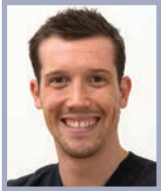


# The perfect smile with long-term survivability



Dr. Thomas Sealey

## Thomas Sealey presents a full ceramic smile-makeover using minimally invasive techniques

### Patient's complaint and dental problems

This patient presented to the practice regarding concerns over her smile aesthetics (Figures 1 and 2). She was a regular attender to the dentist and had well-maintained oral health.

### Treatment options discussed with patient

The patient attended for multiple consultation appointments over a six-month period whilst she considered her options. This gave us ample opportunity to discuss all the different treatments in detail and to create a bespoke treatment plan for her. We considered adult orthodontic correction and completed two treatment courses of tooth whitening during this time.

We showed pictures and examples of all the types of dental treatment including orthodontics and veneers, both ceramic and composite. We also demonstrated the aesthetic result that could be achieved with simple composite bonding techniques. The emphasis was placed on dental health and education, and it was clearly explained how each different treatment option necessitates different care regimes, with supplemental long-term maintenance and ongoing commitment and costs.

### Reasons for chosen treatment plan

The patient decided on a full ceramic smile-makeover using minimally invasive techniques where possible. She felt that she had not achieved the colour of teeth she desired after tooth whitening and that she would not reach the perfect smile she wanted with orthodontics alone. She understood all the alternatives and the risks to her chosen treatment plan. She was aware that the longevity of this treatment would depend on the maintenance of excellent oral health with regular dental check-ups and hygiene appointments.

### Outline of the treatment process

A provisional diagnostic wax-up was designed by the ceramic laboratory after discussing with the patient what she wanted to achieve from her new smile. We talked about tooth shapes and looked at pictures to help determine the smile she idealised. I always have my wax-ups made from an accurate face-bow record; this allows the laboratory to correctly wax the shape of the teeth to accept the patient's natural guidance and relationship.

From this wax-up we could make silicone impressions to make a stent that allowed us to place a temporary acrylic trial-smile over her teeth (Figure 3). This essential step allowed the patient to visualise what the new smile



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6

design would look like in her own mouth. This important stage allows the dentist to make any adjustments to the shape, symmetry and incisal outline of the teeth before proceeding to the next stages.

We completed three separate trial smiles with three separate wax-ups until the patient was satisfied with the final aesthetics of her planned new smile. At this stage we could then begin the actual veneer preparation treatment.

Before beginning treatment, I made an incisal guide stent of the upper teeth, which allowed me to check the relationship of the incisal edges of my upper preparations during treatment to the planned position of the new veneers (Figure 4). This ensured I had allowed enough clearance to accept the new veneers and allowed the ceramist enough space to create the natural incisal shapes of the new teeth. I also had two silicone stents made from the upper and lower wax-ups, which allowed me to place the temporary restorations.

After anaesthesia, an Ivoclar Vivadent Optragate was placed to retract the lips and help support the patient's open mouth for the duration of the treatment. An acrylic throw-away smile was placed over her natural teeth using the stent. The teeth were then roughly prepared for veneers using depth-gauged burs (Figure 5). The throw-away smile was removed, and the teeth pencilled in to help mark the depths for preparation more clearly. The anterior four teeth were then prepared, and a bite registration taken.

This technique means that you are only preparing areas of the tooth that are necessary for reduction to accept the new tooth-shape of the planned veneers. Areas that have

plenty of clearance are left without any unnecessary over-preparation allowing us to keep the veneer preparations as minimally invasive as possible.

I needed to prepare the mesial and distal aspects of the upper four incisor teeth slightly more aggressively as we planned to move the midline to the left to improve the overall smile aesthetics. By using the incisal guide stent (Figure 4) one can ensure that you have removed the correct amount of tooth to allow the laboratory the space necessary to move the central midline, whilst maintaining proportionality and symmetry to all four incisors.

Preparation continued for the remaining upper teeth, followed by a second bite registration. A new face-bow record was taken at this point using the prepared upper teeth.

The final stage was to place a second throw-away smile, which was then removed tooth by tooth. This allows you to measure the thickness of each individual acrylic veneer with callipers to ensure there is adequate thickness for the ceramist, ideally a universal thickness of 0.7mm on the labial surface. With this essential last step, you can correct any areas where you have been too cautious with your tooth preparation before the final impressions. This will ensure that your final veneer restorations are both of adequate thickness to mask any underlying tooth colour and are prepared to respect the ceramic material properties.

After anaesthesia, the lower anterior four incisors were prepared using the same technique as described above. A third bite registration was taken at this point and a stick-bite with corresponding full-face photos. The remaining

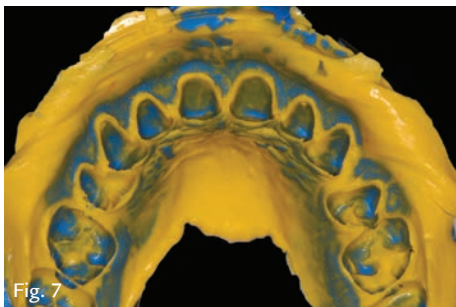


Fig. 7



Fig. 8



Fig. 9



Fig. 10



Fig. 11



Fig. 12

lower teeth were then fully prepared, and a final bite registration taken.

