

Correction of Class II Malocclusion with Temporary Anchorage Device - A Case Report

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Abstract

A 23-year-old adult male presented with the chief complaint of irregularly placed upper and lower front teeth. On extra-oral examination, the profile was found to be straight with competent lips and obtuse nasolabial angle. On intra-oral examination, patient presented with end on molar and canine relationship bilaterally, retained mandibular deciduous canines bilaterally, retroclined upper and lower anteriors with an overjet of 2mm and overbite of 6mm. The patient was treated with Fixed mechanotherapy. MBT prescription of 0.022" X 0.028" stainless steel brackets was used to treat the case and entire treatment took about 20 months.

Background

Angle classified malocclusion in the sagittal plane based on the dental relationship and ignoring the skeletal relation¹. Class II malocclusion is one of them, which represents the second most common type of malocclusion after crowding and it is the most frequently encountered skeletal disharmony in orthodontic population². It is the malocclusion in which distobuccal cusp of the permanent maxillary first molar coincides with the mesiobuccal groove of permanent mandibular first molar. It results due to distocclusion in which the molars are either in full cusp class II or in end on relationship. A full cusp class II molar relation is found to be stable whereas end on molar relation was found to be unstable. Therefore to correct end on molar relationship, either lower molars were protracted or upper molars were distalized to achieve a class I molar relationship.

Anterior dental anchorage is often inadequate to protract even a single first molar without reciprocal retraction of the incisors or movement of the dental midline³ specially in mandibular arch. To protract a mandibular tooth is quiet difficult, due to its bone density which result in more of anterior retraction than of the posterior protraction⁴.

Today in orthodontics, Mini-implants which are also called as Orthodontic temporary anchorage devices (TAD's) plays a major role as all kinds of tooth movements like protraction, retraction, distalization, expansion, intrusion and extrusion can be achieved easily⁵. They have proven efficacy in providing "absolute anchorage" in orthodontics⁶.

They provide skeletal anchorage for mandibular premolars or molar protraction, avoiding the various problems often encountered with the use of dental anchorage³ like anchorage loss, tipping of the molars or anteriors and root resorption⁷. Accurate care should be taken while placing the implants, starting from the implant selection, site selection, angulation of the implant and its placement⁷. The amount of failure rate was also high in the mandible due to close proximity of roots and heavy musculature of mandible³. Thus this article showcases a case report in which TAD's were used to protract the

mandibular premolars and molars along with frictionless mechanics.

Case Report:

A 23years old adult male reported with the chief complaint of irregularly placed upper and lower front teeth. On extraoral examination (Fig.1 Pretreatment Extra-Oral Photographs), the profile was found to be straight with



competent lips and obtuse nasolabial angle. On intraoral examination (Fig.2 Pretreatment Intra-Oral Photographs), patient was



presented with permanent dentition except retained mandibular deciduous canines bilaterally, end on molar and canine relationship bilaterally, retroclined upper and lower anteriors with an overjet of 2mm and overbite of 6mm, rotations was present wrt 16, 24, 26, 35, 44, 45. Crossbite was also present in relation to the upper canine on left side. Once cephalometric examination (Fig.3 Pretreatment (a) Lateral Cephalogram (b) Panoramic Radiograph) the maxilla was



found to be orthognathic with an SNA angle of 81° and mandible was retrognathic with an SNB angle of 76°, the skeletal pattern was found to be class II with an ANB angle of 5°. Upper and lower incisors were found to be retroclined UI to NA and UI to NB readings were 2.5° and 15° respectively.

Treatment Objectives:

1. To achieve Class I molar and canine

2. relationship bilaterally.
2. To correct retroclined upper and lower anteriors.
3. To correct posterior rotations.
4. To correct anterior single tooth crossbite.
5. To achieve normal overjet and overbite.

Treatment Plan:

After model analysis and radiographic considerations, extraction of bilaterally present retained mandibular deciduous canines was planned which was present mesial to permanent mandibular canines. After the extraction, space left, partially will be utilized to intrude the mandibular anteriors for correction of deep bite and partially to protract the mandibular canines, premolars and molars for the correction of class II molar and canine relationship. To protract the mandibular teeth, Mini implants (TAD's) were used initially with helical closed vertical loop and later with power chain.

