PROVISIONAL RESTORATION

IN FIXED PROSTHODONTICS
**Introduction**

- The word provisional means established for the time being, pending a permanent arrangement. Even though a definitive restoration may be placed as quickly as possible after tooth preparation.
- **provisional restoration**, a fixed or removable dental prosthesis, designed to enhance esthetic stabilization and/or function for a limited period of time, after which it is to be replaced by a definitive dental prosthesis. GPT[8]
• In case of unforeseen events (eg: Laboratory delays or Patient unavailability), a provisional restoration may have to function for a extended period

• A provisional restoration will have to be adequate to maintain patient health.

• It should not be casually fabricated on the basis of expected short term use.
Requirements

- Requirements of an optimum provisional restoration can be classified as biologic, mechanical, and esthetic.
Biologic Requirements

• **PULP PROTECTION:**
  - A Provisional restoration must seal the prepared tooth surface from the oral environment to prevent sensitivity and further irritation to the pulp. In severe situation's leakage can cause irreversible pulpitis and the resulting need for root canal treatment.

• **Factors contributing to pulp death:**
  - Preparation trauma
  - Microbial exposure
  - Desiccation
  - Chemical exposure
  - Thermal exposure
• **Periodontal health:**
• A provisional restoration must have good marginal fit, proper contour and a smooth surface. If the provisional restoration is inadequate and plaque control is impaired, gingival health will deteriorate when gingival tissue is impinged upon, ischemia is likely. If it is not corrected, a localized inflammation or necrosis will develop.
• **Occlusal compatibility and Tooth position:**
  • The provisional restoration should establish or maintain proper contacts with adjacent and opposing teeth. Inadequate contacts allow supraeruption and horizontal movements. Horizontal movements results in excessive or deficient proximal contacts.
Prevention of Enamel Fracture

• The provisional restoration should protect crown preparation margins.
• A small chip of enamel will make the definitive restoration unsatisfactory and necessitate a time consuming remake.
Mechanical Requirements:

• The greatest stresses in a provisional restoration are likely to occur during Chewing. The Strength of poly (methyl methacrylate) resin is about one-twentieth that of metal-ceramic alloys, making fracture of the provisional restoration much more likely.

• An FPD must function as a beam on which substantial occlusal forces are transmitted to the abutments.
A) In the anterior, the degree of overcontouring is substantially limited by esthetic requirement.

B) In the posterior region, esthetic is less restrictive.
• Greater Strength is achieved by reducing the depth and sharpness of the embrasures. This increases the cross-sectional area of the connector while reducing the stress concentration associated with sharp internal line angles.

• In some instances making a high strength provisional (e.g., cast metal, fiber reinforced or heat-processed resin) may be beneficial.
Indication for high strength provisional restorations

• A long span posterior FPD.
• Prolonged treatment time.
• Patient unable to avoid excessive forces on the prosthesis.
• Above average masticatory muscle strength.
• History of frequent breakage.
Displacement:

• To avoid irritation to the pulp and tooth movement, a displaced provisional must be recemented promptly. Displacement is best prevented through proper tooth preparation and a provisional with a closely adopted internal surface.
• Excessive space between the restoration and the tooth places greater demands on the luting agents which has lower strength than regular cement and thus cannot tolerate the added force. For this and for biologic reasons, unlined preformed crowns should be avoided.
Esthetic Requirements

• The appearance of a provisional restoration is practically important for incisors, canines and sometime premolars. Contour, color, translucency and texture are the key elements of coronal appearance.

• Contour and color are fundamental and more important than the other two elements. If color and contour are well controlled, most provisional restorations will have a very acceptable and very excellent appearance.
• The provisional is often used as a guide to achieving optimum esthetics in the definitive restoration.
• Beauty and personal appearance are highly subjective and difficult to communicate verbally, and a facsimile prosthesis can play a vital role in the patient's consideration of esthetics and the impact that the prosthesis will have on self image.
• The provisional is shaped and modified until its appearance is mutually acceptable to the dentist and the patient.
COLOR STABILITY

• Discoloration of provisional restoration can be an esthetic problem, especially when the treatment plan requires long term provisionalization.

