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REVIEW ARTICLE

PROVISIONAL RESTORATIONS IN CROWN AND BRIDGE

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ABSTRACT

Interim restorations are a critical component of fixed prosthodontic treatment. In addition to their biologic and biomechanical requirements, interim restorations provide the clinician with valuable diagnostic information. They act as functional and esthetic try-in and serve as a blueprint for the design of the definitive prosthesis. Thus for a successful provisional restoration fabrication the clinician must have a thorough knowledge of the properties of the interim restoration material selected and the technique used. This review article intends to describe in brief the different materials used for making a provisional restoration or crown/FPD and the technique used.

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INTRODUCTION

According to the *Glossary of Prosthodontic Terms,* "*a* provisional restoration is a transitional restoration that provides protection, stabilization, and function before fabrication of the definitive prosthesis. It may be also used to determine the aesthetic, functional and therapeutic effectiveness of a treatment plan (Zinner, 1989)." The terms *provisional, interim or transitional* may be used interchangeably. The word *provisional* means established for the time being, pending a permanent arrangement. Even though a definitive restoration may be forthcoming, a provisional restoration must satisfy the important needs of the dentist and the patient. Since a provisional restoration must be made during the same appointment in which the teeth are prepared, the procedure must be efficient. Costly chair-side time must not be wasted; however, sufficient time must be taken to produce an acceptable restoration. The provisional restoration is frequently the patient's first impression of the final prosthesis. It should be representative of the final aesthetic result, but even more importantly, it must replace the missing tooth structure and maintain a healthy environment for the adjacent soft tissues. An overcontoured or unaesthetic provisional restoration will cause the patient to lose confidence in the restorative dentist, whereas optimally contoured and aesthetic transitional restorations will enhance confidence and establish cosmetic guidelines for the definitive fixed prosthesis.

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GOALS OF TEMPORIZATION

Temporization serves several important functions from the time of the preparation appointment. From the clinical perspective, provisional cover the prepared tooth structure, giving physical protection to the pulp, providing positional stability within the arch, and reducing sensitivity. They are also used in the evaluation of functional programmers (e.g. Phonetics), in interdisciplinary communication, and they maintain occlusion.

DISCUSSION

Preformed Restorations

They come in a variety of materials and graduated sizes, and are simply thin, tooth shaped shells (Christensen, 2004). Preformed crowns are generally limited to use as single restorations rather than for fixed partial dentures. Polycarbonate has the most natural appearance of all the preformed crown materials. It is strong yet flexible enough to contour easily and bonds chemically to a self-curing acrylic resin material used to fill the shell. Stainless Steel Crown used is the most durable of the preformed anatomical crowns, which is used most often in restoring primary teeth. Nickel-chromium crowns are also used as an interim restoration in children with extensively damaged primary teeth. The most recent innovative product from 3M ESPE and the Protemp™ family of temporary products is 3M™ ESPE™ Protemp™ Crown Temporization Material for single-unit temporization. It is a preformed malleable composite-based crown that can deliver a custom fit for your patients in less than four minutes.

Custom-made restorations

Custom-made restorations are those which are fabricated to reproduce the original contours of the tooth. An impression of the prepared tooth is made and a cast is poured. Custom provisional restorations can be fabricated using acrylic, self cure, heat cure or light cure; composite, self cure or light cure. Matrices or moulds which are used to form the outer surface of the custom provisional restorations which provides the axial contours, occlusal form and the proximal contacts with the adjacent teeth. There are several methods by which custom-made provisional restorations may be fabricated (Hannon *et al*., 2001).

DIRECT TECHNIQUE

The direct technique entails fabrication of a provisional restoration directly upon the prepared teeth (Kaiser, 1985).

RESINS

Materials used for direct technique are acrylic resin-autopolymerizing and light cure; composite resin – self-cure and light cure and metal- nickel chromium. Examples of resins used for provisional restorations: (a) Polyethyl methacrylate (Alike (G-C), Duralay (Reliance), Jet (Lang), Neopar (Kerr), Tab (Kerr)) and (b) Bis-acryl composite (syringe mixed) (Snap (Parkell), Trim II (Bosworth), Vita KHB (Vident) (Krug, 1975). UNIFAST LC- Visible-light-activated resin recommended by GC America. It is supplied as powder and liquid which is hand mixed at the time of use. Evaluators found Unifast to be an excellent material with which to reline existing provisionals, correct voids, and repair deficient margins. It is supplied as a powder and liquid which is hand mixed at the time of use.

