

Case Report

Treatment of anterior open bite using mini-implants

ABSTRACT

The paper focuses on orthodontic management of anterior open bite by using mini-implants. Orthodontic mini-implants have been extensively used for anchorage, and they have widened the spectrum of tooth movement that can be achieved. A clinical case with anterior open bite treated with orthodontic fixed mechanotherapy along with mini-implants for anchorage is presented.

Keywords: Anterior open bite, intrusion, mini-implants, segmental mechanics

INTRODUCTION

Anterior open bite can be corrected by either extruding the incisors or intruding the posterior teeth. Orthodontic intrusion of the posterior teeth can be extremely challenging.^[1] High pull headgear is one of the most effective appliances to treat open bite by the intrusion of the posterior teeth, but unfortunately, it is heavily dependent on patient compliance. Other devices such as multiloop edgewise archwire and elastics correct open bite by extruding the anterior teeth. Mini-implants are an excellent source of absolute anchorage.^[2] Mini-implants can be judiciously positioned to generate optimal intrusive force for four posterior teeth on either side. In this case report, we present the management of open bite with the use of mini implants.

CASE REPORT

A 23-year-old male patient Mr. SM had the chief complaints of forwardly placed teeth and space between upper and lower teeth. History revealed that he had thumb sucking habit till 5 years of age. On extraoral examination, he had convex profile, incompetent lips [Figure 1]. On functional examination, the patient had lisping on the pronunciation of the sibilants “s” due to tongue thrusting into the open bite.

On intraoral examination, all the permanent teeth had erupted except third molars. He had Angle’s Class I molar

and canine relationship on both sides [Figure 1]. There was an open bite of 5.5 mm in the anterior region. Crowding was present in the lower anterior region. The maxillary arch had a reverse smile arc [Figure 1].

On cephalometric analysis [Table 1], it was found that interarch relationship was Class I, average growth pattern, proclined upper and lower incisors. In cephalometric analysis for orthognathic surgery, it was found that the posterior upper dental height was increased by 3 mm denoting extrusion of the maxillary posterior segment. This is a common finding in prolonged thumb sucking.

Treatment plan

Based on the clinical and cephalometric findings, it was decided that patient would undergo extraction of all first premolars, followed by fixed mechanotherapy and mini-implants to be used for the intrusion of maxillary posterior segment which was extruded [Figure 2 and Table 1].

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Table 1: Cephalometric analysis before and after treatment

Parameter	Normal	Pretreatment	Posttreatment
Maxilla			
SNA	82°	79°	79°
Na per Pt A	0 mm	-2 mm	-1 mm
Co to A		93 mm	93 mm
PP to SN	8°	7°	7°
Mandible			
SNB	80°	79°	79°
Na per Pog	2 mm	-5 mm	-2 mm
Co-Gn		131 mm	131 mm
Maxilla-mandible relation			
ANB	2°	0°	0°
WITS		AO > BO 1mm	AO > BO 1mm
McNamara diff		38 mm	37mm
Vertical			
FMA	25°	25°	25°
SN to GOGN	32°	32°	32°
Sum of posterior angles	396°	394°	393°
Jarabak ratio	62%-65%	65%	67%
Dental			
1 to NA	22°, 4 mm	46°, 17 mm	22°, 6 mm
1 to SN	102°	129°	107°
1 to NB	25°, 4 mm	36°, 10 mm	25°, 6 mm
1 to APog	22°, 1 mm	39°, 10 mm	26°, 6 mm
Interincisal angle	131°	100°	107°
IMPA	90°	104°	93°
E line to upper lip	-2-2	5 mm	2 mm
COGS			
AUDH	30±2.1	33 mm	32 mm
PUDH	26±2	29 mm	26 mm

COGS: Cephalometric analysis for Orthognathic Surgery

Treatment progress

The buccal implant of size 8 mm × 1.3 mm was placed between second premolar and the first molar. An intrusive force was applied from the implant to the buccal tube on the first molars bilaterally. The posterior and anterior segments were separated, and the treatment was segmental till posterior segmental intrusion was achieved. Continuous arch mechanics was started after positive overbite was achieved [Figure 3].

