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CASE REPORT
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CASE REPORT:
Management of a Severe Gummy Smile with Temporary Anchorage Devices

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Abstract

A 46-year-old Nigerian woman came for consultation with the chief complaint of gummy smile. The clinical examination showed a convex profile, a protrusive maxilla, a Class II Division 1 malocclusion involving a gummy smile. Temporary anchorage devices (TADs) in the anterior dental region were used as anchorage for the intrusion of her maxillary anterior teeth. Those appliances, combined with retraction of the maxillary anterior teeth, eliminated the severe gummy smile and corrected the canine relationship from Class II to Class I. The treatment was workable and simple, and the active period was 12 months. The patient received a satisfactory occlusion and an attractive smile.

Key words: Malocclusion; Intrusion; gummy smile; Temporary Anchorage Device

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Introduction

Excessive gingival display during smiling, or gummy smile, which may result from a variety of aetiological factors [1,2] is an aesthetic problem for some patients.[3-6] In adults, the gummy smile which may be caused by anterior vertical maxillary excess of skeletal or dentoalveolar origin may present with excessive visibility of upper incisors and excessive display of gingiva on smiling (gummy smile).[7] More than 4 mm of gingival display has been considered excessive and unattractive by patients and general dentists.[8] Gummy smiles are rarely corrected with conventional mechanics and often, orthognathic surgery such as Le Fort impaction or maxillary gingivectomies are often indicated to achieve a good smile.[3,5,9-12]

However, if patients are unwilling to undergo surgical treatment, an alternative method must be considered to treat the gummy smile. Temporary anchorage devices (TADs) have simplified orthodontic treatment by changing the conventional conception of biomechanics and anchorage control with good patient acceptance.[13,14] Successful intrusion of teeth with TADs as anchorage had been demonstrated.[2,7,15-18]

The following clinical case describes the treatment of an adult patient with gummy smile using TADs anchorage.

Presenting complaint

A 46-year-old female patient presented at a private orthodontic clinic in Lagos, Nigeria, with the chief complaint of excessive display of gum on smiling.

Medical and Dental History

There was no significant medical history, but past dental history revealed sequelae of trauma to the maxillary right central incisor treated with

apicectomy followed by post and core crown restoration. In addition, her records showed a history of camouflage treatment for Class II division 1 malocclusion with fixed orthodontic appliance and extraction of maxillary first premolars. The prior orthodontic treatment was completed five years before the present complaint.

Diagnosis

Clinical Assessment

Extraoral findings: Examination showed slightly convex profile with competent lips. When the patient smiled, she showed more than 10 mm of gingival exposure in the incisor region (Fig. 1). No short or hyperactive upper lip. There was vertical maxillary excess which could be the aetiology of the gummy smile.[19,20]

Intraoral findings: Examination showed full complement of permanent dentition except the missing maxillary first premolars, bilateral one unit Angle's Class II malocclusion, deep overbite, overjet of 2mm, mild mandibular arch anterior crowding, retroclined maxillary incisors, and mild maxillary anterior spacing (Fig 2). The clinical examination suggested incisal and canine guidance without prematurity and shift. The patient had no temporomandibular joint symptoms. No deviation and pain during the movement of the mandible were discovered.

Radiographic Assessment

Panoramic findings: This revealed missing maxillary first premolars and no sign of root resorption, caries, or periapical lesion.

Cephalometric findings: The Lateral Cephalometric analysis showed a skeletal Class II relationship, with maxillary excess, excessive overbite, and vertical excess. The radiographic images and tracings are presented in Figure 3 and the cephalometric measurements in Table 1.

Treatment Objectives

The treatment objectives were:

To create a satisfactory occlusion, maintaining a Class II molar relationship but normalize overjet and overbite.

Intrusion of the maxillary anterior teeth was indicated to reduce the exposure of the gingiva.

Limit extrusion of the posterior teeth to prevent a clockwise rotation of the mandible and an increase in lower facial height.

Restoration of maxillary central incisors to improve aesthetics.

Treatment Alternatives

Two alternatives were presented to the patient.

1. Combined surgical and orthodontic treatment to elevate and retrude the anterior maxillary dentoalveolar part to eliminate the gummy smile.
2. Orthodontic treatment and use of TADs to provide absolute anchorage for incisor intrusion to eliminate the gummy smile. The disadvantage was that the prognathic maxilla would not be corrected.

After a review of the risks and benefits of the two options, the patient chose the more conservative method which was the second alternative because of the advantages of being less invasive and requiring a shorter treatment time.

Treatment Progress

Orthodontic treatment began on October 23, 2017, with insertion of two mini-implants (1.6 × 8 mm, Hubit, Korea) between the roots of the right and left maxillary lateral incisors and canines.[21] On the same day, preadjusted 0.022-inch brackets, Roth prescription (Dentaurum, Ispringen, Germany) were bonded, engaged with 0.014-inch nickel-titanium archwire ligated to all maxillary teeth. An intrusive force was applied with an elastomeric chain ligated from the TADs to the archwire in the anterior region (Fig. 4, A). At the recall visit after 3 months, mandibular teeth were bonded.

