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## Using Craniofacial Growth as a Friend for Phase I Class II Malocclusion Correction through Twin Block Appliance: A Case Series

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**Abstract:** The malocclusion known as Class II is a prevalent issue globally, affecting about one third of orthodontic patients. The Twin block appliance has gained widespread acceptance due to its effectiveness and compared to previous bulky monoblock appliances. This appliance is particularly successful in modifying the dentoskeletal relation in growing patients. In this series of cases, we will explore three instances where patients with aesthetic concerns were treated with the Twin block appliance. These patients presented with a retruded lower jaw and a convex facial profile, both of which contributed to their Class II malocclusion and hyperactive mentalis. Twin block therapy successfully addressed these issues and proved effective in modifying the patient's growth.

**Keywords:** Class II malocclusion, mandibular rocket, growth

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**Introduction-**Class II malocclusions, which impact around one-third of patients seeking orthodontic correction, are among the most prevalent issues worldwide<sup>1</sup>. Since the beginning of its development, twin block appliances have been viewed as a promising alternative to the hefty monoblock appliances of the past. Twin block appliances are excellent for helping patients grow to alter the dentoskeletal relationship favourably. Three examples treated using twin block appliances, where the patient's primary concern was aesthetics, are covered in this case series. The patients possessed a convex profile and a retro-positioned/retrognathic mandible. Twin block therapy was used to treat patients with hyperactive mentalis and Class II malocclusion. Patient's growth was demonstrated by the treatment's effectiveness.

Twin Block appliances are simple, comfortable, and visually pleasing to the patient. Moving the lower jaw forward is thought to promote its development<sup>3-5</sup>. The method of operation varies depending on the design, but their impact comes from the forces generated by muscle stretching<sup>17</sup>. Various changes in appliance design have expanded the technique's potential to address a wide range of malocclusion classes.

**Case 1-**

A 16- year young girl patient accompanying her mother reported to Orthodontics division of Rural Dental College, Loni with the primary concern of upper front teeth protruding forward. since 4 to 5 years and no contributing medical history was reported by the mother. (TABLE 1.)

Parameter	Mean Values	Pre	Post
SNA	82 <sup>0</sup>	80 <sup>0</sup>	82 <sup>0</sup>
SNB	80 <sup>0</sup>	76 <sup>0</sup>	79.5 <sup>0</sup>
ANB	2 <sup>0</sup>	4 <sup>0</sup>	2.5 <sup>0</sup>
Occlusal Angle	14 <sup>0</sup>	12 <sup>0</sup>	13 <sup>0</sup>
Mandibular plane angle	32 <sup>0</sup>	26 <sup>0</sup>	30 <sup>0</sup>
UI to Pt A linear	4mm	8mm	4mm
UI to Pt A angle	22 <sup>0</sup>	27 <sup>0</sup>	22 <sup>0</sup>
LI to Pt B linear	4mm	4mm	5mm
LI to Pt B angle	25 <sup>0</sup>	24 <sup>0</sup>	28 <sup>0</sup>
Interincisal angle	131 <sup>0</sup>	120 <sup>0</sup>	126 <sup>0</sup>

**Table 1.**

Intraoral and extraoral examination revealed mesocephalic head and mesoprosopic face with incompetent lips and hypertonic muscles. Class II molar relation was noted on both the sides. Nasolabial angle was 103.5°. The patient showed positive VTO on advancement of mandible. (Fig. 1,2)

The cervical maturity index showed stage 4 that is Deceleration with 10 to 25% of growth remaining. A twin block appliance therapy and active labial bow was planned (Fig.3). Full time wear of twin block was advised till the correction of distal occlusion. The treatment was planned for duration of 18 months. After 5 months of follow up the U loops of the labial bow were compressed and the bite blocks remained untrimmed.

Results- At the conclusion of 18 months of treatment, an obtuse nasolabial angle was attained with a SNB angle of 79.5°. The anterior proclination was decreased, resulting in a Class I molar relation (See Fig. 4,5).

**Case 2:**

A 14-year-old boy, who accompanied his mother, visited the Orthodontics division of Rural Dental College, Loni. The main concern was protruding upper front teeth that had been present for 5 years.

Upon intraoral and extraoral examination, it was discovered that the patient had a dolicocephalic head and mesoprosopic face with incompetent lips and a straight profile. The molar relation was Class II on the right and left sides, with an end-on canine relationship, proclined upper incisors, and upright lower incisors with a horizontal growth pattern. The nasolabial angle measured 90°. Additionally, the

patient exhibited a positive VTO upon mandibular advancement (See TABLE 2, Fig. 7,8).