The segmental mechanics started with the aligning wires 0.016" Niti on 0.022" MBT slot. The intrusive force was delivered when the wire progressed to 0.017 × 0.025" SS. Anterior retraction was carried out by friction mechanics on 0.019 × 0.025" SS working wire. After completion of space closure, finishing and detailing were initiated, and settling was done.

DISCUSSION

The segmental intrusion of posterior teeth had been an impossible task before the advent of mini implants. Open bite



Figure 1: Pretreatment extraoral and intraoral photos. Intraoral photos depict the anterior open bite with crowding in the lower anterior region



Figure 2: (a and b) Pretreatment lateral cephalogram and orthopantomogram



Figure 3: Midtreatment intraoral photos

is a very challenging malocclusion to treat, and any untoward orthodontic attempt may worsen the existing problem by extrusion of the posterior teeth and further opening of the bite. Subtelný and Sakuda^[3] have discussed the difficulties in treating open bites and reiterate that open bites are best left untreated.

The most daunting task in treating open bite with posterior intrusion is the application of optimal orthodontic force. Intrusive force is concentrated at the apex of the root. Excessive force to intrude the teeth might cause root resorption. Han *et al.*^[4] have concluded from their study that intrusion of teeth causes four times more root resorption than other tooth movement. Force applied for intrusion has to be calibrated precisely so that excessive force levels are not introduced. Force levels of 10–15 g per tooth in the posterior segment would be ideal.

The introduction of mini implants has broadened the spectrum of orthodontic treatment modalities. There are



Figure 4: Posttreatment extraoral and intraoral photos. Positive overbite is achieved after the correction of anterior open bite

various treatment options for correction of anterior open bite, but there would be the extrusion of anterior teeth with these treatment modalities. The absolute intrusion of the posterior segment can be achieved by using mini implants for anchorage.

The decision on the number of implants to be placed and their location depends on various factors such as number of teeth to be intruded, size and root surface area of teeth, and proper balance of forces. All the posterior teeth from second premolar to second molar were intruded. One mini-implant was placed on either side buccally between maxillary second premolar and first molar. The buccal segment was stabilized by means of a transpalatal arch (TPA) to prevent buccal flaring.

Pekhale *et al.*^[5] have discussed the stress pattern on the posterior maxillary segment that was intruded by means of mini-implant anchorage. According to their results, TPA is mandatory in posterior segmental intrusion to prevent flaring. They advocate the use of three implants (two buccal and one palatal) along with TPA for stability. Since first premolars were extracted it was decided to place mini implants between second premolar and first molar. The TPA was fabricated in such a way that it was 4–5 mm away from the palate to utilize tongue pressure for vertical anchorage and pave adequate relief after intrusion. Smile arc normally follows the contour of the lower lip. Reverse smile arc is a feature of anterior open bite. As the treatment progressed smile arc improved with the closure of open bite [Figures 4 and 5]. Park *et al.*^[2] have discussed the counterclockwise rotation of mandible achieved by intrusion of the posterior segments. It is advantageous in Class II because autorotation in the counterclockwise direction will bring the mandible forward. This will help in the correction of Class II relation. There

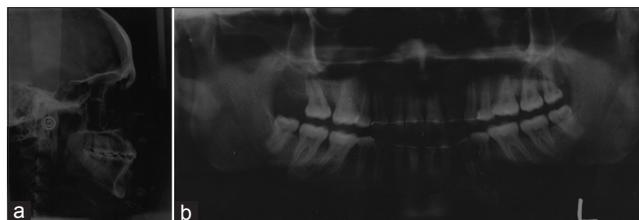


Figure 5: (a and b) Posttreatment lateral cephalogram and orthopantomogram

was no evidence of change in vertical parameters except Jarabak ratio.

After achieving positive overbite, retraction of the anterior teeth into the extraction space of the first premolars was completed by friction mechanics. Finishing and detailing was done to achieve good cusp-fossa occlusion. There was a dramatic improvement in esthetics of the patient after the correction of anterior open bite [Figure 4].

CONCLUSION

The segmental intrusion of posterior teeth was challenging to an orthodontist before the introduction of mini-implants. Mini-implants have broadened not just the age spectrum of patients being treated but also the type of tooth movement that can be achieved.

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Conflicts of interest

There are no conflicts of interest.

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