

Case Report

Treatment of Class III with Facemask Therapy

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Class III malocclusion is one of the most difficult problems to treat in the mixed dentition. It has a multifactorial etiology involving both genetic and environmental causes. The dental and skeletal effects of maxillary protraction with a facemask are well documented in several studies. Although treatment in the late mixed or early permanent dentition can be successful, results are generally better in the deciduous or early mixed dentition. The following case shows early treatment of a young patient with severe sagittal and transverse discrepancy of the maxilla and mandible, using a facemask.

1. Introduction

Class III malocclusion is one of the most difficult problems to treat in the mixed dentition [1]. It occurs in about 1% of North American population and is prevalent particularly in Asiatic countries. Class III malocclusion has a multifactorial etiology involving both genetic and environmental causes [2–4]. The dental and skeletal effects of maxillary protraction with a facemask are well documented in several studies [5–9]. Although treatment in the late mixed or early permanent dentition can be successful, results are generally better in the deciduous or early mixed dentition [10, 11]. The following case shows early treatment of a young patient with severe sagittal and transverse discrepancy of the maxilla and mandible using a facemask.

2. Incidence

Various combinations exist for occurrence of such malocclusions:

Mandibular prognathism: 20%.

Maxillary retrusion: 25%.

Combination: 22%.

Remainder: no anteroposterior skeletal imbalances.

3. Diagnosis and Etiology

A 12-year-old female in the mixed dentition presented with Class III skeletal and dental malocclusion, a prognathic mandible, retrognathic maxilla, and proclined lower incisors (Figure 1). She had symmetrical maxillary and asymmetrical mandibular arch forms with the molars and canines in Class III relationships. All permanent teeth were present except upper, lower second deciduous molars and lower left first deciduous molar.

Centric relation, as determined by mandibular manipulation, was coincident with centric occlusion, suggesting a true mandibular-prognathic Class III malocclusion rather than a pseudo-Class III.

Cephalometric measurements indicated a prognathic mandible and a retrognathic maxillary position.

Our diagnosis was a true Class III due to a prognathic mandible and retrognathic maxilla.

The etiology was genetic with a history of consanguineous marriage and both her brother and sister had similar malocclusion.

4. Treatment Objectives

The purpose of treatment was to correct the sagittal and transverse arch discrepancies through stimulation of maxillary

