Aesthetic success – it's all in the detail

Tom Bereznicki suggests there is a key moment in the reproduction of the created emergence profile in conventional bridgework

Figure 1a

Figure 1b

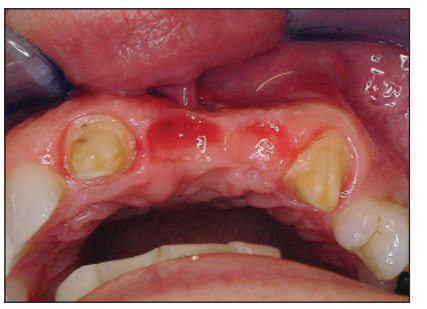

Figure 2a

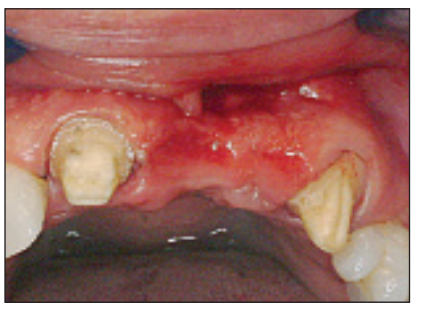

Figure 2b

Introduction

It is generally accepted that the ovate pontic design in conventional bridgework is most predictable in achieving an excellent appearance in the high lip line case where aesthetics are of paramount importance. If the emergence profile is correctly created and the gingival tissues adequately supported by the pontics, papillae can be formed interproximally and the pontic teeth shaped to appear to be emerging from the gingival tissues, thus mimicking the appearance of natural teeth (Figures 1a and 1b).

There are three techniques associated with the creation of the emergence profile for ovate pontic design – namely, prior to impression taking; at the time of impression taking, or at the time the bridge is fitted. It is the author's opinion that the most predictable and aesthetic outcome is achieved if the emergence profile is refined during the phase of temporisation and prior to impression taking. The drawback associated with creating the emergence profile with diamond burs, electrosurgery or laser, at the time of impression taking is that healing can be unpredictable during the laboratory phase of bridge construction with discrepancies only becoming apparent at the time of the trial fit of the bridge. In turn, this necessitates time consuming and frustrating attempts to modify the pontics. Creating the emergence profile on the final working model prior to bridge construction relies entirely on judgement and clinical experience. The same degree of gingival tissue reshaping is required at the fit appointment as was carried out in the laboratory. Very often, fitting the bridge is difficult if not impossible if insufficient tissue is removed. On the other hand, if an excess of tissue is removed the final aesthetic result will be compromised or further modifications to the fit surface of the pontics required.

In the author's hands the most predictable aesthetic results have been associated with the development and refinement of the emergence profile prior to impression taking. However, initially the reproduction of these created tissue contours with a conventional impression was poor, resulting in an unpredictable pontic shape at try-in of the completed bridge. Invariably, as the profile had collapsed, the permanent bridge pontics were deficient and short at tissue level.

The cause of these encountered discrepancies was mainly due to the rapid collapse of the emergence profile on removal of the temporary bridge and further tissue distortion created by the introduction of retraction cord prior to impression taking. The excellent initially-created emergence profile is shown almost immediately following removal of the temporary bridge (Figure 2a). Some 30 minutes later, the distorted and collapsed nature of the tissues after retraction and impression taking are clearly seen in Figure 2b. Further distortion of the recorded tissues occurred in the laboratory with die trimming. A second pour solid model was usually of little predictable help.

Tom Bereznicki graduated from Edinburgh Dental Hospital and School in 1976. He moved to London and, after various house surgeon appointments at Guy's Hospital and the Royal Dental Hospital, he entered general practice and started his own private practice in Queensgate, London, in 1982. His area of special interest is the creation and duplication of the created emergence profile in conventional and implant retained crown and bridgework.
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Figure 3a

Figure 3b

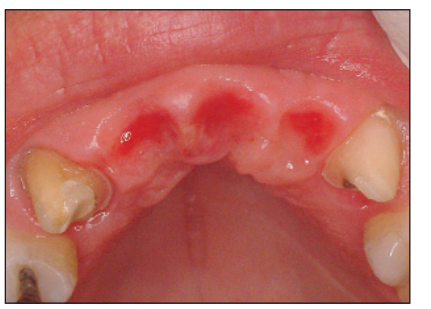


Figure 3c

Background

A typical case shows the problems encountered. The patient had worn a metal skeleton denture for numerous years and was keen to replace it with a fixed prosthesis. He did not wish to explore the option of implants and preferred to proceed with a conventional fixed-fixed bridge. Owing to his high lip line and wide smile, the creation of an emergence profile and ovate pontic design was incorporated into the treatment plan.

