Lecture 5: Temporization

By Dr Cheryl Fu

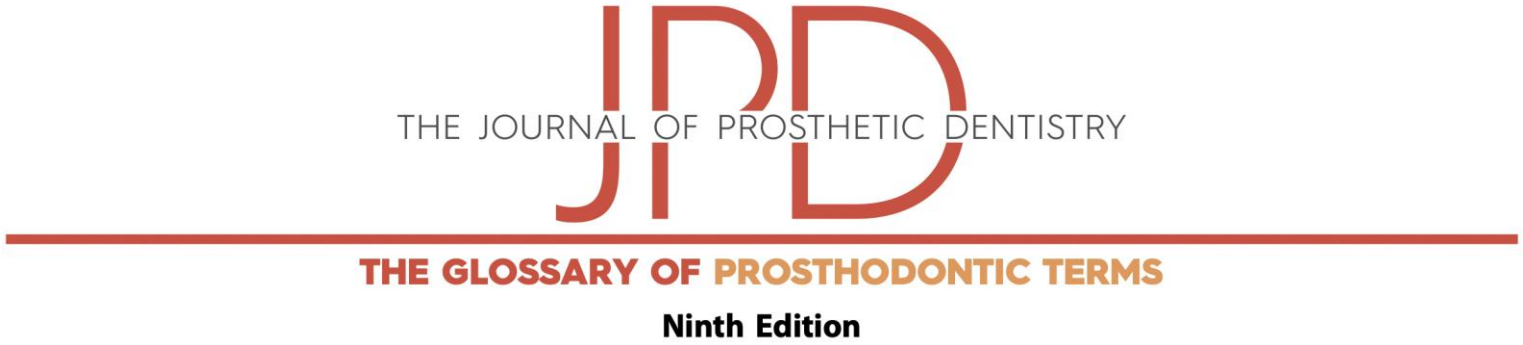
Learning Outcomes

- Biological, mechanical, esthetic principles of temporization
- Temporary materials
- Custom vs pre-fabricated temporaries
- Direct vs indirect vs direct-indirect temporary techniques
- Temporary cements

Reading: Chapter 15 in Contemporary Fixed Prosthodontics

Temporization

- Interim restoration/provisional restoration



temporization: to establish esthetics, occlusal stability, and function for a limited time in preparation for the definitive prosthesis; to verify therapeutic outcome and patient acceptance before the definitive prostheses; *syn*, PROVISIONALIZATION

Temporisation

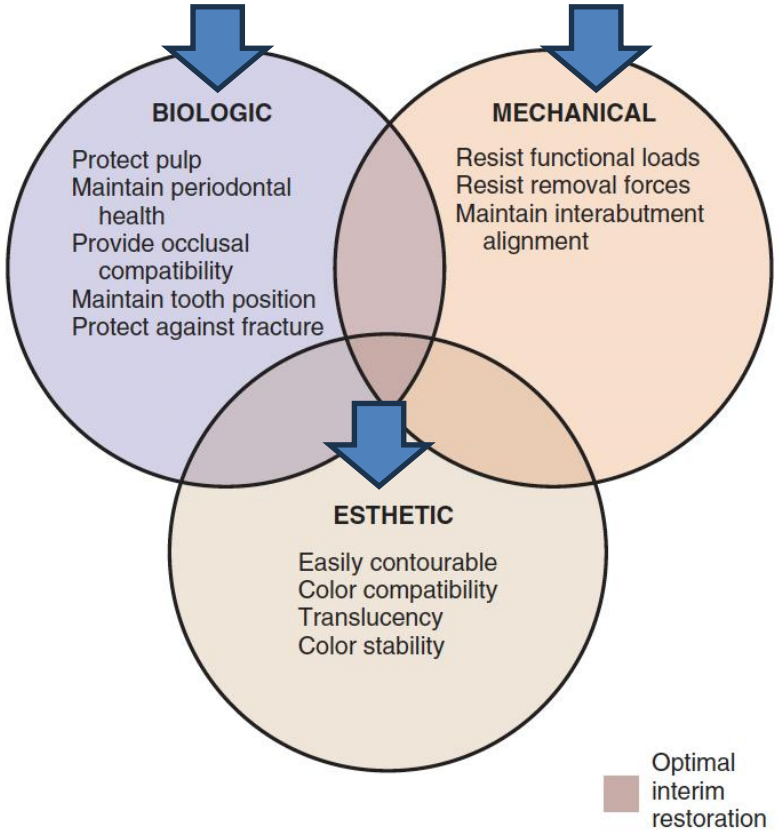
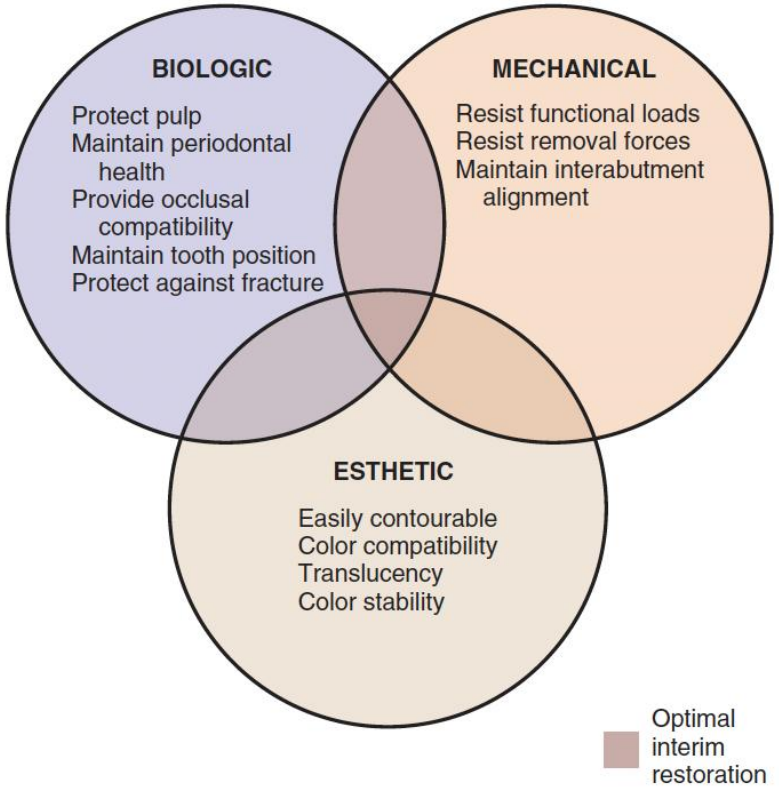