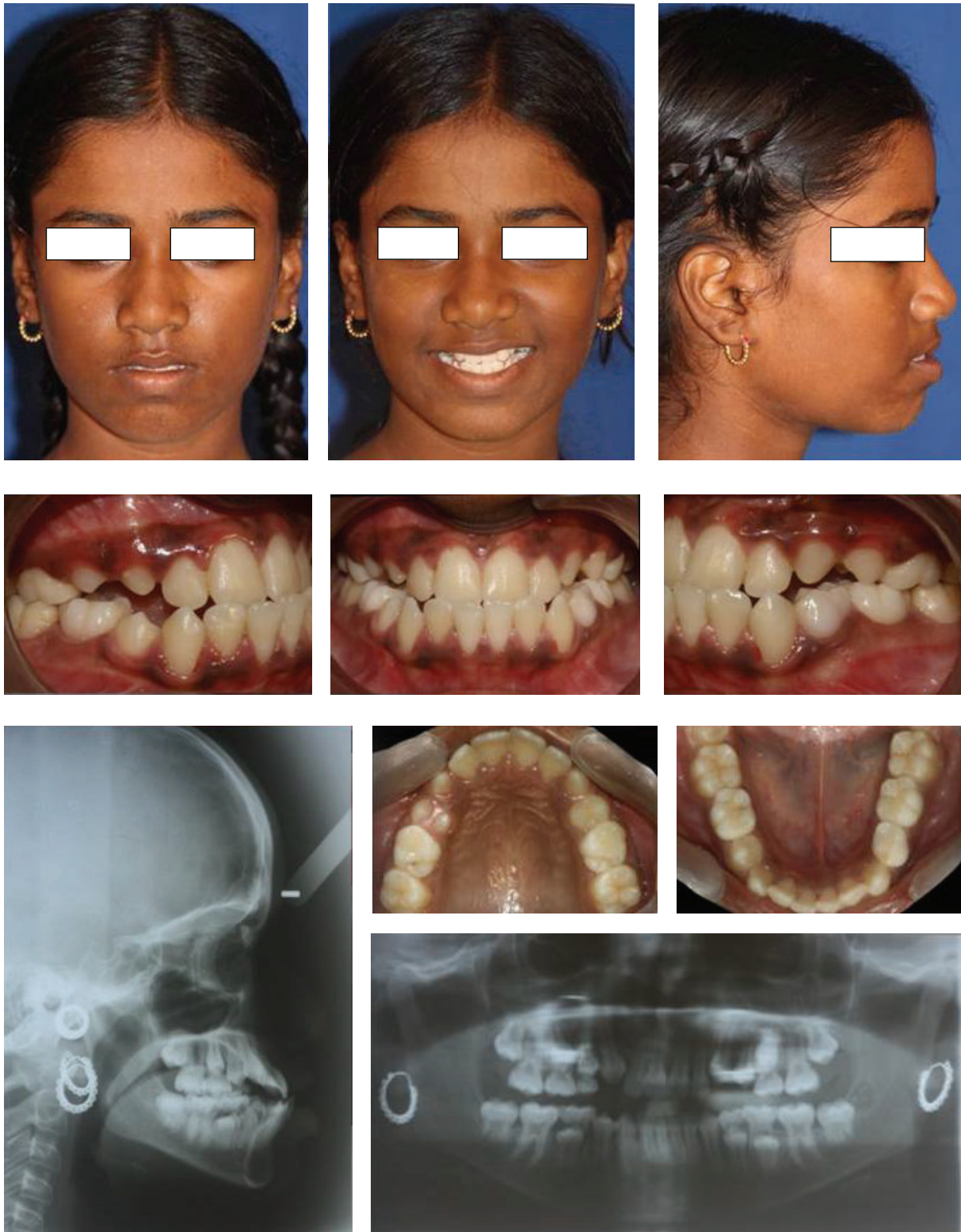


FIGURE 1: 12-year-old female patient with Class III dental and skeletal malocclusion, prognathic mandible, proclined lower incisors, and reverse overjet.

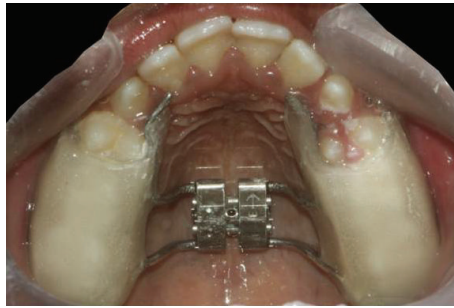


FIGURE 2: RME with Hyrax Expansion.

