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Case Report

Correction of class III malocclusion using enmasse distalization with tad

Saveen N Soman[1], **Sonu Thomson P**[1], **Varsha V**[2,*], **Biswas P P**[2], **A Hariprasad**[2]

[1]*Dept. of Orthodontics, Private Practitioner, Kerala, India*
[2]*Dept. of Orthodontics, Kerala University of Health Sciences, Thrissur, Kerala, India*

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ABSTRACT

Skeletal class III malocclusion in adult patients are generally managed by orthognathic surgery. However, the prognosis is poor when the patient refuses surgical line of treatment. In such cases orthodontic camouflage through dentoalveolar compensation may be attempted. Presently, with the advent of stationary anchorage, en mass distalization appears to be a common choice. This article demonstrates an en mass distalization carried out in the upper and lower arches in a class III skeletal case, refusing surgery. After initial levelling and alignment, TADs (temporary anchorage devices) were placed bilaterally mesial to the first molars in upper and lower arches. After a month, distalization was initiated with 300 gms force applied per side using elastomeric chain. At the end of the treatment, the anterior cross bite and crowding was resolved and the patients profile improved. Thus, en masse distalization with TADs appears be a good choice in class III skeletal cases refusing surgery. It is minimally invasive and cost effective.

1. Introduction

Orthognathic surgery is the ideal treatment option for an adult with a well-developed skeletal class III malocclusion. Similarly, attempting a camouflage treatment in a true surgical case has poor prognosis too.

Patient's who refuse orthognathic surgery in borderline skeletal cases, orthodontic camouflage with fixed appliance mechanotherapy can be effectively executed. Creating space in camouflage cases becomes a dilemma especially when extractions result in excess space and most other space gaining method[1] simply don't add up the required space. Distalization is an alternative method of gaining space. There are several common methods of distalization, to name a few are the pendulum, lip bumber, sliding jig, extraoral anchorage, stationary anchorage etc. Presently with the advent of stationary anchorage, en mass distalization appears to be a common choice due to its minimal invasiveness and also due to its ability to prevent anchorage loss of premolars and flaring of incisors during molar distalization.[2] In spite of the new advent of Infrazygomatic and Buccal shelf implants, routine microimplants also can serve the purpose with atypical angulation and placement at different sites.

This article demonstrates an en mass distalization carried out in a class III skeletal case, refusing surgery. Anchorage was achieved with routine microimplants.

2. Case History and Treatment Plan

A 17yrs old female patient presented with a chief complaint of irregularly placed teeth extraoral examination exhibited a straight profile, anterior divergence, incompetent lips with an interlabial gap of 4mm and obtuse nasolabial angle. The anterior facial height increased by 5mm (Figure 1).

* *Corresponding author*.
E-mail address: vijayanvarsha02@gmail.com (Varsha V).

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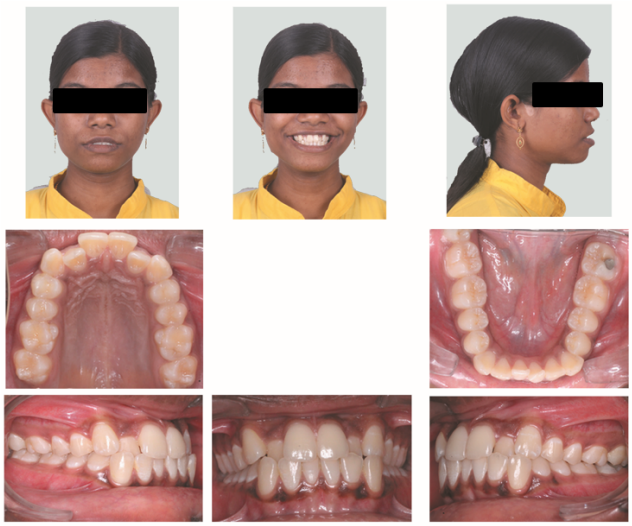

Fig. 1: Pretreatment photograph

The intraoral examination revealed a class I molar, canine and incisor relation with an overjet & overbite of 2mm and a crossbite with respect to 12 and 22 (Figure 1). Cephalometric analysis revealed a class III skeletal relationship with an orthognathic maxilla, mild prognathic mandible, normal growth pattern and proclination of upper and lower incisors. (Figure 1)

The primary treatment objective was to correct the skeletal pattern, cross bite with respect to 12 and 22, relieve the crowding and correct the proclination of upper and lower incisors so as to obtain a pleasing profile. Two treatment options were presented to the patient. The first one involved orthognathic surgery with a mandibular setback. The second treatment option was to extract all the third molars and enmass distalization with temporary anchorage devices. As the patient opted for the second treatment plan, it was decided to start fixed mechanotherapy (MBT, 0.022 slot, LEONE) reinforced with skeletal anchorage using TADs.

3. Treatment Progress

The upper and lower third molars were extracted to facilitate distalization. After initial levelling and aligning, a 0.018 stainless steel wire was placed in the upper and lower arches. The upper and lower 2^{nd} premolar brackets were then debonded to facilitate the placement of NiTi open coil springs with weldable molar tubes with the hook facing mesially. An elastic force of 350 gm was then applied between the TAD and the molar tube (Figure 2 a). The upper and lower microimplants (6mm, 1.5mm dia) were placed between the 2^{nd} bicuspids and 1^{st} molars at approximately 4mm away from the cervical margin in the attached gingiva bilaterally. In a span of 11 months a distalization of 3mm was achieved in upper and lower arches. The molars were then stabilised by Nance button and lingual arch in the upper and lower arches respectively (Figure 2 b). Open coil springs were then placed to make space for the blocked out upper lateral incisors and lower right central incisor and further alignment and finishing was carried out.

