

Subject: Dental Material II

instructor: Mr. Usman

Final term Assignment

50 Marks

Department AHS

DT 4<sup>th</sup> Semester

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**Answer the following questions.**

**Q1.** Explain uses of calcium hydroxide cement

Ans 1 :

Uses of calcium hydroxide cement :

\* Intacanal medicament :

It is the most commonly used dressing for treatment of the vital pulp .It also plays a major role as an inter-visir dressing in the disinfection of the root canal system . Calcium hydroxide cannot be categorized as a conventional antiseptic , but it kills bacteria in root canal space . Calcium hydroxide is a slowly working antiseptic . Direct contact experiments in vitro require a 24 hour contact period for complete kill of entero-cocci . Calcium hydroxide not only kills bacteria , but it also reduces the effect of the remaining cell wall material lipo-polysaccharide .It has a wide range of antimicrobial activity against common endodontic pathogens, but is less effective against Enterococcus faecalls and Candida albicans .

\* Endodontic sealer :

To be therapeutically effective calcium hydroxide must be dissociated into  $\text{Ca}^{++}$  and  $\text{OH}^-$ . Therefore to be effective, an endodontic sealer based on calcium hydroxide must dissolve and the solid consequently lose content.

\* Pulp capping agent :

Calcium hydroxide is generally accepted as the material of choice for pulp capping.

Histologically there is a complete dentinal bridging with healthy radicular pulp under calcium hydroxide dressings. When calcium hydroxide is applied directly to pulp tissue there is necrosis of adjacent pulp tissue and an inflammation of contiguous tissue.

\* Apexification :

In apexification technique canal is cleaned and disinfected, when tooth is free of signs and symptoms of infection, the canal is dried and filled with stiff mix of calcium hydroxide and MTA. Histologically there is formation of osteodentin after placement of calcium hydroxide paste. There appears to be a differentiation of adjacent connective tissue cells; there is also deposition of calcified tissue cells; there is also deposition of calcified tissue adjacent to the filling material.

\* Pulpotomy :

It is the most recommended pulpotomy medicament for pulpally involved vital young permanent tooth with incomplete apices. A pulpotomy is the removal of a portion of the pulp, including the diseased aspect, with the intent of maintaining the vitality of the remaining pulpal tissue by means of a therapeutic dressing.

\* Weeping canals :

For such teeth dry the canals with sterile absorbent paper points and place calcium hydroxide in canal. Calcium hydroxide converts the acidic pH of periapical tissue in the weeping canal to basic pH.

**Q2.** Write a detail note on properties of Mineral trioxide aggregate and also explain Manipulation and setting reaction of MTA.

Ans 2 :

Properties of MTA :

\* PH:

Initial pH of 10.2 which rises to 12.5 (similar to calcium hydroxide ) following setting . The high pH is theorized to be responsible for the antimicrobial action and biological activity of the material .

\* Working time 5 minutes

\* Setting time 3-4 hours (old one )20 minutes

\* Solubility MTA displays low or nearly no solubility, which is attributable to addition of the bismuth oxide .

\* compressive strength :

The compressive strength of set MTA is about 70 mpa

\* Biocompatible

\* Good sealing ability (resist micro leakage )

Usually a thickness of 3 mm to 5 mm is sufficient to provide a good seal .

\* Retentive strength : MTA is not suitable as luting agent

\* Marginal adaptation is better than intermediate restorative material (IRM)

\* Ethoxy benzoic acid ( super EBA )

\* amalgam and GIC .

Manipulation and setting reaction of MTA :

The MTA paste is obtained by mixing 3 parts of powder with 1 part of water to obtain putty like consistency (distilled water, local anesthesia, normal saline). Mixing can be done on paper or on a glass slab using a plastic or metal spatula. This mix is placed in desired location and condensed lightly with a moistened cotton pellet.

MTA has a pH of 10.2 immediately after mixing and increases to 12.5 after 3 hours of setting which is almost similar to calcium hydroxide.

MTA powder should be stored carefully in closed sealed containers away from moisture. The mixing time of MTA is crucial. If the mixing of MTA is prolonged, it results in dehydration of the mix.

Sluyk et al in 1998 reported that the mixing time should be less than 4 minutes.

MTA takes longer time to set compared to any other material. The exact time taken to set varies between different studies.

According to Torabinejad colleagues in 1995, the setting time of grey MTA is about 2 hours and 45 minutes (+5 minutes), whereas Islam et al in 2006 reported 2 hours and 55 minutes for grey MTA and 2 hours and 20 minutes for white MTA.

Extended setting period of MTA is one of its main drawbacks. It is suggested by many investigators that the incorporation of accelerators such as sodium phosphate dibasic ( $\text{Na}_2\text{HPO}_4$ ) and calcium chloride ( $\text{CaCl}_2$ ) may reduce the setting time.

MTA being hydrophilic requires moisture to set, making absolute dryness contraindicated. Presence of moisture during setting improves the flexural strength of the set cement.

**Q3.** Discuss manipulation of amalgam, write indication and contraindication of amalgam.

Ans 3:

Manipulation of amalgam :

Trituration:

Trituration is the process by which mercury is allowed to react with the alloy power . This procedure allows the rubbing of the surface oxide on amalgam particles , exposing an active surface to react with mercury .

Trituration :

- 1) hand trituration
- 2) mechanical trituration

Hand mixing :

A glass mortar and pestle is used . The mortar has its inner surface roughened to increase the friction between amalgam and glass surface with carborundum paste . A pestle is a glass rod with a round end .



Mechanical mixing :

- \* The disposable capsule server as a mortar . Some capsules have a cylindrical metal or plastic piece in the capsule which serves as the pestle .

- \* Reusable capsules are available with friction fit or screw .
- \* Amalgamators have automatic timer and speed control device . The speed ranges from 3200 to 4400 cycles per minute . High copper alloys require higher mixing speed .
- \* Mechanical amalgamator for proportioned capsule (left ) Close-up the mechanical arm that grips and vibrates the capsules .



#### Indications :

- \* 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 :

- \* 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 .

**Q4.** Discuss composition of calcium hydroxide with advantage and disadvantages

Ans 4:

Composition of calcium hydroxide:

1) Accelerator paste :

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

2) Base paste :

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

Advantages :

- \* Initially bactericidal then bacteriostatic .
- \* Promotes healing and repair .
- \* High pH stimulates fibroblasts .

- \* Neutralizes low pH of acids .
- \* Stops internal resorption.
- \* Inexpensive and easy to use .

Disadvantages:

- \* Does not exclusively stimulate dentinogenesis .
- \* Does exclusively stimulate reparativedentin .
- \* Associated with priamary tooth resoption .
- \* May degrade during acid etching .
- \* Degrades upon tooth flexure .
- \* Marginal failure with amalgam condensation .
- \* Does not adhere to dentin or resin restoration .

**Q5.** Write component of composite resin and also discus uses of composite resin.

Ans 5:

Components of composite resin :

- \* Matrix
- \* Filler
- \* Coupling Agent
- \* Initiators and accelerators
- \* Pigments

Uses of composite resin :

- \* Restoration for anterior and poaterior teeth



- \* Pits and fissure sealants
- \* Bounding of ceramic veneers
- \* Cementation of fixed prosthesis .