Digital crown lengthening and home bleaching

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The harmony of a smile mainly depends on the balance of three anatomic components: the teeth, the gingiva, and the lips. Excessive gingival display is defined as a gingival exposure larger than 2mm when a person smiles. Treatment for excessive gingival display depends on the associated factors and aetiology.

Altered passive eruption is a common aetiology of excessive gingival display. Crown lengthening surgery is indicated for altered passive eruption treatment, which consists of exposing sound tooth structure with or without removal of alveolar bone.

To increase the accuracy, predictability and success of crown lengthening surgery, fully digital protocols have been developed.

Case study

In the case presented in this article, the patient's chief complaints were her gummy smile, and the colour of her teeth (Figure 1).

She presented excessive gingival display associated with altered passive eruption from the upper left canine to the upper right canine and a hypermobile upper lip. The treatment plan for altered passive eruption was one-stage crown lengthening surgery.

Home bleaching was also suggested in order to improve the aesthetics. Later, botulinum toxin injection was planned to be performed to reduce the mobility of the upper lip, however the patient was satisfied with the results and decided to abstain from the Botox therapy.

Fig. 1: Preoperative gummy smile situation

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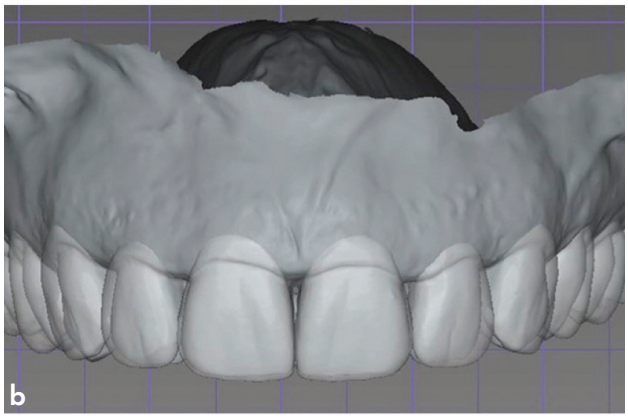
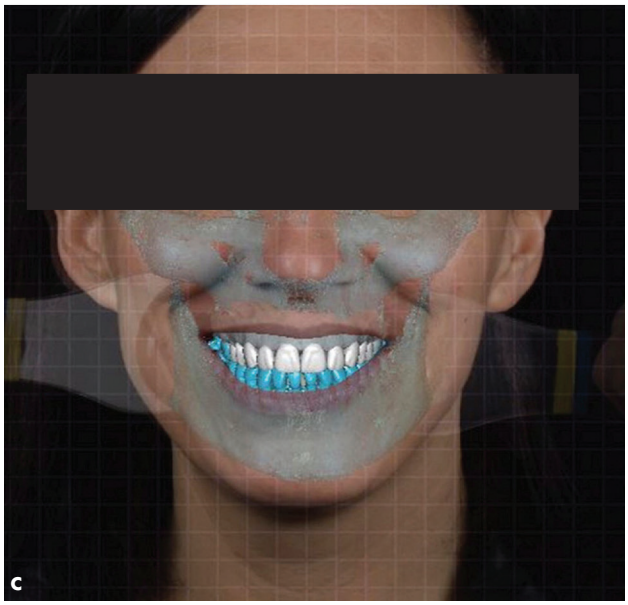