FIGURE 15-1 ■ Factors to be considered in making an interim restoration. The *central area* represents the optimum, in which biologic, mechanical, and esthetic requirements are adequately met.

Just like the principles of tooth preparation there are also factors that need to be considered during the fabrication of a temporary restoration

Image in Contemporary fixed prosthodontics

Temporisation



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Biological Factors:

- Protect pulp (if it is still present)
  - Removal of tooth structure can lead to sensitivity if the dentin tubules are exposed to the oral environment
- Periodontal health
  - A suitably shaped temporary restoration is required to ensure periodontal health.
  - Appropriate contour shape, and smoothness
  - Appropriate interproximal contacts
- Occlusal Compatibility and tooth position
  - Loss of temporary crown can lead to either supra-eruption of the opposing tooth or tilting of the opposing tooth
- Protect against fracture
  - Protect unsupported tooth structure

RECAP: Principles of Tooth Preparations

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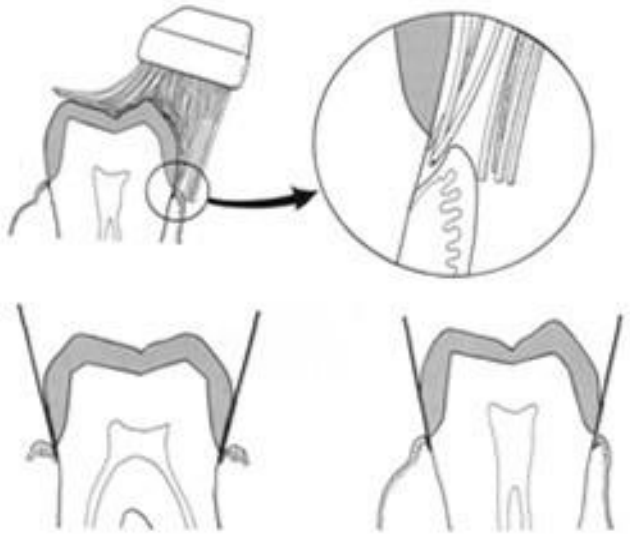
ABUTMENT TOOTH

- Principles of tooth preparation
- Partial or complete preparation



BIOLOGICAL

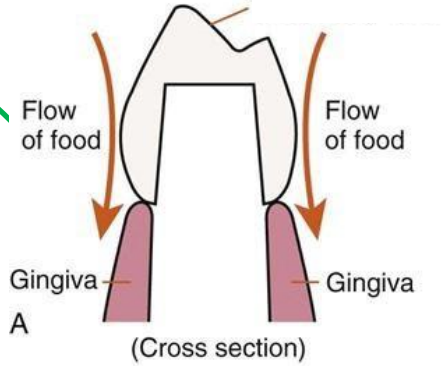
- Conservation of tooth structure
- Avoidance of overcontouring
- Supragingival margins
- Harmonious occlusion
- Protection against tooth fracture

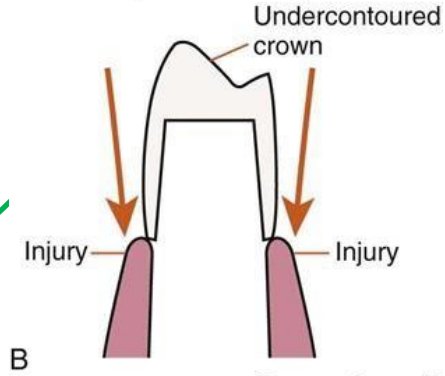
MECHANICAL

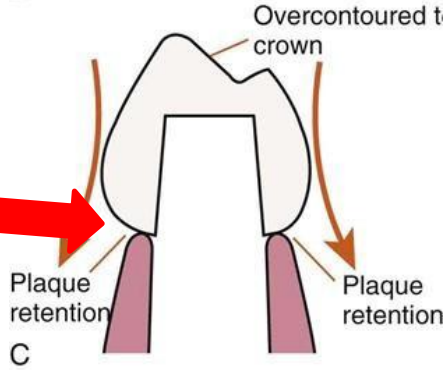
- Retention form
- Resistance form
- Deformation

AESTHETIC

- Minimum display of metal
- Maximum thickness of porcelain
- Porcelain occlusal surfaces
- Subgingival margins



