

Smile makeover - a composite case detailing non-surgical crown lengthening

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Introduction

A patient in their mid-20s attended my clinic to see if it was possible to get her smiling again and fix a front tooth that she had hated ever since it needed a repair as a child.

The headlining observation from the patient was that the teeth appeared small with one front tooth hidden (Figure 1) and many of the lower front teeth looking heavily chipped (Figure 2).

The patient presented with a mostly unrestored healthy adult dentition with a history of fixed appliance orthodontics 10 years previous with no fixed or removable retainers at present.

The upper fours had been removed to correct the class II skeletal base. The teeth had very mild labial crowding and a midline discrepancy of 2mm of the lower teeth to the right, with class I classifications for incisal, canine and molar (Figure 3).

Assessing the patient's smile and dental anatomy, it was observed that at full smile the lip line is moderate, with the lips showing 1.5 to 2mm of gingivae beyond the zeniths of the upper incisors. However, at this point it was noted that the clinical crown heights appear blunted by excessive free gingivae cervically without any papillae hypertrophy, suggesting altered passive eruption (APE).

The UR1 had a composite restoration, very thin in appearance and heavily worn palatal anatomy due to the occlusion. The patient reported a history of trauma to the UR1 hence its composite repair, which has been replaced multiple times. The shade of the teeth had the base colour of Vita A3.

Treatment options

The following treatment options were considered and discussed with the patient:

- Stabilisation
 - Hygiene scale and polish and thorough OHI

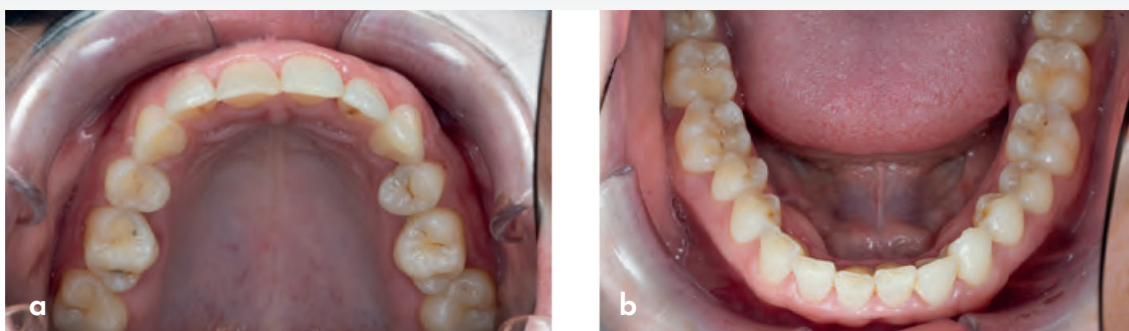


Figure 1: Preoperative smile



Figure 2: Preoperative retracted

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Figures 3a and 3b: Preoperative occlusal views

- Crown lengthening
 - Gingivectomy
 - Surgical
 - Non-surgical
- Prescription tooth whitening
- Restorative
 - Smile design and trial occlusion at new vertical dimension
 - Composite contouring – eight to 12 upper teeth, six to 12 lower teeth
 - Direct – freehand or transferred via clear silicon stent off a wax-up
- Porcelain veneers/veneers – same number of teeth as above
 - Lithium disilicate
- Michigan splint for night-time use.

Crown lengthening

Determining the type of APE is crucial for deciding which type of crown lengthening is suitable. With a periodontal probe and no LA at the consultation, I could determine that at the base of the sulcus, the CEJ could not be felt and more enamel was beyond that point on the upper incisors.

Preliminarily, a non-surgical approach using a laser diode to provide the gingivectomy was recommended with the understanding that once the patient is fully numb, an accurate measure of where the crestal bone/buccal plate began relative to the CEJ would be the final check ahead of any laser gingivectomy.

Direct composite versus lithium disilicate

The development of the silanation processes to allow highly filled yet flowable composites (eg GC Universal Injectables) compete and exceed many paste composites, the ability to additively treat tooth wear with near-to-none surface preparation is increasingly desirable over porcelain.

