



IQRA NATIONAL UNIVERSITY

(ALLIED HEALTH SCIENCES)

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PROGRAM: BS DENTAL

SEMESTER: 4th

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SUBJECT: DENTAL MATERIALS

INSTRUCTOR: Mr. USMAN

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PAPER

QUESTION No 1

❖ CALCIUM HYDROXIDE CEMENT



- It IS A DENTAL MATERIAL
- WHICH WAS FIRST INTRODUCE IN 1921
- IT IS AN INORGANIC COMOUND WITH CHEMICAL FORMULA Ca (OH)^2
- SUPPLIED AS A POWDER, TWO PASTE, ONE PASTE

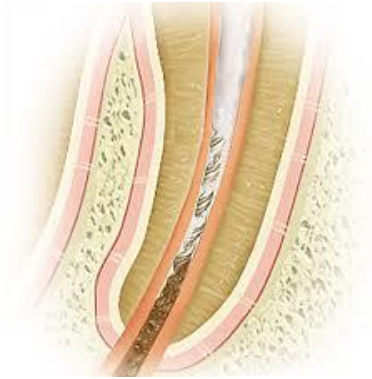
USES:

1. As a Intracanal medicament
2. As a Endodontic sealer
3. As a Pulp capping agent
4. As a Apexification
5. Pulpotomy
6. Weeping canals

1. Intracanal medicament:

- Used dressing for treatment of the vital pulp
- Role as a Disinfection of the root canal system
- Used as a bacteriostatic and bactericidal (death, growth reducing of bacteria) in root canal space
- Not only kill bacteria also reduce effect of remaining cell wall material lipo-polysaccharide

- High range antimicrobial activity against endodontic pathogens



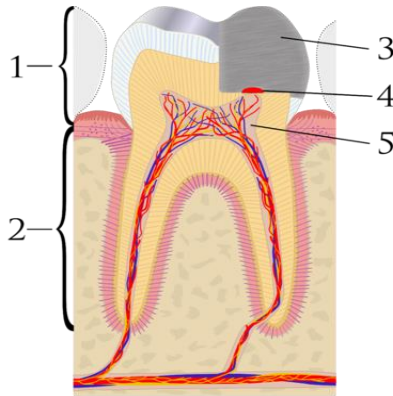
2. Endodontic sealer:

- To be effective, an endodontic sealer based on calcium hydroxide must dissolve/dissociated into Ca^{++} and OH^- and the solid consequently lose content



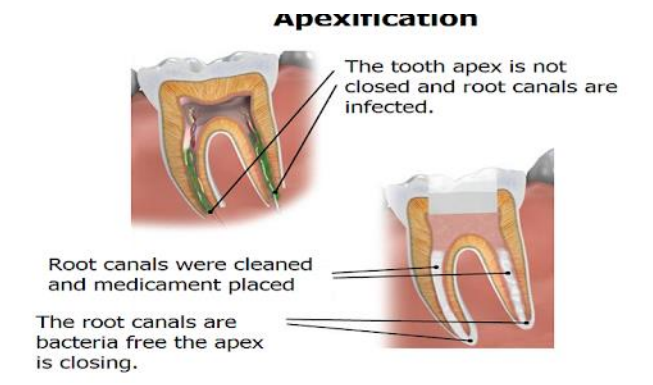
3. Pulp capping Agent:

- Accepted choice for pulp capping
- You cannot used directly to pulp tissue because it can cause necrosis or inflammation of contiguous tissue
- Under calcium hydroxide dressings there will be complete dentinal bridging with healthy radicular pulp



4. Apexification:

Canal cleaned/disinfected > signs & symptoms of infection low > canal dried > filled with stiff mix calcium hydroxide & MTA > formation of osteodentin > differentiation of adjacent connective tissue > also deposition of calcified tissue



5. Pulpotomy:

- Most recommended pulpotomy medicament for pulpally
- For vital young permanent tooth with incomplete apices
- For maintaining the vitality of remaining pulp tissue
- Removal of a portion of the pulp (diseased aspect)

