

“Interim Restorations” Rationale & Techniques of Fabrication

Pratibha Rawat¹ Sudhir Kumar Meena² Anil Pandey³ Amit Kumar^{4*}

¹Reader, Department of Prosthodontic, Crown and Bridges, Daswani Dental College and Research Center, Kota, Rajasthan, India.

²Reader, Department of Prosthodontic, Crown and Bridges, Mahatma Gandhi Dental College, Jaipur, India.

³Reader, Department of Oral and Maxillofacial Pathology, Daswani Dental College and Research Center, Kota, Rajasthan, India.

⁴Assistant Professor, Department of Orthodontics, Daswani Dental College and Research Center, Kota, Rajasthan, India.

ABSTRACT

Background: The term “interim” refers to established for the time being, pending a permanent replacement. Besides the immediate protective & functional properties, the interim restorations are of paramount importance in maintaining occlusion, esthetics, function & outcome of the treatment plan. These restorations are also referred to in the literature as temporary or provisional restorations. Provisional therapy involves numerous materials and techniques that require special knowledge and technical experience. This article discusses why provisional restorations are as important as the final restorations, how to fabricate provisional restorations, and techniques to simplify those procedures chair side.

Keywords: Interim restoration, provisional prosthesis, acrylic resin, study cast, luting agents.

INTRODUCTION

Provisional restorations are of paramount importance in fixed prosthodontic therapy. Biologically acceptable fixed prosthodontic treatment demands that once the tooth preparation is accomplished the prepared tooth should be protected and stabilized with interim restoration that resemble the form and function of the definitive treatment they precede¹. Dental practitioner should understand that there are no ‘inert’ materials for fabrication of interim prosthesis, hence its use should be kept for shorter period of time. Adverse reaction can occur for many types of materials used in fabrication of provisional restorations including Resins, cements, and alloys². Hence one of the primary concerns is to avoid harming the health of the patient, dental staff member and practitioner themselves.

In case of unforeseen events (e.g. laboratory delays or patient unavailability), a provisional restoration may have to function for an extended period. Provisional restoration can also be used for

extended treatment intervals by providing long-term tooth protection and stabilization during adjunctive periodontal and endodontic treatment procedures³. It has been reported that using interim prosthesis for longer time periods can promote tooth sensitivity and potential pulp damage⁴. This article provides an overview of why provisional restorations are as important as the final restorations and describe step by step procedure for the fabrication of provisional restorations.

DIAGNOSTIC USE OF PROVISIONAL RESTORATIONS

Provisional restorations, especially those used for conventional preparations, are invaluable in situations where aesthetic, occlusal or periodontal changes to a patient's dentition are planned⁵.

- Aesthetic changes
- Occlusal changes
- Periodontal changes

Aesthetic changes

Received: Jan. 28, 2017; Accepted: Mar. 9, 2017

*Correspondence Dr. Amit Kumar.

Department of Orthodontics, Daswani Dental College and Research Center, Kota, Rajasthan, India.

Email: dramil08@gmail.com

Proposed changes to the shape of anterior teeth are best tried out with provisional restorations to ensure patient acceptance, and, approval from friends and family, clearly it is easier to trim or add acrylic than it is porcelain.

Occlusal changes

A patient's tolerance to changes in anterior guidance or increased occlusal vertical dimension is best tried out with provisional restorations (Fig 1).



Fig 1: Occlusal changes

Direct or indirect provisional restorations are then constructed from these and cemented temporarily after adjusting to provide even occlusal contact in the intercuspal position and guidance. The patient can then be examined at a further appointment and the occlusal surfaces are copied.

Periodontal changes

Periodontal treatment is commonly a part of comprehensive prosthodontic care.



Fig 2: Provisional Restoration

These provisional restorations provide a matrix against which the tissue heals, guiding the generation of correct soft tissue architecture (Fig 2). Long-term wear of properly fitting and contoured provisional restorations allows the health of the gingival margin to improve and its position to stabilize before impressions are recorded for definitive restorations.

PROVISIONAL RESTORATION FOR CONVENTIONAL PREPARATION

It is worth emphasizing that the length of time between preparation of teeth and cementation of final restorations can vary from a few days for straightforward cases (short-term), to several weeks (medium-term) or even, in the case of complex reconstruction, several months (long-term). The variety of provisional restorations available can seem bewildering. To help you through the maze we need first to consider the materials and then the techniques by which provisionals can be made. Most provisionals are made directly at the chair side, but for long term wear or diagnostic use there can be advantages in having them laboratory-made⁶.

MATERIALS & TECHNIQUES

Interim restorations are generally fabricated using one of the following techniques:-

1. Custom fabrication
- (2) Fabrication with preformed materials.

Additionally both of these procedures can be accomplished with 'direct' clinical, 'indirect' laboratory, or direct/indirect combination techniques⁷. Indirect techniques may result in an increased cost of fabrication and may require special equipment and increased non-clinical time for fabrication.

Custom-fabrication

Custom fabrication represents one of the best choices for provisional restorative treatment.