A desirable feature of composite is its graceful wearability and in a case such as this where localising the treatment to

the most affected teeth can allow for the Dahl principle to take effect.

Vertical dimension

Deciding whether the existing vertical dimension, a new full or partial occlusal scheme would deliver the best or necessary outcome is always a balanced and pragmatic decision to make.

In a clinically ideal scenario, a full occlusal design would deliver the most stable and functional occlusion, however combined with escalating fees and more restorative work to maintain, for most of my younger patients this is not a desirable direction.

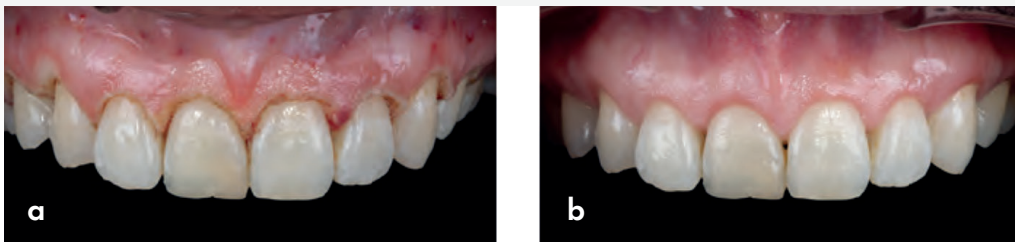
Utilising a combination of intrusion of the anterior teeth and extrusion of the posterior teeth, the Dahl principle is utilised in the new vertical dimension of the design to minimise the involved teeth while freeing myself from the restorative constraints of a conformative approach.

Treatment plan

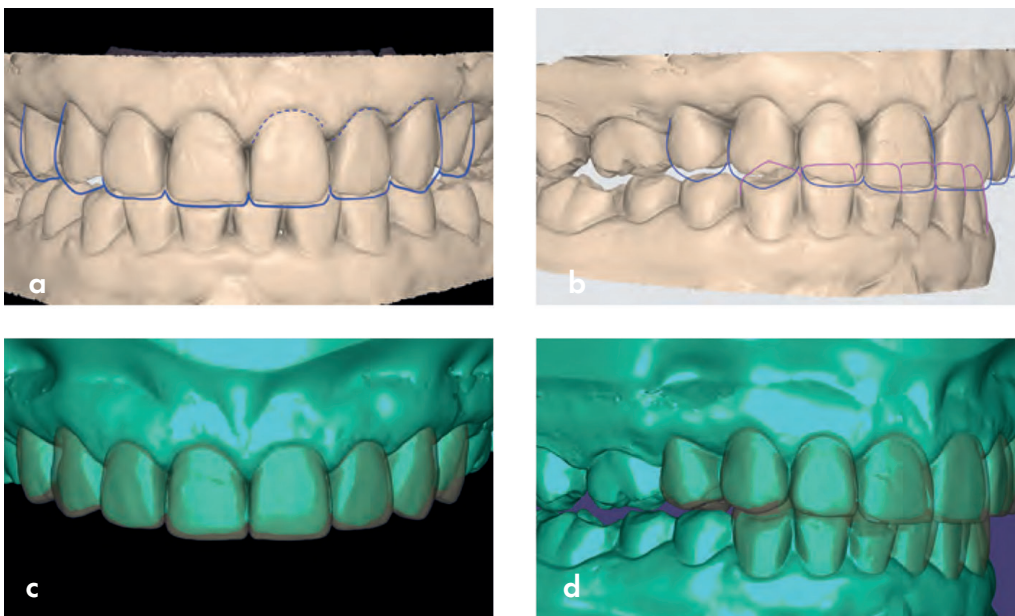
- Stabilisation
 - Hygiene scale and polish and thorough OHI
- Crown lengthening
 - Gingivectomy
 - Non-surgical
- Prescription tooth whitening
- Restorative
 - Smile design and trial occlusion at new vertical dimension
 - Composite contouring – eight upper teeth, six lower teeth
 - Direct – via clear silicon stent off a digital wax-up
- Michigan splint for night-time use.