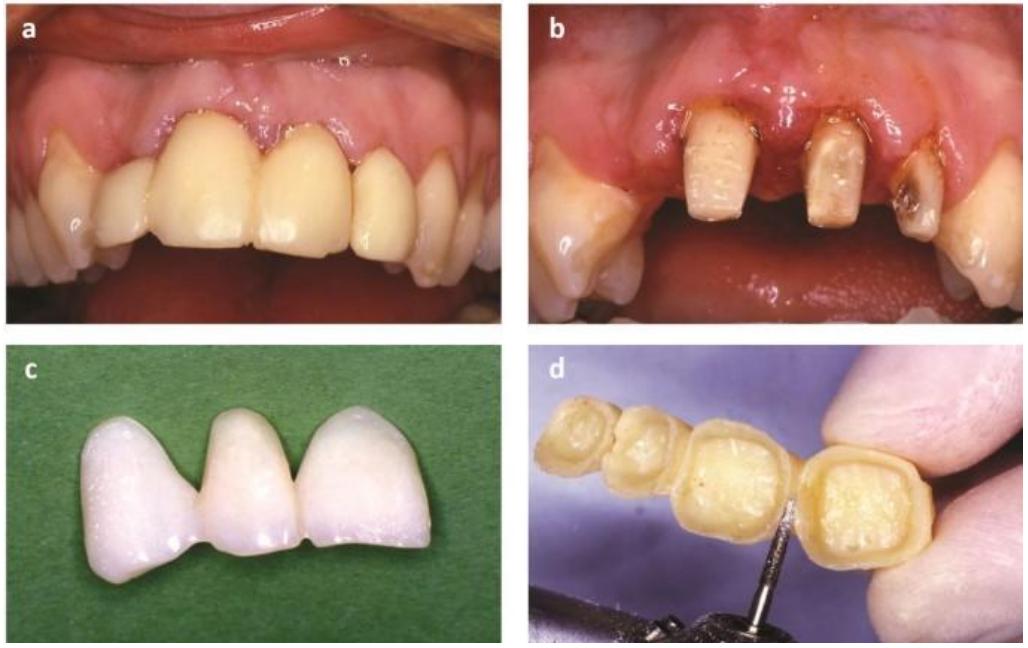




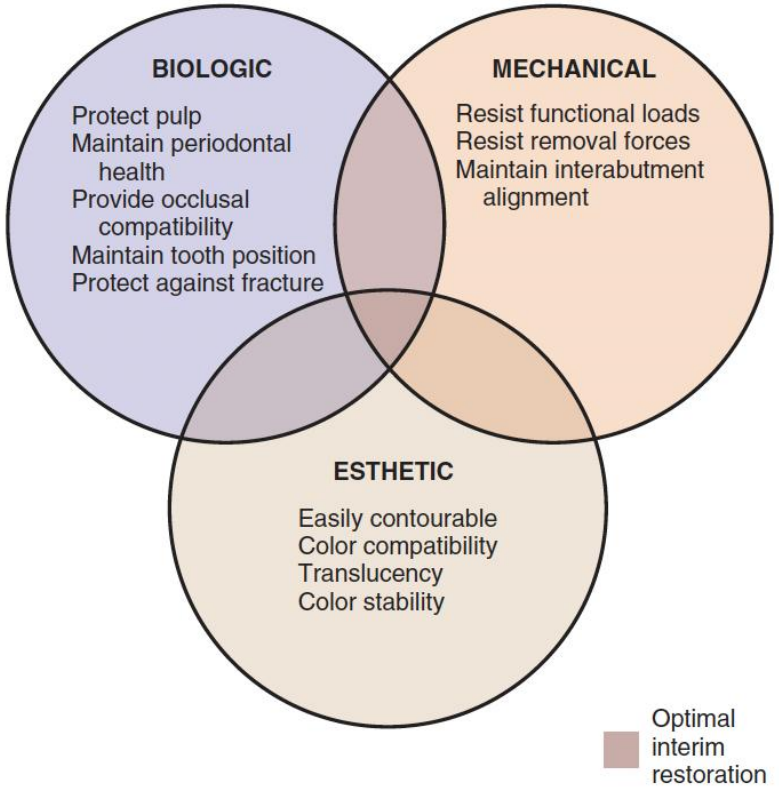
Patient can't clean this!

Which would you prefer?

OR



Temporisation



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- Occlusal Compatibility and tooth position
  - Loss of temporary crown can lead to either supra-eruption of the opposing tooth or tilting of the opposing tooth
- Protect against fracture
  - Protect unsupported tooth structure (more for overlays)