Parameter	Mean Values	Pre	Post
SNA	82 <sup>0</sup>	80 <sup>0</sup>	81 <sup>0</sup>
SNB	80 <sup>0</sup>	77 <sup>0</sup>	80 <sup>0</sup>
ANB	2 <sup>0</sup>	4 <sup>0</sup>	2.5 <sup>0</sup>
Occlusal Angle	14 <sup>0</sup>	12 <sup>0</sup>	13 <sup>0</sup>
Mandibular plane angle	32 <sup>0</sup>	30 <sup>0</sup>	32 <sup>0</sup>
UI to Pt A linear	4mm	8mm	4mm
UI to Pt A angle	22 <sup>0</sup>	38 <sup>0</sup>	28 <sup>0</sup>
LI to Pt B linear	4mm	5mm	4mm
LI to Pt B angle	25 <sup>0</sup>	27 <sup>0</sup>	25 <sup>0</sup>
Interincisal angle	131 <sup>0</sup>	108 <sup>0</sup>	120 <sup>0</sup>

**Table 2.**

The cervical maturity index indicated a skeletal Class II condition, characterized by a normally positioned maxilla and a mandible that is positioned backward. A treatment plan was developed, which included the use of a twin block appliance along with an active labial bow (See Fig. 9). Full-time wear of the twin block was recommended until the distal occlusion was corrected. An anterior inclined plane was also provided until complete buccal segment interdigitation occurred.

The treatment was scheduled to last for 18 months. A follow-up was conducted 5 months later and again the U loops of the labial bow were compressed, although the bite blocks remained untrimmed.

As a result, at the end of the 18-month treatment period, an obtuse nasolabial angle was achieved along with a SNB angle of 80°. The anterior proclination was reduced, resulting in a Class I molar relation (Fig. 10,11).

### Case 3-

A 12-year-old boy, accompanied by his mother, visited the Orthodontics division of Rural Dental College, Loni with the main concern of his upper front teeth protruding forward for the past 4 to 5 years. No relevant medical history was reported by the mother.

Examinations revealed that the patient had a mesocephalic head and mesoprosopic face with incompetent lips and hypertonic muscles. Class II molar relation was noted on both sides. The nasolabial angle was 104°, and the patient exhibited a positive VTO on mandible advancement. (TABLE 3.) (Fig.13,14)

Parameter	Mean Values	Pre	Post
SNA	82 <sup>0</sup>	86 <sup>0</sup>	84 <sup>0</sup>
SNB	80 <sup>0</sup>	78 <sup>0</sup>	80 <sup>0</sup>
ANB	2 <sup>0</sup>	5 <sup>0</sup>	3 <sup>0</sup>
Occlusal Angle	14 <sup>0</sup>	10 <sup>0</sup>	12 <sup>0</sup>
Mandibular plane angle	32 <sup>0</sup>	24 <sup>0</sup>	28 <sup>0</sup>
UI to Pt A linear	4mm	10mm	6mm
UI to Pt A angle	22 <sup>0</sup>	40 <sup>0</sup>	31 <sup>0</sup>
LI to Pt B linear	4mm	5mm	4mm
LI to Pt B angle	25 <sup>0</sup>	25 <sup>0</sup>	25 <sup>0</sup>
Interincisal angle	131 <sup>0</sup>	94 <sup>0</sup>	106 <sup>0</sup>

**Table 3.**

The cervical maturity index indicated stage 4, signifying acceleration with 10 to 25% of growth remaining. A treatment plan was devised, involving the use of a twin block appliance along with an active labial bow. Full-time wear of the twin block was recommended until the distal occlusion was corrected. An anterior inclined plane was provided until complete buccal segment interdigitation occurred. The treatment was scheduled to last for 18 months. A follow-up was conducted at 5 months with the compression of U loops of the labial bow, while the bite blocks remained untrimmed (Fig. 15).

As a result, at the end of the 18-month treatment period, an obtuse nasolabial angle was achieved along with a SNB angle of 80°. The anterior proclination was reduced, resulting in a Class I molar relation. (Fig. 16,17)

### **Cephalometric Superimpositions-**

The cephalometric parameters were calculated by digitizing the initial and final lateral cephalograms. To correct the Class II issue, the primary cephalometric parameter was a considerable rise in SNB angle, with no notable alteration in the SNA angle, showing no change in maxillary skeletal structure, as suggested by Lund and Sandler<sup>8</sup>. The mild alteration in the point A after twin block treatment can be attributed to the anterior maxilla bone remodelling while retracting the upper anterior teeth. During the pubertal growth spurt, the appliance effectively corrected the Class II skeletal malocclusion by altering the spatial relation and length of the mandible.