The edentulous ridge was modified with electrosurgery to create papillae and an emergence profile. A temporary bridge constructed in Protemp 4 (3M Espe) fitted to help maintain this profile during the healing phase of the gingival tissues (Figures 3a, 3b and 3c).

After six weeks the bridge was removed, retraction cord placed in the conventional manner and an impression taken in Impregum Penta Soft Quick (3M Espe). The resultant silver plated working model is shown in Figures 4a and 4b.

It is clearly seen that there is no physical

Figure 4a

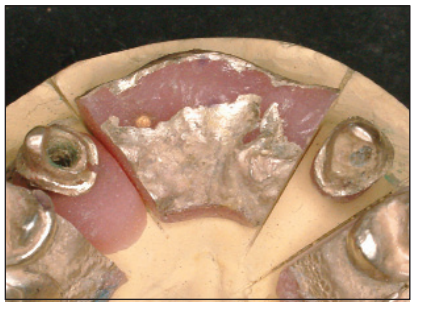


Figure 4b

Figure 5a

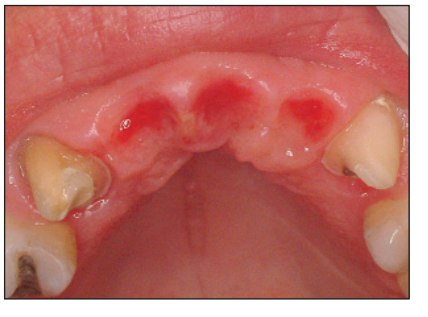


Figure 5b

Figures 6a & 6b

Figure 7

Figure 8a

Figure 8b

Figure 8c

Figure 8d

Figure 9a

Figure 9b

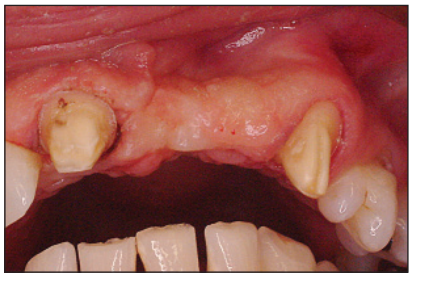


Figure 10a

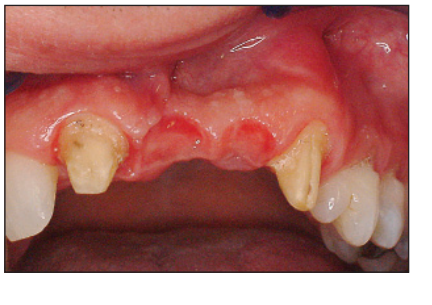


Figure 10b

Figure 10c

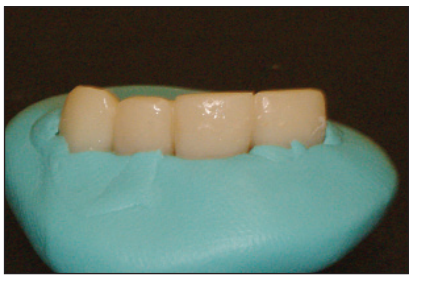


Figure 11a

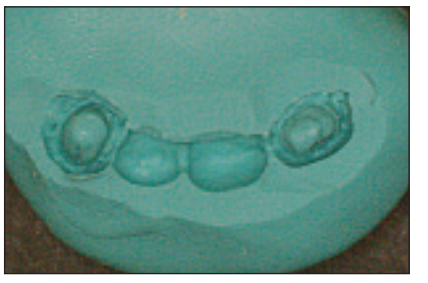


Figure 11b

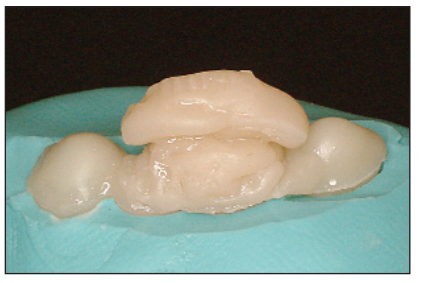


Figure 12

Figure 13a

Figure 13b

Figure 14

resemblance between the patient's tissues and those on the working model especially after die trimming (Figures 5a and 5b).

