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SUBJECT-----Dental Material

INSTRUCTOR----Mr. Usman

Q1. Explain uses of calcium hydroxide cement?

Ans.

USES:-

Intracanal Medicement:-

It is the most commonly used dressing for treatment of the vital pulp. It also plays a major role as an inter-visit 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 lipopolysaccharide. It has a wide range of antimicrobial activity against common endodontic pathogens, but is less effective against *Enterococcus faecalis* and *Candida albicans*.

Endodontic sealer:

To be therapeutically effective calcium hydroxide must be dissociated into Ca^{++} and 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 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.

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:-

5minutes

Setting time:- 3-4hours (old one)

20minutes

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

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 then placed in the 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 and colleagues in 1995, the setting time of grey MTA is about 2 hours and 45 minutes (+5minutes), 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 (Na_2HPO_4) and calcium chloride (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 amalgam?

Ans.

Manipulation of amalgam:

Trituration:

Trituration is the process by which mercury is allowed to react with the alloy powder. 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 serves 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 capsules (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

CONTRA-INDICATION

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 advantages and disadvantages?

Ans.

COMPOSITION

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

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
reparative dentin.
Associated with primary tooth resorption.
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 discuss uses of composite resin?

Ans.

COMPONENTS

Matrix

Filler

Coupling Agent

Initiators and accelerators

Pigments

USES OF COMPOSITE RESIN

Restoration for anterior and posterior teeth

Pits and fissure sealants

Bonding of ceramic veneers

Cementation of fixed prosthesis