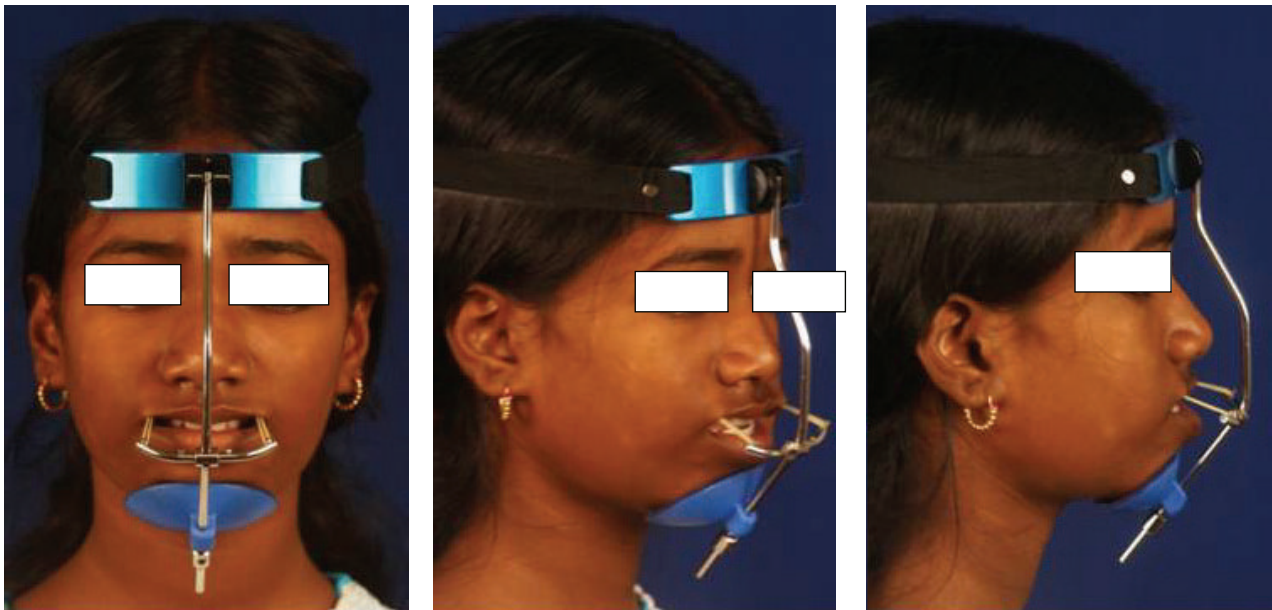


FIGURE 3: Facemask therapy.

growth and redirection of mandibular growth; correct the anterior and posterior crossbites; and obtain Class I molar and canine relationships with correct overbite and overjet along with coincident midlines [12–14]. An alternative to early treatment was to delay fixed-appliance therapy until the permanent dentition had erupted and the growth spurt had ended. This plan, however, would have required extractions and camouflage treatment.

On the other hand, early protraction facemask therapy could effectively reduce the skeletal discrepancy, simplifying orthodontic treatment and reducing the tendency to relapse. The patient was young enough that good cooperation could be expected. The treatment objectives were as follows.

(i) *Leveling and Aligning Both the Arches.* Leveling and alignment are important to achieve proper occlusion.

(ii) *Correction of Overjet.* With the expansion, positive overjet can be achieved.

(iii) *Correction of Molar Relation on Both Sides.* Molar relation needs correction from Class II to Class I occlusion.

(iv) *Correction of Canine Relation.* Canine relation needs to be stable Class I canine.

(v) *Achieving Lip Competency.* With the correction of overjet, lip competency can be achieved.

5. Treatment Plan

The treatment planning included the following:

(1) Assessment of growth potential:

(i) Average growth pattern with 65–85% growth remaining.

(2) Assessment of etiologic factors:

(i) Hereditary.