The overlay of the cephalometric results indicates that the relationship between the molar and canine has been rectified, and the proclination of the incisors has reduced. The changes in the chin and lip contour have contributed to a more harmonious facial profile. The height of the lower face has remained unchanged<sup>6</sup>. After analysing the cephalometric tracings, it was noted that there was a restriction in the growth of the upper jaw, and a significant forward movement of the lower jaw occurred. This led to an improved balanced structural relationship

between the two. Additional factors that contributed to the correction included maintaining the position of the upper jaw molars in both the horizontal and vertical dimensions, and repositioning the front teeth of the upper jaw backward and downward. (Fig. 6,12,18)

### **Discussion-**

Class II malocclusion is a type of malalignment that can be caused by either skeletal or dental issues. This condition is characterized by the presence of upper jaw prognathism or lower jaw retrognathism, or sometimes a summation of both. A proper diagnosis of the root cause is crucial to developing a productive treatment plan. Twin block appliances are a type of functional appliance that can be worn full-time to correct malocclusion by imparting beneficial occlusal forces to inclined planes that cover the posterior teeth<sup>9,11,12</sup>. By leveraging the surrounding neuromuscular forces, this appliance can bring about both orthopaedic and orthodontic changes, causing the mandible to shift. One of the main advantages of this appliance is that alteration occurs at a faster pace<sup>13</sup>. Additionally, its compliant design allows it to be worn for extended periods of time, further facilitating the correction process. The forward physical shift of the lower jaw, along with the lengthening in the areas of the condyle and ramus due to the use of functional devices, aids in the rectification of Class II malocclusions. Changes in lower anterior and posterior face heights and posterior tipping of upper incisors are other providing factors<sup>11</sup>

Clark's Twin block is a myo-functional appliance which effectually alters the occlusal inclined plane to induce favourably aimed occlusal forces by leading to mandibular displacement. It is a good option as it is both aesthetically pleasing and allows for normal chewing.

The skeletal and dental aspects of a patient's malocclusion can be improved by the twin block appliance as shown by many studies which results in a better Class II relationship<sup>10</sup>. In the past, correcting a Class II malocclusion involved using a functional appliance in the early mixed dentition phase, followed by a waiting period of around 2-3 years while permanent teeth erupted. Finally, fixed appliances were used to correct the malocclusion once the premolars had erupted. Identifying the cause of a Class II malocclusion is important for finding the right treatment. The twin block functional appliance provides various benefits such as easy patient tolerance and suitability for mixed and permanent dentition<sup>15</sup>.

However, it may also have potential drawbacks like the lower incisors proclination and development of posterior open bite. In this series of cases, the patients' compliance played a significant role in achieving treatment objectives. Patients reported issues with irregular and forwardly placed upper and lower

front teeth and backwardly placed lower jaw. The selection of the appliance depends on several factors such as patient age, compliance, preference, and familiarity. The patient's profile showed improvement after myofunctional therapy, which can be attributed to favourable growth and functional appliance usage. Research shows functional appliances have limited long-term skeletal changes, and their effects are mainly dentoalveolar. There were no signs of maxillary growth restriction<sup>14</sup>. Twin-block functional appliances offer several advantages such as easy acceptance by the patient, easy repair, and suitability for mixed and permanent dentition. The size of this appliance is convenient and minimizes speech interference, making it easy for patients to use, and treatment goals can be achieved with patient cooperation<sup>16</sup>.

### **Conclusion-**

Twin block appliance which is also known as mandibular rocket is the best versatile removable functional appliance which has proved its efficacy and efficiency almost for four decades. This case series has also witnessed the result in accordance with the previously published literature with additive information that when you get a compliant patient at right stage of growth and development, the right diagnosis, right selection of an appliance indicated at the right time favours the right result.

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### Case 1-



Fig. 1. Pre-treatment (Extraoral and Intraoral)



Fig. 2. Pre-treatment (OPG and Lateral Cephalogram)