Various materials are available as listed below:-

1. Polymethyl methacrylate (self or heat cured)
2. Bis acryl composite (eg Protemp, Quicktemp)
3. Urethane dimethacrylate (light cured) (eg Provipont DC)
4. Restorative composite

The technique allows for intimate contact between a provisional restoration and prepared tooth. It provides a continuous mechanism for a variety of alterations during treatment such as marginal adaptation, contour change, shade adjustment, occlusal modification, and repair.

Fabrication with preformed materials

Preformed provisional crowns or 'matrices' usually consist of tooth-shaped 'shells' of plastic, cellulose acetate, or metal (Fig 3). Compared with custom fabricated restorations, this treatment method is quick to perform but This can result in improper fit, uneven occlusal contact for a provisional restoration resulting in inadequate treatment outcome. To avoid confusion with terminology, a shell is incorporated into the provisional restoration whereas a matrix is merely used to form it (Fig 4).



Fig 3: Polycarbonate crown, Aluminum crown and Nickel-chromium crown



Fig 4: Impression (alginate or elastomer) Vacuum formed thermoplastic Proprietary celluloid Matrices

Indirect technique for using self-cure resin

An alginate impression is recorded of the prepared teeth and this is cast up in quick setting plaster. The plaster model is then coated with cold-mould seal and a suitable shade of self cured acrylic mixed up. The acrylic is then flowed into a matrix made from the diagnostic wax up (e.g. silicon putty or vacuum formed) which is then seated onto the cast and its position stabilized(Fig 6)



Fig 5: Putty index

TRIMMING AND POLISHING THE RESTORATION

Gross trimming can be performed by using an acrylic trimming bur or stone to remove bulk of provisional material. A fine disc is utilized to achieve smooth margins. The provisional restoration should have a polished surface to help prevent staining of the

restoration as well as plaque accumulation that can irritate the gingival tissue and compromise periodontal health.

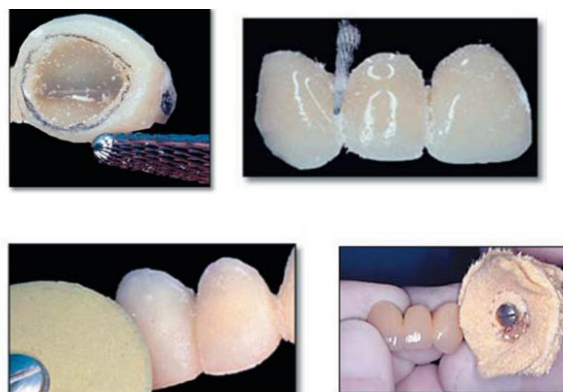


Fig 6: Trimming and Polishing

Polishing is done using polishing buff and polishing cake (Fig 6). Following trimming and polishing the provisional restoration is ready for cementation.

DIRECT TECHNIQUE

The direct technique entails fabrication of a provisional restoration with autopolymerising resin directly upon the prepared teeth.

PROCEDURE

1. The diagnostic cast of the arch to be treated is modified as necessary by diagnostic waxing, an impression made with irreversible hydrocolloid (Alginate), and a cast produced.
2. A thin plastic shell or matrix of polypropylene or addition silicon, is formed and trimmed as illustrated.
3. After the teeth are prepared, and the soft tissue displaced from the sub gingival margins, silicone grease is applied to the prepared tooth surfaces for protection against the irritating effects of the monomer.
4. Autopolymerising resin is placed in the matrix, which is seated over the prepared teeth. One advantage of the plastic matrix is that the thinness allows the patient to close his teeth, thereby allowing occlusion to be developed more accurately. Cool water should be played over the matrix to minimize the heat developed during polymerization. The setting of the resin should be tested at regular frequent intervals to determine the degree of hardness.

5. The provisional restoration that has been cast is removed from the matrix, and finished. The restoration is refitted to the teeth if any marginal discrepancies are there that can be corrected by adding small increments.
6. Occlusion is refined; the removed from the teeth, polished, and seated with provisional cement⁶.

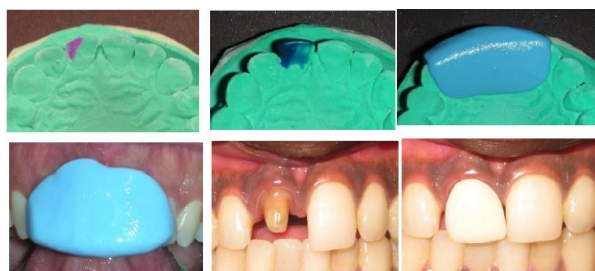


Fig 7: Direct Technique

THE INDIRECT-DIRECT RELINE (EGG SHELL) TECHNIQUE

The indirect- direct technique combines a pre-existing “shell” of the provisional restoration with a chair side reline procedure after the teeth have been prepared. The advantage of the technique is that the “shell” can be fabricated as a laboratory procedure prior to the appointment at which the teeth are prepared.

This technique enables fabrication of the provisional restoration, which fits the teeth accurately, which has proper contour, aesthetics, and occlusion, and which has been produced with minimum time commitment for the patient⁹.