Pulpotomy



6. Weeping canal:

Canal dry with paper points > calcium hydroxide place > convert acidic PH of periapical tissue in the weeping canal into Basic PH



QUESTION No 2

❖ PROPERTIES OF MINERAL TRIOXIDE AGGREGATE (MTA)



- **Compressive strength: 70 mpa**
- **PH: 10.2- 12.5 (HIGH PH responsible for the antimicrobial action and biological activity)**
- **Biocompatible**
- **Thickness: 3mm-5mm**
- **Working time: 3-4 hrs 20 min (old one)**
- **Better marginal adaption than other material IRM, EBA, GIC**
- **RETENTIVE STRENGTH: not suitable as a lutting agent**
- **Good sealing ability**
- **Working time: 5 min**
- **Solubility: low or nearly Low**

❖ **MANIPULATION and SETTING reaction of MINERAL TRIOXIDE AGGREGATE (MTA)**



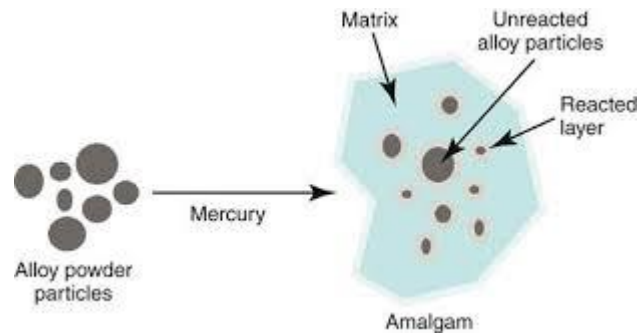
- **Maxing Ratio 3 parts powder : 1 part water**

- Maxing can be also be done with local anesthesia or normal saline
- Maxing on paper pad/ glass slab with plastic/metal spatula
- After Mixing placed in the desired location and condensed lightly with a moistened pellet
- PH 10.2-12.5
- Should be stored in sealed containers away from moisture
- Maxing time is crucial, Don't mix it prolong time (not more than 4min)
- If prolonged mixing it results in dehydration of the mix
- MTA have long setting time compared to other
- Setting time according to various studies i.e. 2hrs 45min, 2hrs 55min, and 2hrs 20min
- Hydrophilic requires moisture to set
- Presence of moisture during setting improves the flexural strength of the set cement

QUESTION No 3

❖ MANIPULATION of AMALGAM

- a) **Trituration:** A process in which the mercury is allowed to react with alloy powder.
- Hand trituration
 - Mechanical trituration



- **Hand Trituration/Mixing:** In this process a glass mortar and pestle is used
 - ✓ **Glass mortar:** The mortar has its inner surface roughened to increase the friction between amalgam and glass surface with carborundum paste
 - ✓ **Pestle:** The pestle is a glass rod with a round end.



- **Mechanical Trituration/Mixing: :** In this process a electrical device is used called Amalgamator.

There capsules are available serves as a mortar. Some capsules have a cylindrical metal or plastic piece in the capsule which serves as the pestle. In market the reusable capsules are also available with friction fit/screw.

- ✓ **Amalgamator:** It is a electrical device used for trituration of amalgam. Amalgamators have automatic timer and speed control device. The speed ranges from 3200 to 4400 cycles per minute. For proportioned capsules (left) Close-up the mechanical arm that grips and vibrates the capsules



b) **Condensation:**

- After trituration the amalgam is placed in the cavity
- condensed with suitable instrument
- condensation must be done with in the 4 walls and floor
- if more than 1 walls are missing, we can used a steel matrix to compensate for it.
- Proper condensation increases the strength and decrease the creep of amalgam.
 - i. **Manual condensation:** The mixed material is condensed in increments. Each increment is carried to the prepared cavity by means of a small forceps or an amalgam carrier
 - ii. **Mechanical condensation:** The Mechanical condensers provide vibration or impact type of force to pack the amalgam mix.