A second hard tissue model poured from the same impression was of little help. The collapse of the created emergence profile is such that, despite some arbitrary model trimming in the soft tissue area, the temporary bridge which fits accurately in the mouth will simply not seat onto the working model (Figures 6a and 6b).

It would, therefore, be impossible to make a predictable bridge that would fit accurately around the created soft tissue profile.

It was the frustration experienced in this case that lead to the development of the following technique to duplicate the created emergence profile. Figure 7 shows the accuracy of fit of the same temporary bridge fitted onto a hard tissue model made using the technique.

The before and after photos of the case are shown in Figures 8a, 8b, 8c and 8d. The shape of the ovate pontics of the temporary bridge were so accurately reproduced in porcelain that the only adjustments required following the try-in stage were related to occlusal refinement and issues with colour matching.

Technique

The technique itself is dependant on the accurate duplication, with a stent, of the fit surface of the temporary bridge that was used to create and maintain the emergence profile of the soft tissues (Figure 9a and 9b).

It is also important to realise that the soft tissue impression technique shown in this article should be taken prior to the final impression. The degree of distortion created by the retraction cord and ongoing tissue collapse cannot be compensated for by the formed impression stent.

In the case study being used in this article, the edentulous ridge prior to – and following – the creation of the emergence profile is shown (Figures 10a, 10b and 10c).

The temporary bridge, which is used to maintain the tissue contours during their maturation, is also used to create the impression stent. Once cleaned of all temporary cement, the bridge is submerged to around one third of its fit surface in Provil Novo Soft Fast Set impression putty (Heraeus). Once the putty has set, the bridge is removed (Figure 11a and 11b).

Flowable light-cured composite Venus Flow (Heraeus Kulzer) is then injected into the mould in layers and cured until flush with the level of the putty. Ordinary light-cured composite Venus (Heraeus Kulzer) can then be used to bulk up the stent and create a retention tag to ensure undistorted removal in the impression (Figure 12).

As polymerisation shrinkage will have occurred during the curing process, the composite stent will not fit accurately onto the abutment teeth in the mouth without further adaptation. The inside surfaces of the stent abutting the tooth preparations are therefore cored out (Figures 13a and 13b) and all excess 'flash' trimmed away.

The stent is then trial fitted to ensure a passive fit on the abutments and correct tissue displacement in the pontic areas (Figure 14). There is invariably some tissue blanching for one or two minutes indicating that the gingivae are being pushed into the same position being supported by the temporary bridge

The impression stent is now ready for final adaptation. A water soluble separating medium Wink (Pulpdent) is applied to the abutment teeth and a Composite Activator & Bonding Fluid (Bisco) followed by composite bonding

