

# Provisionalisation: An innovative technique using a malleable customised temporary crown

By Dr Christopher CK Ho



*“There has also been the recent introduction of an innovative preformed malleable composite based crown that can be custom-fitted in minimal time for single units. It combines the advantages of composite-based temporisation with the advantages of prefabricated crowns...”*

**T**he aim of provisionalisation is “to restore, protect and maintain the position of prepared teeth between appointments and until the placement of the permanent crown and bridge”.

The material should incorporate the following qualities:

- High mechanical strength - rigidity and resilience with good wear resistance;
- Dimensional stability;
- Biocompatibility - unreacted monomers from materials may cause pulpal and periodontal irritation;
- Aesthetics and colour stability;
- Good marginal adaptation and seal; and
- Easy handling.

These provisional materials have been classified into two categories:

1. **Prefabricated crowns** which are available in many forms for a variety of single-unit applications. They have been made of anodised gold or polycarbonate materials.
2. **Chemical-cured crowns** which consist of two subgroups (see Table 1):
  - a. Powder/liquid acrylic: which can be used for single to multiple units. These are based on the methylmethacrylate monomers.
  - b. Composite resin materials: which consist of resin and a filler system. The fillers account for about 40% (by weight) in the bisacryl resin formulations. These materials provide improved mechanical properties, a lower setting temperature and reduced polymerisation shrinkage as well as good colour stability and polishability. These materials are the most commonly used materials in the dental marketplace.

There has been the recent introduction of an innovative product of a preformed malleable



Figure 1. Protemp Crown (3M ESPE).

composite based crown - 3M ESPE Protemp Crown that can be custom-fitted in minimal time for single units. It combines the advantages of composite-based temporisation with the advantages of prefabricated crowns (fast, simple with no matrix and no mess).

The feature of this crown is the unique handling property with the temporary crown being mouldable and malleable in its uncured state. It handles like wax or clay and can be adapted to the tooth preparation margins and proximal contacts. Additionally occlusal stops are easy to form as the patient can occlude into the material while uncured to form the occlusal contacts. Once the clinician is happy with the marginal fit and occlusion, the material can be cured and a mechanically stable composite resin material is obtained.

At this stage it is indicated only for canines, premolars and molar teeth and is only available in one shade.



Figure 2. Tooth 16 presented with a ceramic onlay with recurrent distal caries.



Figure 3. Tooth 16 prepared for all-ceramic crown.



Figure 4. Impression taking with light and heavy body material.



Figure 5. Impression of prep. showing clear detail of margins.

### Case presentation

The patient was a 45-year-old female that presented with recurrent caries under a ceramic onlay (Figure 1). In addition, this was causing her sensitivity to cold and the patient was treatment planned for a full coverage all-ceramic crown.

The tooth was prepared for an all-ceramic crown incorporating a rounded shoulder preparation with rounded internal line angles. An impression was made with a polyvinylsiloxane material (3M ESPE Imprint 3 Quickstep HB/LB) (Figures 2-5).

Once impression taking is complete, the Protemp crown is utilised and the steps required are:

1. Size selection: Determination of the proper Protemp crown size. This can be completed using the measurement tool included or with callipers (Figures 6-8).

Table 1. Types of provisional materials - acrylic- or resin-based

- **Polymethyl methacrylate (PMMA)** - most indirect temporary materials. Heat and pressure. Good mechanical properties with strength and colour stability, highly exothermic and significant shrinkage, odour (JET, Lang; TAB, Kerr).
- **Polyvinyl ethylmethacrylate (PVEMA)** - acrylic for intraoral use - less exothermic. Porosity compromises strength and aesthetics (SNAP, Parknell; Trill II, Bosworth).
- **Urethane dimethacrylate (UDMA)** - high fracture toughness and low exothermic reaction (Triad, Dentsply).
- **Bis-acryl resin composite** - most popular (Luxatemp, DMG; Protemp Garant, 3M ESPE; Integrity, Dentsply). Low exothermic reaction, good marginal integrity.

2. Protemp Crown Preparation: The materials are designed to be able to fit accurately and the temporary crown can

be modified by trimming the margins to fit being mindful of following the gingival contour (Figure 9).



