



CASE REPORT

MINIMALLY INVASIVE INTERDISCIPLINARY MANAGEMENT OF GUMMY SMILE IN AN ADULT PATIENT WITH VERTICAL MAXILLARY EXCESS USING TEMPORARY ANCHORAGE DEVICES AND CROWN LENGTHENING: A CASE REPORT

Hitesh Ramdas Sawant¹, Karishma Ashok², Parag Vishnu Gangurde¹, Nilesh Joshi², Sanpreet Singh Sachdev^{3*}, Sheetal Mohan Jadhav⁴

¹Departments of Orthodontics and Dentofacial Orthopedics, Bharati Vidyapeeth (Deemed to be University) Dental College and Hospital, Navi Mumbai, India, Email ID: hitesh.sawant@bharativedyapeeth.edu

²Departments of Periodontics, Bharati Vidyapeeth (Deemed to be University) Dental College and Hospital, Navi Mumbai, India, Email ID: drkarishmaperio@gmail.com

¹Departments of Orthodontics and Dentofacial Orthopedics, Bharati Vidyapeeth (Deemed to be University) Dental College and Hospital, Navi Mumbai, India, Email ID: parag.gangurde@bharativedyapeeth.edu

²Departments of Periodontics, Bharati Vidyapeeth (Deemed to be University) Dental College and Hospital, Navi Mumbai, India, Email ID: nilesh.joshi@bharativedyapeeth.edu

³Departments of Oral Pathology and Microbiology Bharati Vidyapeeth (Deemed to be University) Dental College and Hospital, Navi Mumbai, India, Email ID: sanpreet.singh@bharativedyapeeth.edu

⁴Departments of Prosthodontics Bharati Vidyapeeth (Deemed to be University) Dental College and Hospital, Navi Mumbai, India, Email ID: sheetal.jadhav@bharativedyapeeth.edu

Corresponding author*: Dr. Sanpreet Singh Sachdev, 317, Department of Oral Pathology and Microbiology, Bharati Vidyapeeth (Deemed to be University) Dental College and Hospital, Sector-7, Belapur CBD, Navi Mumbai, Maharashtra – 400614, India. Email: sanpreet.singh@bharativedyapeeth.edu

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ABSTRACT

Gummy smile, characterized by excessive gingival display, presents a multifactorial diagnostic challenge requiring interdisciplinary management. Traditional surgical correction through Le Fort I osteotomy is invasive and often declined by patients. Minimally invasive alternatives such as intrusion using temporary anchorage devices (TADs), in conjunction with periodontal aesthetic recontouring, offer promising outcomes in borderline cases. A 19-year-old female presented with a convex facial profile, gummy smile, and skeletal Class II relationship with vertical maxillary excess. Orthodontic intrusion of the maxillary arch using TADs, combined with crown lengthening by internal bevel gingivectomy, was planned and executed. The treatment achieved aesthetic and functional goals, including correction of proclination, reduction of gingival display, and establishment of Class I canine and molar occlusion. This case demonstrates the success of a minimally invasive, interdisciplinary approach for managing gummy smile due to vertical maxillary excess. TADs provided absolute anchorage for controlled intrusion, while crown lengthening improved gingival symmetry and smile aesthetics, avoiding the need for orthognathic surgery.

Keywords: Orthodontics, Periodontics, Interdisciplinary Dentistry, Crown lengthening procedure, Orthognathic surgery

INTRODUCTION

Aesthetic dentistry in adult patients often demands a nuanced and interdisciplinary approach to resolve skeletal and dentoalveolar discrepancies.¹

One such complex presentation is a "gummy smile," or excessive gingival display, typically considered unattractive when the gingiva visible during smiling exceeds 3 mm.² Etiologies contributing to this

condition are diverse and include vertical maxillary excess, hyperactive upper lip musculature, altered passive eruption, short clinical crowns, and hyperdivergent facial growth patterns. Among these, vertical maxillary excess remains particularly challenging in adult patients due to its skeletal origin³.