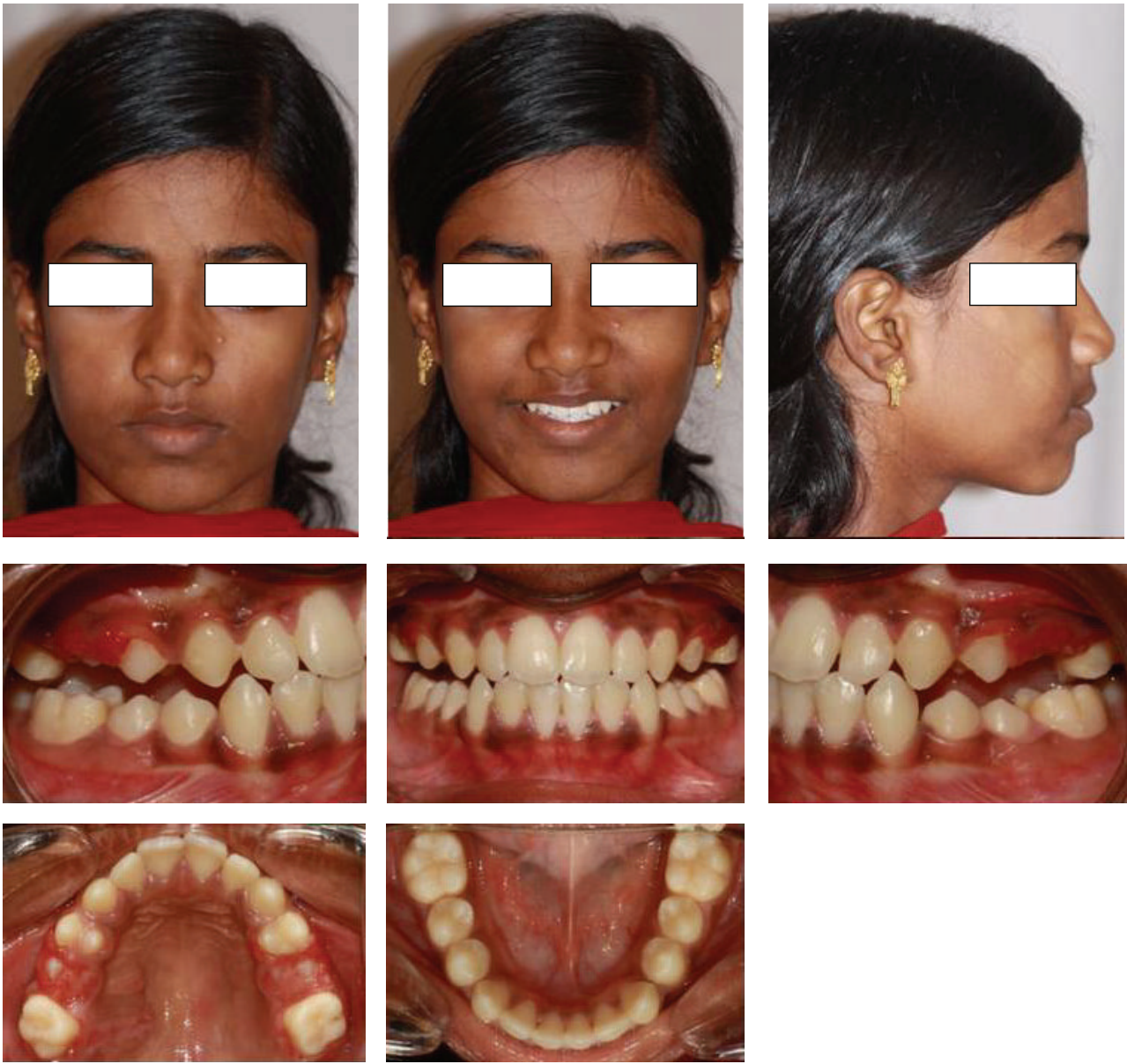


FIGURE 4: After facemask therapy.



FIGURE 5: Occlusal settling.

TABLE 1: Comprehensive cephalometric evaluation (sagittal and dentoalveolar).

S. number	Measurements	Normal values	Before treatment	After treatment
1	SNA	$80^\circ \pm 2^\circ$	80°	84°
2	SNB	$80^\circ \pm 2^\circ$	84°	82°
3	ANB	$2^\circ \pm 2^\circ$	-4°	2°
4	Co-Gn-Mandibular length		111 mm	113 mm
5	Co-point A		80 mm	85 mm
6	Na I to Pog	Small -8 to -6	-2 mm	+1 mm
7	I to SN	102°	104°	105°
8	I to PP	720	56°	55°
9	I to MP (IMPA)	90	97°	96°
10	I to NB	25°	34°	33°
11	Interincisal angle	132°	115°	115°
12	I to NA	4 mm	8 mm	6 mm
13	I to Apog	2-4 mm	10 mm	5 mm
14	I to NB	4 mm	9 mm	6 mm

TABLE 2: Comprehensive cephalometric evaluation (vertical).

