

Case report

Timely Combination Therapy of Skeletal and Dental Class II malocclusion with Temporary Anchorage Device and Mesially Impacted Mandibular 2nd Molars:

A Case-Report.

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Abstract:

Introduction: Patient is a 14 years old Chinese boy presented with skeletal Class II with incompetent lips, severe dental Class II malocclusion and severe crowding complicated with both sides mesio-angular impacted of mandibular 2nd molars. **Treatment Plan:** Growth modification using functional appliance for skeletal Class II correction with maxillary arch expansion and correction of mandibular plane angle by intrusion of maxillary molars. Extraction of lower 1st premolars and 2nd molars on both sides was carried out in conjunction with fixed orthodontic alignment and to facilitate of spontaneous eruption of lower third molar. Midline correction was followed by space closure and finishing and detailing. **Results:** Alignment of upper arch in the regained space with maxillary expansion without any extraction was done. Anterior maxillary dentitions were retracted using Temporary Skeletal Anchorage Devices (TSADs). In lower arch 1st molars were mesially protracted by using class II elastics. 3rd molars spontaneously erupted in the extraction space of 2nd molar. Midline corrected with good facial profile and competent lips. **Conclusions:** Timely execution of expert treatment plan can bring cost effective and time saving results with minimum loss. By proper counseling, patient compliance and confidence can be boosted which could have a positive effect on the treatment outcome.

Keywords: Class II malocclusion; temporary anchorage device; impacted mandibular 2nd molars.

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Introduction

Early intervention of maxillary constriction with myofunctional appliance can eliminate the need for tedious and expensive treatment of surgical expansion of maxillary segment. Studies found comparable treatment outcomes of non-surgical to surgical cases, only if the former is carried out promptly¹.

Combination therapy is a mix of orthopedic and fixed appliances with minimum pre-requisite patient compliance in a single-stage towards more predictable results². Selection of functional appliance is made according to its mode of action, evaluated outcome, growth pattern, dental relationships and clinical indications³.

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Twin Block with expansion screw is used for its patient acceptability and favorable expansion component. High Pull Head gear can be used to modify clockwise and forward growth of maxilla and anti-clockwise and forward growth of mandible ⁴. In Twin Block Technique, a combination of the two aforementioned appliances, can be used in the case of Class II division I cases to address associated skeletal discrepancies⁵. Temporary Skeletal Anchorage Devices (TSADs) is being used for en-masse retraction of anterior maxillary dentition with zero anchorage loss⁶.

This case report is about timely intervention of Skeletal Class II patient with functional appliances, fixed orthodontics of dental Class II division I and TSADs for maximum anchorage.

Diagnosis and Etiology

Patient is a 14 years old Chinese boy, with presenting of protruded maxillary anterior teeth and a retrusive mandible. The photographs indicate a convergent facial profile, acute nasolabial angle, incompetent upper lip and moderate-full incisal show (Figure 1) complicated with a retrognathic mandible and upper limit of mandibular plane angle. He has a class I molar and canine relation on right side, with half-unit class II molar and canine on the other side and 9 mm overjet with a deep impinging bite. Lower midline is shifted 3mm to right side from the chin point. Upper left canine is buccally erupted with 8mm crowding whereas upper midline is 2.5mm shifted to left side, lower right 1st premolar is buccally blocked out with 8.5 mm crowding and both lower second molars are partially impacted mesially. Buccal cross-bite in the left side from 1st premolar to 1st molar is identified (Figure 2). The lateral cephalogram analysis confirms a skeletal Class II with a short retrusive mandible and an increased mandibular plane angle (Figure 3). Upper Incisor Angle (UIA) shows incisor proclination. Dental pantomogram (DPT) confirms missing upper third molars and mesioangular impaction of lower 2nd and 3rd molars (Figure 4).

Treatment Objective

Realistic objective was multi-planar control of skeletal growth to attain function, correction of malocclusion and crowding, devising extraction plan and sequence, establishing upper and lower midlines, improving overjet and overbite, idealize facial profile and provide retentive end-results.

