

Steps to Select a Material for Tooth filling

Decision for selection is a complex, factors including:-

- 1-The tooth,
- 2-The patient,
- 3-The clinician,
- 4-properties of restorative material.

Individual restorative materials ideally are applied in a clinical circumstances, and not substitute one material for another to obtain a long-term success

Specific clinical situation

Dictate a much narrower range of appropriate restoration options.

Factors considered for selection of specific clinical situation

- A-The diagnosis of dental caries.
- B-Treatment & material options.
- C-Ideal characteristic of restorative materials.
- D-Longevity of filling materials.
- E-Determine a restoration failure.

Early caries, is likely to be asymptomatic and is found by the traditional "checkup." Started by a demineralized process.

Such demineralized enamel transmits:

hot, cold, pressure and pain

much more readily than normal enamel. Such pt. feels something like a toothache, but the dentist says you don't have a cavity

Remineralization

Is the process of restoring minerals - again, in the form of mineral ions - to the hydroxyapatite's latticework structure.

Remineralization is three-dimensional.

Both remineralization and demineralization occur on the surface of the tooth.

There is no connection between the bloodstream and the enamel.

Taking mineral supplements has virtually no impact on remineralizing the teeth..

Early caries, so

- 1- Fluoride applications,
- 2- preventive resin restorations.
- 3- Oral bacterial screening for mutans strep. and lactobacillus appropriate .

This way of caries treatment is known as (TRY NOT TO RESTORE)

On the other hand

- 1- Carious cavities.
- 2-Tooth fracture,
- 3-Restoration failure,
- 4-Trauma,

All must be treated by filling

B-Treatment and Material options

Treatment a specific characteristics of patient's dentition including:

Patient's oral hygiene.

Periodontal health.

Dental caries history.

The first decision includes:-

- 1-Extent of caries cavity.
- 2-Strength of remaining tooth structure .
- 3-Financial costs .
- 4-Ability of the dentist to perform the procedure.
- 5-Preferences of the dentist & the prevailing standard of care.

The second decision.

Which procedure and material to use.

A "case presentation" outlining overall treatment options.

- 1-Nature of the oral cavity.
- 2-Type of restorative failure expectation.
- 3-system representing the oral cavity.

1-the nature of the oral cavity subject the restorative material to :-

- a-Dietary factors.
- b-Adhesive nature of plaque.
- c-The complex and different structures of cementum, dentine. & enamel.
- d-Fracture of the tooth structure.
- e-Acid-base shifts.
- f-Temperature changes.

Interaction with other materials specially implant material

What is the effect of different filing materials on titanium properties or absorption of oxygen .

- 2-Restorative failure Expectation?

3-System representing the oral cavity.
No system that can duplicate the combined stresses of the oral cavity over a lifetime.

Material options

1-Harmless to all oral tissues—gingiva, mucosa, pulp, and bone.

2-No toxic, leachable, or diffusible substance that can be absorbed & causing teratogenic or carcinogenic effects.

3-Free of agents that could elicit sensitization or an allergic response.

4-Local reactions involve:

The gingiva,

Mucosal tissues,

Pulp, and

Hard tooth tissues, including excessive wear on opposing teeth.

5-Systemic reactions are expressed as allergic skin reactions. may be classified as acute or chronic.

Dental materials contain components that are common allergens, such as:

Chromium, cobalt,

Mercury,

Eugenol,

Components of resin-based materials.

Formaldehyde-containing materials

Methacrylate.

Procedural influences BUT NOT THE FILLING MATERIALS?

Designing Restorative Materials

These include potential tissue responses,

Leakage of bacteria at the tooth-filling interface,

Shrinkage of materials, and

Stress created in the tooth structure from restoration procedures.

Lining agents

Calcium hydroxide:

Act to stimulate formation of secondary dentin.

Glass ionomer cement

Protect the prepared dentin and enamel from leakage around the restoration and invasion of bacteria.

Similar considerations apply to gingival and mucosal tissue.

Severe pulp lesions, in the short term,

Consideration must be given to what ?

Relevant to composites.

The larger the cavity?

Eventually, it may be necessary to replace the restoration?

Stress from Restoration Procedure?

But these generally subside within hours or days after a procedure is completed.

Local reaction to Amalgam

Corrosion may limit marginal leakage, but in the long-term?

Innocuous to gingival tissues

Lichenoid reactions reported

Thermal conduction to pulp

In fact, corrosion products from amalgam form along the restoration-tooth interface, suppressing the penetration of fluids, debris, and microorganisms.

Pigmentation of the mucosa can occur from?

An increased content of mercury has been observed in gingival biopsies from areas in close contact?

Incomplete polymerization leading to degradation ?

Composite resin

Dimethacrylates.

Initiators ?

Accelerators?

Inhibitors?

Plasticizers?

Pigments ?

The level of pulpal response to composite.

Gingival reactions following contact with composite materials The permeability of the gingival epithelium allows penetration of leachable components?.

Glass ionomer

They measured the pH , chemically irritating conditions for the dental pulp?

Gold Foil and Dental Casting Alloys

Gold foil

- Inert, sensitivities are rare
- Potential pulpal reactions due to condensation
- Rare allergic reactions to alloy metals

Casting alloys

■ **Cast dental restorations and solders contain a number of elements?**

■ Chromium?