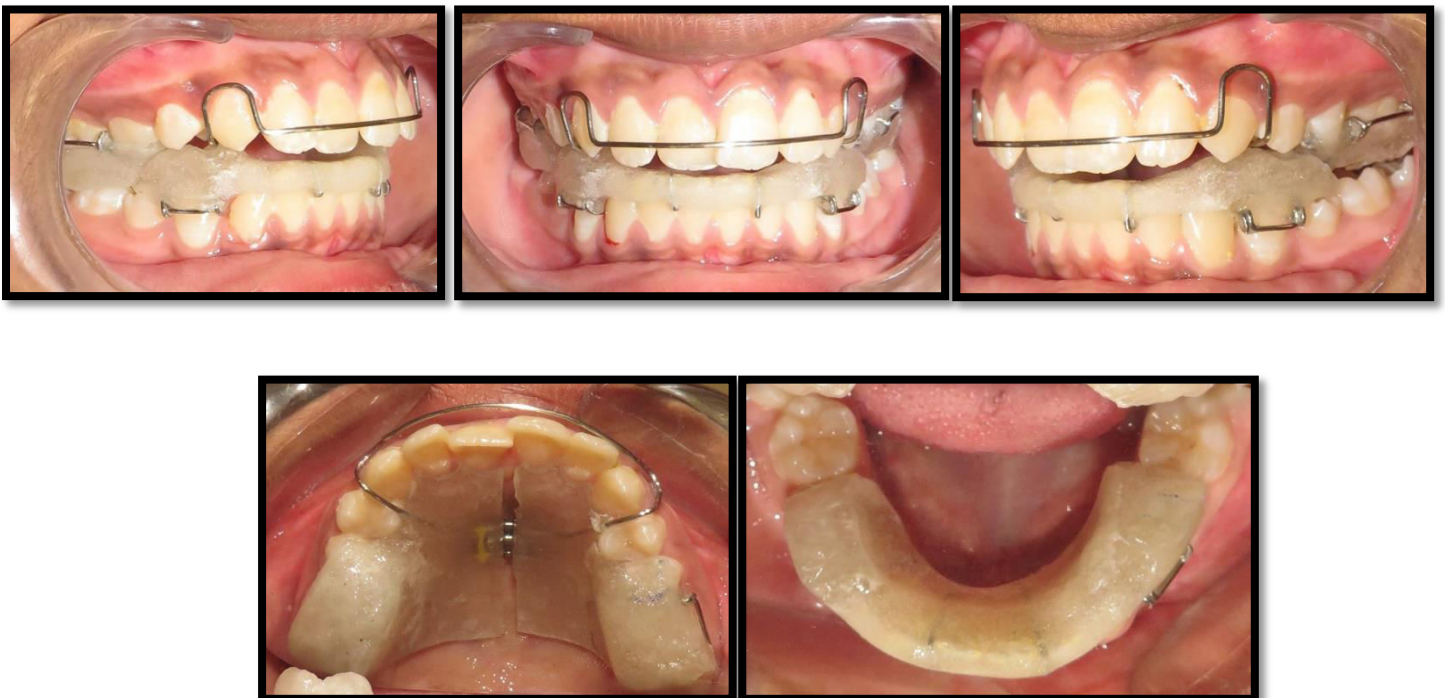


Fig. 3. Twin Block



Fig. 4. (Post Twin Block: Extraoral and Intraoral)



Fig.5. Post-twin block (OPG and Lateral Cephalogram)

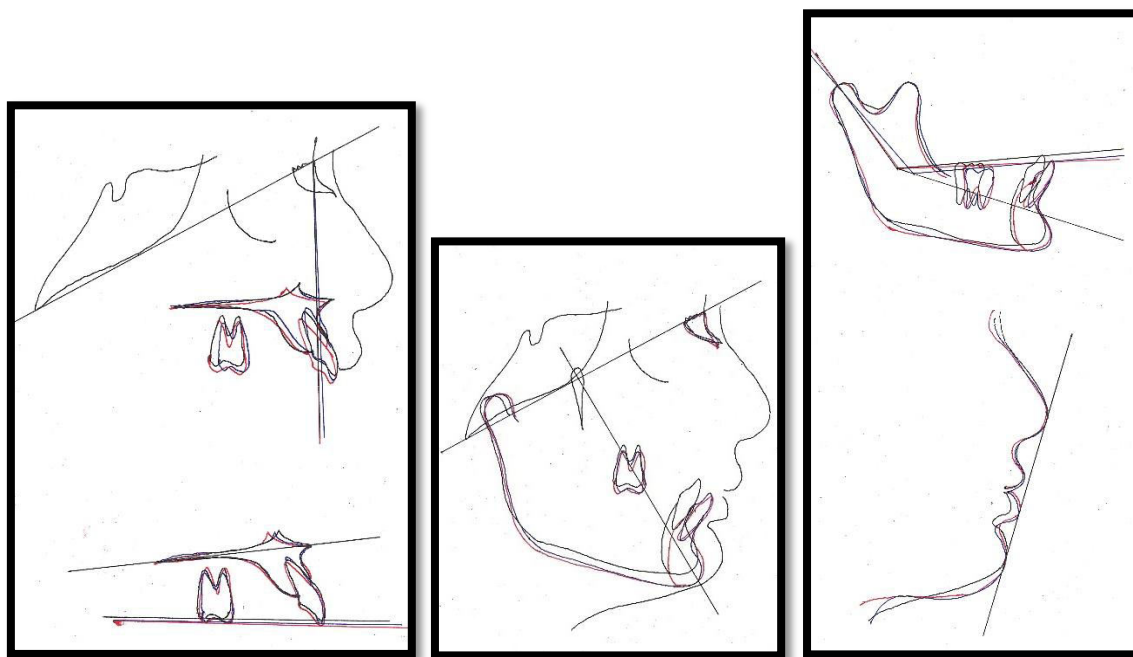


Fig.6. Cephalometric superimpositions

Case 2-





Fig. 7. Pre-treatment (Extraoral and Intraoral)

