treatment lateral cephalogram

2.7. Treatment results

After completing the comprehensive treatment, the facial asymmetry of the patient significantly improved. A well-balanced chin was visible, and the resting lip cant relative to the interpupillary line was alleviated. Additionally, proper occlusal interdigitation with Class I canine and Class II molar relationships was observed, and the dental midline matched the facial midline. Patient had achieved a pleasing consonant smile (Figures 9, 10, 11 and 12). On cephalometric superimposition, increase was seen in SNA = 81° and decrease in SNB = 82° resulting in decrease in ANB = -1° (Figure 13).

Figure 9: Post-treatment extraoral photographs

Figure 10: Post-treatment intraoral photographs

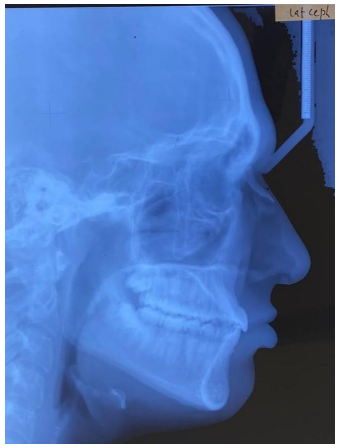

Figure 11: Post-treatment lateral cephalogram

Figure 12: Post-treatment P.A. view

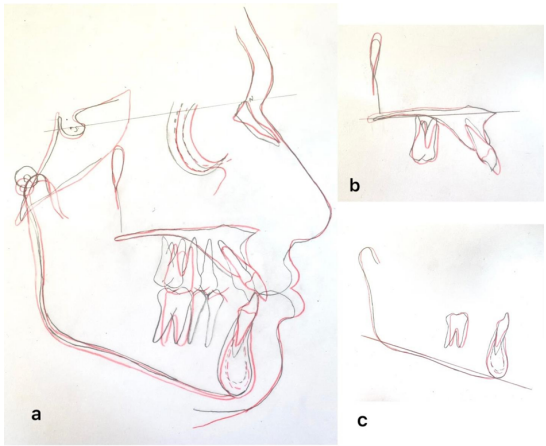

Figure 13: Pre and Post orthodontic treatment Superimpositions (Black- pre treatment; red- post treatment). (**a**): Overall superimposition: Registered on SN plane at S. (**b**): Maxillary superimposition: Registered on palatal vault at ANS; and (**c**): Mandibular superimposition: Registered on Mandibular plane at symphysis

2.8. Post-retention

A post-retention follow-up was conducted four years after completing orthodontic treatment. There was remarkable settling of buccal occlusion of the patient. She was happy and very satisfied with her facial esthetic and dental configuration (Figures 14 and 15).

Figure 14: Post- retention extraoral photographs

Figure 15: Post-retention intraoral photographs

3. Conclusion

This case reports illustrates non surgical treatment of facial asymmetry alongwith correction of buccal segment crossbite with the help of mandible repositioning occlusal splint, alignment of buccally placed 23 in the arch and final finishing and detailing by orthodontic camouflage using fixed orthodontic treatment.

4. Source of Funding

None.

5. Conflict of Interest

None.

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