Figure 6. Measuring the mesial-distal dimensions to approximate the correct Protemp crown to be chosen.



Figure 7. Protemp crown chosen to match dimensions of preparation.



Figure 8. Measurement of the vertical height of the crown for modification.

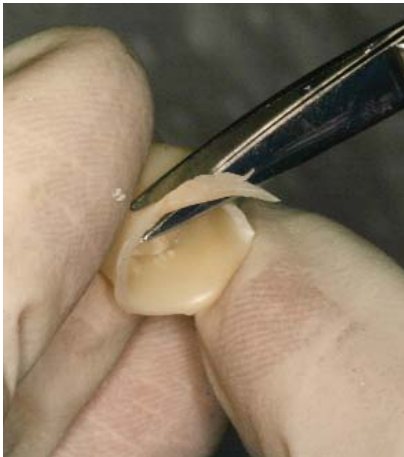


Figure 9. Trimming of the temporary crown with scissors, following the gingival contours.



Figure 10. Adaptation of margins with a flat plastic instrument. This may be done after the patient has occluded into the temporary crown to develop the occlusion.



Figure 11. Tack light curing to set lingual margin.

3. Adaptive Phase: The Protemp crown is adapted, and shaped to provide good interproximal contact (Figure 10). The patient may gently close into the malleable crown, which will gently seat and allow development of a rudimentary occlusion within the provisional restoration. While the patient is in occlusion the buccal margin can be adapted carefully and then tack cured to allow polymerisation. The lingual margin is also tack cured followed by a final light cure (Figure 11).

4. Final Light Cure: Once the Protemp crown is removed then a final light cure of about 60 seconds should be made to allow complete polymerisation of the crown.

5. Finish and Polishing: careful trimming of the temporary crown is made with finishing (Soflex) discs and occlusion is checked (Figure 12).

6. Cementation: the temporary crown is temporarily cemented and excess is removed. Final check of the occlusion is made and any polishing required is carried out (Figures 13-16).

### Custom repair

If the crown is undercontoured or margins deficient, it is a simple task of applying composite to add to these regions. The use of flowable composite is recommended due to the ease of placement. The surface is roughened and then dried, followed by direct placement of the resin. There is no need to apply bonding agents to allow adhesion and the area is then finished and polished.

### Conclusions

The Protemp crown is an innovative pre-formed temporary that is adaptable to a



Figure 12. Finishing margins with Soflex disc (3M ESPE).



Figure 13. Protemp crown filled with temporary cement.



Figure 14. Protemp crown cemented with temporary cement.



Figure 15. Floss used to remove excess temporary cement.



Figure 16. Protemp crown cemented.



Figure 17. Filtek flowable composite resin added to the buccal margin due to deficiency.

patient's prepared tooth in a simple and convenient method without the use of a matrix. The final crown approximates as nearly as possible the original tooth in terms of space occupied in the arch, with proper relationship with the adjacent teeth and functional occlusion with the opposing dentition.

This technique is particularly useful in cases of:

- A broken down tooth that normally would require a wax-up or build-up before a key/matrix was made;
- Where the clinician has forgotten to make a key/matrix of the tooth before

preparation of the tooth;

- When the temporary is lost between the preparation and cementation appointment and there is a need to remake a temporary; or
- Use on prefabricated implant abutments or temporary to provide a temporary solution in immediate loading.

The use of the Protemp temporary crown is simple with easy adaptation into clinical practice. It has allowed some clinicians to reduce the time required to fabricate a provisional crown and is a useful technique to have as part of one's armamentarium.

#### About the author

*Dr Christopher Ho received his Bachelor in Dental Surgery with First Class Honours from the University of Sydney in 1994 and completed a Graduate Diploma in Clinical Dentistry in oral implants in 2001. He is a Clinical Associate with the Faculty of Dentistry at Sydney University. In addition to teaching at undergraduate level, he has lectured and given continuing education presentations in Australia and overseas on a wide range of topics related to cosmetic and implant dentistry. He maintains a successful private practice centered on comprehensive aesthetic and implant dentistry in Sydney.*