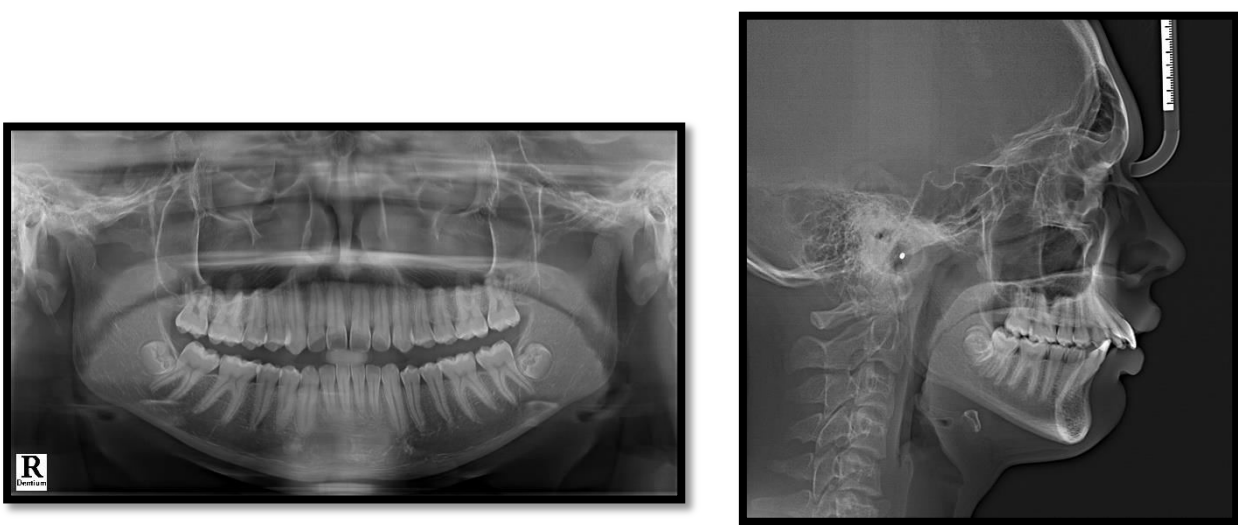


Fig. 8. Pre-treatment (OPG and Lateral Cephalogram)



Fig.9. Twin block



Fig. 10. Post Twin Block (Extraoral and Intraoral)

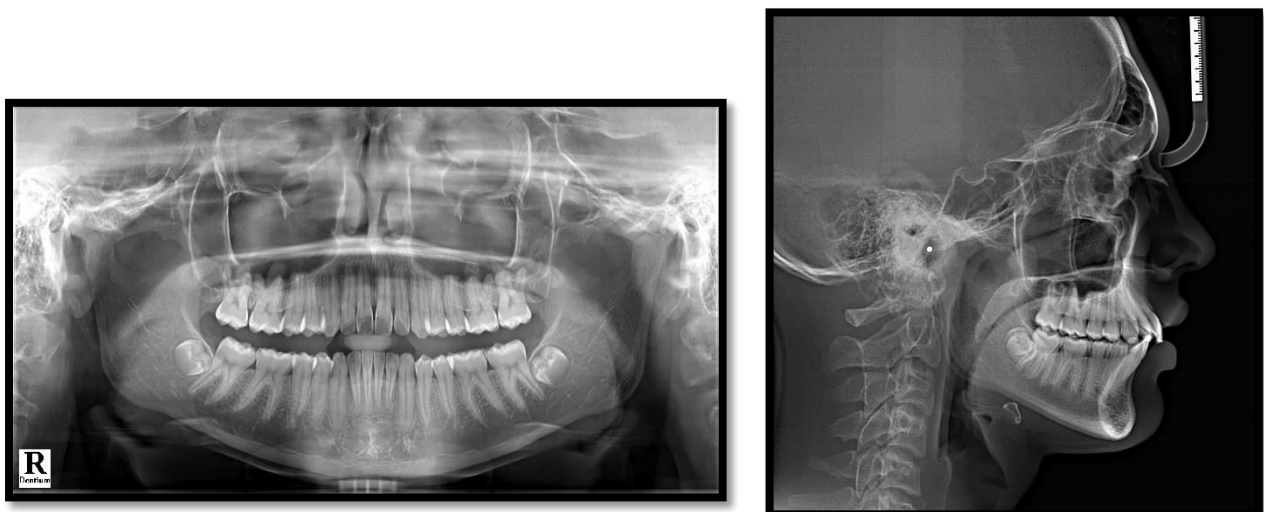


Fig.11. Post-twin block (OPG and Lateral Cephalogram)

