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Interdisciplinary Ortho-Perio Treatment of Excessive Gingival Display

A CASE REPORT

Introduction

The establishment of a functional occlusion is just one goal of successful orthodontic treatment. We also need to be aware of creating and designing the final smile aesthetics to be harmonious and pleasing to the eye.

Proper smile design must take into account multiple factors, including the smile arc, incisal display, overbite, tooth inclination and gingival display.¹

Excessive gingival display upon smiling is often deemed unaesthetic. It's been demonstrated that a typical population perceives 1–2 millimeters of gingival display as ideal, and anything more than 3–4mm as bordering on undesirable and unsightly.^{1,2}

Determining the etiology on why a patient has excessive gingival display is important, because it may be caused primarily by dental components, a combination of dental and skeletal components, or perhaps a true skeletal vertical maxillary excess. Each of these etiologies will have its own method of resolving the excessive gingival display. Severe skeletal vertical maxillary excesses may even require orthognathic surgery for correction.^{3,4,5}

This case report presents and discusses the treatment of a patient with the chief complaint of excessive and uneven gingival display, utilizing an interdisciplinary ortho and perio approach to resolve her concerns.



Fig. 1: Analysis of vertical facial thirds and lower third



Fig. 2: Initial extraoral and intraoral photographs

Clinical diagnosis

A 26-year-old patient presented with the chief complaint that she shows too much gum and not enough teeth when she smiles. Soft tissue and facial analysis revealed a dolichofacial facial profile with a slight increase in anterior facial height, and an analysis of her vertical facial thirds and lower third revealed an increase in lower anterior facial height and mild vertical maxillary excess (Fig. 1).

Her upper and lower lips were ahead of the E-line by about 5.5mm and 7.2mm, respectively. Intraoral examination revealed mild to moderate crowding in the maxillary

and mandibular arches, Class I molar relationship and canine relationship, a deep impinging overbite and overjet of 4.5mm.

Incisal display at smiling was ~100 percent, with uneven and excessive gingival display of up to 5mm. The patient did not exhibit any lip strain at rest and closure (Fig. 2).

Cephalometric diagnosis revealed a skeletal Class II with an ANB angle of 7.5, primarily due to an increase in SNA angle (Table 1). Her panoramic radiograph showed a complete dentition, except for the third molars and root-canal treatment on the upper left central incisor (Fig. 3, p. 30).



| Maxilla to Cranial Base | Initial Values |
|---------------------------|----------------|
| SNA (degrees) | 88.5 |
| Mandible to Cranial Base | |
| SNB (degrees) | 81.0 |
| SN-MP (degrees) | 34.3 |
| FMA (degrees) | 25.3 |
| Maxillo-Mandible | |
| ANB (degrees) | 7.5 |
| Maxillary Dentition | |
| U1-NA (mm) | 3.9 |
| U1-SN (degrees) | 107.0 |
| Mandibular Dentition | |
| L1-NB (mm) | 9.7 |
| L1-MP (degrees) | 98.7 |
| Soft Tissue | |
| Lower Lip to E-Plane (mm) | 7.2 |
| Upper Lip to E-Plane (mm) | 5.5 |

Table 1: Initial cephalometric values and cephalometric radiograph



Fig. 3: Initial panoramic radiograph



Fig. 4: 12 months after initial consultation—debonding appointment

Treatment plan

The patient expressed that she did not want to change her profile, and her primary concern was reducing the gingival display when she smiles.

Our analysis of her soft-tissue profile and facial pattern deemed that despite a dolichofacial pattern, slight increase in anterior facial height and mild vertical maxillary excess, the patient also had upper anterior dentition displaying poor width-to-height morphology—they were more square-shaped, rather than rectangular or ovoid-shaped. We decided to treat this patient as follows:

1. Preorthodontic treatment consultation with the periodontology department for bone sounding to determine that sufficient enamel was present subgingivally, and that the underlying osseous architecture is favorable for postorthodontic treatment, gingivectomy and osseous recontouring.
2. Band and bond the upper arch with differential bracket positioning for relative anterior intrusion and posterior extrusion to reduce the deep and impinging overbite (GAC Dentsply Micro VS Euro metal prescription brackets).