Clinical challenges

This case presented several clinical challenges, including deciding on a suitable vertical dimension to allow correct proportions, reaching minimal thicknesses in composite resin and



Figures 4a and 4b: Prescription and sketches for digital designer to aid digital wax-up



Figures 5a to 5d: Comparing the digital wax-up to the sketches overlaid onto the preoperative teeth



Figure 6: Trial smile and occlusion assessment

suitable anatomy for axial forces to favour good response for the intrusion of anterior teeth using the Dahl principle.

In addition, we found aesthetically layering the UR1 in combination with injection moulding/pressing of composite for the most exterior layer to be a challenge.

Clinical overview and reflection

With the anaesthetic, a diagnosis was made to determine a type 1A APE, which was ideal for non-surgical crown lengthening.

The gingivectomy ranged between 0.5mm and 1.5mm on the upper four to four, performed freehand and guided healing with the use of a high-filler flowable composite applied in a crescent on each newly defined margin, held by lightly etched enamel collar (Figure 4).

A sketch was made on screenshots of the digital scans to feed my vision to my digital designer to deliver a full anatomic wax-up on Exocad.

I like to communicate the buccal volume for the smile, desired finishing line and a prescribed overbite at the new vertical dimension (Figure 5).

At the trial smile, the upper anterior teeth were well balanced and suited the shade of the patient's lip in smile. It showed enough incisal edges when speaking (Figure 6).

The upper molars needed more volume to match the adjoining premolar, but due to cost reasons the patient was unable to have two more additional teeth.

The lower design was too long relative to the size of the upper teeth, an oversight on a screen, so using a pencil I shaded the incisal edges to mimic the silhouette of shorter teeth to replicate in the definitive composites at the next stage (Figure 7).



Figure 7a: Laser gingivectomy used to level margins and reveal more enamel; 7b Two-week review of soft tissues

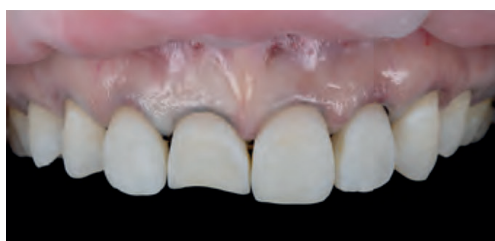


Figure 8: Composite removal UR1, retraction of the gums, teeth etched



Figure 9: Composite removal UR1, retraction of the gums, teeth etched

The patient liked the colour of the trial, Luxatemp BL, which helped indicate the resin selection for the next step. Luxatemp BL appears closest to BL3 at a medium translucency and fairly comparable to BW in the GC UI range, the intended composite.

With the plan confirmed at the trial smile with an agreeable design, the teeth were ready for the composite transfer in GC Universal Injectable BW.

Composite removal of the UR1, retraction cord in the sulcus, contacts checked and smoothed with a yellow IPR strip, the enamel was etched and ready for embrasure isolation (Figure 8).

The occlusal view of the readied teeth shows the use of a liquid latex to block out the cervical embrasures and contact point, as my

technique involves transferring the full anatomy in one go instead of alternating teeth, reducing my opportunity of clinical errors but accepting the need to separate contact points (Figure 9).

The UR1 being instanding and with a large class IV volume missing, layering of the differing opacities and internal anatomy was needed to bring life to that one tooth while the other teeth afforded a monolithic resin selection.

Using a classical layering approach to build a palatal shell from a putty stent off the wax-up, dentine opacity composite (DMG Ecosite B1) and translucency flowed in-between the mamelons and incisal edge (DMG Ecosite Incisal) prior to the GUI BW composite transfer (Figures 10 and 11).



