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Class II Correction Using Advansync Appliance – Case Report

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ABSTRACT:
Among various malocclusions that requires orthodontic treatment, Class II malocclusion is one of the most common problem, and it occurs in about one third of the total population.The major diagnostic finding in Class II malocclusion is mandibular skeletal retrusion. When a Class II patient has deficient mandibular growth, we usually try to increasemandibular growth in order to improve the patient's facial aesthetics. One of the most discussed topics in orthodontics is the effectiveness of functional appliances on mandibular growth. Functional appliances comprise of a range of removable and fixed devices that are designed to alter the position of the mandible, to induce lengthening of the mandible by stimulating increased growth at the condylar cartilage.
The case reports presented below,in which mandibular advancement were achieved using AdvanSync appliance demonstrating the effectiveness of the appliance.

I. INTRODUCTION:

Treatment of Class II malocclusions has been an important topic of discussion among orthodontic investigators for decades. There are various treatment modalities that have been developedto correct Class II malocclusions. These include selectiveextraction treatment patterns, orthopaedic forces using appliances likeheadgear,growth modification of jaws using functional appliances,removable and fixed intra-arch and interarch appliances,as well as orthognathic surgery to reposition jaw or bothjaws[1].

We can alter the position of the jaws either sagittalor vertical using various fixed or removable functional appliances, resulting in orthopaedic and orthodonticchanges[1].Although theeffects of some fixed functionalappliances such as the Herbst and the mandibular anteriorrepositioning appliance (MARA) have been wellunderstood by studies, the effects of the AdvanSync appliance (Ormco, Glendora, Calif) are not wellunderstood or documented[2].

ThisAdvanSync appliance consistsof crowns cemented to the maxillary and mandibularpermanentfirst molars and they are connected by telescopingrods. The AdvanSync was designed to allow the simultaneous use of conventional fixed orthodontic therapybecause the crowns have 0.022 x 0.028-inslots. The telescoping mechanism works to constantly posturethe mandible forward upon closure, thereby enhancing mandibular growth to correct the Class IImalocclusion.

Therehavebeen very few studies that has evaluated the effects of AdvanSync. A study done by Al-Jewair et alcompared the effects of theAdvanSync with MARA and reported that both wereeffective in correcting Class II malocclusions; theAdvanSync shows more of a headgear effect causingmaxillary restriction and less mandibular lengthenhancement when compared with the MARA. The appliancesproduced similar dentoalveolar changes including mesialmovement of the mandibular molars and protrusion of the mandibular incisors[3].

Hence, in order to increase theorthopaedic effect, special attention has been drawn to the factors like timing of treatment[4,5], type of functional appliance indicated[5,6],rigidity of the fixed functional appliance[7-8],and mode ofmandibular advancement during treatment (single orgradual activation)[9-11]. The condylargrowth can be stimulated efficiently if thefunctionaltreatment is performed during the adolescent growthspurt using rigid functional appliances.

DIAGNOSIS AND ETIOLOGY

Case 1

A 14 years old pubertal male reported to the department of orthodontic and dentofacial orthopaedics with a chief compliant of unsatisfactory aesthetic appearance of forwardly placed upper front teeth presented for treatment. Extraoral examination revealed mesoprosopic facial form with an acute nasolabial angle and deep mentolabial sulcus. Patient having convex profile with competent lips and recessive chin position.

Intraoral examination revealed permanent dentition, U shaped upper and lower arches, spacing on the upper arch, increased overjet and

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overbite, scissor bite relation with respect to upper left first premolar and lower left first premolar. Patient is provisionally diagnosed as Angle'sclass II div1 subdiv(right) malocclusion with end on molar relation onright side and class II canine relation on right and end on canine relation on left side.

Cephalometric data(table.1)and radiographic examination confirmed a skeletal class II malocclusion. Vertical dimension showed a hypodivergent growth pattern(FMA=24^0). Mandibular incisor inclination was increased (IMPA =110^0). Inclination of maxillary incisors was increased (U1-PP =113^0). Patient also showed severe deep bite.