Treatment Plan

To modify and control the growth of maxilla and

mandible with the help of Twin Block and achieve maxillary expansion by expansion screw to correct left buccal crossbite and gain space for buccally erupted right canine. Molar intrusion with the help of head gear will be utilized. It also aids in growth of mandible and balance facial profile. Advise and discuss extraction of lower 1st premolars and 2nd molars for correction of crowding and facilitation of eruption of third molar, respectively. Initial leveling and alignment by fixed appliance. Correction of upper and lower midline shifts, establish esthetic and functional occlusion followed by temporary anchorage device assisted en masse retraction and space closure. Retention strategies implement dual retentions with combination of the fixed and removable retainers. Fixed retainer from canine to canine with vacuum formed retainer will be used for the upper arch meanwhile for the lower arch, combination of fixed retainer from canine to canine and Hawley retainer will be constructed.

Treatment Progress

Orthodontic treatment was started with growth modification with functional appliance twin block and the growth modification was enhanced with occipital pull headgear to control the facial height and minimized posterior rotations (Figure 5, 6). Three months into treatment, the strategy was to create space for left maxillary lateral incisor (22) and left maxillary canine (23), correct left buccal crossbites and to correct the upper midline by maxillary expansion using expansion screw which already attached to the twin block appliances.

Twin block correction was retained with fixed inclined plane for three months (Figure 7) concurrently with alignment of teeth which was carried out with self-ligating brackets (Figure 8). Both mandibular premolars were extracted to overcome lower incisors proclination by the dentoalveolar effect of the twin block with option of mandibular second molars or third molars were given to patient. Bilateral mandibular second molars were extracted due to the simple extraction option as patient and parents agreed.

Temporary anchorage device were inserted at the buccal segment of maxillary arch for incisors uprighting and space closure phase (Figure 9). Coil spring retractions and Class II elastic used in combination in order to close space for both arches. All space in the upper arch were closed and noted that the bilateral lower third molar was erupted in

alignment (Figure 10). Finishing and detailing was done and twenty-four months into treatment, the case was debonded, the teeth were in well-interdigitated occlusion and the profile was good (Figure 11 and 12). Patient used combination fixed and removable retainers for both upper and lower arches in retention phase. The removable retainer was instructed to be wear in night time only and advisable for lifetime.

Results

Normotrophic profile with competent lips, Class I Canine relationship was achieved for appropriate canine guidance, Class I incisor relationship and molars were finished in angle class III relation. Ideal overjet and overbite with no crossbite were attained. Crowding was eliminated and arches were perfectly aligned after space closure. Midlines were corrected to acceptable extent. Mandibular third molar erupted spontaneously, establishing occlusal contacts (Figure 13). Pre- treatment, post-functional

appliance and at the end of orthodontics’ treatment lateral cephalometric tracing and values are shown in Figure 14 and Table 1.

Table 1. Cephalometric values.

Variables	Before treatment	Mid of treatment	At the end of treatment
	Value	Value	Value
SNA	83.0°	82.0°	83.0°
SNB	76.5°	78.5°	79.0°
ANB	6.5°	3.5°	4.0°
MMPA	31.0°	29.0°	27.0°
LFH	60.0 mm	64.0 mm	65.0 mm
UFH	48.0 mm	50.0 mm	56.0 mm
LFH %	55%	56%	54%
UI MAX	131.0°	127.0°	116.0°
LI MAND	94.0°	99.0°	90.0°
IIA	104.0°	105.0°	125.0°



Figure 1. Pre-treatment Facial Photographs.



Figure 2. Pre-Treatment Intra Oral Photographs.



Figure 3. Pre-Treatment lateral cephalometric radiograph.

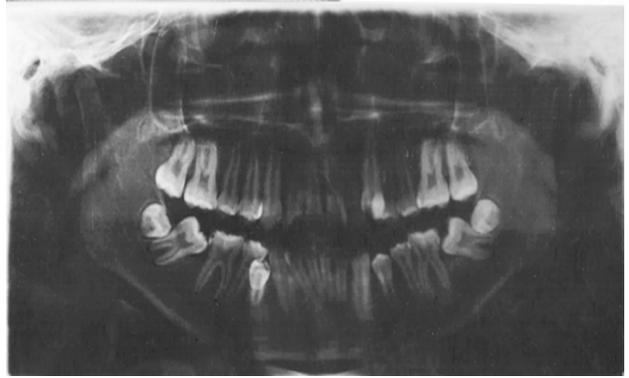


Figure 4. Pre-Treatment Orthopantomograph.