Both arches were aligned and leveled beginning with 0.014-inch nickel-titanium archwires, with progression up to 0.019 × 0.025-inch stainless steel archwires. With the rectangular 0.019 × 0.025-inch stainless steel archwire, elastomeric chain was used to close spaces in the maxillary arch (Fig. 4, B), and Class II intermaxillary elastics was used for better interdigitation of occlusion (Fig. 4, C).

Before debonding, Gingivectomy was carried out to eliminate gingival hyperplasia. The TADs remained stable during treatment and were removed under topical anesthesia. After debonding, removable vacuum formed thermoplastic retainers were placed in both arches. The total active orthodontic treatment time was 12 months.

The crown restorations on maxillary central incisors were done to improve aesthetics, then a canine-to-canine and lateral incisor-to-lateral incisor lingual retainer was bonded in the mandibular and maxillary arch respectively.

Treatment results

The gummy smile was eliminated, and in full smile view, the patient showed not more than 4mm of gingiva (Fig.5). The post-treatment photographs and dental casts demonstrated Class I canine with Class II molar relationships, normal overbite, and overjet (Figs. 6 and 7).

The post-treatment cephalogram and panoramic radiograph are shown in Figure 8. The cephalometric analysis (Table 1) and superimposition (Fig 8, C) showed that the maxillary incisors were intruded by 7.0 mm with concomitant intrusion of the maxillary molars and autorotation of the lower jaw in anticlockwise direction. However, the final cephalometric analysis (Table 1) showed that the skeletal anteroposterior discrepancy between the maxilla and the mandible remained unchanged. The comparison between the pretreatment and posttreatment panoramic radiographs showed an evidence of mild root resorptions within acceptable parameters compatible with the extent of movement.

A stable occlusal relationship and a harmonious face were maintained for one year follow-up (Fig. 9).

Table 1. Cephalometric data

Measurement	Norm	Pretreatment	Posttreatment	Δ
SNA (°)	85.5 ± 3.5	91	88	-3
SNB (°)	82.7 ± 3	82	79	-3
ANB (°)	2 – 4	9	9	0
LAFH (mm)	60.9 ± 5.0	69	57	-12
U1 to FH (°)	119 – 127	104.5	117	12.5
IMPA (°)	96 – 104	97	99	2
Interincisal angle (°)	108 – 116	137	127	-10

Fig. 1. (A – I) Pretreatment facial and intraoral photographs.

Fig. 2. (A – E) Pretreatment dental casts.

Fig. 3. (A) Initial panoramic radiograph, (B) Initial lateral cephalometric radiograph, and (C) tracing.

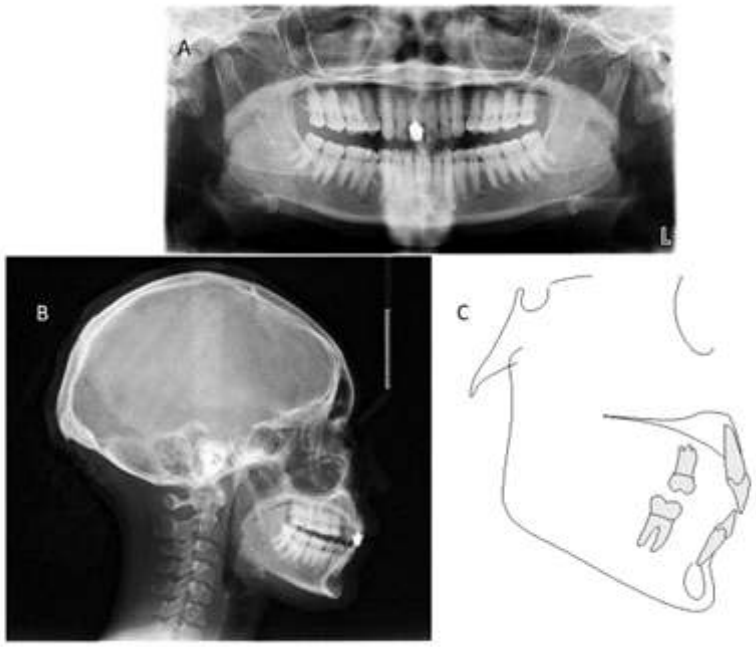

Fig. 4. Treatment progress: (A) intrusive force applied with an elastomeric chain; (B) elastomeric chain to close spaces; and (C) after intermaxillary elastics used for better occlusion.

Fig. 5. Full smile photographs: (A) pretreatment; (B) posttreatment; and (C) 1-year in retention.

Fig. 6. (A – I) Posttreatment facial and intraoral photographs

Fig. 7. (A – E) Posttreatment dental casts.

Fig. 8. (A) Posttreatment panoramic radiograph; (B) cephalogram; and (C) superimposition.