Temporisation

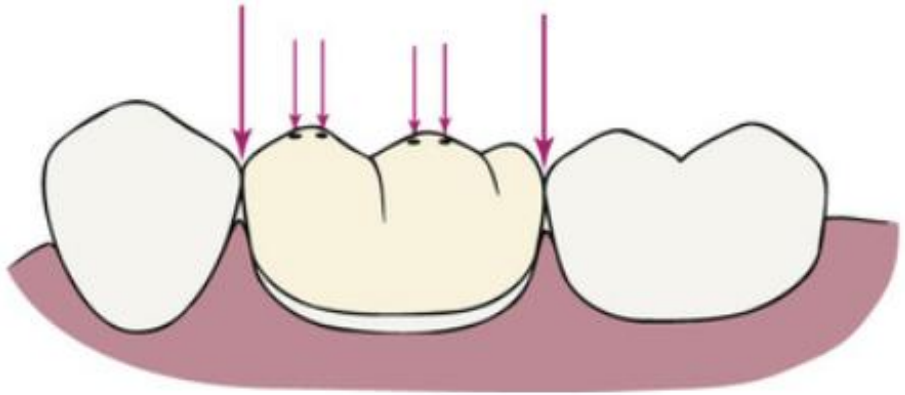
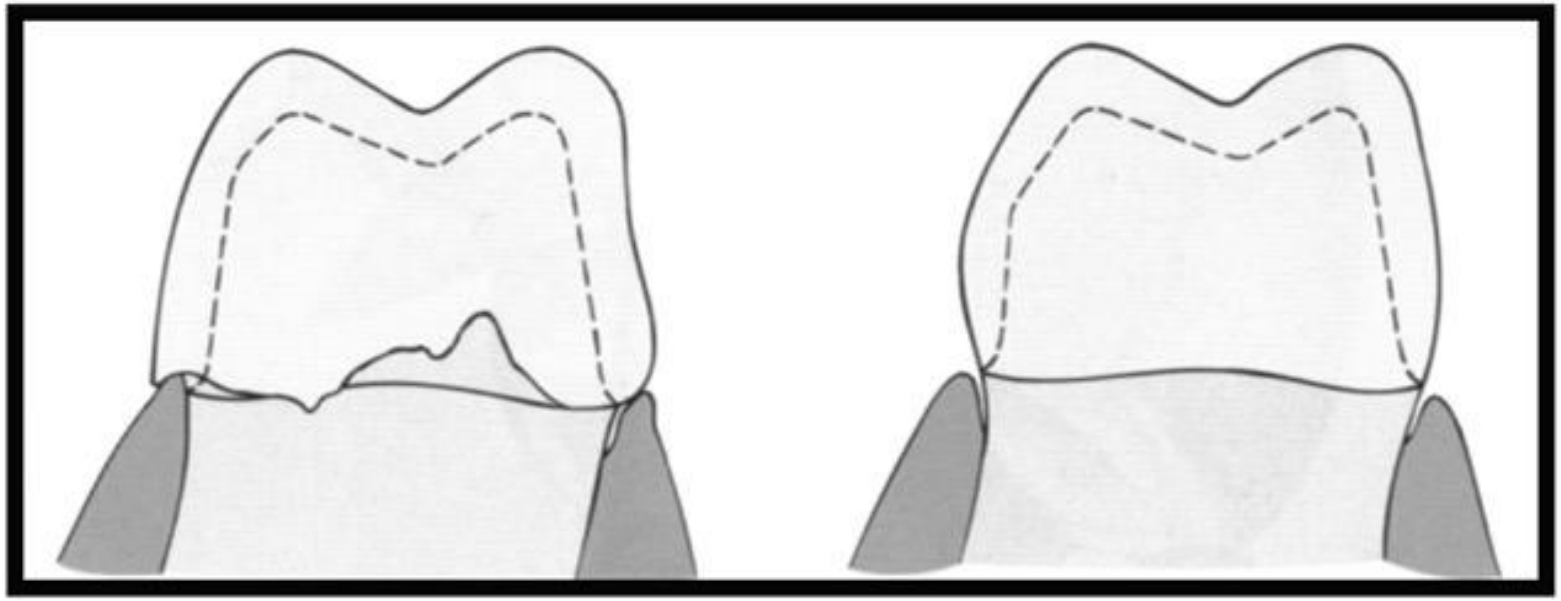


FIGURE 15-4 Proper occlusal and proximal contacts promote patient comfort and maintain tooth position.

Temporisation



Open margins
Overhangs
Over contoured

Sealed margin
Smooth margin
Well contoured

Temporisation

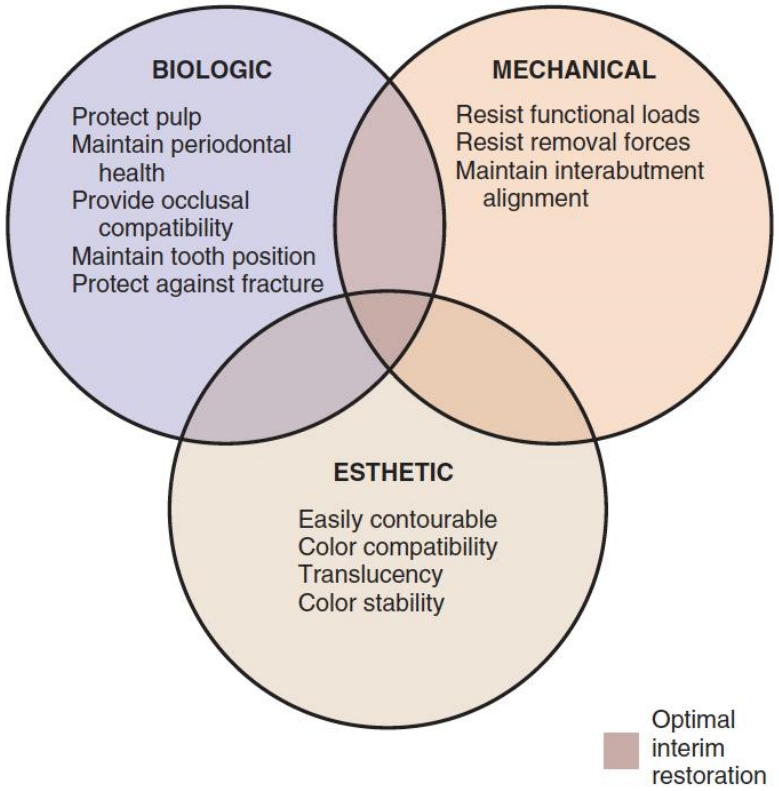
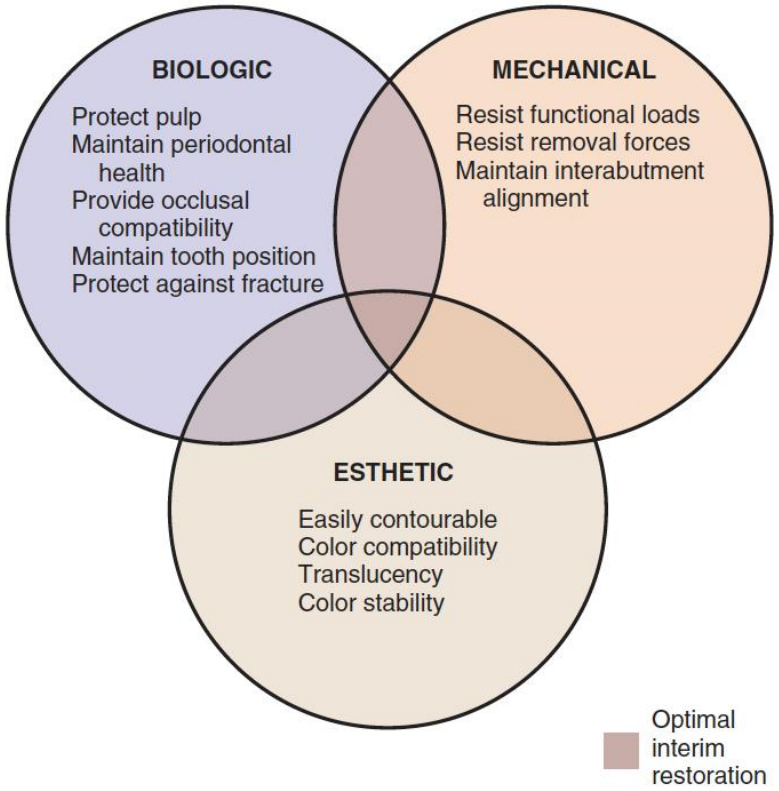


