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Provisional restorations

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Purpose

The purpose of this clinical update is to assist the clinician with the materials and techniques needed for the fabrication of fixed prosthetic restorations.

Introduction

Prepared teeth must be protected and the patient kept comfortable during fabrication of the definitive/final restoration. By utilizing successful methods and compatible materials, the clinician can gain the patient's confidence and favorably influence the ultimate success of the final restoration. A high quality provisional restoration should satisfy the following requirements (1, 2, 3, 4):

1. Pulpal protection: The restoration should be fabricated from a material that will prevent the conduction of extreme thermal changes.
2. Positional stability: The tooth should not be allowed to drift or extrude in any direction.
3. Occlusal function: The tooth should be able to function under all occlusal loads. This loading will prevent migration and will aid in patient comfort.
4. Cleansability: The restoration must be made of a material and have proper contours that will permit the patient to keep it clean during the treatment period.
5. *Non-impinging margins*: The margins of the provisional restoration should be harmonious with the gingival tissue and contours. Ill-adapted provisional restorations can contribute to gingival proliferation, recession, or hemorrhage during impression making or delivery.
6. Strength and retention: The restoration material must withstand the forces of mastication without fracturing or loosening.
7. Esthetics: In all cases, the restoration must provide an acceptable esthetic result. The esthetic component of the restoration design will allow the patient to test the design of the final prosthesis for form and function. It will confirm the esthetics of the diagnostic wax-up and will confirm the incisal length and position of teeth with regard to phonetics.
8. Lab communication: The provisional restoration can be used as a tool to communicate form, function and the restoration's dimensions to the laboratory. It will allow the laboratory to fabricate a final restoration that reflects the dimensions of the provisional restoration that has been pre-approved by both the patient and the clinician.

Prefabricated vs. Custom Restorations

Prefabricated forms include copper bands, stock aluminum cylinders, anatomic metal crown forms, clear celluloid shells, and tooth-colored polycarbonate crown forms. These prefabricated forms can only be used for single-tooth restorations. Custom crowns and fixed partial dentures can be fabricated from a variety of resins and by a variety of methods. The methods include direct fabrication, indirect fabrication or a combination indirect-direct fabrication technique (1, 2, 3).

Direct vs. Indirect Techniques

Provisional restorations can be classified by the method used for adapting the restoration to the teeth.

The direct technique: Fabrication is done on the prepared tooth in the mouth. A clear matrix fabricated from a diagnostic wax-up made prior to the treatment appointment can be used to form the provisional restoration and is useful as a reduction guide during tooth preparation. Autopolymerizing, tooth-colored, acrylic is mixed and placed in the matrix while in the "doughy" phase. The matrix is placed onto the teeth, quickly removed and excess material removed or additional material added if needed. When the matrix is reseated it should be liberally cooled with water during the polymerization (exothermic) stage. After polymerization, the matrix can be removed, the acrylic crown trimmed and the occlusion finalized. Using a paint-on technique with the same resin, the margins can be finalized and smoothed using a Hollenback or Woodson instrument. The restoration can then be removed and polished with pumice prior to cementation.

Alternatively, a matrix made from a preoperative impression or a manufactured crown form can be used. This same approach is useful with light cured acrylic resins and obviates the need for water coolant. Regardless of the acrylic used, care must be taken to avoid locking the cured acrylic into undercuts. Heat generation and free monomer contact with the tooth may have long-term pulpal implications (2).

The indirect technique: The indirect technique is preferred over the direct technique for its accuracy. An irreversible hydrocolloid impression is made of the prepared tooth and poured with a quick setting plaster. The resultant cast is lubricated and the acrylic provisional restoration fabricated much like the direct technique except the resin is allowed to fully polymerize on the cast. Additionally, the physical properties of the resin can be improved by curing in a water filled pressure vessel. With all phases of construction completed extraorally, no heat is generated on the prepared tooth. The distortion associated with removal during polymerization, which occurs using the direct-technique, is eliminated. The marginal fit of poly(methyl methacrylate) provisional restorations are improved by nearly 70% by fabricating them indirectly (5). A further advantage of the indirect technique is that much of the work can be delegated to auxiliary personnel.

The indirect-direct technique: This technique incorporates the advantages of the prior two techniques. The predominant portion of the provisional restoration is fabricated extraorally, minimizing the exothermic exposure to the tooth. The provisional restoration is then tried in and any marginal errors corrected intraorally using an autopolymerizing acrylic resin prior to cementation.

Resins for Provisional Restorations

There are several types of resins that can be used for making custom provisional restorations. Poly(methyl methacrylate) has been in use the longest. Poly(ethyl methacrylate), poly(vinylethyl methacrylate), bis-acryl composite resin, and visible light-cured (VLC) urethane dimethacrylate have come into common usage in recent years. Epimine resin (Scutan), which for a decade also was used for this purpose, is no longer available. No one resin is superior in all respects and the restorative dentist must assess the advantages and disadvantages of each in selecting a resin to use (3, 6, 7, 8).

Table 1 Characteristics of Resins used for Provisional Restorations (3)

Type	Brand	Manufacturer	Advantages	Disadvantages
Poly(methyl Methacrylate)	Alike Cr&Br Resin Duralay Jet	GC America LD Caulk Reliance Dental Lang Dental	Good marginal fit Good transverse strength Good polishability Durability	High exothermic heat increase Low abrasion resistance Free monomer; Toxic to pulp High shrinkage
Poly(ethyl Methacrylate)	Snap	Parkell Biomaterials	Good polishability Minimal exothermic heat increase Good stain resistance Low shrinkage	Low surface hardness Reduced transverse strength Low fracture toughness Not as durable
Bis-acryl Composite	Pro-Temp	Espe-Premier	Good marginal fit Low exothermic heat increase Good abrasion resistance Good transverse strength Low shrinkage	Low surface hardness Less stain resistance Limited shades Limited polishability Brittle
VLC urethane dimethacrylate	Triad	Dentsply York	High surface hardness Good transverse strength Good abrasion resistance Controllable working time Color stability	Poor marginal fit Less stain resistance Limited shades Expensive Brittle

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Note: The mention of any brand names in this *Clinical Update* does not imply recommendation or endorsement by the Department of the Navy, Department of Defense, or the US Government.

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