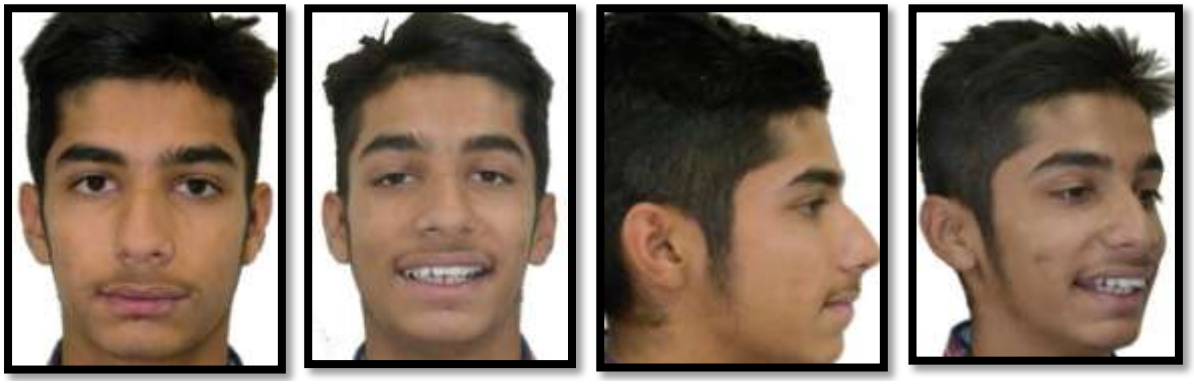

Fig 1A Fig 1B Fig 1C Fig 1D

Fig 1A-D. Pre-treatment extra oral photographs of case 1

Fig 2A Fig 2B Fig 2C

Fig 2D Fig 2E

Fig 2A-E. Pre-treatment intra oral photographsof case 2

Case 2

A 15 years old pubertal male reported to the department of orthodontics and dentofacial orthopaedics with a chief compliant of forwardly placed upper front teeth presented for treatment. Patient having convex profile with competent lips and recessive chin position.

Intraoral examination revealed permanent dentition, U shaped upper and lower arches, spacing on the upper arch, increased overjet and overbite, scissor bite relation with respect to upper left and right first premolar and second premolar.Patient is provisionally diagnosed as Angle'sclass II div1 malocclusion.

Cephalometric data(table.2)and clinical examination confirmed a skeletal class II malocclusion. Vertical dimension showed a hypodivergent growth pattern (FMA=17^0).Inclination of maxillary incisors was increased (U1-PP =133^0) with severe deep bite.

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Fig 3A Fig 3B Fig 3C Fig 3D

Fig 3A-D. Pre-treatment extra oral photographs of case 2

Fig 4A Fig 4B Fig 4C

Fig 4D Fig 4E

Fig 4A-E. Pre-treatment intra oral photographs of case 2

TREATMENT OBJECTIVES

Case 1

The primary aim of the treatment was to promote mandibular advancement to achieve class I skeletal base and improve the profile. It was also important to correct the dental Class II div 1 subdiv (right) malocclusion, reduce the increased overjet, improve the incisor inclination, reduce the deep bite,correct the scissor bite and correct the spacing on upper arch.

To coordinate the arches correctly and to correct the sagittal skeletal relationship fixed functional appliance therapy was done with AdvanSync appliance. Simultaneously fixed therapy was done using preadjusted edgewise brackets(0.022x0.028). The appliance activated 2-4 mm over 6 months period.Once the applianceremoved, fixedorthodontic treatment is continued to achieve correctanterior torque, occlusion and adequate finish.

Case 2

The major goal of the treatment was to promote mandibular advancement to achieve class I skeletal base and improve the profile. It was also important to correct the dental Class II div 1 malocclusion, reduce the increased overjet, improve the incisor inclination, reduce the deep bite, correct the scissor bite and correct the spacing on upper arch.

To coordinate the arches correctly and to correct the sagittal skeletal relationship fixed functional appliance therapy was done with AdvanSync appliance. Simultaneously fixed therapy was done using preadjusted edgewise brackets(0.022x0.028). The appliance activated 2-4 mm over 6 months period. Once the

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applianceremoved, fixed orthodontic treatment is continued.