FIGURE 15-1 ■ Factors to be considered in making an interim restoration. The *central area* represents the optimum, in which biologic, mechanical, and esthetic requirements are adequately met.

Mechanical Factors:

- Resist functional loads
  - Chewing/daily function
  - In complete crown preparation if there is sufficient reduction the temporary material should withstand oral stresses.
  - Provisional restoration for cracked tooth
- Resist removal forces
  - In complete crown preparation, the retentive factors such as parallel preparation
  - Instruct patient to not chew sticky foods, can continue to floss, but they are to PULL THE FLOSS THROUGH THE SIDE, and not back through the contacts.

Temporisation



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Aesthetic Factors:

- Anterior teeth
  - Accurate shade matching
  - Appropriate shape
- Complex treatment plans
  - May use long term interim restorations to let patient "try out" the proposed treatment
  - Especially important for large changes to the incisal edges or palatal contour (s, f, th, etc sounds)

Complex treatment plans

But, not done in 1 step. Many many steps in between:

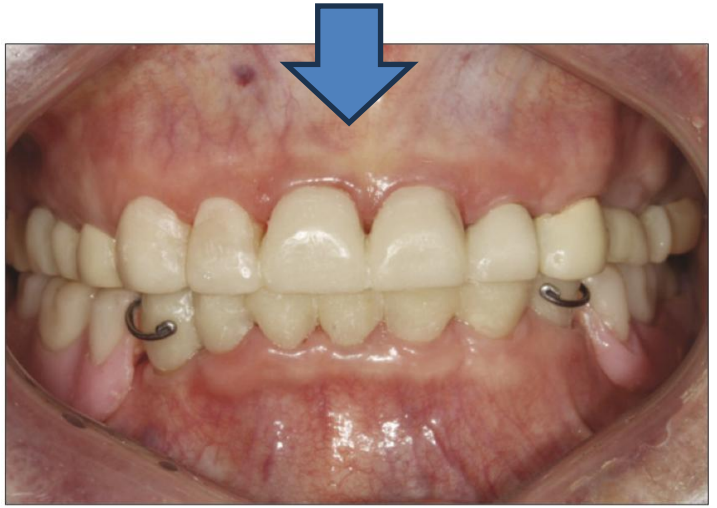


Fig. 5. Provisional restorations were placed after trial period of removable occlusal overlay splint.

Song MY, Park JM, Park EJ. Full mouth rehabilitation of the patient with severely worn dentition: a case report.

Alternative reasons for long term temporaries: Cracked teeth

- Numerous proposed management strategies:
  - Single vs multi-staged
  - Direct vs indirect
  - Cuspal coverage?
- One of potential treatments: Full crown
  - However preferable to start with crack investigation and restoration with composite core prior to crown. Otherwise potential unwanted stress concentration.
  - Thus we are now in “multi-staged treatment”
  - How long do we wait: ranges from 1 week to 6 months.
  - Extracoronal splinting via orthodontic bands, or temporary crowns
  - Tooth with uncertain prognosis: is it worth it?

Temporary Materials

Selection of temporary restoration material depends on several factors:

- Anticipated load
- Prosthesis design
- Span length
- Duration of provisional restoration

Temporary Materials

Ideal Properties

- Adequate strength
- Abrasion resistant
- Biocompatible
- Non-irritant
- Dimensional Stability
- Ease of contouring and polishing
- Good aesthetics
- Convenient handling
  - Working time
  - Setting time
  - Application
  - Easily modifiable

Temporary Materials

Custom and prefabricated
Direct vs indirect vs direct-indirect

Choices for custom temporary restorations:

- Polymethyl Methacrylate (PMMA)
- Polyethyl Methacrylate (PEMA)
- Bisacryl Composite Resin
- Light-Cured Composite Resin

Direct vs Indirect fabrication

Direct Fabrication

- Eliminates the need of an alginate impression and cast (not entirely…)
- However technique sensitive
- PMMA is not suitable due to exothermic reaction and polymerization shrinkage
- Can be subdivided into “custom” or “preformed” method.