Figs. 2a-c: Digital smile design according to CBCT data

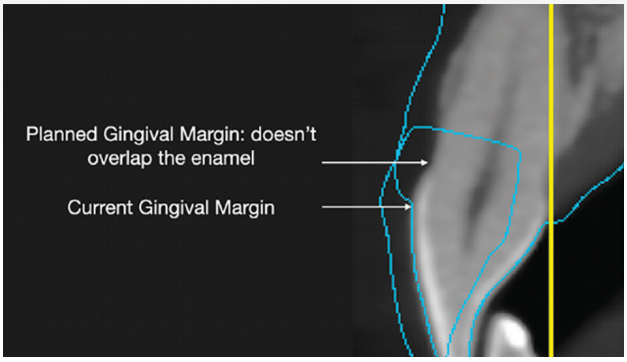


Fig. 3: Planning for crown lengthening

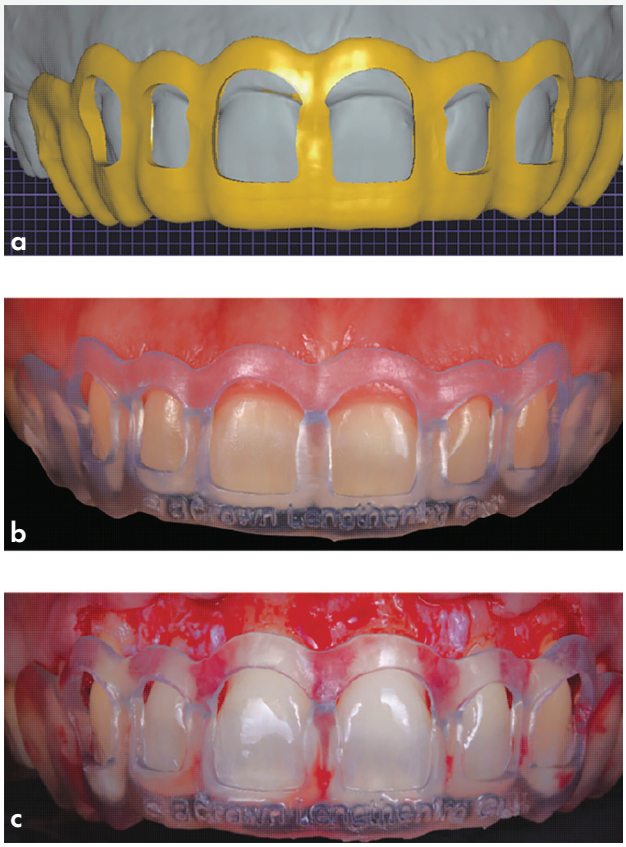
Fig. 4: Smile with wax-up

Intraoral scans, extraoral digital smile design (DSD) photographs, and cone beam computed tomography (CBCT) were taken. All the data was superimposed (Figure 2).

A digital diagnostic wax-up design was performed. It should overlap the gingival margin to achieve less gingival display. The wax-up is designed according to the DSD and the anatomic crown measures extracted from the CBCT.

The shape and size of the teeth were discussed with the patient before finalising the wax-up. In the lateral cut view, it was verified that the new margin of the wax-up is coronal to the CEJ observed on the CBCT (Figure 3).

The wax-up design cast was 3D printed (Xfab 2000, DWS Systems) with cast resin (3D printable resin Invicta 915, DWS Systems). A polyvinyl siloxane index (Aquasil Ultra+, Dentsply Sirona) was made on the printed cast. A mock-up was performed to check the occlusion and aesthetics (Protemp 4, 3M) (Figure 4).



Figs. 5a-c: Digitally designed surgical guide for crown lengthening

The crown lengthening surgical guide was designed according to the approved wax-up and mock-up. The surgical guide was printed with a 3D printer (Xfab 2000) and biocompatible resin (3D printable resin DS5000, DWS Systems) (Figures 5a and 5b).

Crown lengthening procedure

The crown lengthening procedure was performed by Dr Abdullah Ajili and Dr Lory Abrahamian.

First, the gingivectomy was carried out with an electric tip following the inner shape of the windows of the guide. Then, a full thickness flap was made with papilla preservation to make the osteotomy at the level of the bone that corresponds to the upper part of the surgical guide (Figure 5c). Finally, the needed osteoplasty was performed.

Figure 6 shows a close-up of the guide with the open flap. A three-month postoperative control photograph can be seen in Figure 7, exposing the stability of the results using the crown lengthening guide.

Three months after the surgery, home bleaching was performed for 14 days using 16% carbamide peroxide (White Dental Beauty Professional Tooth Whitening System, Optident) (Figure 8).