Orthognathic surgery, particularly Le Fort I osteotomy with maxillary impaction, is widely accepted as the definitive treatment for vertical maxillary excess.⁴ However, this option is invasive, involves hospitalization, general anesthesia, and prolonged recovery periods. Many adult patients either decline or are medically unfit for such extensive procedures. In such borderline cases, conservative options that utilize temporary anchorage devices (TADs) for skeletal camouflage have emerged as reliable and effective alternatives. TADs facilitate controlled intrusion and allow for significant vertical alterations without relying on patient compliance or extraoral appliances.⁵

Another crucial element in smile aesthetics is the appearance of gingival margins and crown proportions. Following intrusion, particularly of the entire maxillary arch, the clinical crowns may appear shortened. In such scenarios, periodontal procedures like crown lengthening or gingivectomy play an essential role in achieving a balanced and harmonious smile. This case report describes a comprehensive interdisciplinary approach involving TAD-assisted orthodontic intrusion and aesthetic

crown lengthening in a young adult patient with vertical maxillary excess and a gummy smile, who was unwilling to undergo orthognathic surgery.

CASE REPORT

A 19-year-old female reported to the orthodontic department with the chief complaint of prominent upper front teeth and a visible gummy smile during social interactions. The patient was otherwise systemically healthy, had no contraindications to dental treatment, and expressed a strong preference for non-surgical correction. Her primary aesthetic concern revolved around excessive gingival display and lip incompetency at rest.

Clinical Findings

On extraoral examination, the patient exhibited a convex facial profile with vertical facial excess and a high smile line that resulted in more than 5 mm of gingival display. She had competent lips only when strained. Intraorally, she demonstrated a skeletal Class II maxillomandibular relationship characterized by a prognathic maxilla and retrognathic mandible. A vertical growth pattern was noted along with severe proclination of both maxillary and mandibular incisors. The recorded overjet was 11 mm, and the overbite was 4 mm. The clinical crowns of the maxillary anterior teeth appeared shortened in relation to the extent of gingival display, suggesting altered passive eruption. Cephalometric analysis confirmed skeletal Class II malocclusion with vertical maxillary excess and dentoalveolar protrusion (Figure 1).

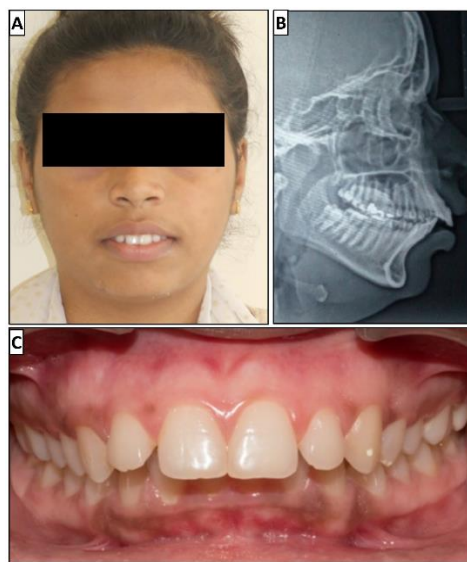


Figure 1. A) Pre-operative facial view showing incompetent lips; B) Lateral cephalogram showing proclined anterior teeth; C) Teeth in occlusion

The patient was diagnosed with a high-angle skeletal pattern contributing to the gummy smile. The case was determined to be a borderline surgical case, but based on the patient's preference, a non-surgical treatment plan focusing on camouflage and aesthetic enhancement was devised.

Orthodontic Intervention

Orthodontic treatment was initiated with the patient's informed consent. The treatment plan involved bilateral extraction of maxillary first premolars (teeth 14 and 24) to facilitate retraction of the maxillary anterior teeth and create space to manage the proclination. Local anesthesia with 2% lignocaine and adrenaline was used to perform the extractions. This phase allowed for improvement in the incisor inclination and establishment of Class I canine relationships.