Indirect Fabrication

- More accurate

Direct-indirect Fabrication

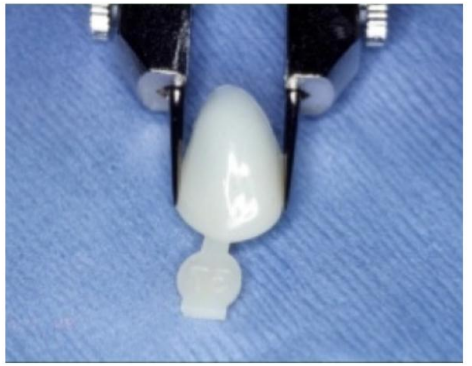
- A shell is formed using the indirect method which is relined chairside to fit the preparation.
- Reduces chairside time
- Less heat generation

Direct: Preformed

- A premade mould which must be relined to fit on the prepared tooth.
- Available forms:
  - Polycarbonate
  - Cellulose acetate
  - Aluminum
  - Tin-silver
  - Nickle-chromium

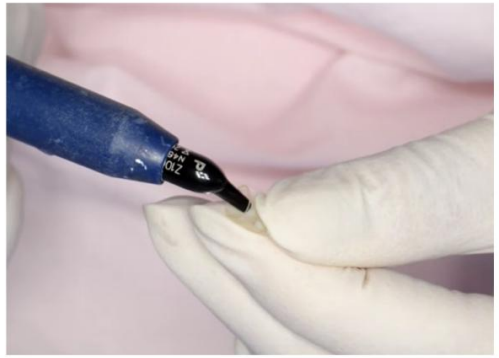
Polycarbonate

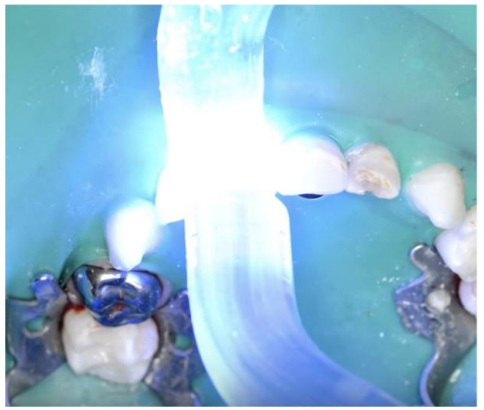
- Colour stable restoration, but only available in 1 shade (can be modified using the lining material)
- Forms part of the provisional restoration
- Bonds to PEMA
- Procedure
  - Select correct crown form based on morphology and mesial-distal width
  - Adjust height until passively fitting
  - Lubricate tooth with petroleum jelly to protect from monomers and prevent bonding of the acrylic to the tooth.
  - Mix PEMA and apply to crown when PEMA loses its gloss
  - Fit crown on tooth, and immedidately remove the excess from the margins
  - Once the material is in rubbery phase (2 minutes) remove and reseat the crown to prevent thermal irritation and ensure the crown can be removed later
  - After 5 minutes when material is fully set, the material can be adjusted and cemented with temporary cement
  - Check occlusion



Acetate strip crowns

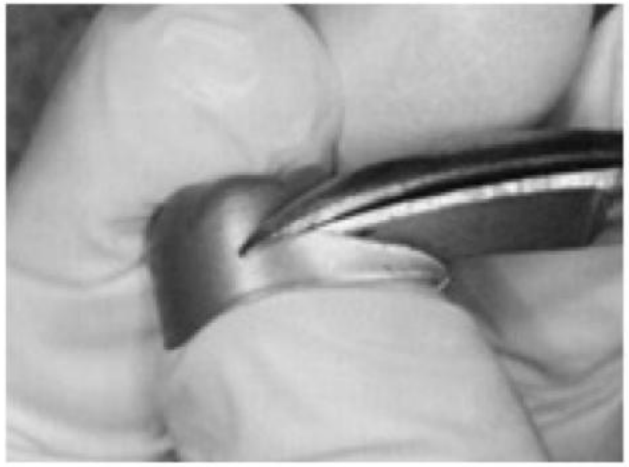
- Does not bond to acrylic
- Only used to provide shape to the provisional restoration (the crown form needs to be removed)





Metal Crowns

- Available in molar and premolar forms
- More suited for children
- Very strong
- Easily adjusted
- Luted with cement
- Will form part of the final provisional restoration
- Procedure:
  - Selected the correct crown based of morphology and mesiodistal width
  - Adjust mesiodistal width with pliers
  - Can adjust the height using scissors or pliers



Direct (custom)

- Requires a mold
  - Silicon or Clear thermoplastic material
- Mold can be constructed intra-orally with silicon, or can be done on a cast of the teeth. (Allows wax up to change the morphology of the existing tooth)
- Advantages
  - Easy to apply
  - Can be done in same visit
  - Can incorporate wax up modifications
  - Cheapest
- Disadvantages
  - Inferior mechanical properties
  - Optimal fit is compromised
  - More clinical time

Indirect

- Advantages
  - Superior mechanical properties
  - Patient not exposed to uncured monomers (allergies)
  - No heat from polymerizing resins
  - Better fit (we are removing the luxatemp provisional restorations when semi-set)
  - Better finish and polish
  - Less clinical time
  - Incorporates wax-up modifications
  - Possibility of metal reinforcement
- Disadvantages
  - Time consuming (lab turn around time)
  - Additional cost
  - More suitable for extensive restorations (long term temporaries)

Indirect-Direct

- Advantages
  - Superior mechanical properties
  - Better finish and polish
  - Incorporates wax-up modifications
- Disadvantages
  - Additional laboratory cost
  - More time consuming than indirect technique (shells likely need some sort of adjustment)