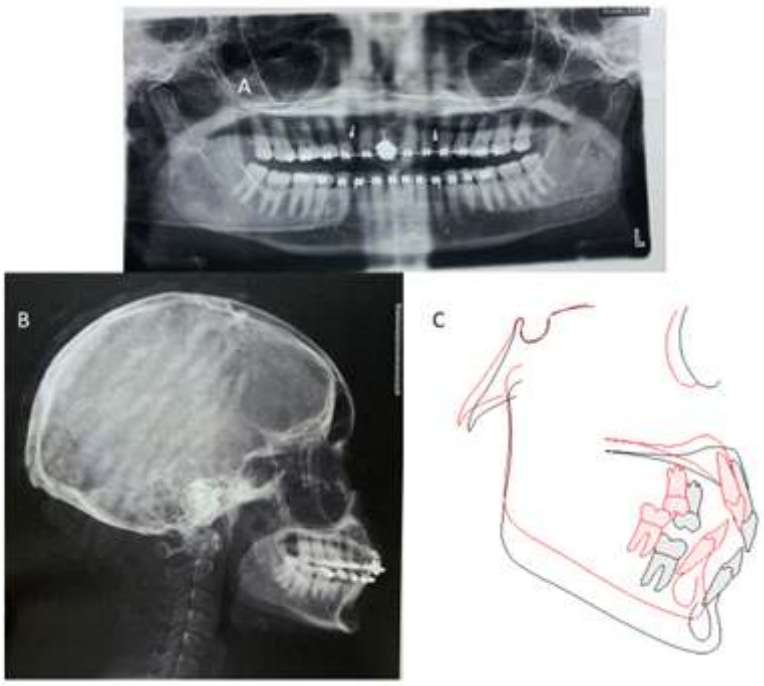

Fig. 9. (A – I) Facial and intraoral photographs after 1-year in retention.

Discussion

Excessive gingival display can be classified by etiology into soft tissue, dentoalveolar, and skeletal types.[7,19,20]

When a gummy smile is found in adults with long-face syndrome caused by excessive vertical maxillary growth, orthognathic surgery is generally required to intrude the maxilla and eliminate the excessive gingival display.[2-4,10,11,22,23] Such increase in vertical facial height may be confirmed by cephalometric analysis.[5] However, in some gummy smiles of dentoalveolar origin, when a gummy smile is derived from protrusion and extrusion of the maxillary anterior dentoalveolar complex, orthognathic surgery could produce decreased anterior dentoalveolar height after surgery, resulting in a low smile and unfavorable result.[24] Although in this patient, the LAFH was 69mm at treatment onset (Table 1), due to the potential risks of jaw surgery which include excessive hemorrhage, infection, loss of tooth vitality, and periodontal loss, as well as risks inherent to anesthesia[2] and high treatment costs, the patient was reluctant to undergo surgery.

In the orthodontic clinic, titanium miniplates and dental implants have also been successfully used for tooth intrusion.[12,25] But, the TADs have the advantage of immediate loading, multiple placement sites, uncomplicated placement and removal procedures, and minimal expense for patients.[26] A mini-implant for orthodontic anchorage should be small enough to place in any areas of alveolar bone, even apical bone, the surgical procedure should be easy enough for an orthodontist or general dentist to perform and minor enough for rapid healing, the implant should be easily removable after orthodontic treatment with minimal patient cooperation requirement, except for good oral hygiene.[25,27,28] In this case, the TADs remained stable during the time of intrusive force application.

Correction of gummy smiles with continuous light intrusion forces on the maxillary anterior dental arch[29] could also be accomplished by extraoral intrusion appliances such as headgear[30] and J-hook.[31] Traditional intrusion techniques, such as utility arches[32] and 1-piece intrusion arches,[33] were optional but not optimal for this patient, because they require anchorage on the molars and produce undesirable moments on the anterior teeth.

Intrusion of posterior teeth in the upper arch was not planned but superimposition of the lateral cephalometric tracings shows some intrusion of upper molars that resulted in anticlockwise rotation of lower jaw (Fig. 8,C). This movement was explained as a result of binding archwire with the brackets and buccal tubes at later stages of incisor's intrusion.[34] There was no major significant change observed in the cephalometric anteroposterior skeletal measurements and the patient remained skeletal class II. However, special consideration was given to the soft tissue aesthetics which was further improved with restoration of crown and gingivectomy after debonding.

Conclusions

TADs were adopted for the treatment of a 46-year-old woman with a gummy smile, and a desirable result was achieved.

The excessively erupted anterior teeth were corrected by intrusion of the anterior dental alveolus; this eliminated the gummy smile.

The appropriate application of TADs to correct a gummy smile must be based on the correct analysis of the etiology.

This appliance was simple and workable for the treatment of a Class malocclusion patient with a gummy smile, and she was satisfied with the result.

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Conflict of Interest

None declared

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