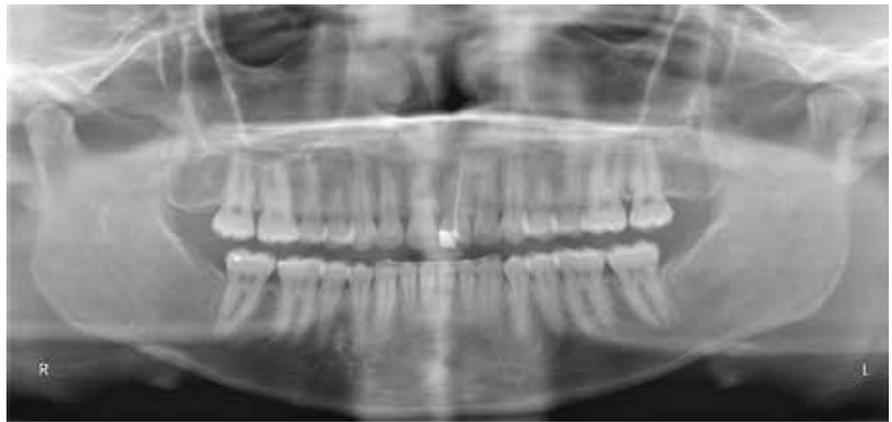


Fig. 5: 12 months after initial consultation—final panoramic radiograph

| Maxilla to Cranial Base | Initial Values | Final Values |
|---------------------------------|----------------|--------------|
| SNA (degrees) | 88.5 | 87.5 |
| Mandible to Cranial Base | | |
| SNB (degrees) | 81.0 | 81.2 |
| SN-MP (degrees) | 34.3 | 34.2 |
| FMA (degrees) | 25.3 | 25.9 |
| Maxillo-Mandible | | |
| ANB (degrees) | 7.5 | 6.3 |
| Maxillary Dentition | | |
| U1-NA (mm) | 3.9 | 3.0 |
| U1-SN (degrees) | 107.0 | 101.5 |
| Mandibular Dentition | | |
| L1-NB (mm) | 9.7 | 9.3 |
| L1-MP (degrees) | 98.7 | 110.1 |
| Soft Tissue | | |
| Lower Lip to E-Plane (mm) | 7.2 | 6.7 |
| Upper Lip to E-Plane (mm) | 5.5 | 5.1 |

Table 2: Initial and final cephalometric values and final cephalometric radiograph



Fig. 6: Two weeks after debonding—smile analysis and digital template

- Once sufficient bite opening is achieved, bond the lower arch.
- Place bite-opening step-bends on the maxillary arch and reverse curve of Spee in the lower arch to decrease the overbite and reduce the overjet as required.
- Use Class II elastics for overjet reduction.
- Place fixed lower retainers and deliver overlay Hawley retainers (Perfect Finish Laboratory, New Jersey) for retention.
- Refer to the periodontology department for aesthetic gingivectomy and osseous recontouring.

Progress

One year after initial: The patient completed the orthodontic treatment as prescribed in the above treatment plan.

She was also informed that because of the slower rate of soft-tissue remodeling and the intrusion mechanics on her upper anterior dentition, her gingival display may increase slightly more than before (Fig. 4, p. 30).

Postorthodontic treatment cephalometric analyses showed an improvement in the ANB angle, but a slight decrease in upper incisor inclination and increase in lower incisor inclination because of the overjet reduction (Table 2).

The panoramic radiograph showed the roots in acceptable alignment and no additional bone loss from the treatment (Fig. 5).

Two weeks after orthodontic debond: The patient presented to the periodontology department, where her smile was reanalyzed and preoperative bone sounding was performed under local anesthesia.

It was determined that the patient had

uneven and excessive gingival display because of altered passive eruption and mild vertical maxillary excess—the treatment of choice was decidedly aesthetic gingivectomy with osseous recontouring.