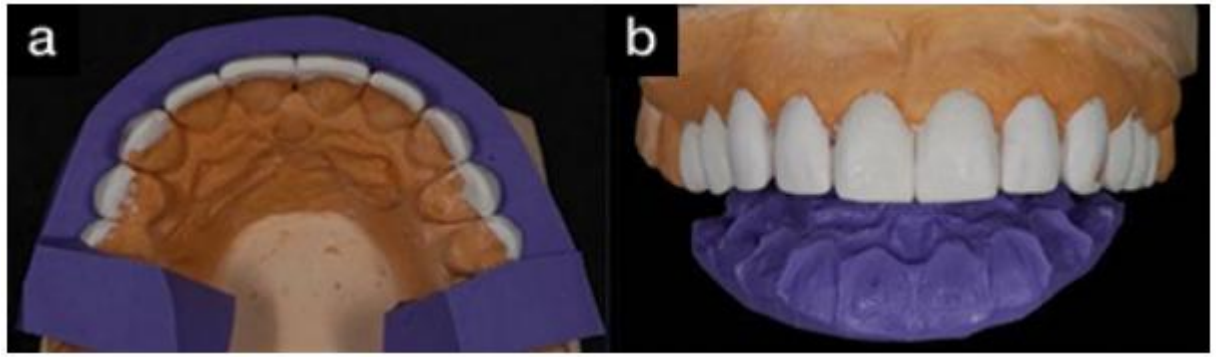
Indirect-Direct

Indirect

- Stone model is conservatively prepared in the laboratory with supragingival margins
- Provisional restoration is constructed in the laboratory with the aid of template

Direct

- Provisional restoration is tried in the mouth and adjusted accordingly
- Relined with suitable material



Temporary Materials

Choices for custom temporary restorations:

- Polymethyl Methacrylate (PMMA)
- Polyethyl Methacrylate (PEMA)
- Bisacryl Composite Resin
- Light-Cured Composite Resin

PMMA

Advantages:

- High strength
- Colour stability
- Can be characterized
- Easily smoothed
- Easily repaired
- Low cost

Disadvantages:

- Highly exothermic
- Significant polymerization shrinkage (21%!)
- Monomer release toxic to pulp
- Unpleasant odor
- Low abrasion resistance

Can be used in indirect or direct-indirect method

PEMA

Advantages:

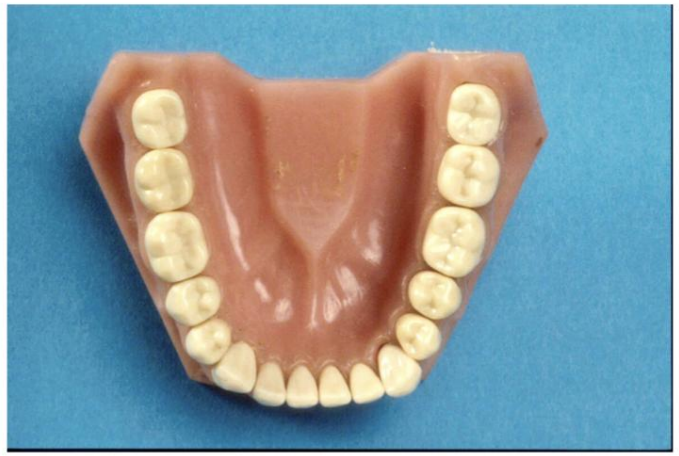
- Easily polished
- Minimal exothermic heat increase (compared to PMMA)
- Low shrinkage
- Can be characterized
- Easily repaired
- Low cost
- Moderate strength

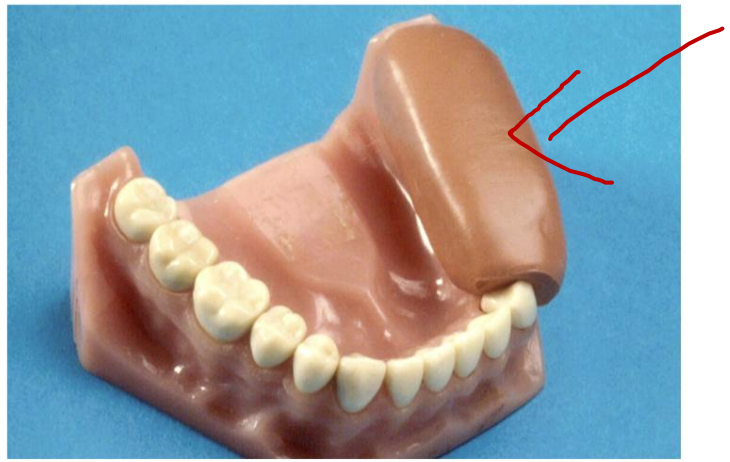
Disadvantages:

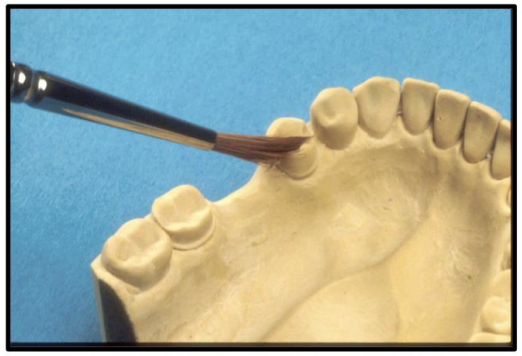
- Surface hardness (weaker than PMMA)
- Strength
- Durability
- Fracture toughness
- Unpleasant odor

Can be used in direct method for single crowns, or in the direct-indirect reline method