c) Carving:

- The amalgam is overfilled into the cavity and the mercury rich surface layer is trimmed away.
- The carving should not be started until the amalgam is hard
- A scraping or ringing sound should be heard when it is carved.



d) Burnishing:

- After the carving, the restoration is smoothed, by burnishing the surface and margins of the restoration.
- Burnishing is done with ball burnisher
- Final smoothing can be done by rubbing the surface with a moist cotton pellet



e) Polishing:

- Polishing minimizes corrosion and prevents adherence of plaque
- Polishing should be delayed for at least 24 hours after condensation



❖ Indication & contraindication of AMALGAM

Indications: Those situations in which we can use this material.

- Restoration of posterior teeth (Class I & II)
(Moderate to large preparations)
- In some cases restoration distal surface of the canine
- Class V preparations (some cases)

- Class VI preparation
- Core build up for badly broken down teeth in the posterior teeth

Contraindications: Those situations in which we cannot use this material.

- When esthetics is important (e.g. anterior teeth)
- Patients have a history of allergy to mercury or other amalgam components
- Remaining tooth structure requires support.
- Treatment of incipient or early, primary fissure caries.

QUESTION No 4

❖ Composition of Calcium Hydroxide



Accelerator paste:

- Alkyl salicylate 36 – 42 %
- Inert fillers – titanium oxide 12 – 14 %
- Barium sulphate 32 – 35 %
- Calcium sulphate 14 – 15 %

Base paste:

- Calcium hydroxide 50-60%
- Zinc oxide 10%
- Zinc stearate 0.5%
- Ethylene toluene sulphonamides and paraffin oil 39.5%

❖ Advantages & Disadvantages of Calcium Hydroxide

Advantages of Calcium Hydroxide:

- Work as a bactericidal (death of bacteria) and bacteriostatic (control growth of bacteria)
- Available in market, inexpensive and easy to use
- Promotes healing and repair
- Neutralizes low PH of acids
- Stops internal resorption
- High PH stimulates fibroblasts

Advantages of Calcium Hydroxide:

- Does not adhere to dentin or resin restoration
- During acid etching may degrade
- Marginal failure with amalgam condensation
- Degrades upon tooth flexure

- Does not exclusively stimulate dentinogenesis
- Associated with primary tooth resorption
- Does exclusively stimulate reparative dentin

QUESTION No 5

❖ Components of composite resin



- RESIN/ MATRIX
- FILLER
- COUPLING AGENT
- INITIATORS and ACCELERATORS
- PIGMENTS

RESIN: Bis GMA or Urethane diacrylate + diluent monomer- TEGDMA

- functions of the resin are to transfer stress between the reinforcing fibers, act as a glue to hold the fibers together, and protect the fibers from mechanical and environmental damage

FILLERS: Colloidal silica + amorphous silica + quartz + glass

- Improve mechanical properties (COMPRESSIVE strength, modulus of electricity and hardness)

- Improve Optical properties, and decrease polymerization shrinkage and thermal expansion

COUPLING AGENT:

- Dental composites use filler particles coated with silane coupling agents
- Provide a good bond between the inorganic filler and the resin matrix, manufacturers treat the surface of the filler

INITIATORS/ACCELERATORS:

- The role of the initiator-accelerator system is to polymerize and cross-link the system into a hardened mass.
- The polymerization reaction can be triggered by light-activation, self-curing (chemical activation), and dual curing (chemical and light-curing).

COLOUR PIGMENTS:

- To match tooth color/provide natural color to the tooth

❖ USES of composite resin



- Class I, II, III, IV, V, and VI Restorations

- Pits and fissure sealants
- Foundation or Core buildups
- Bonding of Ceramic veneers
- Sealants and preventive resin restorations
- Cementation of fixed prosthesis
- Composite inlay for certain cavities



THANK YOU SO MUCH