S. number	Measurements	Normal values	Before treatment	After treatment
Angular measurements				
1	Facial axis (Ricketts)	$90^\circ \pm 3$	95°	91°
2	y-axis	66°	60°	61°
3	Sn-Go-Gn	32°	26°	29°
4	FH-M.P. (F.M.A.)	25°	24°	25°
5	Angle of inclination	85°	87°	85°
6	Basal-plane angle Pal-MP	25°	21°	24°
7	OCC - Pal	11°	8°	4°
8	OCC - Man	14°	16°	18°
9	Gonial angle Ar-G0-Gn (Bjork)	$130^\circ \pm 7^\circ$	124°	124°
10	Upper Gonial angle	$50^\circ-55^\circ$	54°	54°
11	Lower Gonial angle	$70^\circ-75^\circ$	70°	70°



FIGURE 6: Retention with Fr-3.

(3) Planning for final interincisal relationship:

(i) Ideal overjet and bite.

The appliance included protraction facemask with bonded RME to correct the skeletal relation and the retention plan included Frankel-III. RME with Hyrax Expansion screw was activated once per day until we achieved the desired increase in transverse dimension (Figure 2). After the patient

is accustomed to wearing, facemask treatment is initiated (Figure 3). A force of 14 OZ/side is delivered to the maxillary complex. The appliance is worn full time (about 20 hours/day) for 6 months. After facemask therapy (Figure 4), occlusal settling was done (Figure 5) and the patient was retained using a Frankel-3 appliance (Figure 6), 20 hours per day, with the patient removing the appliance only during activities such as eating and playing sports.