TREATMENTPROGRESS

Case1

After the analysis of patient clinically and radiographically it was decided to go for fixed functional therapy using AdvanSync appliance. The crowns were cemented on the maxillary and mandibular first permanent molars on both sides and AdvanSync appliance is given. Simultaneously fixed therapy was started with preadjusted edgewise brackets (0.022x0.028).

The treatment protocols used by theAdvanSync developers include stepwise activation asjudged by the severity of the overjet. Theappliancesare activated 2 to 4 mm over 6months (for AdvanSync)duration until moderate overcorrection achieved with theAdvanSync. The occlusion with the AdvanSync isovercorrected to asuper Class Icanine relationship and molar relationship.

Once the appliances are removed, edgewise fixedorthodontic treatment is continued to achieve correctanterior torque and occlusion and adequate finish.

Fig 5A Fig 5B Fig 5C

Fig 5A-C. Intra oral photographs of case 1 with AdvanSync appliance

Case 2

After in depth clinical examination and radiographic analysis, it was planned to go for fixed functional therapy using AdvanSyncappliance. AfterAdvansync appliance was cemented,simultaneously fixed therapy was started with preadjusted edgewise brackets (0.022x0.028). Theappliancesare activated 2 to 4 mm over 6months (for AdvanSync)duration until moderate overcorrection achieved with theAdvanSync. The occlusion with the AdvanSync isovercorrected to a super Class I molar relationship.

Fig 6A Fig 6B Fig 6C

Fig 6A-C. Intra oral photographs of AdvanSync appliance and fixed orthodontic therapy (case 2)

TREATMENT RESULTS

Case 1

After 6 months of treatment using AdvanSync appliance patient's soft tissue profile got improved along with skeletal relationship.over correction of molar and canine relation to superclass I relation by mesial shift of lower first molar and forward growth of mandible along with distalization of upper first molar. Cephalometric changes(table.1) included decrease in the severity of skeletal class II pattern (ANB=4^0), mandibularretrognathism got corrected (SNB=79^0),distalization of upper first molar occurred (U6-Ptm =12mm).Lower incisor proclination got reduced (IMPA=102^0) and position of upper and lower incisors got corrected (U1-NA=5mm, L1-APog=2mm).

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Fig 7A Fig 7B Fig 7C Fig 7D

Fig 7A-D. Extra oral photogrphs of case 1 after Advansync therapy

Fig 8A Fig 8B Fig 8C

Fig 8D Fig 8E

Fig 8A-E. Intra oral photographs of case 1 after AdvanSync therapy

Fig 9A Fig 9B Fig 9C

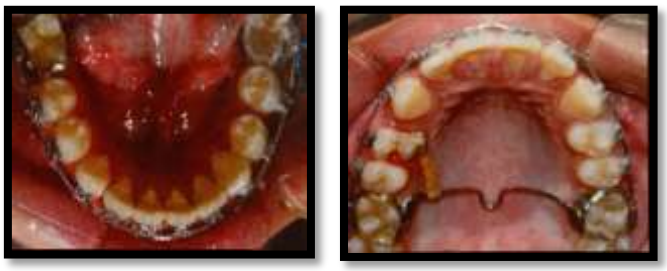

Fig 9D Fig 9E

Fig 9A-E. Present intra oral photographs of case 1

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Case 2

After 8 months of treatment using AdvanSync appliance patient's soft tissue profile got improved. Over correction of molar and canine relation to superclass I relation by forward growth of mandible along with distalization of upper first molar. Cephalometric changes(table.2)included skeletal class II pattern changed into class I pattern (ANB=2^0), mandibularretrognathism got corrected (SNB=80^0), distalization of upper first molar occurred (U6-Ptm =10mm) lower incisor proclination got reduced (IMPA=104^0) and position of lower incisors got corrected(L1-APog=3mm).