Fig. 6: Close up of surgical guide with open flap

Fig. 7: Check-up three months after crown lengthening

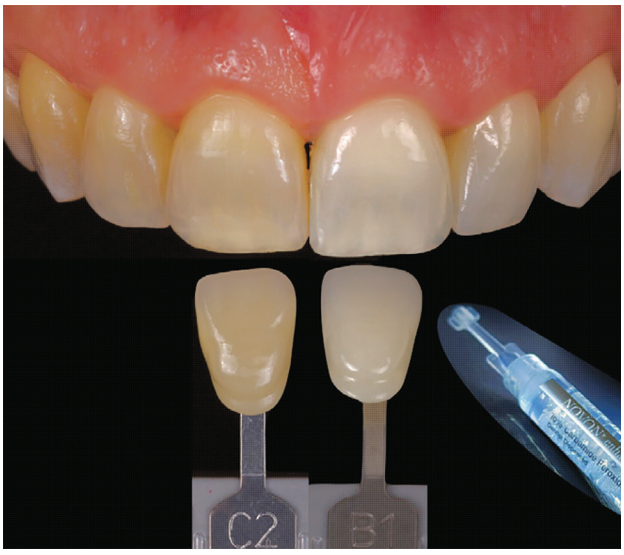


Fig. 8: Before and after whitening

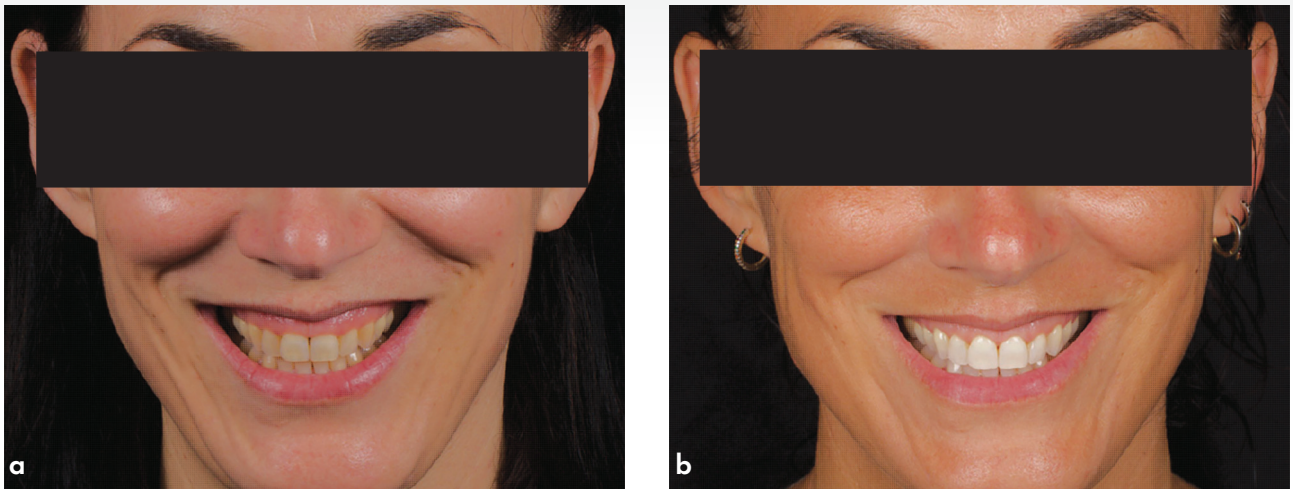


Fig. 9a-b: Before and after crown lengthening and whitening

Figure 9a shows the initial situation while the six-month post-crown lengthening surgery and two months post-bleaching result can be seen in Figure 9b.

Conclusions

The treatment of excessive gingival display with a crown lengthening surgery is technique sensitive. Using a digital workflow helps the clinician to achieve predictable results. Minimal invasive bleaching therapy could be used to ameliorate the aesthetics of the smile.

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