Figure 5. Intra-Oral Photographs during functional treatment (Twin block appliance).

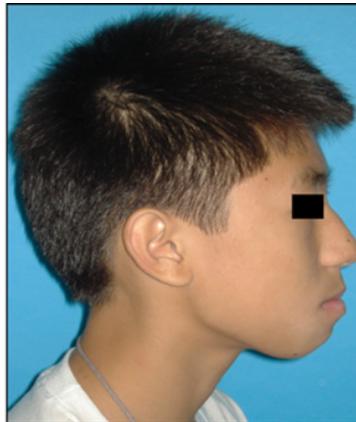
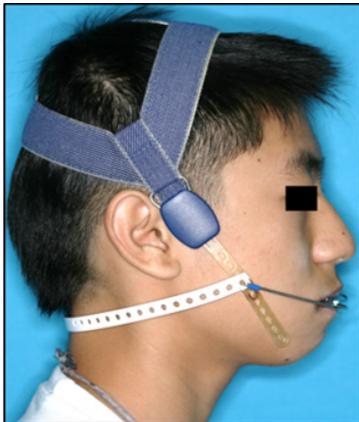


Figure 6. Extra-Oral Photographs during functional treatment (Head gear appliance).



Figure 7 Progress intraoral photographs (after twin block correction).



Figure 8. Progress intraoral photographs (alignment using self ligating bracket).



Figure 9. Progress intraoral photographs (Temporary anchorage device and coil spring).



Figure 10. Progress intraoral photographs (after space closure).



Figure 11. Post treatment intraoral photographs (after debonding).



Figure 12. Post-treatment extra-oral photographs (after debonding).



Figure 13. Spontaneous eruption of third molars.