Fig 10A Fig 10B Fig 10C Fig 10D

Fig 10A-D. Extra oral photographs of case 2 after Advansync therapy

Fig 11A Fig 11B Fig 11C

Fig 11D Fig 11E

Fig 11A-E. Intra oral photographs of case 2 afterAdvanSync therapy

Fig 12A Fig 12B Fig 12C

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Fig 12D Fig 12E
Fig 12A-E. Present intraoral photographsof case 2

II. DISCUSSION

AdvanSync appliance can be used for the effective management of skeletal class II malocclusion if it is planned properly according to the various factors like timing of treatment, type of functional appliance indicated, rigidity of the fixed functional appliance, and mode of mandibular advancement during treatment (single or gradual activation).

According to Al-Jewair et al, patients requiringrestriction of maxillary growth, protrusion ofmandibular incisors, seem ideally suited forAdvanSynctreatment. Therefore, growing patients with a skeletalClass II malocclusion caused by maxillary prognathismwho can afford mesialization of the mandibular dentitionare the good candidates for AdvanSync therapy[3]. Accordingto McNamara,maxillary prognathism is not commonwith skeletal Class II malocclusion[2]. Therefore,patients who ideally match the requirements for AdvanSync therapy seem to be less common. In patients withskeletal Class II malocclusions due tomandibular retrognathism(most common),it seems more appropriate.

These case reportsshowthedentoskeletal treatment effects of the AdvanSync and at the completion of functional appliances treatment, the AdvanSync showed more distalization of upper molars with insignificant amount of skeletal mandibular advancement. In addition, the AdvanSyncappliance showed notable restriction in maxillary growth.These findings confirm a short-term orthopaedic effecton the maxilla. Thisis similar to the short-term effects documented inmultiple studies of the Herbst appliance.[12-13]The AdvanSync, on theother hand, showed acontinued restraining effect on maxillary growth. Themandibular growth enhancement is not that significant.[6]Along with the mandibular advancement significant upper molar distalization occurred. If the molars are distalized, the orthopaedic effect is greatly decreased, then we have to move the mandible with minimum movement of upper teeth for maximum orthopaedic effect.

Treatment of Class II malocclusions withnon-extraction techniques is evident more because ofthe introduction of various intraoral molar distalizationtechniques during the past decade. Maxillary molarscan be moved distally by many force systems eitherextra-orally or intraorally.

TheAdvanSyncappliance is almost half of the size of theMiniscope Herbst appliance that hadbeen using and half of the size of designs used in past. Due to smallersize of the appliance, it fits more in the posteriorof the mouth. The appliance also does not show and bulkierin the mouth likeprevious Herbst designs,so patients are more accepting to having it. The major advantage that came out of the smaller designwas the abilityto bracket every toothforward of the appliance[15].

Cozza et al, compared effects ofAdvanSync with Class II elastics. AdvanSyncappeared to producemore significant skeletal effects as shown by greatermaxillary skeletal growthrestriction (SNA) and improvement in theintermaxillaryrelationship (ANB, Wits appraisal, and convexity).[5]

In general,appliances should be selectedfor their likelihood of fulfilling the individual patientrequirements based on proper diagnosis and treatment planning.

III. CONCLUSIONS

1. AdvanSync appliance is effectivein normalizingClass II malocclusions.
2. AdvanSync corrected Class II malocclusions throughmaxillary skeletal growth restriction and dental correction by distalization of upper molars.
3. The Advansync appliance causes significant amount ofdistalization of upper teeth and

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restraining maxillary growth with little orthopaedic effect on mandible.

Case 1

Cephalometric Assessment Pre- and Post-treatment(Table.1 and figures 7,8 and 9)

Skeletal parameter	Initial (Fig.1)	Final(Fig .2)	Norm
SNA,	85^0	83^0	82.0 ± 3.5
SNB,	77^0	79^0	80.0 ± 3.0
ANB,	8^0	4^0	2.0 ±2.4
Wits appraisal,	7mm	4mm	0.0 ± 1
FMA (MP-FH),	24^0	25^0	26. ± 5
MP-SN,	29^0	31^0	32
U-incisor protrusion (U1-NA),	8mm	5mm	4
L1 protrusion (L1-APo),	3mm	2mm	2.0± 2.3
IMPA	110^0	103^0	95. ±7.0
U6-Ptm	15mm	12mm	14 ±3