• P R M are prone to absorption of liquids, so staining can easily produce color changes. Combination of provisional materials, staining solution & immersion time are significant factors affecting color stability. The coffee solution exhibited more staining capacity than the tea solution.
Effect of different polishing methods on colour stability

• Polishing procedure were used, including pumice, diamond polishing paste, polishing discs.

• The methyl methacrylate-based material was found to be more color stable than the autopolymerized [protemp II] and light polymerized.

• The use of diamond polishing paste after polishing with pumice significantly decreased the staining of methyl methacrylate and bis-acryl composites.
Materials and Procedure's:

- The mold cavity is created by two correlated parts, one forms the external contour of the crown of fixed partial denture, and the other forms the prepared tooth surfaces and the edentulous ridge contact area. The terms external surface form (ESF) and tissue surface form (TSF) are suggested for these mold parts.
External surface form:

- **Custom** - A custom ESF is a negative reproduction of patients teeth before preparation.

- Accurate reseating of the ESF is easier and mold cavity produces better results if thin areas of impression material are trimmed away.
• A custom ESF can be produced from thermoplastic sheets, which are heated and adapted to a stone cast with vacuum or air pressure.

• **Advantages**: in direct technique - ESF are its minimum interference with the occlusion. After tooth preparation it is filled with resin, placed in the mouth, fully seated as the patient closes into maximum intercusptation.
• **Disadvantages:** The material is a poor dissipator of the heat released during resin polymerization, so care must be taken to remove it from the mouth before injury can occur.

• A thermoplastic ESF can help evaluate the adequacy of tooth reduction.

• Transparent sheets are available in cellulose acetate or polypropylene. Polypropylene produces better surface details and is more tear resistant.
• **Preformed:** A variety of preformed "crowns" is available commercially. They can be thought of as ESFs rather than as finished restoration and therefore must be lined with autopolymerizing resin.

• Most crown forms need some modification (e.g., internal relief, axial recontouring, occlusal adjustment) in addition to the lining procedure.

• A custom ESF is superior because it is less time consuming.
Polycarbonate:

- Polycarbonate has the most natural appearance of all the preformed materials.
Cellulose Acetate:

- Cellulose acetate is a thin (0.2 to 0.3 mm) transparent material. Shades are entirely dependent on the autopolymerizing resin. The resin does not chemically or mechanically bond to the inside surface of the shell.

- However, removing the shell requires the addition of resin to reestablish proximal contacts.
Aluminum and Tin Silver:

- Aluminum and tin silver are suitable for posterior teeth.
- The most elaborate crown forms have anatomically shaped occlusal and axial surfaces using crowns that have been preformed.
- Care must be taken to avoid fracturing the delicate margin of the tooth preparation while fitting a metal crown form.
Nickel- Chromium:

- Nickel chromium shells are used primarily for children with intensively damaged primary teeth. They are more suitable for primary teeth.
Tissue Surface form:

- There are two primary categories of tissue surface forms indirect and direct.

**Indirect Procedure:**

- An impression is made of the prepared teeth and ridge tissue and is poured in quick setting gypsum.
Advantage:

- There is no contact of free monomer with the prepared tooth or gingiva, which might cause tissue damage and an allergic reaction or sensitization.

- In allergic patients an exposure to even small amounts of monomer usually causes painful ulceration and stomatitis.
• The procedure avoids subjecting a prepared tooth to the heat created from polymerizing resin.

• That amount of temperature elevation is capable of causing irreversible pulp damage.

• An increase in temperature depends directly on the type and volume of resin present.
The marginal fit of provisional restorations that have been polymerized undisturbed on stone casts is significantly better than that of provisional that have been removed from the month before becoming rigid. This is because

- The stone restricts resin shrinkage during polymerization.
- Separating the resin from the tooth causes distortion.
Direct Procedure:

• The patient’s prepared teeth and gingival tissues directly provide the tissue surface form.

• **Disadvantage:** Potential tissue trauma from the polymerizing resin and inherently poor marginal fit.
Provisional Restorative Materials:

- **Ideal Properties:**
  An ideal provisional material has the following characteristics.

- Convenient Handling: Adequate working time, easy moldability, rapid setting time.

- Biocompatibility: Non toxic, non allergic nonexothermic.

- Dimensional stability during solidification.