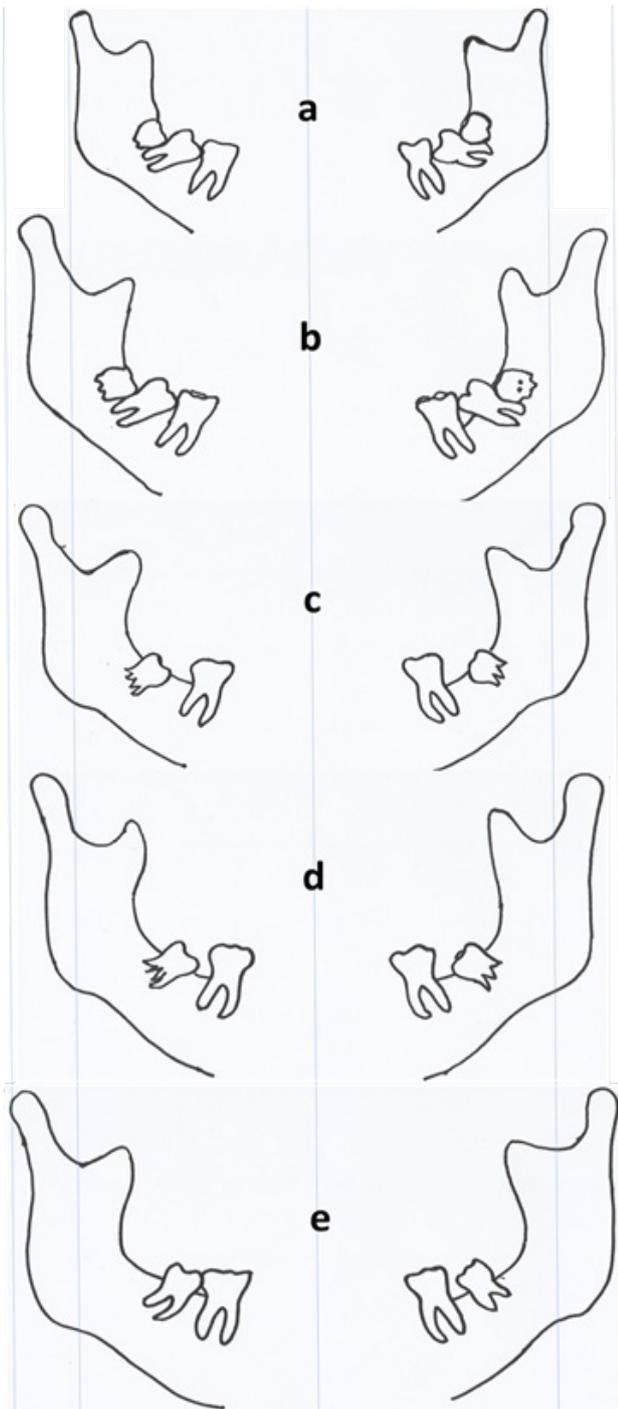


Figure 14. Cephalometric tracing.

Discussion

Growth modification appliance to modify and control multi-planar Skeletal Class II growth patterns is one of the treatment alternatives to correct the skeletal pattern. Functional appliance is one of the most famous appliances used in orthodontics to alter and modify the growth. Functional appliances such as twin block could be fixed or removable in nature.

Choice of removable twin block appliance is made due to its striking benefits in comparison to other appliances in literature viz, relevant ease of use, patient compliance, maxillary expansion component, marked effect of vertical ramal lengthening and mandibular growth and its rapidity⁷. Twin block also helped in raising bite to relieve deep impinging bite and aids in retraction of upper incisors⁸. High pull head gear has added benefits in intrusion of upper molars in addition to assistance of their distalization achieved with twin block⁹. Twin block has a retroclination effect on the maxillary anteriors and a proclination effect on mandibular anteriors, fixed orthodontic alignment and finishing of former and up righting of latter is carried out¹⁰.

As establishment of lateral guidance is essential buccally erupted canine is then aligned, into the space created during maxillary arch expansion, using self-ligating brackets^{11,12}. Upper midline is also corrected in conjunction. For mandibular arch lower 1st premolar extraction was advised based on the to address lower proclination and to minimize lower lip protrusion¹³. An alternative would have been extraction of second molar instead of first premolar but that could not address two main concerns of the treatment outcome that were midline correction and uprighting of proclined lower incisors¹³. Extraction of mesio-angularly impacted second molars to aid spontaneous eruption of third molar with a good radiographic mesio-distal width requires an expert opinion and right timing of execution. It is an established norm to extract second molars provided early development of third molar shows a promising angulation of eruption and occlusion in arch¹⁴⁻¹⁶.

En-Masse retraction of upper anteriors requires maximum anchorage with zero loss. In this case, upper molars are distalized and intruded and will be unstable to provide anchorage for en-masse retraction, so temporary anchorage device was planted mesial to 1st maxillary molar for the purpose¹⁷. Coil spring retractors were used for continuous intermediate force retraction. Reciprocal anchorage was designed by class II elastics from crimp able hooks, between upper lateral and canine, to lower mandibular molars on both sides as mesial sliding mechanics.

Space closure and finishing by the end of second year of fixed treatment followed by retention phase. Upper midline remained slightly off but patient was satisfied with the results. A near ideal facial profile and competent lips achieved and patient is very happy with the new apparent.

Timely intervention can provide a wide array of treatment alternative which are less tedious and best use of the available appliances¹⁸⁻²⁸. If the treatment is delayed, more invasive procedures are required to achieve the same outcome which could be from minor oral surgical extraction of impactions due to compromised eruption space up till surgically assisted rapid palatal expansion for correction of maxillary arch constriction.

Conclusion

Expert orthodontic treatment planning and timely execution can save both, care giver and recipient, of time and money to produce near ideal outcomes. Precise treatment duration can bring excellent

acceptability and compliance and at the end of treatment greater satisfaction of parents and patient.

Ethical Approval: Consent has been taken.

Conflict of interest: The authors declared no conflict of interest

Authors' contributions:

Case management: NR, AAR, WMC, Study design: NR, MKA, AAR, WMC

Data gathering: NR, AAR, WMC

Writing and submitting manuscript: NR, MKA, AAR, WMC

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