Case Report

Treatment of class II malocclusion with bimaxillary dentoalveolar protrusion and compromised mandibular first molars through anchorage miniscrews (TADS)

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ABSTRACT

Introduction: Patients with dental Class II bimaxillary dentoalveolar protrusion are generally treated by extracting all four first premolars or two first and two second premolars, and retracting the anterior teeth. This case report describes the treatment of an adult female patient aged 21-year-old with bimaxillary protrusion, a Class II canine and class II molar relationship along with lip protrusion.

Materials and Methods: In this patient, the lower right and left mandibular first molar i.e., (3-6) and (4-6) had to be extracted due to extensive caries, also extraction was performed for maxillary 1st right and left bicuspids i.e., (1-4) and (2-4).

Mini-implant (1.4 mm in diameter, 8 mm long) were placed in interradicular bone between the maxillary second bicuspids and first molars and mesial to mandibular second molar to allow en-masse retraction of upper and lower anterior teeth.

Results: Overall, miniscrews (TADs) can provide anchorage to produce a good facial profile in cases of dental Class II bimaxillary dentoalveolar protrusion with hopeless mandibular first molars.

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1. Introduction

To achieve functional efficiency, aesthetic harmony and structural balance is aim of an orthodontic treatment. For ideal result and difficult orthodontic tooth movement¹,² anchorage i.e., resistance towards unwanted tooth movement³ is an integral part of an orthodontic treatment.

Bimaxillary dentoalveolar protrusion is a condition that is mainly characterized through an increased procumbency of lips as well as protrusive and proclined upper and lower anteriors. It is also a usual finding among various different populations⁴–¹⁰.

Retroclination as well as retraction of maxillary and mandibular incisors with an upshot decrease in soft tissue procumbency and convexity is goal of an orthodontic treatment.¹¹

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Regular treatment approach for patients with Class II bimaxillary dentoalveolar protrusion is extraction of right and left 1st or 2nd maxillary or mandibular bicuspids, followed by retraction of anterior teeth using different anchorage mechanics.¹²–¹⁴

However, the treatment plan becomes more complex and controversial when a patient has hopeless mandibular first molars that should be extracted and wants to preserve mandibular premolars.

Skeletal anchorage was achieved since TADs were introduced since last two decades.

Present day use of TADs in advanced orthodontics enables an orthodontist to achieve skeletal anchorage that mainly allows them to attain difficult tooth movement.

As a part of TADs miniscrews are being used in various day to day orthodontic practices and it also helps to attain various difficult tooth movement such as intrusion, extrusion, distalization of molars.
When miniscrews were rightfully used various difficult orthodontic cases were reported treated successfully.\textsuperscript{15-19}

Bimaxillary dentoalveolar protrusion cases mainly requires levelling as well as alignment of teeth followed by retraction and retroclination of maxillary and mandibular anterior that finally results in a decreased convexity and soft tissue procumbency.

This case report describes orthodontic treatment of an adult female patient with severe bimaxillary dentoalveolar protrusion along with incompetent lips and compromised mandibular first molars with use of miniscrews (TADs) for anchorage.

2. Case Report

A 21-year old female patient reported to the clinic with forwardly placed upper and lower anterior teeth.

Extraoral examination revealed, an acute nasolabial angle along with a convex profile, incompetent as well as protrusive upper and lower lips, a positive tongue thrust and a deep mento-labial sulcus.

Intraoral examination revealed that the patient had a poor oral hygiene, with grossly carious right and left mandibular first molars ie, (3-6, 4-6).

All permanent teeth were present through third molar, except for the mandibular right and left first molar which were grossly carious and in a non-restorable status. A Class II canine relationship on the both right and left side was observed.

Angles’s molar relationship on right side could not be determined because of the missing structure of right first mandibular molar due to carries while a class II molar relationship was observed on left side.

In relation with facial midline the lower midline was shifted 1 mm to the right. There was also 3-mm crowding in mandibular arch whereas 2mm crowding was found to be in maxillary arch. (Figure 1)

No bone pathology and a normal morphology of condyle was observed in panoramic radiograph. All permanent teeth are present including all four wisdom teeth, there is also presence of severe decay on the mandibular right and left first molar i.e. (3-6, 4-6). (Figure 2)

The lateral cephalogram and its tracing showed dental Class II bialveolar protrusion, but Class I skeletal pattern. The skeletal pattern was normodivergent as evidenced by the FMA (Frankfort mandibular plane angle) of 29.5º, ANB-2º, SNA-75º and SNB-73º with proclined upper and lower anterior. (Figure 3)

The IMPA (incisor mandibular plane angle) of (100º) reflected the proclination of lower incisors. There were no significant signs or symptoms of temporomandibular disorders. (Figure 3)

2.1. Treatment Objectives

The treatment objectives were

1. Alignment and levelling of teeth in both maxillary and mandibular arches and to obtain a functional occlusion.
2. Correcting the overjet.
3. Improvement of dental symmetry.
4. To achieve a balanced facial profile.

