

## International Journal of Dental Science and Innovative Research (IJDSIR)

# IJDSIR : Dental Publication Service

Available Online at: www.ijdsir.com

Volume - 7, Issue - 3, May - 2024, Page No. : 157 - 162

Vertical maxillary excess correction with infra zygomatic mini plates - A Case Report

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**Citation of this Article:** Rishikesh Sukumaran, Shoukathali P.H, Vaisakh, Terrance Abraham, Hariprasad A, Biswas P P, "A comparison of the effects of twin block and herbst appliances in the treatment of skeletal class II malocclusions - A Cephalometric Study", IJDSIR- May – 2024, Volume –7, Issue - 3, P. No. 157 – 162.

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# **Type of Publication:** Case Report **Conflicts of Interest:** Nil

## Abstract

This case report demonstrates the intrusion and retraction of maxillary teeth using infra zygomatic mini plates. A "Y" shaped surgical stainless steel mini plate was fixed with screws in the anterior region of the zygomatic buttress and tip of the surgical plate was exposed into the oral cavity for the attachment of elastomeric chains. At the end of treatment, a complete correction of gummy smile was achieved. The infra zygomatic plate assisted intrusion and retraction of maxillary teeth is an excellent method for the successful correction of the gummy smile.

**Keywords:** Vertical Maxillary Excess, Miniplate, Skeletal Anchorage, Zygomatic Buttress.

## Introduction

An increase in length of the mid face is termed as vertical maxillary excess (VME) invariably associated with a gummy smile. Like other Dentofacial deformities, ME is not a stereotyped abnormality rather, it can best be considered a syndrome since it possesses a spectrum of musculoskeletal, esthetic, occlusal, functional, and growth characteristics.1However, it must be noted that there are two distinct types of VME: (1) with open-bite and (2) without open-bite.1 Characteristic features of vertical maxillary excess includes excessive exposure of maxillary anterior teeth, poor lip to tooth relationship, large interlabial distance, long lower third of face and inordinate exposure of the maxillary teeth and gingiva upon smiling. The excessive gingival exposure on smiling has provoked considerable interest and concern among the orthodontist. The "gummy" smile can be defined as 2mm or more of maxillary gingival exposure in fullsmile2. The etiology of gummy smile varies from excess vertical maxillary growth, short upper lip, hyperactive elevator muscles of the upper lip, passive eruption of upper anteriors and gingival hyperplasia. There are different treatment strategies for the correction of gummy smile including headgear therapy, crown lengthening procedures, surgical methods like Lefort<sup>1</sup> Osteotomy with superior impaction, botulinum toxin injections, skeletal anchorage systems assisted intrusion and different loop mechanics depending upon the etiology. Several types of skeletal anchorage devices, including miniscrews, on plants, and miniplates, have been introduced, and the most popular is the miniscrew <sup>8-9</sup>.Various case reports by Lin,<sup>5</sup> Mohammed,<sup>19</sup> and Kaku,<sup>20</sup> had used multiple miniscrews in the anterior and posterior segments to provide simultaneous intrusion and retraction without causing extrusion posteriors. But their placement is usually between the dental roots; this renders them an obstacle to many desired tooth movements <sup>10-12</sup>. There have been previous reports about surgical miniplates as orthodontic anchorage.<sup>13-15</sup> These miniplates do not interfere with tooth movement and can

with stand heavier and more dynamic forces than miniscrews because of multi-screw retention. Several designs are suitable for orthodontic purposes. Sugawara et al developed a new design of miniplate anchored to the zygomatic buttress and named it the "skeletal anchorage system."De Clerck and Cornelis showed patients treated with miniplates and various additive components.<sup>16-18</sup>

### Case report

A 19 year old female patient with a chief complaint of excess visibility of the gums during smile presented with a prognathic maxilla and orthognathic mandible, classII skeletal pattern mild procilination or upper and lower incisors with gummy smile. The correction of the gingival display was to be carried out with nonextraction line of treatment with fixed mechanotherapy reinforced with skeletal anchorage after extraction of all first bicuspids for intrusion and simultaneous retraction. The vector of force for retraction needed to be steep enough to achieve true intrusion along with retraction. The site for anchorage had to be as high as possible. Inter radicular micro implants was not a viable choice because of anatomical limitations. Thus a modified miniplate was chosen as it could be positioned above the apices of the maxillary first and second premolars bilaterally.



Figure 1a – Pre-treatment photos



Figure 1b - Pre-treatment models



Figure 1c - Pre-treatment radiographs

## **Treatment progress**

After initial leveling and aligning, a 0.019x0.025 stainless steel arch wire with bilateral post between the upper lateral and cainie was placed. Stainless steel infra zygomatic "Y" shaped plate was used bilaterally in the infra zygomatic area under local anesthesia. The free ends of the "Y" plate was positioned directly above the apices of the 1<sup>st</sup> and 2<sup>nd</sup> maxillary premolars. Double TPA was given connecting the 1st premolars and the 1st molars to prevent the buccal flairing of the posterior segment. An intrusive and retractive vector of force with the help of elastics was placed from the double posted arch wire (distal to laterals and distal to premolars) bilaterally passing through the center of resistance of the maxilla to the free end of the "Y" plate. Using the law of parallelogram of forces and the trigonometric formula (F  $\cos \theta$  and F  $\sin \theta$ ) the retractive and intrusive forces were calculated to be 297 and 247gms. The duration of treatment was three years.