- Ease of contouring and polishing.
• Adequate strength and abrasion resistance
• Good appearance- Translucent, color controllable color stable.
• Good patient acceptance- nonirritating, odourless colorless.
• Ease of adding to or repairing.
• Chemical Compatibility with provisional luting agents.
Currently Available Materials:

- These materials shrink during polymerization which cause marginal discrepancy.
- Resins currently used are exothermic and not entirely biocompatible.
- These materials are divided into four-resin groups:
  - poly (Methyl Methacrylate)
  - Poly (ethyl Methacrylate poly vinyl ethyl Methacrylate)
  - Microfilled composite (bis acrylic composite resin)
  - Light cured (urethane dimetha acrylate)
Evaluation:

• The provisional FPD should be evaluated in the patient's mouth for proximal contacts, contour, surface defects marginal fit and occlusion.

• Deficient proximal contacts, imperfections in contour or surface defects can be corrected by adding resin, using the bead brush technique.
Bisacrylic composite crown: [PROTEMP II]

- Bisacrylic composite crown can be used to fabricate a provisional restoration on a quick set plaster cast.

- Its polymerization produce very little heat & it has minimal toxic effect on soft tissue & the pulp.
Fiber-reinforced composite prosthesis

• Fiber reinforced composite have good flexure strength.
• F R C substructure is translucent and require no opaque masking.
• The most commonly used fibers are glass, polyethylene, and carbon.
• Fiber architectures include unidirectional, braided and woven pattern.
• All polymer prosthesis compose of an internal glass fiber reinforced composite substructure covered by particulate composite.
Cementation:

• The primary function of the provisional luting agent is to provide a seal, preventing marginal leakage and pulp irritation.

• Definition GPT[8] provisional cementation of an interim or definitive restoration with a luting agent with weak retentive properties to facilitate the planned future removal of the restoration.
IDEAL PROPERTIES

• Ability to seal against leakage of oral fluid.
• Strength consistent with intentional removal
• Low solubility
• Chemical compatibility with the provisional polymer
• Convenience of dispensing and mixing
• Ease of eliminating excess
• Adequate working time and short setting time.
• Compatibility with the definitive luting agent.
Available Materials:

• In presently available materials, zinc oxide eugenol cements appear to be the, most satisfactory.

• Zinc phosphate, zinc polycarboxylate, and glass ionomer cements are not recommended because their comparatively high strength makes intentional removal difficult. Weaker ZOE cements allow easy removal, which enables reuse of the restoration.
• In addition to its acceptable sealing properties, ZOE also has an obtundent effect on the pulp unfortunately, free eugenol act as a plasticizer of methacrylate resins.

• It has been shown to reduce surface hardness and presumably strength. The R methacrylates are severely affected by free eugenol. Methyl methacrylatres are affected moderately, and the composites are only slightly softened.
• One study demonstrated that both residual ZOE and non eugenol containing temporary cements reduced the tensile bone strength of resin luting agents.
• In practice, all traces of temporary cement should be thoroughly removed to maximize adhesion.
• Air abrasion with aluminum oxide will effectively remove residual ZOE cement residue, but alcohol and organic solvents will not.
• Similarly, cleansing with pumice will leave a ZOE residue, which can inhibit bonding.
• In situations when the tooth preparation lacks retention, when a span is great or long term use is anticipated, or when parafunction exists, using higher strength cement may be desirable.
• A good compromise would be eugenol free zinc oxide, which has slightly greater strength than cements containing eugenol.
Procedure:

1. To facilitate removal of excess cement, lubricate the polished external surfaces of the restoration with petrolatum.
2. Mix the two pastes together rapidly and apply a small quantity just occlusal to the cavosurface margin.
3. Seat the restoration and allow the cement to set.
4. Carefully remove excess with an explorer and dental floss.
Removal, Recementation and Repair

• The provisional restoration is removed when the patients returns for placement of the definitive restoration or for continued preparation. Fracture of the prepared tooth or foundation must be avoided.

• This risk can be minimized if removal forces are directed parallel to the long axis of the preparation.

• A slight buccolingual rocking motion will help break the cement seal.
CONCLUSION

• All fields of human activity have been affected by great advances of technological developments. As so has dentistry benefited from these advances.

• Today a wide variety & high quality of the materials are available. But the dentist needs to make the right choice depending upon the technique and condition
THANK YOU