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BD(DT) 4th Semester

ID 14795

 *Dental Material*

*Question1:*

 Explain uses of calcium hydroxide cement?

*Answer:*

 **USES OF CALCIUM HYDROXIDE CEMENT:**

 Following are the uses of calcium hydroxide cement:

1. **INTRACANAL MEDICAMENT:**

 Temporary placement of medicaments with good biocompatibility into root canals for the purpose of stoping coronal invasion of bacteria from the oral cavity.

* 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 lipo-polysaccharide.
* It has a wide range of antimicrobial activity against common endodontic pathogens, but is less effective against Enterococcus faecalis and Candida albicans
1. **ENDODONTIC SEALER:**

#  It is also called **Root Canal Sealers.** These endodontic sealer or Root canalsealers along with solid core material plays a major role in achieving the three dimensional sealing of the root canal system.

# 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.

1. **PULP CAPPING AGENT:**

The treatment initiated to preserve and maintain pulp tissue in a healthy state, the tissue may compromised by caries, trauma or restorative procedure.

* 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.
1. **APEXIFICATION:**

Apexification is a method of dental treatment to induce a calcific barrier in a root with incomplete formation or open apex of a tooth with necrotic pulp.

* 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.
1. **PULPOTOMY:**

 A pulpotomy is a dental procedure in which the pulp of the tooth in the crown is removed and the pulp in the root canal is left intact.

* It is mainly performed on primary teeth (on children) and is used to treat tooth decay that has extended to the pulp
* .It is the most recommended pulpotomy medicament for pulpaly 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.
1. **WEEPING CANAL:**

It also significance as Dry Canal System. At the start of endodontic treatment, there is a reddish discharge, at the succeeding appointment the exudate will be clear.

* 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.

*Question2:*

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

 *Answer:*

1. **PROPERTIES OF MINERAL TRIOXIDE AGGREGATE:**

 Following are the properties of mineral trioxide aggregate:

1. **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.
1. **WORKING TIME:**

The working time is**5minutes**

1. **SETTING TIME:**

The setting time is**3-4hours**(old one) **20minutes**

1. **SOLUIBILITY:**

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

1. **COMPRESSIVE STRENGTH:**

 The compressive strength of set MTA is about 70 mpa

1. **BIOCOMPATIBLE:**

good Sealing Ability (resist Micro leakage)

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

1. **RETENTIVE STRENGTH:**

 MTA is not suitable as luting agent

1. **MARGINAL ADAPTION:**

 Itis better than intermediate

* Restorative Material (IRM)
* Ethoxy Benzoic Acid (super EBA)
* amalgam and GIC
1. **MANIPULATION:**
* The MTA paste is obtained by mixing 3 parts of mixing with 1 part of water to obtain putty like consistency. Mixing can be done on paper on glass slab using a plastic or metal spectula. This place on desire locationand condesend lightly with moistened cotton pellet.
* MTA is ph of 10.2 after mixing and increases 12.5 after 3 hour of setting which is almost similar to hydroxide.
* MTA powder should clearly stored in closed sealed container away from moisture. Is mixing is prolonged than it should lead to dehydration
* Sluyk in 1998 reprted that mixing that mixing time should be less than 4 minutes.
* MTA take longer time to set as compared to other material. The exact time taken in varies studies.
* According to Torabinejad in 1995, that setting time is 2 hour and 15 minutes, whereas Islam in 2006 reported 2 hour 55 minutes for grey MTA 2 hour a20 minutes for white MTA.
* MTA being hydrophilic requires moisture to set, making absolute dryness contraindicated.
* Presence of moisture during stetting improves the flexural strength of set content.

*Question3:*

 Discus manipulation of amalgam, write indication and contraindication of amalgam?

Answer:

 **MANIPULATION:**

 Following are the manipulation of amalgam:

1. **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 manipulation is done by two way:

1) hand trituration

2) mechanical trituration

**a. HAND TRITURATION:**

* 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 road with a round end.
1. **MECHANICAL TRITURATION:**
* 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.
* malgamators 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.
1. **INDICATION:**

Following are the indication:

* 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
1. **CONTRAINDICATION:**
* 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.

*Question4:*

Discus composition of calcium hydroxide with advantage and disadvantages?

*Answer:*

 **COMPOSITION:**

 Following are the 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 %
1. **BASE PASTE:**
* Calcium hydroxide 50-60%
* Zinc oxide 10%
* Zinc stearate 0.5%
* Ethylene toluene sulphonamides and paraffin oil 39.5%

**ADVANTAGES:**

 Following are the advantage of calcium hydroxide:

* 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

**DISADVNTAGE:**

 Following are the disadvantage of calcium hydroxide:

* Does not exclusively stimulate dentinogenesis.
* Does exclusively stimulate reparativedentin.
* 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.

*Question 5:*

 Write component of composite resin and also discus uses of composite resin?

*Answer:*

 **COMPONENT OF COMPOSITE RESIN:**

 Following are the component of composite resin

* Matrix
* Filler
* Coupling Agent
* Initiators and accelerators
* pigments
1. **RESIN MATRIX:**
* Bis-GMA (bisphenol-A glyceril methacrylate)
* UDMA (urethane dmethacrylate)
* TEGDMA (triethylene glycol dimethacrylate)
1. **FILLER PARTICLE:**
* Silica particle
* Quartz
* Glass(Ba,Sr,Zr)
1. **COUPLING AGENT:**

 **Chemical Bond:**

* Filler particle- resin material
* Transfers stresses

 **Organosilane(Biofunction Molecule):**

* Siloxane end bond to hydroxyl groups on filler
* Methacrylate end polymerize with resin
* Chemical bond
* Improve physical and mechanical properties
* Inhibiting leaching by preventing water from penetrating along with resin
1. **PIGMENTS:**
* Provide the opacity or transparent needed to make the composite similar to the natural tooth tissue
* Metal oxide particles

 - Titanium oxide

 - Aluminum oxide

1. **COLOR DETERMINATION:**

 It should be as close to that of the natural tooth as possible.`

**USES OF COMPOSITE RESIN:**

 Following are the uses of composite resin:

* Restoration of anterior and posterior teeth
* Pit and fissure sealants
* Bounding of ceramic venners
* Cement of fixed prosthesis

Some special uses are as follow:

* Flowable
* Condensable / Packable

**FLOWABLE:**

* Has a reduced filler content to make the material “flowable”
* Indicated for Class I restorations in the gingival areas
* Used as a cavity base or liner especially for Class II preparations wherein access is difficult to achieve
* Used as a pit and fissure sealant

**CONDENSABLE/PACKABLE:**

* Has a filler particle that inhibits the filler particles by sliding to one another
* •Stiffer, thicker feel