Fixed mechanotherapy was started using a pre-adjusted edgewise appliance with a 0.022 x 0.028-inch slot. The alignment and leveling phase involved sequential Ni-Ti archwires: 0.014, followed by 0.016, 0.017 x 0.025, and 0.019 x 0.025 gauges. Finally, a 0.019 x 0.025 gauge stainless steel wire was used for stabilization. Once leveling was completed, 1.4 x 6 mm Dentos mini-implants were placed bilaterally in the posterior buccal segments between teeth 16–17, 12–13, 22–23, and 26–27. An additional TAD was placed in the mid-palatal region for vertical anchorage (Figure 2). A transpalatal arch with a modified helix was incorporated to prevent palatal cusp overhang during the intrusion process.

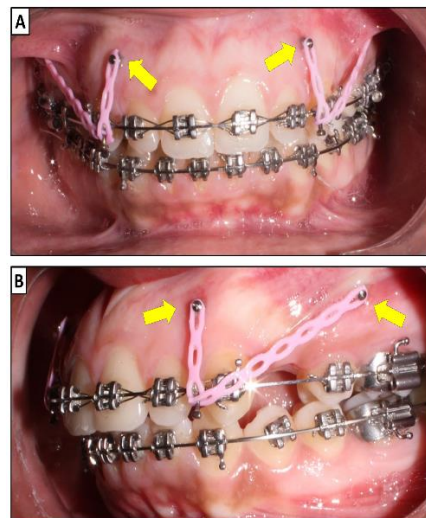


Figure 2. Temporary anchorage devices (arrows) in the A) Anterior region for Intrusion and B) Posterior region for Retraction

Crimpable hooks were inverted on the base stainless steel archwire to facilitate attachment of elastomeric chains from the TADs, thereby generating intrusive forces directed toward the occlusal plane. Over a treatment period of approximately 10 months, significant vertical intrusion of the maxillary dentition was achieved, leading to improvement in incisor inclination, overjet, overbite, and a marked reduction in gingival display. The patient's lip competency improved visibly, and the excessive vertical dimension of the smile was considerably mitigated.

Following the intrusion phase, it was observed that the clinical crown heights of the maxillary anterior teeth were still short due to gingival tissue encroachment, possibly as a result of tissue rebound or incomplete passive eruption. Hence, an aesthetic crown lengthening procedure was planned for the patient.

Periodontal Management

On periodontal evaluation, the patient displayed a high smile line with wide buccal corridors and an uneven gingival zenith. Bone sounding using transgingival probing revealed adequate distance between the gingival margin and underlying bone, ruling out the need for osseous surgery. There was no periodontal pocketing or loss of attachment, and the periodontium was healthy. A diagnosis of altered passive eruption of the maxillary anterior teeth was made, and an internal bevel gingivectomy was planned to recontour the gingival margins and increase the clinical crown length without compromising biologic width.

Under local anesthesia, a No. 15 blade was used to make an internal bevel incision approximately 1–2 mm apical to the existing gingival margin. A No. 12 blade was then used to perform a sulcular incision, and the collar of gingival tissue was excised with the aid of a Gracey curette. The surgical area was carefully debrided and left to heal without the use of periodontal dressing or sutures (Figure 3). Post-operative instructions were provided, and healing was uneventful over the next two weeks.