Ceramic

■ No known reactions except wear on opposing dentition and restoration

Other materials, such as luting agents (cements)? The biological response?

C-Ideal characteristics of restorative materials

1-Physical properties of the material.

2-Technical feature for the provider.

3-Pt. acceptability.

4-Clinical aspects.

5-Direct and indirect.

6-Longevity & diagnosis.

I-Physical/Mechanical Properties

1-Stability in the acid/base oral fluids

2-Low thermal conductivity.

3-Resist permanent deformation under the forces of mastication.

4-Ability to achieve and maintain a highly polished .

5-Tooth-colored.

6-Resistance to fracture and marginal breakdown .

7-Wear rate similar to enamel .

8-Resistance to corrosion .

Corrosion of titanium - dental restorative alloy couples and the effects on cultured cells?

■ Titanium is a metal used for dental implants, crowns and bridges.

■ In the oral cavity, uncovered titanium is a corrosion-resistant material due to the oxide film formed on the surface.

■ However, the film might be unstable under certain conditions?

■ Lower currents were registered for the amalgam-titanium couples

■ Coupling of titanium to gallium alloy or dispersed-type high-copper amalgam increased the amount of released metal ions, and significant cytotoxic effects were observed.

■ The gallium alloy-titanium couple resulted in significant decreases in cellular viability, proliferation and collagen synthesis.

9-Adhesive to the tooth structure .

10-Capability to adapt well to the cavity walls .

11-Nonconductive of electrical currents.

12-Not sensitive to moisture contamination during placement .

13-Minimal thermal and dimensional changes during setting and at the “set” phase.

II-Technical Features for the Provider

Easy to manipulate, place, & shape.

Safe to handle.

Requires minimal tooth prep.

Able to be repaired in the mouth.

Insensitive to the technique .

Easy to diagnose the need for replacement, and then easy to replace or repair

III-Patient Acceptability?

IV-Clinical Aspects

■ **Biocompatible with oral tissues and normal metabolic and physiological processes**

■ **Anticariogenic**

■ **Not disposed to the accumulation of dental plaque**

■ **Long-lasting (10 years)**

■ **Able to determine clinically& by X-ray .**

V-Direct and Indirect Restorative Materials

Restorations classified as direct or indirect.

Direct restorations Require less destruction of intact tooth tissues than indirect restorations. The greater the loss of tooth structure, the more indirect restoration is indicated

Indirect restorations, such as inlays& onlays, are fabricated in a dental lab .
Require multiple visits & placement of temporary restorations .
Require the removal healthy tooth tissues to produce parallel walls .
More expensive .
Composite inlay is prepared in the mouth,
hardened outside the mouth,
and cemented into the tooth during the same visit.

- A CAD CAM

- A camera will record the prepared tooth optically.

- A ceramic block to produce an inlay, onlay, or crown & Bridge . -Cementation at the same visit .

VI-Longevity and the Diagnosis of Failure in Restorative Materials

Factors varying according to:-

- 1- Tooth type,
- 2-Location,
- 3-Condition , type of restoration,
- 4- Age of the patient,
- 5-Materials used,
- 6-Clinician capability,
- 7-Diagnosis of restoration failure.

Rules about

- 1- failures that need :
a-repair or b-replacement. 2-success.
- of restorative materials to judge the longevity of the materials.

- There are lack of objective measures that a restoration has failed.

Factors, to replace or repair a restoration :-

- 1-Breakdown in marginal integrity.
- 2-Presence of recurrent caries.
- 3-Unacceptable esthetics.
- 4- excessive wear, and
- 5-Pain symptoms.

- 2-bacterial colonization,

The decision to classify any of the above clinical conditions requiring replacement draws on the dentist's clinical judgment

- Replacing amalgam restorations :-

- 1-Marginal degradation

- 2-tooth fracture

. For replacing composites,

- 1-Poor marginal adaptation

- 2- Anatomic form

- 3- Recurrent caries

- 4-Discoloration .

Factors Influencing the Success of a Restorative Material

Diverse factors.

- 1-Patient,
- 2-Clinician, and
- 3-Restorative material .

Factors Influencing the Success of a Restoration

Patient characteristics

■ Help in the longevity .

■ Cooperation during a procedure allows:-

a-Moisture control

b- Visual access,

c-Aids in proper tooth preparation .

d-Placement of the restoration.

e-The size of the restoration.

f-Dietary factors.

g-Personal prevention practices.

h- Damaging oral habits, such as bruxing or ice-chewing.

Dental clinician factors

■ The dentist's skill affects the longevity of restorations

■ a- faulty preparation

■ b- contouring, and

■ c-overhangs .

■ These factor likely contributes to the use of new materials,&limited data upon which clinicians can make decisions about the use of materials.

Restorative materials factors

Some materials are so technique-sensitive that widely variable results can occur. Technique sensitivity also is an issue in the dental laboratory where, i.e.

■ A number of problems may occur in the processing which may ultimately result in delayed failure.

Amalgam is a relatively low technique sensitivity?

A slight amount of moisture result in the immediate failure ? (material&how)