

Treatment of vertical maxillary excess in combination with hyper-mobility of the upper lip

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This case describes the treatment of vertical maxillary excess utilising surgical crown lengthening, followed by placement of all ceramic e-max crowns 15 to 25

History, diagnosis and treatment plan

The patient, a 32-year-old female in good health, attended the practice with the priority of improving the 'gummy' appearance of her smile in preparation for her upcoming wedding ten weeks following her consultation.

A comprehensive dental health examination was completed prior to commencement of treatment. An intra-oral assessment confirmed a Class I occlusion with a minimally restored dentition. Past treatment included a frenectomy and diastema closure of 11/21 with direct restorations. All anterior teeth presented with reduced incisal length. The patient reported that she

had undertaken previous investigation with view to surgical correction of maxillary vertical excess via a maxillary osteotomy, but had declined this option, preferring to seek a less invasive solution. Periodontal health was generally good with localised regions of gingivitis (classified as low risk perio with BPE scores of 2 or less).

Assessment of the occlusion and dental history confirmed no history of occlusal/functional risk factors from the patient's perspective. Clinically, some evidence of occlusal pathology was noted with the wear of incisal edges of all anterior teeth and abfraction lesions in the lower arch. Absence of posterior wear facets suggested that wear to date was



Figure 1



Figure 2

associated with a constricted chewing pattern, although the patient reported no changes in tooth length within the past five years.¹ Examination of the TMJ and muscles of mastication found no abnormalities.

Assessment of facial aesthetics confirmed a diagnosis of maxillary vertical excess with moderate to high mobility of the upper lip (Figures 1-3). Excessive gingival display was confounded by the short clinical crown heights of all upper teeth. Assessment of the incisal edge position in relation to the position within the face, confirmed that ideal treatment would consist of raising the incisal edge position apically by approximately 2mm, or at a minimum maintaining the existing position.

Treatment options

With a view to obtaining informed consent, a number of treatment solutions were presented to the patient. The first was that of surgical correction of the maxilla with/without pre and post surgical orthodontic alignment. Subsequently, the teeth would be restored to more acceptable length (either direct or indirect). While this option would require an invasive surgical procedure, it would offer the most conservative way of achieving the smile the patient desired from a dental health perspective. This treatment option was rejected on the grounds of invasive surgery and time scale.

The second solution consisted of comprehensive orthodontic treatment with the aim of intruding

the entire upper arch, thus lifting the occlusal plane. While the use of temporary anchorage devices (TADS) and selected sectional decortication of the buccal plate can assist such treatment, intrusion of teeth is a typically slow affair with increased risk of root resorption. Again, restoration of the upper teeth to achieve ideal crown length would be required post orthodontic alignment. This option was rejected on the grounds of a reduced predictable outcome and the need to still undertake restorative care, and finally time scale.

The third solution consisted of using Botulinum toxin to reduce lip mobility.² This has been shown to offer an effective result with mild to moderate gummy smiles and high lip mobility. The use of Botulinum toxin can also be used as an adjunct to alternative treatment modalities, including the LipStat procedure (surgical management of excessive gingival display).³ Both the use of Botulinum toxin and lip surgery were also rejected as the sole means of treatment, due to the existing aesthetic appearance of the teeth, i.e. the teeth would still appear 'unattractive' in the patient's words even with less gingival display. However, the patient was prepared to use Botulinum toxin and /or LipStat procedure as an adjunct post restorative treatment, if she still felt her gingival display was too great. Bhola⁴ suggested that unfavourable dental features such as short clinical crowns should be treated prior to undertaking the LipStat procedure, as correction of such features may alter the need for such an intervention.



Figure 3

The final treatment solution consisted of a more invasive approach dentally, involving that of surgical crown lengthening of all visible teeth within the smile, followed by placement of full coverage indirect restorations to achieve ideal tooth length. This solution would necessitate the need to conform to the existing incisal edge position in order to retain some resemblance of tooth structure, and ideally, vital tooth substrate. While a significant improvement of the smile would be expected, a number of compromises would need to be accepted. That of long term health, reduced long term prognosis of restored teeth, what to do with the teeth when restorations eventually require replacement, increased risk of endodontic complication, along with acceptance that final gingival display may still be greater than ideal.

This final solution was accepted by the patient with a view that all solutions would require restorative care to achieve acceptable crown length/width ratios while achieving her desired results in a minimal time frame.

Treatment process

When considering such treatment, both soft-tissue healing times and occlusal assessment, diagnosis and treatment can take significant time. With just 10 weeks to complete treatment prior to her upcoming wedding, the treatment journey would require multi phasing of treatment procedures in place of a more sequential approach, while at

the same time provide a restorative solution which would offer the patient long term excellence.

The patient was determined to undertake treatment regardless of the potential risks to healthy teeth and occlusal complications. Hence, while there was clinical justification to establish an aetiological cause of previous tooth wear, there was little need to delay treatment whether utilising a deprogrammer or occlusal splint. Again, informed consent was sought with the understanding that the patient should be prepared to wear and pay for an occlusal splint to aid management of possible para-functional activity following post-restorative care if deemed necessary.

Treatment would therefore consist of the follow stages:

1. Diagnostic wax-up utilising existing incisal edge position - (1 week)

Required to preview final result and aid assessment of soft tissue contour, height and form in preparation for surgical crown lengthening.