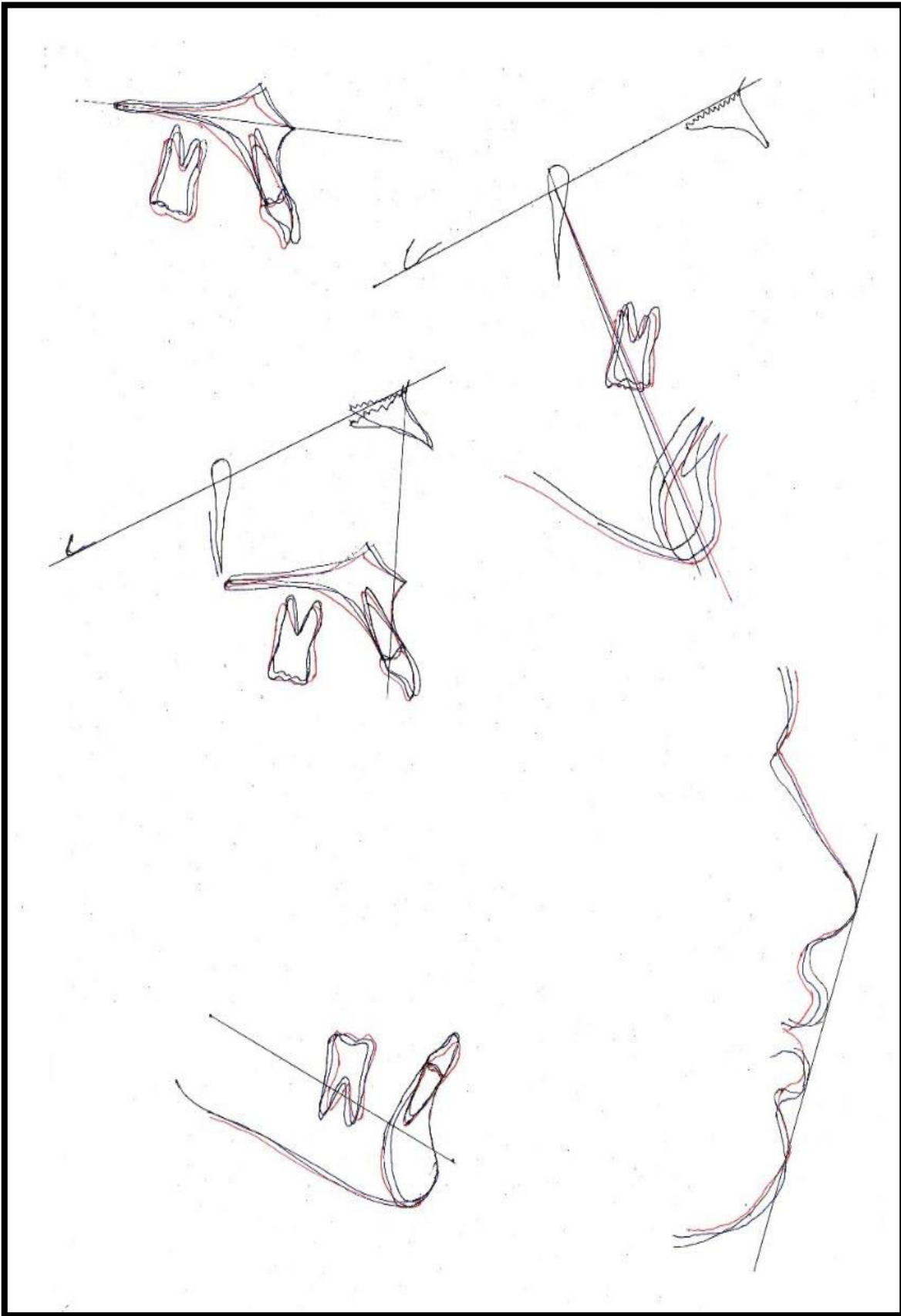


Fig.12. Cephalometric superimpositions  
Case 3-



Fig. 13. Pre- treatment (Extraoral and Intraoral)