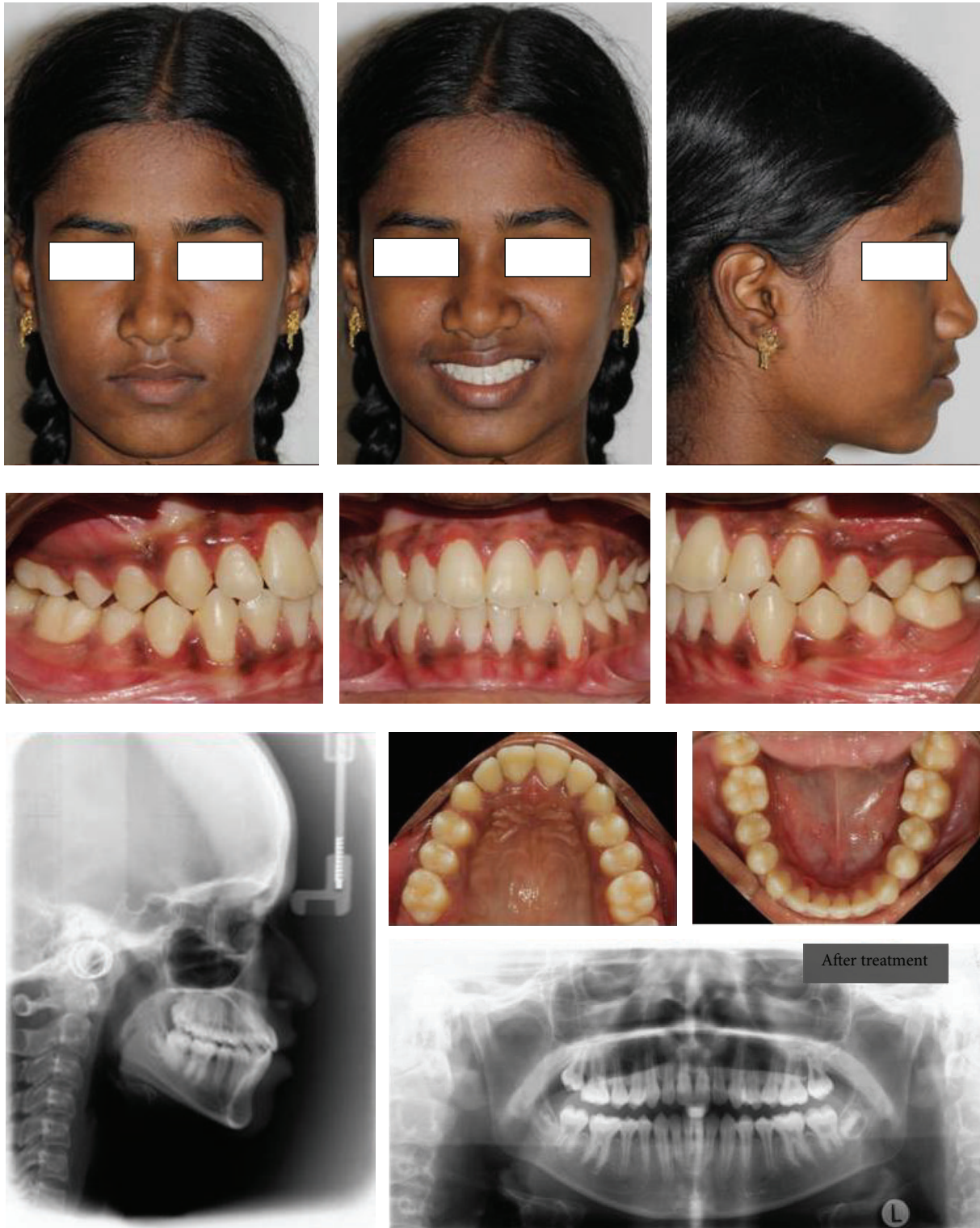


FIGURE 7: After treatment.

6. Treatment Results

Patient compliance was excellent with both the facemask and the elastics. The patient displayed a bilateral Class I canine occlusion and a Class I molar relationship (Figure 7). The

arch forms were symmetrical and well aligned. The SNA angle had increased while SNB decreased resulting in a normal jaw relationship ($ANB = 2^\circ$). Normal overbite (1 mm) and overjet (3 mm) were achieved, and the midlines were centered. Vertical skeletal measurements remained near-constant with

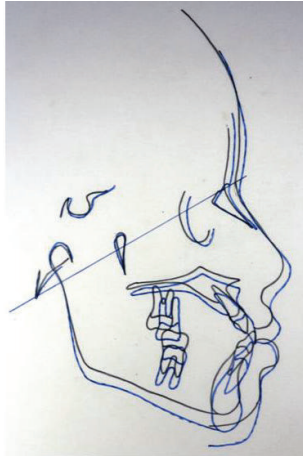


FIGURE 8: Superimposition.

an increase in Sn-Go-Gn angle by 3 degrees. The buccal crossbite was corrected. Canine rise and incisal guidance were established; lateral and jaw-opening excursions were smooth and straight. The patient's face appeared symmetrical with competent lips. The esthetic balance was significantly improved in the lateral view and the lips were in a normal relationship. Intraoral radiographs showed good root parallelism.

Cephalometric analysis confirmed that the concave profile had been straightened (Figure 8). Results are demonstrated in Tables 1 and 2.

7. Discussion

Numerous studies have demonstrated the importance of early treatment in Class III patients. We have chosen Facemask RME therapy for achieving maxillary skeletal protraction, redirecting mandibular growth in downward and backward direction. Maxillary protraction is recommended for patients with skeletal Class III malocclusion and maxillary deficiency. For most patients with Class III malocclusion seen in the early mixed dentition or late deciduous dentition, Facemask is the customary choice [15]. Skeletal correction can also be corrected by using miniplates anchored with intermaxillary elastics followed by fixed mechanotherapy [16].

Most of the studies on the effects of posteroanterior traction of the maxillary complex in Class III patients have demonstrated that improvement in intermaxillary sagittal skeletal relationships was associated with an increase in vertical skeletal relationships which can be particularly unfavorable in hyperdivergent Class III patients. But, in recent studies, the vertical skeletal features do not influence the short term outcomes of RME/FM therapy [17]. As in our case, vertical measurements did not show any marked difference. Lingual tipping of the lower incisors has been achieved. After the facial mask and the RME appliance have been removed, the patient is retained using FR-3 appliance [18].

It is used since it is easiest to manage clinically because no substantial postural change is produced in the maxillo-mandibular relationship. The effects produced are similar to that of facemask therapy.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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