

CASE  
REPORT

# An Innovative Non-Compliant Interceptive Approach for 3-Dimensional Class II Defect in Mixed Dentition

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**Aim:** The aim of this study was to intercept the Class II Div 1 malocclusion with 3 dimensional defects early in mixed dentition to reduce its severity, so to avoid the psychological trauma, in this poor non-compliant patient, which would also be cost effective.

**Method:** A combination appliance, which would consider all 3 dimension, be cost effective and which would not depend on patient for compliance was a need for this patient. So an innovative approach of using a maxillary expansion plate with the incline plate as that of twin block but which can be cemented to the arch and prism shaped composite blocks as that of Planas Direct Tract on the mandibular second deciduous molar was designed. As soon as the appliance was bonded, profile was improved.

**Results and conclusion:** At the end of 8 months of active treatment, there was improvement in transverse, sagittal and vertical dimension with the satisfaction of the patient and the parent. The fabricated combination appliance, proved successful for intercepting the condition, satisfying the patient and parent by improving psychological condition along with the Class II condition. It was decided to name the appliance as 3D RDC CORRECTOR [3 dimensional (institution name) corrector].

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## Introduction

It is a well-known fact that skeletal Class II malocclusion is the most common dentofacial deformity observed in the field of Dentofacial Orthopedics. More than 80% of the Class II malocclusions are due to retrognathic mandible. <sup>(1)</sup> Several studies have shown that, in addition to the sagittal and vertical problems related to this malocclusion, it is frequently associated to transverse discrepancies. It is proved that Class II malocclusion with mandibular retrusion is associated with a significant constriction of the maxillary arch with reduced intercanine and intermolar width <sup>(2)</sup>.

The significant reduction in maxillary width found in subjects with Class II Division 1 malocclusion compared to normal occlusion individuals, is considered a possible cause of mandibular retrusion, which makes the correction of the transverse discrepancy frequently necessary <sup>(3)</sup>.

Class II malocclusion characteristics in all three spatial planes (transverse, sagittal and vertical) are already present in the primary dentition and remain in the mixed dentition with no self-correction. Hence, as soon as the transverse maxillary deficiency is diagnosed, correction is recommended, regardless of other skeletal discrepancies since transverse growth ends earlier than the others dimensions <sup>(4)</sup>. In addition, it is stated that a distal step in the deciduous dentition likely reflects an underlying skeletal imbalance and typically results in a Class II malocclusion occurring in the permanent dentition <sup>(5)</sup>.

## Material & Methods

A 10 years old female patient reported to the Department Of Orthodontics and Dentofacial Orthopedics, Rural Dental College, Loni, India, with the chief complaint of forwardly placed upper front teeth. Though the condition was not that severe, she was very much concern about it.

Extraoral Clinical examination revealed convex facial profile and significant improvement in the facial profile on mandibular advancement i.e. patient showed positive VTO (visual treatment objective). Intraoral findings showed that patient was in mixed dentition phase with Angles Class II molar relationship and increased overbite and overjet with mild crowding in maxillary

and mandibular arch (FIG 1). Also when patient was asked to advance the mandible in expected correct sagittal relation crossbite was revealed in canine premolar region which indicated constricted maxillary arch.



Fig.1

Cephalometric findings (FIG 2) showed optimal maxilla and retruded mandible, increase in the maxillary and mandibular incisal inclination over the basal bone and increase in the overjet and overbite.



Fig.2

A combination appliance was designed and fabricated to intercept the condition.

### Appliance Fabrication

The bite was registered by advancing mandible not more than 70% of the maximum protrusive path and considering the freeway space. Bite was then mounted on the articulator.

#### Maxillary component

Maxillary component consisted of palatal expansion plate to deal with the transverse discrepancy. The plate is extended onto the occlusal surface of the posterior teeth to form the occlusal plane with the help of which the maxillary component is cemented onto the maxillary arch and also it forms the platform for the incline planes to correct the sagittal discrepancy. This plane resembles to those of the incline planes of the twin block. The angulation of the incline plane is approximated to  $70^{\circ}$ .

#### Mandibular component

Mandibular component is composed of two individual prism shaped blocks made of readily available adhesive composite material. These blocks were bonded directly on the occlusal surface of the second deciduous molars on both sides, same as that of Planas Direct Tract<sup>(6)</sup>. The position of the inclined planes of the maxillary component is co-ordinated with these composite blocks. The angulation of the inclined planes in composite blocks is approximated to  $70^{\circ}$ .

The acrylic inclined planes along with the mandibular component (composite blocks) help slide the mandible forward into its correct or near correct sagittal position. This position of the mandible will be maintained at rest as well as during function. Hence, it helps correcting the sagittal discrepancy.