Retraction cord was carefully placed sub-gingivally to help retract the tissue and allow for accurate impression of the preparation margins. A foundation-shade photo was taken (Figure 6) before the two-stage PVS impression, which was taken in unperforated metal impression trays (Figure 7).

The teeth were temporised by spot-etch and spot-bonding the labial surfaces followed by placement of the silicone stent filled with acrylic resin (Figure 8). This was allowed to cure before the stent was removed. The margins of the temporary veneers were neatened, and the gingiva released at the embrasure areas. Photos of the temporary restorations accompanied the impressions and bite records to the laboratory.

Between the preparation and the final fit visit the patient attended the ceramic laboratory so the technician could view her wearing the temporary smile and discuss any final changes in shape or symmetry of the teeth, as well as to discuss colour, anatomy, and any natural nuances etc. to be incorporated into the final ceramic veneers (Figures 9 and 10).

At the final fitting appointment, the teeth were anaesthetised, and the temporary veneers removed. You can see from the case photos how clean and demarcated the gum levels were around the veneer preparation margins. Time spent finishing the temporary veneer margins during their placement allows the patient to keep the temporaries very clean and therefore the gum health is very good and conducive to easy final cementation with no bleeding.

We always try the veneers on to the teeth before final

placement to ensure the fit and aesthetics is correct. I use two different shades of veneer try-in paste, one on each side of the mouth. This allows the patient to choose which shade of cement they prefer, as they can have a subtle effect on the warmth of the final cemented veneers.

The teeth were rinsed with chlorhexidine to inhibit the MMPs (matrix metalloproteinases) released from any exposed and damaged dentine. These enzymes degrade collagen over time, which will reduce the bond-strength of resin-bonded materials. Although every effort was made to keep the preparations entirely in enamel, there will undoubtedly always be some prepared dentine which needs to be considered during your bonding protocol.

The teeth were prepared with aluminium oxide air abrasion before being enamel etched around the margins (Figure 11) and then over the labial surface. Etching of the dentine was avoided where possible. The surfaces were then bonded with Adhese Universal, applied from the Vivapen (Figure 12). The veneers were cemented following the Ivoclar Vivadent Variolink Esthetic LC protocol. This cement system was chosen for the bond strength of the material, the vast array of aesthetic cement shades and the excellent natural aesthetics that can be obtained due to its colour stability.

The veneers were cemented two at a time and provisionally flash-cured for two seconds. The margins could then be cleared with a sickle scaler before the final cure (Figure 13). The ease of clean-up using this technique means that you don't have to traumatise the gums or interproximal areas when attempting to remove any fully-cured excess cement. I finally used a diode laser to gently shape the gingival margin of the UL1 to correct the asymmetry (Figure 14).





The occlusion was checked, and minor adjustments made. By providing the laboratory with multiple staged-preparation bite registrations and a face-bow record, they could consistently create a balanced occlusion in the veneers, which substantially limits any adjustments necessary on the day of fit. Acrylic night guards were made to protect the veneers from any night-time bruxism and therefore improve their longevity.

The patient was reviewed after one week (Figure 15), four weeks and at three months (Figure 16) to monitor how she adapted to her new smile and to review and reinforce good oral health practices.

### Material selection

Clinical consistency in both the handling and the aesthetic properties of the Variolink range make it my cement material of choice. IPS E.max is an amazing material with so many applications in dentistry. If the restorations are well-designed and the occlusion carefully considered, then the material rarely fractures, even in very thin sections. This means you can restore the incisal edges of anterior teeth with confidence and maintain a minimally invasive approach to tooth preparation. The tints, translucencies and subtle nuances that can be incorporated into E.max veneers can create incredibly natural aesthetics (Figure 15).

### Clinical outcome from dentist's perspective

I am incredibly pleased with the final aesthetics of the patient's smile. By keeping a very open dialogue with a fantastic laboratory and ceramist we could correct the patient's asymmetries and midline shift, disguise the class 2 relationship, correct the incisal and gum outline and

broaden the smile (Figure 16). The patient was involved in every stage and, so we could create a bespoke treatment plan, which met her expectations and provided her with the exact smile-aesthetics that she desired (Figure 17).

### Patient's reaction to completed treatment

The patient was overwhelmed on the day of fitting. She told us that the smile makeover would transform her life and provide her with an invigorated confidence and courage in social situations. This was a very emotive experience for all the team members involved and is the reason we all chose our profession. We are so fortunate to be practising in an era when we have the materials and technology to be able to provide these larger treatment options but with the understanding of minimally invasive techniques and using thinner veneer laminates.

This allows us to create the perfect smile, with long-term survivability, but without the increased risk to the health of the teeth that was probable using historic deeper preparation techniques, which were necessary to allow for the thicker material needed with alternative ceramic materials.

The laboratory work was completed by Rob Storrar at Amdocs. ■

### About the authors

*Dr. Thomas Sealey is a private cosmetic dentist working in Ingatestone, Essex. He has vast experience in all aspects of dentistry and holds a masters degree in medical education and is undertaking a second masters degree in endodontics. He lectures on cosmetically focussed adult orthodontics and is the inventor of the Single-visit Orthodontic Lingual and Invisible Dual*