Table .1

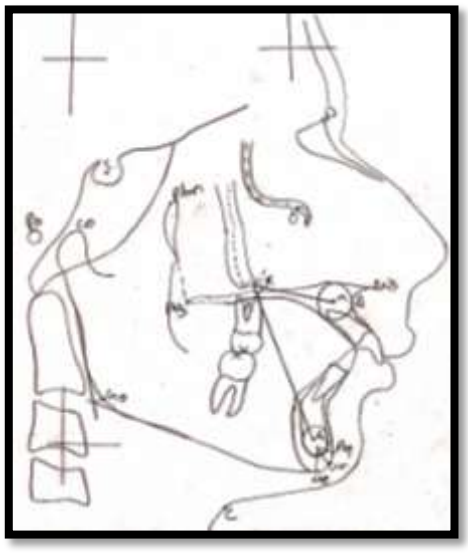

Fig .7

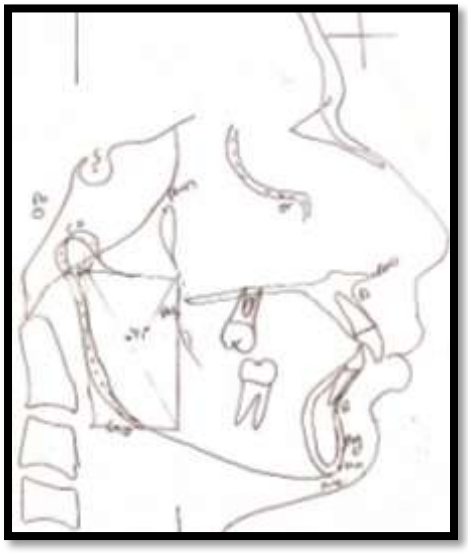

Fig .8

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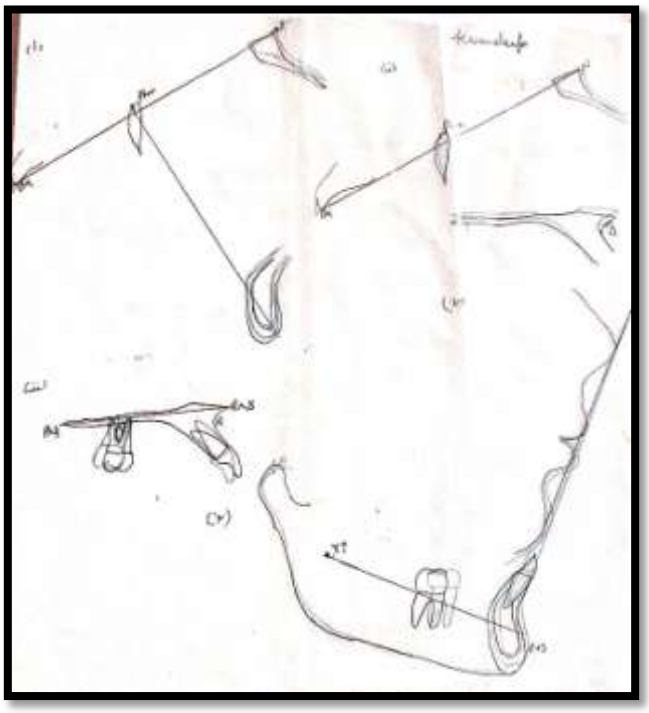

Fig .9

Case 2

Cephalometric Assessment Pre- and Post-treatment (Table.2 and figures 10,11 and 12)

Skeletal parameter	Initial	Final	Norm
SNA	83^0	82^0	82.0 ± 3.5
SNB	76^0	80^0	80.0 ± 3.0
ANB	7^0	2^0	2.0 ±2.4
Wits appraisal	4mm	2mm	0.0 ± 1
FMA (MP-FH)	17^0	21^0	26. ± 5
MP-SN	19^0	27^0	32
U-incisor protrusion (U1-NA)	16mm	9mm	4
L1 protrusion (L1-APo),	3mm	2mm	2.0± 2.3
IMPA	107^0	104^0	95. ±7.0
U6-Ptm	14mm	10mm	14 ±3