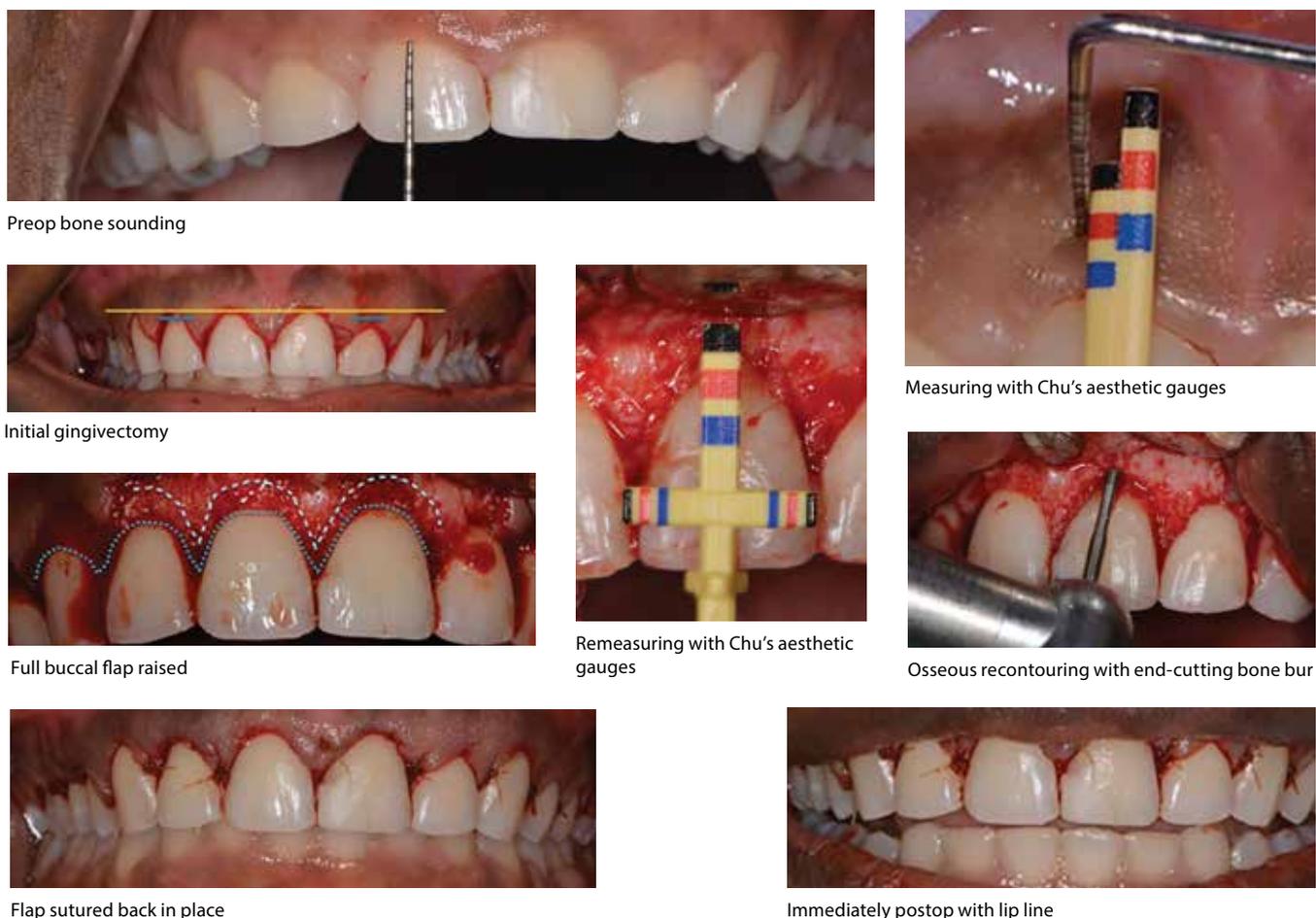
Measurements of the keratinized gingival length and normalized tooth width-to-height ratios were calculated for her as a digital template before the surgical procedure (Fig. 6).

Three weeks after orthodontic debond: Utilizing the digital template and an aesthetic gauge (Hu-Friedy, Chu's Aesthetic Gauge) the gingivectomy was first performed followed by raising a full buccal flap and osseous recontouring. Intraoperative bone sounding was repeated throughout the procedure to ensure the re-establishment of a healthy biological width (Fig. 7).

Six weeks after periodontal surgery (to allow soft-tissue maturation before the first postoperative review): During the review, the patient expressed that she was already satisfied with the results. However, closer analyses and patient corroboration revealed there were areas that needed modification—specifically, the interproximal papilla between the UR3,4 and the UL2, 4, 5, where the margins still looked irregular. Minor revision gingivectomy was performed under local anesthesia to address these concerns (Fig. 8, p. 34).

Twelve weeks after periodontal surgery (15 weeks after orthodontic debond): The patient presented for a final joint postoperative review with both the orthodontics and periodontology departments. She was extremely satisfied with the results and expressed that all her concerns about her gingival display upon smiling had been resolved (Fig. 9, p. 34).

Fig. 7: Three weeks post-debond—esthetic gingivectomy and osseous recontouring



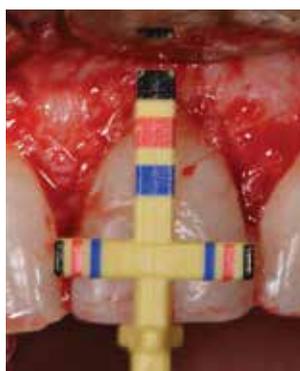
Preop bone sounding



Measuring with Chu's aesthetic gauges



Initial gingivectomy



Remeasuring with Chu's aesthetic gauges



Full buccal flap raised



Osseous recontouring with end-cutting bone bur



Flap sutured back in place



Immediately postop with lip line

Treatment review and conclusion

Overall, the patient was extremely happy with both the orthodontic and periodontic treatments received. The treatment of a smile with uneven and excessive gingival display can often be challenging. On occasion a patient’s chief complaint can be resolved only through an interdisciplinary approach.

This case study is one example of how the disciplines of orthodontics and periodontology worked closely together from the initial stages of diagnosis and treatment planning, right through to executing the treatment, to finally delivering the results to satisfy the patient’s expectations, giving her the great smile she always desired. ■



Review; arrows indicate areas requiring revision



Revisions performed

References

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Fig. 9: 12 weeks postop (15 weeks post debond)—extraoral and intraoral photographs