EPIMINES

Only one epimine resin (**Scutan, ESPE**) is currently available for use by professionals for the fabrication of provisional restoration. The catalyst used with epimine has been reported to cause tissue irritation and maybe a sensitizing agent to the practitioner.

COMPOSITES

Bis-acryl resins can be used for most types of provisional restorations Most products are available in automix systems, which improve their ease of use. However, automix systems limit the practitioner's ability to alter the viscosity of the material. Autocure systems: Protemp II (ESPE), Luxatemp (Zenith/DMG Hamburg), Integrity (Caulk), Protemp Garant (ESPE), Pro-Fitt (Lone Star), SmarTemp (Parkell). Dual cure systems: Provipont DC (Vivadent) and Iso-Temp (3M). Provisional restorations made with Protemp 3 Garant are said to be more fracture resistant that those made with other composite products.

Luxatemp was the first bis-acrylic composite that was offered in the advantageous 10:1 mixing ratio for automatic mixing. Types available: Luxatemp, Luxatemp-Fluorescence, Luxatemp-Glaze & Bond, Luxatemp-Solar. Revotek LC is a visible-light-activated, single-component, "sculptable" resin composite marketed by GC America for the fabrication of provisional (i.e., temporary) restorations. Since it is a one-component material, no mixing of powders and liquids is required. GC America claims that Revotek LC is less messy than other types of provisional materials, handles without tackiness, and can be used quickly and easily to fabricate all types of provisional restorations.

INDIRECT TECHNIQUE

An impression is made of the prepared teeth and ridge tissues and is poured in accelerated setting stone or plaster. The provisionals are fabricated outside the mouth (Fisher, 1998).

This technique has several advantages over the direct procedure:

- There is no contact of free monomer with the teeth or gingiva, which might cause tissue damage and allergic sensitization.
- The procedure avoids subjecting a prepared tooth to heat from the polymerization of resin.
- Improved fit of the crown, which is achieved through processing against a cast, which limits polymerization shrinkage.

Indirect-direct reline (eggshell) technique

A combination of the two techniques is proposed to provide a relatively atraumatic means to achieve the most accurate fitting interim prosthesis. This technique combines the best marginal accuracy with the least potential for thermal damage to the pulpal tissues. This technique involves the fabrication of a thin shell indirectly on a minimally reduced cast of the proposed restorations, in the laboratory prior to tooth preparation. Adequate space is allowed internally for additional resin. The restoration has only an approximate fit on the clinically prepared tooth. It is then lined directly in the mouth with additional resin.

TRIMMING AND POLISHING

Smooth, polished surfaces on correctly contoured restorations that provide good marginal adaptation are necessary to maintain optimal health. Fastcut Whitestone is recommended for controlled trimming of excess acrylic.

CEMENTATION

Provisional cement is used to hold the restoration in place. It fills the space between the crown and the preparation, thus supporting the occlusal contours, filling and sealing the margin/finish line area. Primary function of the provisional luting agent is to provide a seal, preventing marginal leakage and pulp irritation.

Materials for cementation: Eugenol - ZoE B&T (Powder Liquid), Tempocem (Auto-mix syringe), Temp-bond and IRM Non-eugenol – ZONE (Auto-mix syringe), Tempbond NE (Paste-Paste), Nogenol and Dycal Resin – Mizzy (Auto-mix syringe), Provilink Silicone – PreVISION Hereaus/Kulzer (Paste)

Problems related to provisional restorations

Critical aspects related to provisional restorations include shade selection, discoloration, marginal integrity, strength and

interaction with the luting agent (Yannikakis, 1998; Guler *et al*., 2005; Young *et al*., 2001).

Summary and Conclusion

Provisional restorations are a critical component of fixed prosthodontic treatment. For single unit restorations, the bis-acryl materials offer many desirable properties. They tend to have low exothermic reactions, minimal polymerization shrinkage, minimal odour and objectionable taste, and relatively quick setting reaction and are easy to trim and marginally accurate. For multi-unit, complex, long term interim fixed prosthesis; the polymethyl methacrylate provisional materials remain the materials of choice. The clinician must have a thorough knowledge of the handling characteristics and properties of the interim restoration material selected. The technique used in fabrication will most likely have a greater effect on the final result than the specific material chosen.

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