Treatment progress:

Preadjusted edge wise appliance with 0.022 X 0.028" slot were bonded to upper and lower arch, levelling and aligning was accomplished initially with 0.016" NiTi and then with 0.018" NiTi and 0.020 Niti wire in upper and lower arch. The sequence of wires used was 0.016" Niti, 0.018" NiTi, 0.020" Niti, 0.016 X 0.022 Niti, and 0.016 X 0.022 Stainless Steel (SS). After achieving adequate arch alignment, correction of rotations and intrusion of mandibular incisors with NiTi wires, rest of the space closure was done with segmental 0.016 X 0.022 SS wire in upper and lower arch. TAD (8mm long and 2.5mm diameter) was placed between mandibular first molar and second premolar on either side by self-drilling method under local anesthesia (Fig.4 Placement of TAD bilaterally). All four mandibular incisors



was consolidated and segmental 0.016 X 0.022 SS arch wire was placed in to make it a single unit. To protract the mandibular canine and both premolars bilaterally, helical closed vertical loop made in 0.016" x 0.022" SS wire was

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placed in this segment (Fig.5 Segmental arch wires with helical closed vertical loop for protraction of canine and premolars) and



anchorage was taken from TAD, stop loops were made distal to canine bracket and mesial to second premolar bracket and the terminal end of this wire was engaged with TAD distal to second premolar. The loops were activated on every visit after three weeks. To avoid the reciprocal effect of this loop that is further distalization of mandibular first molar, the terminal end of vertical loops was engaged to TAD, instead to first molar. The whole segment from canine to second premolar was then pushed anteriorly against the TAD. After achieving class I canine relationship bilaterally and protracting both mandibular premolars into the extraction space, the whole segment was consolidated and made one unit including mandibular incisors. Against this unit, the mandibular molars was protracted bilaterally. To protract the molars, a lingual buttons was bonded on canines and welded on first molars bands bilaterally on lingual surface. Then a power chain was placed from buttons on canine to molars lingually and from bracket on canines to buccal tube hook on molars buccally. The power chain was changed on every visit after three weeks till molar was protracted completely and Class I molar relationship was achieved bilaterally.

Treatment Results:

The planned treatment objectives were achieved with well aligned upper and lower teeth, normal overjet and overbite, class I canine and molar relation on both the sides (Fig.6 Post Treatment Intra-Oral Photographs). The



extraction spaces in the lower arch were completely closed by otraction of canines, premolars and molars. Post treatment panoramic radiograph showed good amount of root parallelism (Fig.7 Post Treatment (a) Lateral Cephalogram (b) Panoramic Radiograph). Post treatment cephalogram



showed mesial movement of first molars. Permanent retention was given in the lower arch to ensure post-treatment stability.

Discussion:

Class II malocclusions exhibit complex characteristics like a Class II molar relationship with deep bite and severe crowding. They have been found to be difficult to treat with a high risk of relapse as reported by Canut and Arias⁸. However, there are several treatment options commonly employed. In the current study, to correct class II molar relationship, molar protraction along with canine and premolars was planned instead of maxillary molar distalization as they were already distally placed according to Rickettes, Ptv to upper molar distance. Although protracting and retracting any of the Mandibular teeth is a challenging procedure because of the density of mandibular bone, and significant anchorage demands, but with the introduction of Temporary anchorage devices (TADs) in the orthodontics, it become quite easy to bring about these movements specially in mandibular arch⁹ Orthodontic anchorage is crucial and has been considered relevant in providing satisfactory clinical results. Many auxillary appliances are developed in the process of conserving anchorage with their own limitations^{7,10}. Initially, in conventional treatment, headgear and intraoral elastics are used to improve anchorage. However, these devices require patient's compliance, which can significantly influence treatment¹⁰.

The clinical results of the case reported herein demonstrates that the use of TAD's as anchorage devices was an efficient strategy for protracting mandibular teeth. The introduction of miniplate anchorage in Orthodontics was a great progress, since it minimizes the need for patient's compliance and allows for a more predictable orthodontic movement

Conclusion:

Mini-implants or TAD's have been proved to be a good alternative for dental anchorage. They can be easily placed in either of the jaws

for skeletal anchorage and each type of movement can be achieved with this. By using TAD's, the adverse effect of dental anchorage can be avoided.

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