Custom

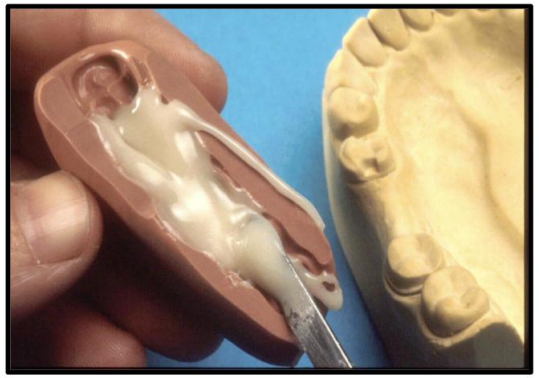






Lubricate the prepared

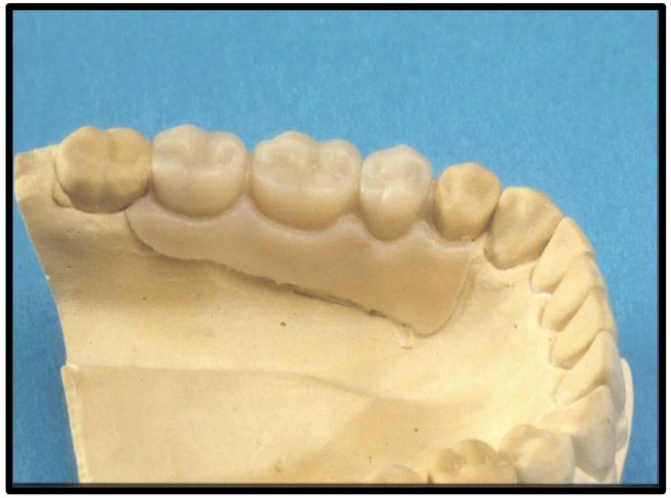
Acrylic PEMA
Bisacryl

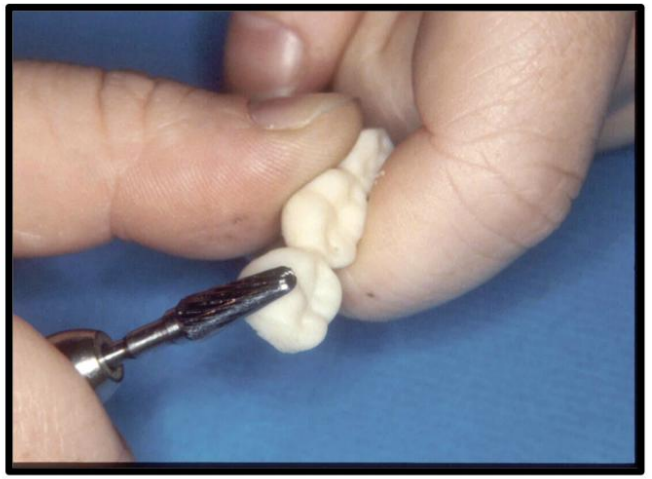


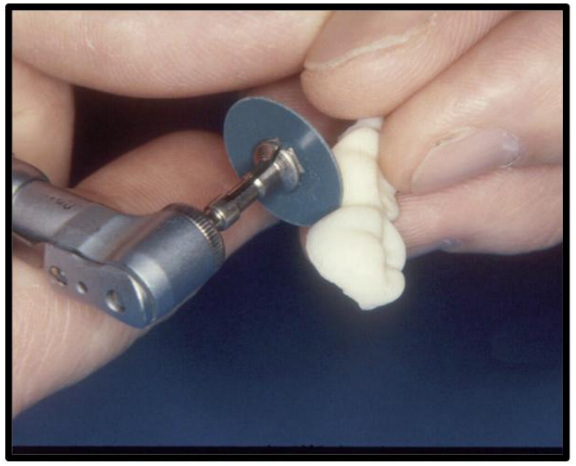
Apply the material to
the mould

Seat the mould

Custom







Bisacryl composite resin

Advantages:

- Low exothermic reaction
- Minimal polymerization shrinkage
- Ease of application via cartridge system
- Can be smoothed or polished
- Can be characterized

Disadvantages:

- Brittle
- Difficult to repair
- Does not bond to polycarbonate crowns
- High cost

Ideal for direct methods for single crowns

Light cured composite resin

Advantages:

- Controlled setting (light cured)
- Highly aesthetic
- Can be characterized
- Easily polished and smoothed

Disadvantages:

- Brittle
- Transparent template required for light cure
- Can be time consuming
- High cost

Single unit restorations in the direct method. Can also be used to repair open margins in bisacryl composite crowns. Can also be fabricated in the indirect method

Temporary cements

- Objectives:
  - Provide adequate seal
  - Retain provisional restoration
  - Minimal solubility
  - Adequate handling and mixing
  - Adequate working and setting time
  - Cleansable
  - Biocompatible with pulp/gingiva
  - Compatible with restorative materials
  - Allows for restoration removal

Temporary cements

- Types:
  - Zinc-oxide eugenol cement
  - Eugenol free cement
  - Polycarboxylate cement (harder cement)
  - Tempbond clear (aesthetic)

Temporary cements

- Zinc-oxide eugenol cement is most commonly used
- High strength cements should be avoided as it can cause damage during the removal of the temporary restoration.
  - Can be used when there is lack of retention in tooth preparation
  - Long span restorations
  - Parafunctional activities
- Eugenol may act as a plasticizer of methacrylate resins
  - Thus could reduce bond strengths of permanent resin cements
- Thus can use eugenol free cements

Temporary Cements

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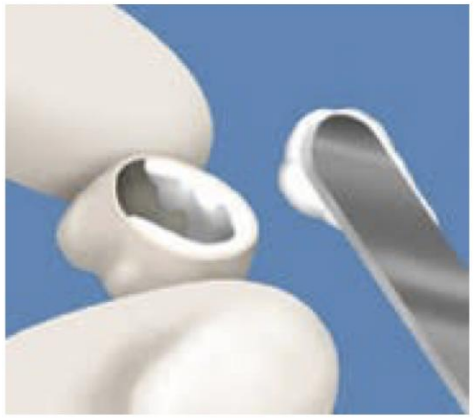
TEMPORARY CEMENTS

1) Mix the base and activator
2) Apply a small quantity just short to the margin
3) Seat the crown and hold tightly (or ask patient to bite over a cotton roll)
4) Remove the excess with an explorer and dental floss
5) Make sure no cement is left in the gingival sulcus
6) Occlusion should be checked and adjusted after cementation



Thanks for listening

Any questions? Send me an email or ask me during CSSL