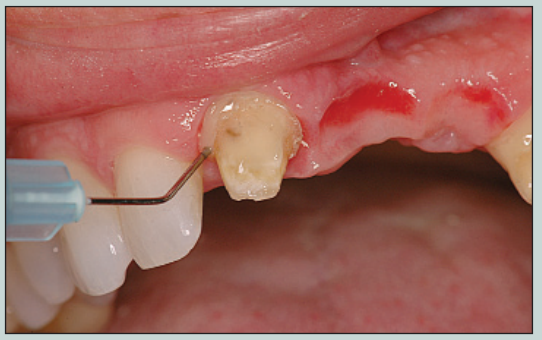


Figure 15a

Figure 15b

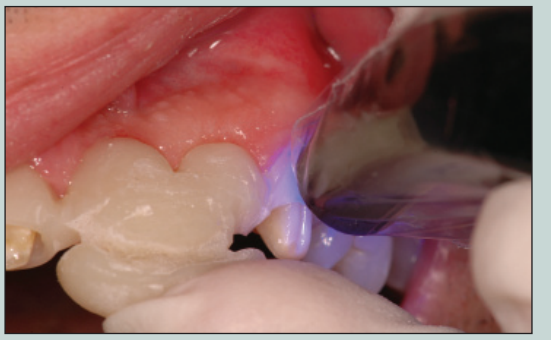


Figure 15c

Figure 16a

Figure 16b

Figure 17a

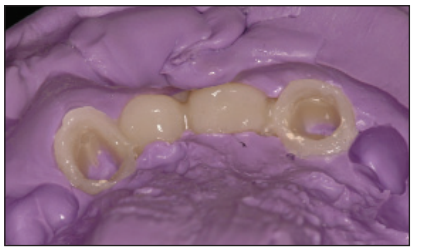


Figure 17b

agent OneStep Plus (Bisco) applied to the fit surface of the stent around the abutment teeth. Flowable composite is then applied as shown to the abutment teeth (Figure 15a), the stent fitted and maintained in place with finger pressure (Figure 15b) while the composite is light-cured (Figure 15c).

The stent is then removed, any excess flash trimmed away from the abutment tooth areas as necessary and then refitted in the mouth to ensure a positive fit. It is essential that the stent shows stability otherwise unwanted displacement may occur during seating of the impression material. If retention is insufficient then a temporary cement such as Temposil (Coltene Whaledent) can be used to keep the stent in place. The author prefers this material as it can be easily peeled out after the locating impression is taken out without leaving any residue inside.

To allow future accurate location of the working dies in the stent it is essential that the fit surface is clean and temporary materials such as TempBond (Kerr), which usually require removal in an ultrasonic bath, should be avoided. The located stent is now ready for the final impression. To ensure the stent is removed with the impression the retention tag is painted with the appropriate tray adhesive. In this case a quick setting impression material, Template (Clinicians' Choice), was used in a stock disposable tray and the impression is shown after removal and location of the working dies which were taken from the master model (Figures 16a and 16b).

The final impression in Impregum Penta Soft Quick (3M Espe) in a custom tray was taken shortly after normal gingival retraction. The huge difference between the soft tissue detail in the stent impression compared with the normal working impression is clearly visible (Figures 17a and 17b).

It is both my technician's and my own preference to silver plate the final impression in cases where the dies will require to be moved from one working model to another. After the final dies are trimmed, they are transferred to the stent impression and a soft tissue model poured. The stent impression can also be used to pour a hard model in stone as shown (Figures 18a, 18b and 18c) and the degree of accuracy of reproduction of the gingival tissues in both the soft and hard tissues is clearly visible.

The final bridge was constructed in porcelain fused to precious metal. The metalwork and most of the porcelain work was carried out on the working silver plated model. Refinement of the fit surface of the porcelain pontics was achieved by transfer to both the soft tissue and hard tissue models. The degree of reproduced accuracy achieved is shown in Figures 19a and 19b. The fit of the pontics was entirely passive on the tissues yet completely supported the formed emergence profile and further modifications did not prove necessary.

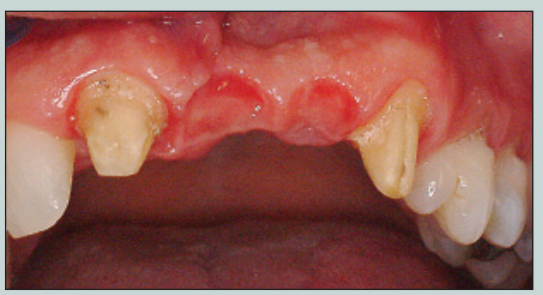
Conclusion

Unfortunately, it is not within the scope of this article to describe the technique behind the creation of the emergence profile itself, merely its duplication.

The author has consistently found it easier to work with composite during the temporisation phase rather than in porcelain at try-in of the permanent bridge. The extra time taken to refine the emergence profile is more than made up for at the trial stages of fitting the permanent bridge with a conventional technique.

The putty impression of the temporary bridge can be taken at the last check appointment of the emergence profile and the stent made at a convenient time prior to final impression appointment. Needless frustration, both clinically and in the laboratory, is also avoided. The technique as demonstrated produces excellent and consistently reliable results – the fit of the framework and porcelain refined on the working model and the pontic areas on both the soft and hard tissue models.

My thanks to my technician Mick Kedge for all his support and help in the development of the technique and my patients John McGarrell and Andrew Fraser for the endless hours in the chair while I worked on refining the technique at the chairside.



Figures 18a, 18b and 18c

Figure 19a

Figure 19b