CEMENTATION

Provisional luting agents should possess good mechanical properties, low solubility, and tooth adhesion to resist bacterial and molecular penetration. The most important function of these materials is to provide an adequate seal between the provisional restoration and prepared teeth⁹. Provisional restorations are usually cemented with soft cement. Traditionally, a creamy mix of zinc oxide eugenol was used, but nowadays most dentists prefer proprietary materials such as “Temp Bond” (Color plate 8). Zinc phosphate, zinc polycarboxylate, and glass ionomer cements are not recommended because their comparatively high strength makes intentional removal difficult¹⁰.

Occasionally, hard cement is needed to retain a provisional on a short preparation.



Fig 8: Provisional cements

The retentive requirements for provisional luting materials are that they be strong enough to retain a provisional restoration during the course of treatment but allow easy restoration removal when required.

PROBLEM SOLVING

A number of problems are encountered when making provisional restorations. Some of these are discussed below:

Gross occlusal errors, air blows and voids



Fig 9: Excess cement removal

Hydrostatic pressure built up within the unset resin during reseating of the impression matrix - consider putting escape vents. Avoid voids by syringing material directly onto preparations (Colour plate 9). Of course, material is also loaded into the impression, ensuring the tip is always in the resin, to prevent the incorporation of air.

Premature decementation Premature loss of provisional restorations is frustrating for both patient and dentist. This problem can be largely avoided by ensuring harmony with the occlusion. A few seconds spent marking up and adjusting occlusal contacts will save time in the long run. Occasionally, it is necessary to use a stronger cement, such as zinc

polycarboxylate, especially where retention is limited.

Removal of excess cement

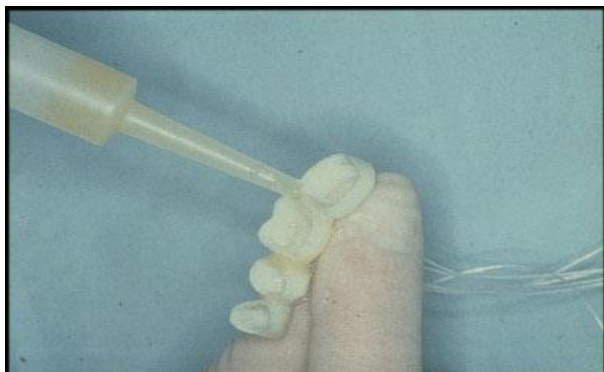


Fig 10: Removal of excess cement

A handy tip to facilitate removal of set cement (either hard or soft); loop floss under each connector of linked crowns and apply petroleum jelly to external surfaces. To make removal easier, the cement should be applied in a ring around the inner aspect of the margin (colour plate 10). Alternatively, the manufacturer's modifier should be added to the cement. Equal lengths of base and catalyst with a third of a length of modifier will soften the cement appreciably.

SUMMARY

The proper fabrication of an esthetic temporary restoration offers protection to the prepared teeth, allows for the proper healing and health of the soft tissue, ensures normal speech and function during the fabrication of the final restorations, and, most importantly, provides the patient with natural appearing teeth¹¹. Besides the immediate protective, functional and stabilizing value, interim restorations are useful for diagnostic purposes where the functional, occlusal and esthetics parameters are developed to identify an optimum treatment outcome before the completion of planned definitive treatment. Using the technique and materials described in this presentation, dentists can quickly provide patients with a strong,

esthetic provisional restoration. This will better enable the dentist to create a final restoration that meets the patient's expectations and builds the patient's confidence in the dentist's esthetic abilities.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Wassel RW, Ingledew RP, Steele JG. Crowns and other extra coronal restorations: Provisional restorations. *BDJ* 2002;192:619-630.
2. Anusavice KJ, Phillip's Science of dental materials. 10th ed, Philadelphia, 1996, WB Saunders. pp. 285, 431.
3. Wataha JC. Principles of biocompatibility for dental practitioners. *J Prosthet Dent* 2001;86:203-209.
4. Burns DR, Beck DA, Nelson SK. A review of selected dental literature on contemporary provisional fixed prosthodontic treatment: Report of the committee on research in fixed prosthodontics of the academy of fixed prosthodontics. *J Prosthet Dent* 2003;90:474-497.
5. Schwedhelm ER. Direct technique for the fabrication of acrylic provisional restorations. *J Contemp Pract* 2006;1:157-173.
6. Schillenburger HT, Hobo S, Whitsett LD, Bracklett SE. Fundamentals of fixed prosthodontics. (3rd ed) Chicago: Quintessence 1997:226-245.
7. Rosenstiel SF, Land MF, Fujimoto J. Contemporary fixed prosthodontics. (2nd ed) St Louis: Mosby 2000:381-416.
8. Glossary of Prosthodontic Terms. *J Prosthet Dent* 2005;84:10-92.
9. Rudd KD, Marrow RM, Eissmann HF. Dental laboratory procedures. Vol 2. St.Louis; The C.V. Mosby Company: 1986:213-220.
10. Rosenstiel SF, Gegauff AG: Effect of provisional cementing agents on provisional resins, *J Prosthet Dent* 1988;59:29.
11. Davis LG et al: Psychological effects of aesthetic dental treatment, *J Dent* 1998;26:547.