Table .2

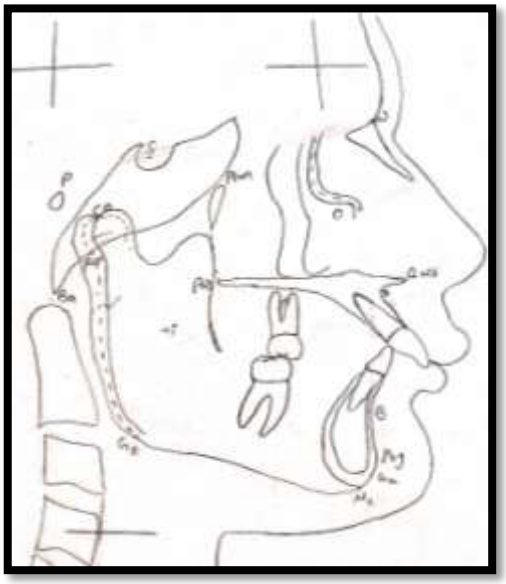

Fig .10

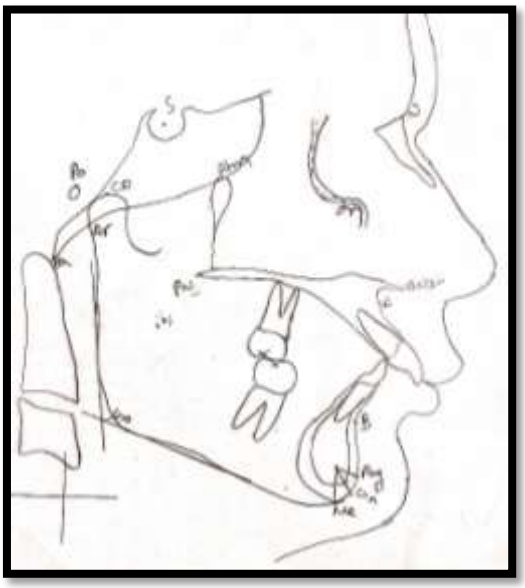

Fig.11

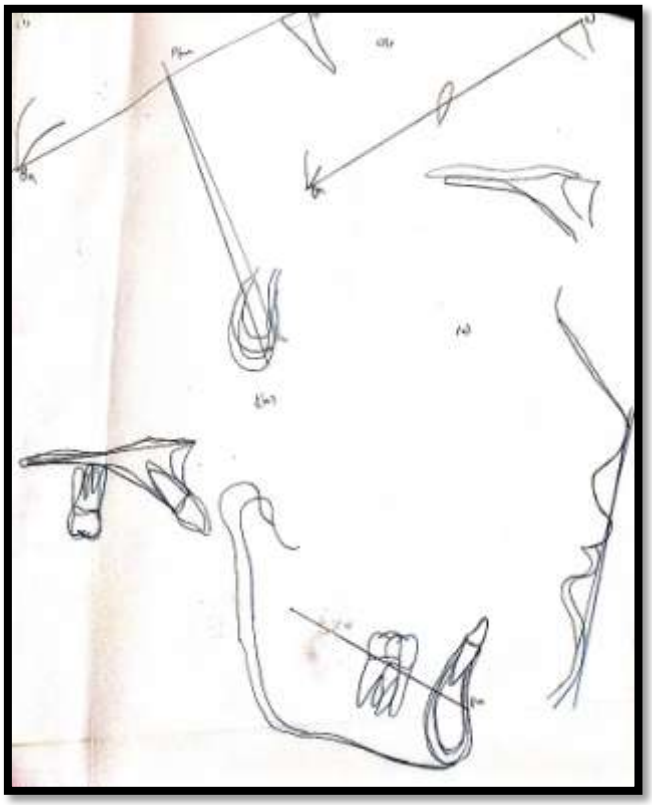

Fig.12

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