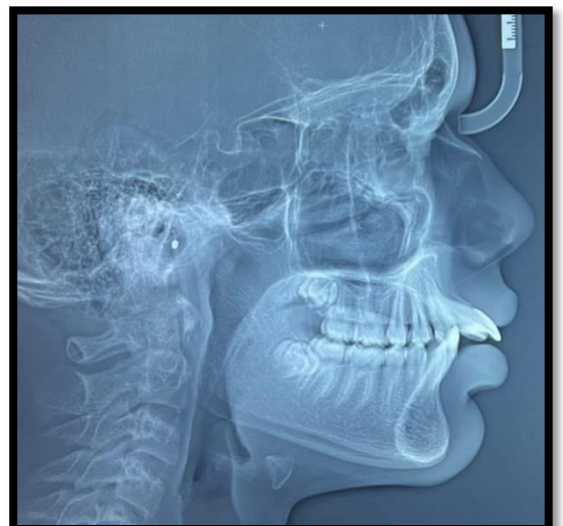
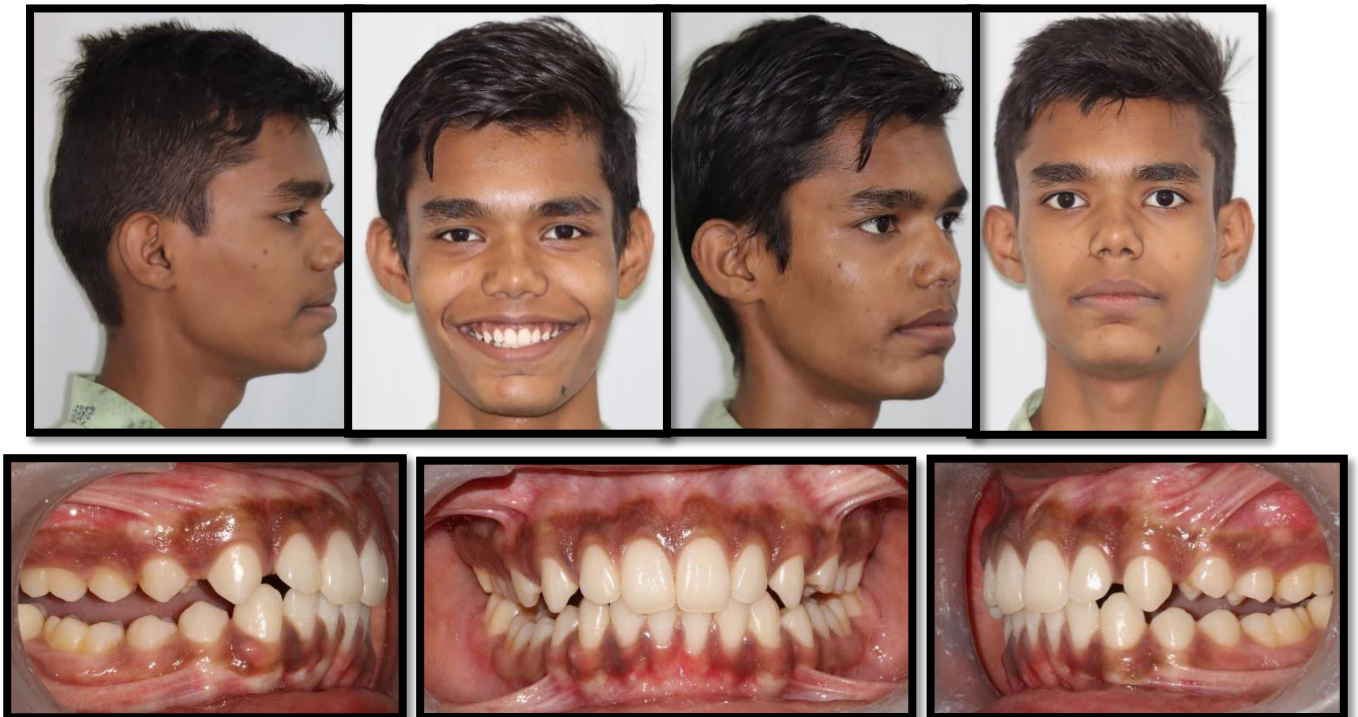




Fig. 14. Pre-treatment (OPG and Lateral Cephalogram)