Figure 2: Surgical placement of the mini implants



Figure 3: TPA on molars and premolars to prevent buccal flaring



Figure 4: Progress of retraction using elastics



Figure 5: Arch wires with post distal to canine and distal to 2nd premolar

## Results

Treatment using miniplates as skeletal anchorage device demonstrated maxillary skeletal and dental alveolar changes. The gummy smile was completely corrected with the intrusion of the upper segment. During the treatment period the maxillary downward and forward desent due to growth was restrained. Dentoalveolar readings demonstrated significant intrusion and bodily

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retraction of the maxillary anteriors with are mark able improvement in the smile of the patient. The cephalometric superimpositions showed that UI to NF reduced from 34 mm pre-treatment to 28mm posttreatment. The treatment finished with a pleasing profile and good smile esthetics post treatment.



Figure 6: Post treatment extra oral and intraoral



Figure 7: Post treatment radiographs



Figure 8: Extra oral comparison before and after treatment

#### Discussion

Gummy smile can occur due to many reasons such as vertical maxillary excess, excessive gingival overgrowth, altered passive eruption, anatomically short upper lip, hyper mobile muscles of the upper lip, or a combination of any of these factors. Various kinds of skeletal anchorage situations have been described that permit the orthodontist to treat certain malocclusions that are correction. In this patient, the gummy smile was a result of vertical maxillary excess. The use of mini screw mechanics for achieving the effect of a Le Fort I impaction of the maxilla was proposed by Lin et al. using multiple screws. Posterior bite block therapy with or without repelling magnets has been used in several studies with results showing reduction in lower anterior facial height. However, patient compliance with such appliances was poor, and temporomandibular joint problems have been reported with the use of repelling magnets. In this case report, infrazygomatic plates along with a modified TPA in the maxillary arch had been used without the problem of patient compliance. This has satisfactorily resulted in the intrusion of entire maxillary dentition. This procedure has been termed by Paik et al as "slow impaction" of maxilla as it mimics the effects produced by Le Fort I maxillary surgery. Stability has always been a concerning factor following posterior intrusion and reduction of vertical dimension in adult patients. It has been suggested that intrusion of posterior teeth can be maintained by isometric clenching exercises. Chewing gum exercise to increase the contraction forces of elevator muscles of the mandible can be helpful in maintaining the correction. Isometric clenching on soft bite plate for 30 min per day over an 8weekperiod or two 15 min sessions (3 s clenching with 5 s rest in between) can be done. Alternatively, chewing gum exercise of 30 min per day for 4 weeks can be advised. Following this, total occlusal force was found to be increased by 140% and contact area by 125%.In 2003, Paik et al 3 treated vertical maxillary excess by single palatal implant and modified trans palatal arch (TPA). In 2006, Kim et al.4used mini-implant with

segmented wires to achieve intrusion. Gummy smile

impossible to manage with traditional methods 6-7.

Many a times, orthognathic surgery is required for

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poses anesthetic problem and requires proper diagnosis and treatment planning. Gummy smile along with a hyper divergent profile is often characterized by excessive maxillary posterior Dentoalveolar height along with excessive anterior Dentoalveolar height. In such situations, often surgical therapy like a Le Fort impaction is needed to improve esthetics. However, alternative method using miniplate is now frequently used in cases where going under the knife is an issue.

#### **Composite analysis**

Table 1: Anteroposterior parameters

Parameters	Pre-treatment	Post-treatment
SNA	91.3	89.7
SNB	84.6	84.9
ANB	6.7	1.6

Table 2: Vertical parameters

Parameters	Pre-treatment	Post-treatment
ANS-Me	75mm	75.3
NA-APOG	15	9.6
OP to FH	13.6	9.2

Table 3: Dental parameters

Parameters	Pre-treatment	Post-treatment
Overjet (mm)	5mm	2mm
Overbite (mm)	бmm	2mm
U1 to NF	34 mm	28 mm

 Table 4: Soft tissue parameters

Parameters	Pre-treatment	Post-treatment
UL – E line	2mm behind	5mm behind
LL – E line	3mm ahead	0 mm
L6 – MP	31mm	32.5
L1 –MP	92.49	45.5
U1 – NF mm)	34 mm	28mm
L1 – NF (mm)	28 mm	25 mm
U6 – NF	27 mm	22 mm

#### Conclusion

The miniplate is an effective and very stable stationary anchorage devise. It provides the operator a good sense of confidence with regard to stability. It has only one disadvantage of having to undergo two minor surgical procedures. Patients with gummy smile can be treated successfully by no extraction with intrusion and retraction with the help of infra zygomatic mini plates to achieve total maxillary intrusion and thereby achieve reduction in gummy smile and pleasing esthetics.

## **Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient has given her consent for her 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.

## Abbreviations

1. VME – Vertical maxillary excess

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