Figures 10a and 10b: Instanding and class IV space of UR1 requires layering prior transferring new surface anatomy



Figures 11a and 11b: Dentine-like composite layered finished with achromatic high trans flowable composite for the incisal third

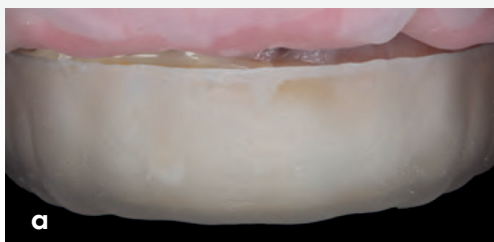


Figure 12a: Printed special tray used to make silicon stents from the printed wax-up models

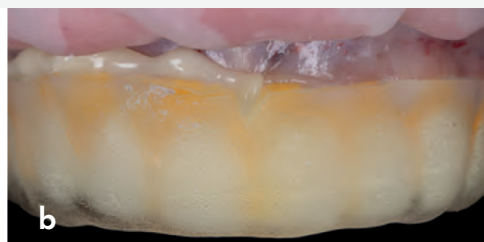


Figure 12b: Allows uniform pressure when seating the GUI pre-loaded

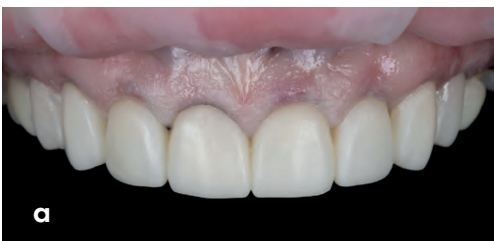


Figure 13a: Stent removal to reveal accuracy of the pressed GUI in one seat



Figure 13b: One-month postoperative review showing great soft tissue integration



Figures 14a and 14b: Same steps repeated for the lower anterior teeth

Without layering, the UR1 would appear too high in value, denser white than all the adjacent teeth if the final thickness was in one monolithic BVV.

The desired injectable composite is pre-loaded into my Exaclear stent that is held rigidly in a 3D printed special tray that is seated in one go atop all the teeth in question and on the layered UR1 (Figure 12).

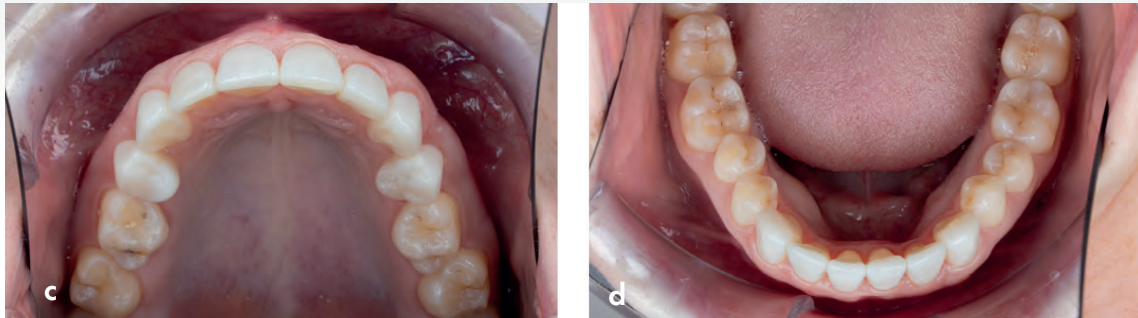
Selectively curing enough of the composite through the

firmly held special tray, it is then cured once again without the tray and the apparent excesses removed with the silicon stent in-situ.

Once the stent is removed, a number 12 blade is used to cut away a thin film of cured composite around the sulcus to have a clean reveal (Figure 13). This is repeated for the lower teeth (Figure 14) in the same appointment for a marathon five-hour sitting (with some breaks...)! This is required to ensure



Figures 15A and 15B: Lateral ICP views to see the new VD and posterior disocclusion



Figures 15c and 15d: Occlusal views of the postoperative result restoring upper eight teeth and lower six teeth



Figures 16a and 16b: Before and after smile



Figures 17a and 17b: Before and after retracted

the occlusion is stable. Refinements were left for the initial review appointment a few weeks later.

One month later, my postoperative records are captured to observe good soft tissue integration (Figures 15-17). With the expected posterior disocclusion as seen in the photos, the anterior eight units occluded well with the patient eating all foods. Upon further assessment, the sevens and eights were coming into light

occlusion, trapping a thicker 40um articulating as the mandible is repositioned in centric relation.

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