Following the application of fluoride, the maxillary and mandibular components were cemented / bonded on the respective arches.(FIG 3)



Fig.3

All the necessary instructions pertaining to oral hygiene maintenance were given to the patient. She was instructed to avoid hard and sticky food substances that may dislodge or break the appliance. Patient was recalled after every four weeks for follow-up. Appliance was debonded after 8 months of active treatment. (FIG 4, FIG 5). The results were evaluated and pre and post treatment values were compared.



Fig.4



Fig 5

## Results

**Clinically**, the patients appearance was significantly improved with pleasing profile.

### Study models evaluation (table I)

1] linear change in molar relationship (measured from mesiobuccal cusp tip of upper first molar to mesiobuccal groove lower first permanent molar)

SIDE	PRE	POST
RIGHT	5mm	1mm
LEFT	3mm	0mm

2] Change in overjet and overbite

	PRE	POST
OVERJET	6 mm	4mm
OVERBITE	4mm	2.5mm

3] Change in transverse dimension in maxillary arch

	PRE	POST
Inter molar distance (measured from central fossa)	43mm	47.5mm

There was significant increase in the transverse dimension thus unlocking the mandible to facilitate advancement.

The distance between the mesiobuccal cusp of the maxillary first molar and the buccal groove of the mandibular first molar was significantly reduced. This indicated a change in the molar relationship from Angles Class II towards Class I.

There was decrease in overjet and overbite.

### Cephalometric evaluation(table II)

1] Antero-posterior skeletal measurements

PARAMETERS	PRE	POST
SNA	81 <sup>0</sup>	82 <sup>0</sup>
SNB	74 <sup>0</sup>	79 <sup>0</sup>
ANB	7 <sup>0</sup>	3 <sup>0</sup>

2] Mandibular length measurements

PARAMETERS	PRE	POST
Mandibular length (Co-Gn)	85mm	88mm
Ramus height (Co-Go)	40mm	42mm

3] Maxillary length measurements

PARAMETERS	PRE	POST
Maxillary length (Co-Pt.A)	40mm	40mm
N ⊥ Pt.A	-1.5mm	-1mm

4] Incisor measurements

PARAMETERS	PRE	POST
U1 to SN	115 <sup>0</sup>	114 <sup>0</sup>
U1 to N-Pog	+13mm	+11mm
L1 to A-Pog	+3mm	+4mm
IMPA	100 <sup>0</sup>	100 <sup>0</sup>
Overjet	7 mm	4.5mm
Overbite	5mm	3.5mm

## Discussion

This case reported in mixed dentition period, presented with skeletal Class II Division 1 malocclusion with retrognathic mandible and constricted maxilla; which was confirmed by advancing the mandible in its expected correct position, crossbite was noticed in canine premolar region. Also patients profile significantly improved in doing so. Patient and parent being economically poor were concerned about the treatment and its cost. Also patient was psychologically depressed.

Need was felt to design a combination appliance which was cost effective, simultaneously acting in all three dimensions and also be non-compliant. Hence, maxillary unit consisting of expansion plate along with the incline plates as that of Twin Block and mandibular unit consisting of prism shaped composite blocks bonded directly on the mandibular deciduous second molar as that of PDT was thought.

Appliance was bonded on their respective arches for active period of 8 months followed by anterior incline plane for retention purpose.

There was significant reduction in the angle ANB from  $7^{\circ}$  to  $4^{\circ}$ .

This reduction is greater than those observed in studies on Twin Block appliance in mixed dentition period. This was because of the constant action of this combination appliance glued to occlusal surfaces leaving no scope for compliance to play any part in the treatment bringing about a majority of the skeletal change<sup>(7) (8) (9)</sup>.

**Maxillary Skeletal Changes-** The angle SNA and maxillary length did not show any significant change. This indicates that during treatment, the reciprocal effects of the protractive muscles have a restraining force on the maxillary growth.

**Mandibular Skeletal Change-** The change in angle SNB was of  $5^{\circ}$ . Also there was increase in the mandibular length. The change was greater than the comparative studies on removable twin block appliance again attributed to the 24\*7 action of the combination appliance. The increase in the ramal height was also appreciable. This significant change was brought about by greater adaptation of the condyle in the temporomandibular joint when the mandible was brought downward and forward because of the appliance

**Dentoalveolar Changes-** A upper incisors remained stationary. Also no significant change in lower incisor inclination was seen.

## Conclusion

The fabricated combination appliance proved to be successful in intercepting and minimizing the discrepancy by transversely, expanding the maxilla; sagittally, advancing the mandible to its correct position and vertically, opening of the bite. Hence, acting in all 3 dimensions. The appliance was very much cost effective. And most importantly patient and parent both were satisfied with the obtained result. The appliance is named as a **3D RDC corrector**.

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