Fig. 2: a): TADs placed mesial to 1^{st} molar in upper and lower arch. Open coil and buccal tube placed between 1^{st} bicuspid and 1^{st} molar and initially 300gm of force applied; **b**): Spaced gained in upper and lower arch

4. Treatment Outcome

The anterior cross bite and crowding was resolved with very minimal changes in profile. (Figure 3) The cephalometric analysis demonstrated the the pterygoid vertical to upper and lower first molars has decreased by 3mm after treatment, indicating enmasse distalization in upper and lower arches. (Table 1, Figure 4) The post treatment OPG demonstrated upright molars with no distal tipping.(Figure 4)

Fig. 3: Post treatment photographs

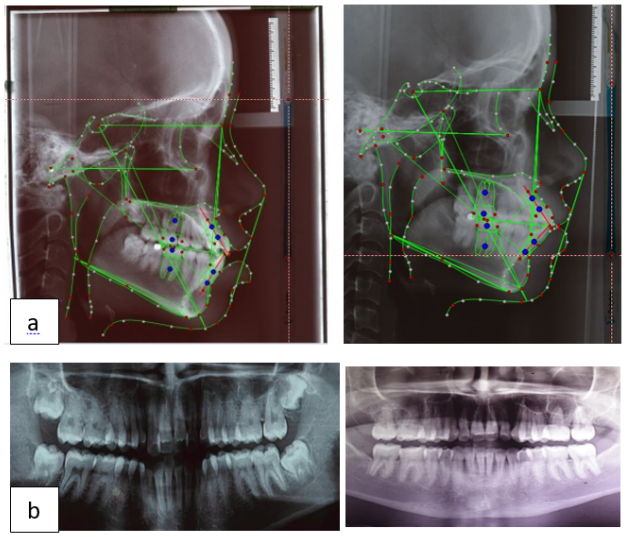

Fig. 4: a) Pre and Post treatment OPG; **b**): Pre and Post treatment lateral ceph

Table 1: Pre and post cephalometric measurements

Measurements	Pretreatment	Post treatment
SNA(°)	88	88
SNB(°)	87	86.5
U1 –NA(°)	33	36
L1 – NB(°)	28	39
Ptv to U6(mm)	22	19
Ptv to L6(mm)	24	21
Upper lip to E line (mm)	1mm behind	2mm behind
Lower lip to E line(mm)	7mm ahead	2mm ahead

5. Discussion

In this case, even though the primary treatment objective was to correct the underlying class III malocclusion, it was not possible as the patient declined a surgical line of treatment. Hence, the main treatment objective was to decrowd the arches which was successfully accomplished by en–masse distalization with TADs.

Distalization could be achieved with both extraoral and introral appliances. Extraoral appliances such as headgears rely on patient compliance. However intraoral appliances such as Nance arches, pendulum appliance, K loop, etc often produce unwanted tooth movements, such as anchorage loss, distal tipping and extrusion of molars.[3] With time, TADs have gradually replaced the forementioned appliances and have become the preferred anchorage option for orthodontists.

Most distalizing appliances have the disadvantage of reciprocal anterior movement of incisors which is unwanted. This adverse effect is overcome with the use of TADs.

Most studies using TADs have shown a molar distalization of an average of 3mm in the maxillary arch[4] and 4mm in the mandibular arch[5] with a range of 3mm to 5mm. In the present case study, 3mm of distalization was achieved in the upper and lower arches. Microimplants were more commonly used than skeletal plates in most reports. This is probably because using skeletal plates require an open method for both fixing and removing it. 10 mm was the commonly used length of miniscrews in the upper arch[6] and 11mm in the lower arch[5] with a range of 6 to 14mm miniscrews. The present study used 6mm screws.

For distalization, the common area for implantation in the upper arch is the interradicular area between maxillary second premolar and first molar at an angulation of 30° to the long axis of the tooth[2,4] and in the lower arch it is in the retromolar area distal to the mandibular second molar[5] after 3^{rd} molar removal. Other common sites used were the maxillary tuberosity,[6] palatal interradicular alveolar bone between the first and second molars in the upper arch and the external oblique ridge in the lower arch.[4] The most common site for the placement IZC bone screws in the maxilla is in the infra-zygomatic crest, higher and lateral to the 1st and 2nd molar at an angulation of 55°–70° to the tooth surface and in the mandible, it is the buccal shelf area, lateral to the 2nd molar at an angulation of 60°– 75° to the tooth surface.[7] In the present study the microimplants were placed between the 2^{nd} bicuspids and 1^{st} molars at approximately 4mm away from the cervical margin in the attached gingiva bilaterally.

Most authors used force values that ranged from 200gms to 500gms while in the present study 350 gms was used bilaterally.[1]

6. Conclusion

With the advent of stationary anchorage, en mass distalization appears to be a common choice due to the cost effectiveness and simplicity in design. One can expect an average amount of distalization of 3-4mm within upper and lower arches. Positioning of the TAD in relation to the radicular surfaces of teeth should be given due consideration during distalisation.

7. Declaration of Patient Consent

I certify that we have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

8. Source of Funding

None.

9. Conflict of Interest

None.

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Author biography

Saveen N Soman, Private Practitioner https://orcid.org/0009-0009-4185-0064

Sonu Thomson P, Private Practitioner https://orcid.org/0009-0001-9662-6328

Varsha V, Post Graduate Student https://orcid.org/0000-0002-2549-4890

Biswas P P, Professor and HOD https://orcid.org/0000-0001-8432-2127

A Hariprasad, Professor

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