Fig.15. Twin block



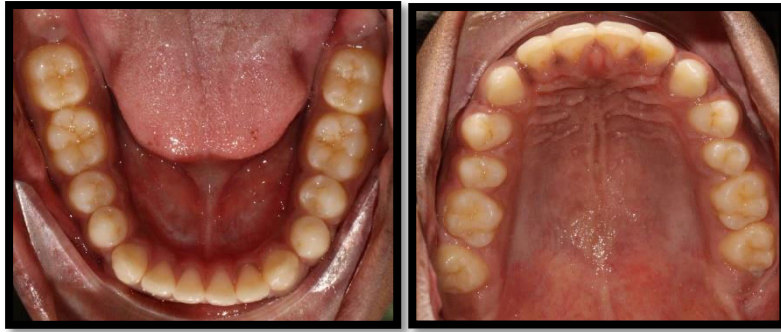


Fig. 16. Post Twin Block (Extraoral and Intraoral)

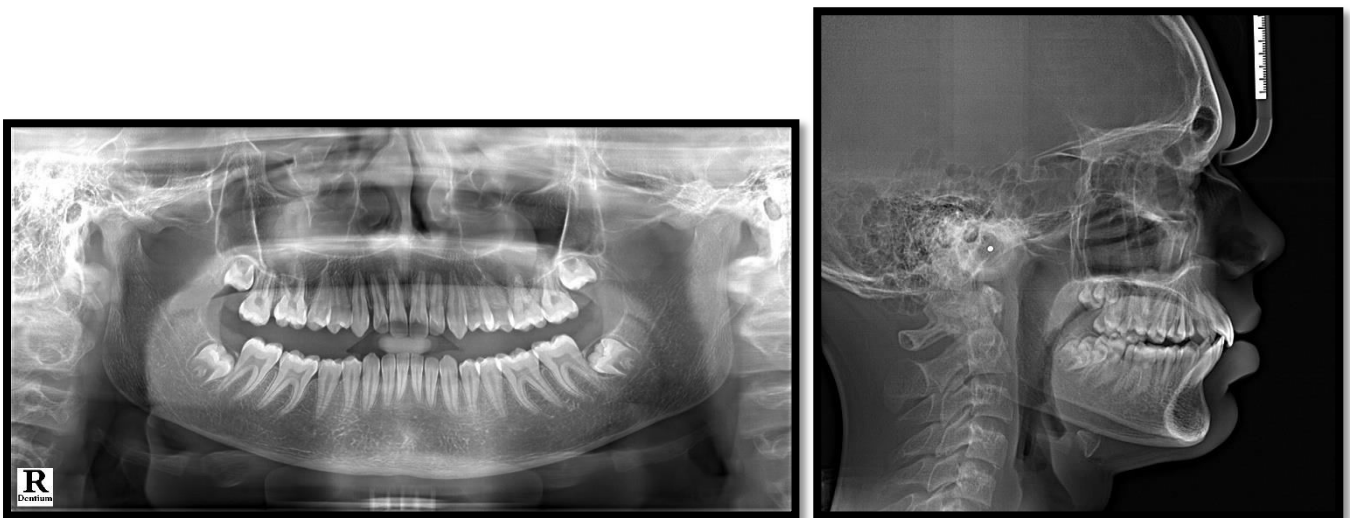


Fig. 17. Post-twin block (OPG and Lateral Cephalogram)

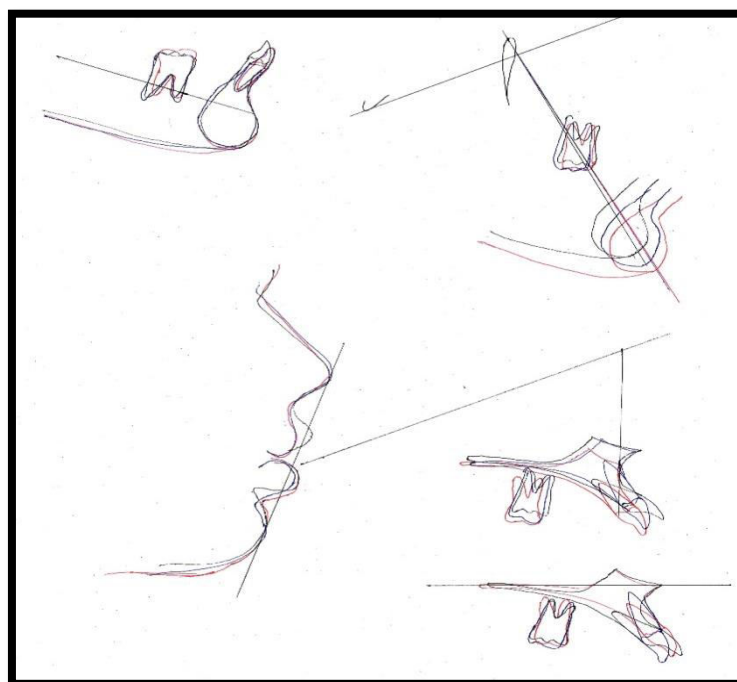


Fig.18. Cephalometric superimpositions