Intrusion of anterior teeth to improve smile esthetics

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Abstract A gummy smile is probably one of the most common causes of an unaesthetic smile. Causes include overeruption of maxillary anterior teeth and maxillary vertical excess. Intrusion of maxillary anterior teeth with Orthodontics and Le forte I superior repositioning may form a part of the solution. Of late the use of micro implants have improved the smile esthetics of borderline surgical cases by allowing the Orthodontist to intrude teeth more than what was possible with conventional Orthodontics.

Keywords Gummy smile · Intrusion · Micro implants

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Introduction

The correction of a dental deep bite is rather complex, limited neither to the anterior teeth nor to a well defined age group. In adults the problem can be an isolated one, but in growing children the deep bite is generally related to other dentofacial anomalies. The most frequent indications for the correction of a deep bite are, aesthetic reasons, growth inhibition of the mandible (Class II, Division 2 malocclusions), periodontal damage, and functional disturbances.

The outlook of a patient with a gummy smile or a short upper lip will improve after intrusion of the upper front teeth. Intrusion by definition refers to the apical movement of the geometric center of the root (centroid) in respect to the occlusal plane or a plane based on the long axis of the tooth [1].

Although many Orthodontic techniques claim to intrude incisors, considerable extrusion of molars occurs in many patients. Reaction forces are difficult to control and, since extrusion occurs more easily than intrusion, the result has often been tipping and extrusion of the molars with loss of the intrusive force. Interception of reaction forces is one of the most challenging problems of intrusion. For this reason, different means have been devised to reinforce anchorage; namely headgears and transpalatal bars. The use of micro-implants as absolute anchorage devices has

Table 1 Amount of intrusion achieved

Pre-treatment	Post-treatment	Total
7mm	2mm	5mm
6.5mm	1.5mm	5mm
7mm	1.5mm	5.5mm
7.1mm	1.2mm	5.9mm
6.1mm	0mm	6.1mm
6.2mm	1mm	5.2mm
7.1mm	1.3mm	5.8mm
7mm	2mm	5mm
7.2mm	1.2mm	6mm
6.5mm	1.3mm	5.2mm
7mm	1mm	6mm
6.5mm	1.5mm	5.5mm
6.5mm	1mm	5.5mm
7.1mm	0.5mm	6.6mm
7mm	0mm	7mm
6.5mm	1mm	5.5mm
7mm	1.3mm	5.7mm
7.2mm	1.2mm	5mm
7mm	1.1mm	5.9mm
6.5mm	1.4mm	5.1mm
6.5mm	1mm	5.5mm

revolutionized anchorage considerations [2].

Cases with a gummy smile due to extruded maxillary anterior teeth, will qualify for correction with mini implants.

Patients with an unaesthetic smile due to over eruption of the maxillary anterior teeth will be best suited for correction with micro-screws as an alternative to a surgical correction. A new technique is described where micro implants providing skeletal

anchorage were used to correct malocclusions which would have otherwise been considered as borderline skeletal malocclusions.

Materials and methods

Sample group contains 21 cases. Two cases could not be followed as they had transferred to a different region. Patients

Fig. 1 Pre-treatment study model

Fig. 3 Mid-treatment lateral cephalogram showing the placement of micro implant

Fig. 5 Post-treatment cephalogram showing reduced overbite and improved maxillary incisor angulation

Fig. 7 Post-treatment extra-oral with increased deep bite, gummy smile, extruded maxillary incisors with retroclination were selected. Age group : 12 to 18 years (9 boys, 12 girls)

Methodology

Titanium mini implants, 1.5mm diameter, 6mm length, low profile heads were used. Pretreatment and posttreatment study casts were taken and the overbite was measured with an electronic vernier caliper, with an accuracy of 0.1mm.

Pre-adjusted edgewise appliance systems were used for aligning and levelling. All the cases were treated as non-extraction cases. A segmented archwire was

Fig. 2 Mid-treatment intra-oral photo

Fig. 4 Intrusion with mini implant

Fig. 6 Post-treatment intra-oral

Average intrusion in 4 months (mms)

placed in the anterior region. A force of 60 gms was given to this segmented wire by attaching a e chain from the micro implant. The patient was recalled once in a fortnight and the force was evaluated.

Treatment plan

1. Intrusion of maxillary incisors, over correct overbite.
2. Align and upright lower incisors.

Micro implant

Titanium mini implants or miniscrews are ideal to address the anchorage requirements

of the Orthodontist. Some of their benefits include immediate loading, simple to insert and remove, dependability and most of all accepted by the patients.

The micro-implant can be loaded immediately with forces from 50g to 200g.

The implants are available from 1.2mm to 2.0mm diameters. The length of the micro-implant ranges from 6mm to 11mm.

The head designs vary from different manufacturers, and differ for locations of micro-implant (low profile, low profile flat, and regular).

Surgical procedure

After discussion with the oral and maxillofacial surgeon, the surgical procedure was performed under local anesthesia. The micro-implant was taken with the driver and placed 4mm superior to the free gingival margin between the central incisors.

The angle of placement was between 30 to 45 degrees to the occlusal plane.

As the sample cases had a deepbite combined with a retroclined anterior teeth, a single buccally placed implant was preferred.

Results

The intrusive force was applied between the central incisors with the use of an elastic power chain. The main disadvantage of elastic power chains is the dissipation of force values with time. To overcome this, the power chain was changed every two weeks after checking the force with a dontrix gauge. The average force used for intrusion was 50 to 60 gms.

The total time taken for incisors to get intruded was 4 months. The average deep bite varied from 6.1 to 7.2mm. Post intrusion the overbite reduced to 2mm to 0 mm. The smile esthetics was vastly improved with excellent patient satisfaction.

Oral hygiene and periodontal health

Patients undergoing orthodontic treatment in general and with mini-implants in particular are more prone to worsening periodontal health due to primarily poor oral hygiene.

Three patients had loosening of the micro-implants, which were later replaced.

Discussion

A large number of patients suffer from poor self esteem due to an unaesthetic facial appearance. A majority of them from a gummy smile. Most often the cause is a vertical maxillary excess needing an Orthognathic surgery.

The recent advent of using micro-implants as skeletal anchorage has seen a dramatic compliance from patients, who would otherwise have not preferred to undergo a surgical option [3,4].

The primary indication for this technique is the presence of a increased overbite (deep bite), associated with retroclined maxillary incisors. The expected reduction in overbite by orthodontic technique alone would be around 2 to 3mm. In this technique we had achieved an intrusion of 7mm, this is due to the skeletal anchorage provided by the micro-implant or TAD (Temporary Anchorage Device) and the proclination of the maxillary incisors,

which in these cases, was beneficial as they were retroclined prior to treatment.

We have successfully used the micro-implants to improve the smile esthetics by intruding the maxillary anterior teeth and thereby reducing the gummy smile. This modality of treatment may be considered for borderline surgical cases with extrusion of maxillary anterior teeth with retroclination.

The results have been excellent with good patient co-operation. Long term follow-up of these cases may be needed to study the possibility of a relapse. It is the same with other orthodontic treatments, an overcorrection of deep bite is recommended to take into consideration any relapse tendency.

The use of micro-implants to correct malocclusions, some of which may fall in the category of borderline surgical cases, seems promising. This is yet another area, where the team work of an Oral and Maxillofacial Surgeon and an Orthodontist can benefit the patients.

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