2. Surgical crown lengthening - (2 weeks healing time)

Surgical crown lengthening completed 15 to 25 with the aid of a suck-down matrix from the wax-up, used as a guide to aid bone removal. Crestal bone removed approximately 3.5mm beyond proposed new crown margins via a combination of rotary and hand instrumentation.⁵ Both labial and interproximal bone

removal was required to achieve correct marginal bone form while maintaining biological width. A reduction in labial bulk was also completed in order develop a more ideal aesthetic soft tissue architecture. (Ideal healing time - three months).

3. Preparation of all teeth within the smile with full coverage restorations and impressions, two weeks post surgery

Short clinical crowns pre-operatively would result in significant dentine exposure. Therefore 15 to 25 would be prepared for a cohesive cementation protocol as dentine bonding cannot be relied upon as a significant reduction in bond strength to dentine at 90 days post cementation is recorded in the literature.⁶ Crown margins prepared to within 2.5mm of crestal bone with the aim of placing all visible margins 0.5-1.0mm subgingival. Provisional Bis-acrylic crowns placed post impressions and face-bow recordings.

The patient requested that the shade of the ceramic restoration be close to the lower teeth, but without the white mottling effect. The body shade of the natural teeth was recorded with the aid of a Vita shade guide as A1.5 – A2.

4. Fitting of a deprogrammer within 1 week of provisional crown placement (bell curve for appliance 4 weeks)

A Kois deprogrammer was provided to aid diagnosis of potential parafunctional activity, while

providing a reproducible orthopaedic position in order to establish an occlusal scheme with minimal future risk.¹ The patient was found to be deprogrammed within two weeks, presenting with no visible signs of wear on the deprogrammer suggesting absence of parafunctional activity. A constricted chewing pattern (CCP) was not recorded, however some posterior interferences were.

5. Confirmation of deprogrammed occlusion, equilibration, plus bite records (4 weeks post deprogrammer insertion)

Both provisional crowns and natural teeth were equilibrated with the aid of the deprogrammer. Although no (CCP) was recorded, this candidate was conscious not to lock the patient into a tighter MIP (but merely establish bilateral equal simultaneous contacts) as distribution of the wear facets pre-operatively still suggested a CCP as the etiological cause of previous tooth wear. Bite records were recorded in sections, and the laboratory instructed to create full coverage restoration in e-max (cut back technique for incisors, full contour with window layered ceramic technique for canines and pre-molars).

6. Fitting of final restorations (1 week post bite registration)

Final crown seating was completed using a cohesive cementation protocol with air-abrasion of tooth substrate followed by seating of all crowns with self etching dual cure cement.

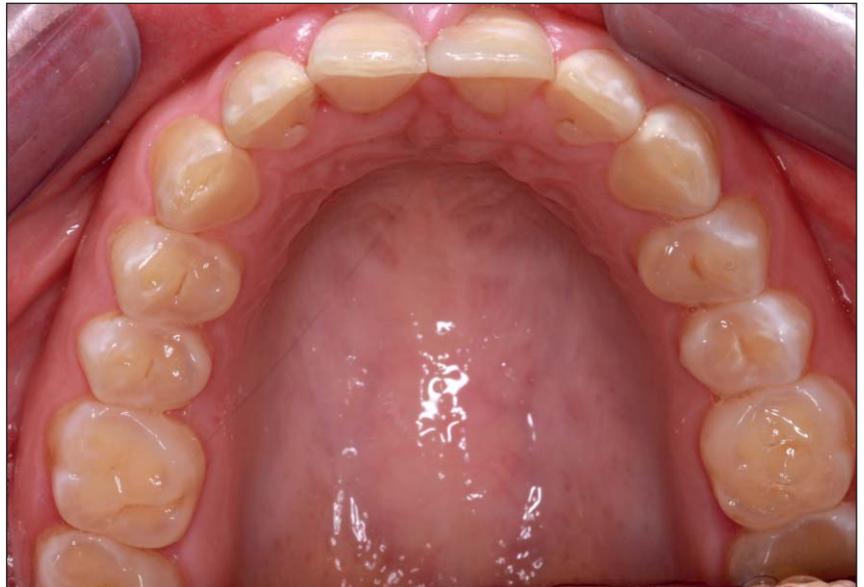


Figure 4

Total eight weeks treatment time, with two weeks healing prior to wedding. While the literature indicates that biological width is predictably established at 2.5mm from crestal bone to gingival sulcus⁵ and that interproximal papillae will reform 100 percent of the time when contacts are placed 4mm from interproximal bone,⁷ expecting gingival tissue to heal with complete resolution within such a short time frame is unrealistic. Completing extensive surgical crown lengthening and restorative treatment within a few weeks of each procedure will result in multiple traumatic episodes, thus delaying resolution of all soft tissues further. *Figure 4* was recorded four months post-treatment at which point tissue resolution was incomplete, presenting with general gingival inflammation and exposed crown margins.

In this instance, complete success could not be recorded prior to the wedding, with blunting of papilla, black triangles and widespread gingival inflammation. However, due to careful planning and meticulous attention to detail regarding crown lengthening and crown margin placement in relation to crestal bone, the patient was reassured with 100 percent confidence that complete resolution of all soft tissues would occur in the coming months. Indeed, the images presented of this case were recorded approximately 12 months post treatment, indicating complete resolution of soft tissues.



Figure 5

On completion of treatment the patient declined both the use of Botulinum toxin and/or the LipStat procedure to reduce the gummy smile further as she was delighted with the result (Figures 5-10).

Finally, this case demonstrates that long term excellence is still achievable even with compressed treatments times, if phased correctly utilising careful clinical technique and appropriate case selection.

References

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Figure 6



Figure 7

Figure 8



Figure 9



Figure 10