2.2. Treatment Plan

1. Extracting mandibular first molars ie, (3-6, 4-6) and maxillary first bicuspids ie, (1-4, 2-4).
2. Placement of miniscrews during the alignment stage.
3. En-masse retraction of upper and lower anterior teeth in to the extraction spaces via miniscrews (TADs).
4. Finishing and detailing finally followed by retention.
2.3. Treatment Progress

After extraction of mandibular 1st molars (3-6, 4-6) and maxillary right and left 1st bicuspids, MBT appliance (0.22 slot) were used.

Levelling and alignment were performed with 0.014 Niti wires followed by 0.017 X 0.025 and finally 0.019 x 0.025 Niti wires were used respectively.

Four orthodontic mini-implants (SK surgicals) of conical shape, 8mm length and 1.4 mm diameter were placed interradicularly between the maxillary second bicuspids and first molars and mesial to mandibular second molar during the alignment stage. (Figure 4).

A 0.017 x 0.025 inch Stainless steel arch-wire was placed in upper and lower arches, a closed power chain were applied from the maxillary and mandibular mini-implants to the anterior hook of all four canines to retract the anterior teeth.

After retraction, the treatment was completed with ideal arch wires sequencing and with use of settling elastics (Figure 4). For retention lingual bonded retainers were bonded to the lingual sides of the six anterior teeth. The total treatment time was 22 months.

Superimposition of the pre and post treatment cephalometric analysis showed that both maxillary and mandibular incisors were bodily retracted (U1 to NA 24° / 5mm, L1 to NB 28° / 4.5mm). Also there was no significant change in ANB angle.

Effective retraction of Upper and lower lip was achieved that finally resulted in an increase in nasolabial angle from 85° to 97° resulted in a significant profile change of patient.

| Parameter/Angle’s | Pre treatment | Post treatment |
|-------------------|--------------|----------------|
| ANB Angle         | 2°           | 2°             |
| SNA               | 75°          | 74.9°          |
| SNB               | 73°          | 72.9°          |
| Nasolabial Angle  | 85°          | 97°            |
| IMPA              | 100°         | 96°            |
| U1 to NA          | 45° \ 13mm   | 24° \ 5mm      |
| L1 to NB          | 33° \ 9.5mm  | 28° \ 4.5mm    |

3. Discussion

Patients consider for orthodontic treatment reason being facial aesthetics especially in bi maxillary dentoalveolar protrusion cases that are mainly recognized by procumbency of upper and lower lips along with flaring of the maxillary and mandibular anterior.

In orthodontics, extracting first permanent molars to resolve bimaxillary protrusion cases is not widely accepted.

Mills study indicated that extracting first molars could reduce the prognosis by half and doubles the treatment time.

However, in this case, extraction of mandibular right and left first permanent molars were performed because of their non restorable status caused by extensive carries and that finally indicated for extraction.

Other treatment options included such as extracting the lower two premolars i.e, (3-4, 4-4) but that could not possible due to grossly carious mandibular right and left first molars i.e , (3-6, 4-6), thus having premolars against molars might not be a favourable treatment of choice. Many clinical necessities let unusual extraction of molar including extensive caries and large restorations.

3.1. Molar extraction is usually indicated when

1. Severe carious lesions, ectopic eruption, or is considered in severe rotation.
2. Facial profiles with Moderate arch length deficiencies.
3. Distalization of molars in relapsed orthodontic cases for space gaining.

Removing molars can serve as an alternative for extraction of the maxillary or mandibular bicuspids.
Miniscrews (TADS) can provide anchorage in missing or compromised molar cases mainly to facilitate the retraction of anterior in to extraction spaces.

High possibility and risk factor involved in direct anchorage as a miniscrew could fail during en-masse retraction and in the presence of power chain, the canine might be pushed mesially. Thus for this purpose a close follow-up was an important aspect of an orthodontic treatment, specifically during the first 2 weeks of retraction.

For En-masse retraction of anterior teeth skeletal anchorage with use of miniscrews was important to implement this treatment plan.

Current study enabled us to effectively retract upper and lower anterior and eventually upper and lower lips to a more favourable position when anchorage was properly maintained with the use of miniscrews (TADS). Thus the use of miniscrews (TADS) facilitated the treatment of bimaxillary dentoalveolar protrusion with compromised mandibular molar cases more effectively regardless the extraction pattern used.

4. Conclusion

The total treatment period was 22 months. Use of miniscrews (TADS) in Class II bimaxillary dentoalveolar protrusion cases with compromised molars can help to achieve and provide skeletal anchorage for en-masse retraction of the anterior teeth into the extraction spaces resulting in reduction in procumbency of lips and retroinflation of upper and lower anterior that resulted in a significant profile change of patient.

5. Source of Funding

None.

6. Conflict of Interest

None.

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