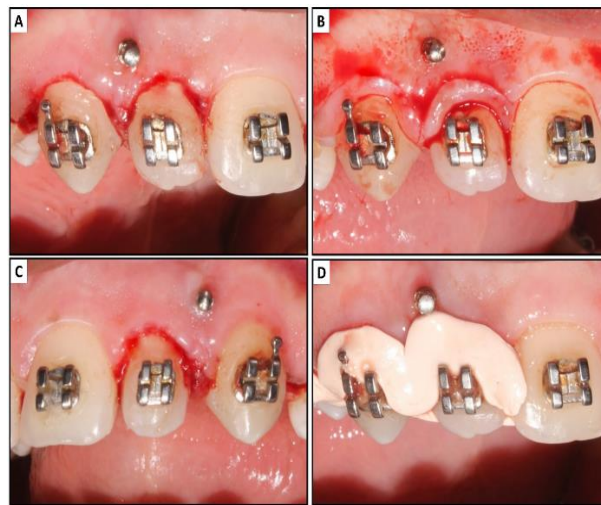


Figure 3. Periodontal aspect of management, including A) Tissue excision, B) Interrupted external bevel incision, C) Placement of periodontal pack, D) Gingival condition after Phase I treatment

Follow-up and Outcomes

After the combined orthodontic and periodontal treatment, the patient exhibited a significant reduction in gummy smile, harmonious gingival margins, and improved facial aesthetics. The final occlusion was stable with bilateral Class I canine relationships. The overjet and overbite were within normal limits, and the maxillary incisor proclination was corrected (Figure 4).

The clinical crown lengths of the maxillary anteriors were visibly enhanced, contributing to an improved smile arc and symmetry. The patient reported high satisfaction with the treatment outcome and expressed increased self-confidence in social settings. No adverse effects, such as TAD failure or periodontal complications, were observed during or after treatment.



Figure 4. Comparative visualization of A) Pre-operative smile, B) Pre-operative lateral profile, C) Post-operative smile, and D) Post-operative corrected profile

DISCUSSION

Management of gummy smile in adult patients requires careful diagnosis and a comprehensive understanding of its multifactorial etiology.⁶ When vertical maxillary excess is a contributing factor, traditional orthognathic approaches such as Le Fort I

osteotomy are effective but often rejected due to their invasive nature. In the present case, the patient's unwillingness to undergo surgery necessitated a non-surgical, camouflage-based treatment approach.

TADs serve as a valuable adjunct in such scenarios, providing absolute anchorage for vertical intrusion of

the dentition.^{7,8} The biomechanical efficiency of TADs allows for controlled and segmental intrusion without relying on extraoral anchorage or patient compliance.^{5,8} The use of multiple TADs in the posterior and palatal regions ensured uniform intrusion of the entire maxillary arch, reducing gingival display and correcting the vertical discrepancy.

Post-intrusion, the importance of micro-aesthetic refinement became evident. Despite functional success, the shortened clinical crowns and uneven gingival margins necessitated periodontal intervention. Internal bevel gingivectomy proved effective in enhancing crown proportions and improving gingival zenith alignment without disturbing the biologic width.

Botulinum toxin injections have been considered for hyperactive lip musculature in managing gummy smiles.^{9,10} However, due to concerns about toxicity and patient preference, this modality was not employed in the current case. The comprehensive effect of anterior intrusion, combined with soft tissue recontouring, addressed both skeletal and soft tissue components of the smile without surgical risk.

This case underscores the importance of interdisciplinary collaboration in managing complex aesthetic concerns. Meticulous planning, accurate diagnosis, and execution of biomechanical strategies were critical in achieving the desired results. The patient's adherence to oral hygiene and post-surgical care also contributed significantly to the success of the treatment.

CONCLUSION

This case highlights a successful example of managing a gummy smile in an adult patient with vertical maxillary excess through a non-surgical, minimally invasive interdisciplinary approach. The use of TADs for maxillary intrusion combined with periodontal crown lengthening provided an effective alternative to orthognathic surgery in the form of camouflage. The outcome was functionally stable and aesthetically pleasing, reaffirming the value of integrating orthodontic and periodontal strategies in adult smile design.

DECLARATIONS

Consent for publication

Patient's informed consent for treatment and publication was duly obtained.

Competing interests

The authors declare no conflicts of interest

regarding this study.

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