

Dental materials specific to pediatric dentistry: current perspectives



I. Prophylactic materials

A. Fluorides

B. Pit and fissure Sealants

C. Materials for the maintenance of buccal dental hygiene

- ◆ *dentifrices and cleaning agents and prophylactic polishing agents*

- ◆ *mouthwashes*

- ◆ *plaque indicators*

A. Fluorurides

Effects of fluorine:

- ▣ increases the resistance of dental hard tissue to demineralization
- ▣ Accelerates dental remineralization
- ▣ It reduces the cariogenic potential of the dental plaque

! The certain prophylactic action of F is posteruptive.

Systemic individual treatment with F: solutions (drops) and tablets
-> depending on the drinking water concentration F and the age of the patient

solutions (drops) - up to the age of 3 years
tablets (0.25 mg F / 0.5 mg F / 1 mg F) -
after 3 years



Fluorination agents - topical local application

Fluorura de sodiu (NaF)

- 2% solution - 4 series of applications
- (3/7/10/13 years)



Fluorura de staniu (SnF₂)

- aqueous (watery) solution 8-10%
(*application at 6 months, from the age of 3 years*)

Fluorofosfatul acidulat (APF)

- aqueous / gel / thixotropic gel
(once every 6 months)

Aminofluorides



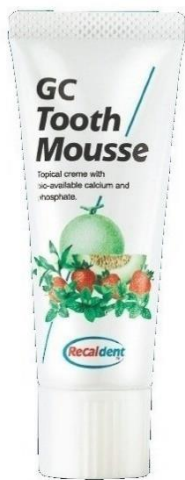
Presentation modes

1. Fluoride Gels

- content in high fluoride ions ->
- is applied by the physician
- (indirect technique - trays)
- about 1g / session



2. Prophylactic pastes



3. Toothpaste

(concentration of F of 0.25%)



4. Varnish fluorides



5. Mouthwash



INDICATIONS - FLUORIDES



- Patients with increased and moderate risk of dental caries, especially in patients up to 5 years of age.

- In patients who can not be fluoride in another way (trays, etc.)
- For the fluoride treatments required during orthodontic treatment and after de-bonding of brackets.
- After ultrasound scaling and brushing professionally.
- In patients living in areas where water is poor in fluoride.
- In patients with incipient caries or active caries.



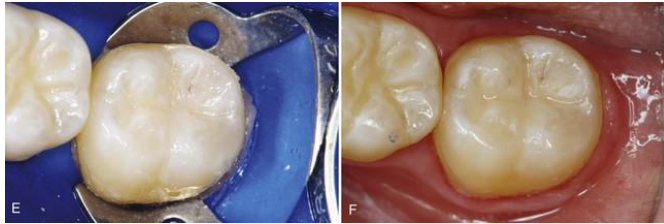
B. Pit and fissure sealing

Steps: 1) *Tooth preparation*

- hygiene of the oral cavity => brushing with dentifrice without Fluorine (interfering with acid demineralization)



- isolation (rubber-dam)



- etching -> H_3PO_4 37% - 60 s permanent teeth / 120 s temporary teeth

- washing the acid (20s) + drying the engraved surface (20s)



2) Preparation of the sealing material and application



3) Photopolymerization 30 sec



4) Sealing check



II. Materials for pulp-dentinal protection

- must provide: chemical / electrical / thermal / mechanical / pulp medication.
 - > varnish / liners / intermediate bases / base fillings / dental adhesives

A. Varnish

- natural or synthetic resins dissolved in a volatile solvent -> liners - solutions or varnishes
- are placed in layers with a thickness of 2-5 μm (single or double layer)
- incompatible with resin-based restorative materials, preventing adherence to dental tissue of composites, dental adhesives and GI



B. Liners

- water-based liners -> lining-suspensions (active components are placed in suspensions) - placed in layers of 20-25 μm

cement liners - are placed in layers of 0.2-1 mm

- liners-solution



For effective pulp thermal insulation, the remaining dentine layer should be approximately 2 mm.

-> if this is not possible, it is recommended to place a base fill (1.5-2 mm) or a cement-liner (0.2-1 mm).

C. Intermediate bases -> calcium hydroxide based materials + ZOE-based materials

Materials based on calcium hydroxide

Ca (OH) 2 -> Elemental material for direct and indirect pulp capping
!!! hydrolysis in contact with fluid from dental canals - it is recommended to apply a base filling

Liners

suspension liners - two-component powder / liquid system

paste liners - single-component system



- apply thin layer to dentine and air-dry at low pressure, 15-30 s



- isolates electrically, but can not thermally



Cimenturi pentru protecție pulpo-dentinară

- izolatori termici în cavitățile profunde
- medicinal products - a role of stimulation of neodentinogenesis, antalgic or desensibilisation

cement based on classical Ca (OH) 2

- Two-component paste / paste system
- 0.5 mm layer application
- increased solubility!



- single-component system (photopolymerizable)
 - lower solubility and high compressive strength
 - Applications: indirect pulp capping / Ca (OH) 2 liner coating in the direct pulp capping

■ products:



D.Materials for base fillings

Base filling

1.5-2 mm thick

- role of thermal and chemical protection of the pulp

- mechanical support for the coronary reconstruction material

The choice of the material for the basic filling depends on:

- the cavity class

the type of restorative material to be used

!!! interaction between materials (NO: ZOE + composite)

the depth of the cavity



Cimenturi PCZ (policarboxilat de zinc)



ZOE (zinc oxid eugenol)



ZOE (zinc oxid eugenol)



Lineri pe bază de compomeri si cimenturi glassionomere

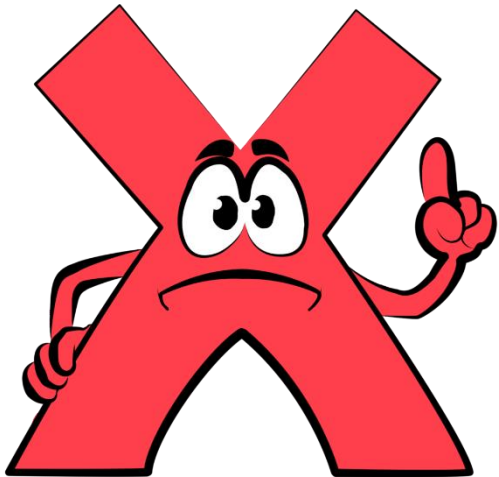


1. ZOE (zinc oxid eugenol)

-> bicomponent system: powder / liquid

Types :

- unmodified (classic)
- modified with polymers
- EBA (modified with alumina and orthoethoxybenzoic acid)
- HV-EBA
- ZOE with other destinations (pulp-dentinal protection, canal fillings)



!!! Contraindications :

- not used concomitantly with calcium hydroxide because the eugenol chelates calcium ions
- ZOE-based liners are not used directly under composite fillings due to the eugenol-inhibiting effect on polymerization

2. FOZ (fosfat de zinc)

two-component system: powder / liquid
preparation - in chilly consistency

increased acidity - pulp-dentinal protection

Indications :

- base obturations in medium cavities
- base obturations in deep cavities but with prior pulp-dentinal protection
- material for lining thin and unsustainable walls
- temporary obturation over pulp devitalizing materials



Cimenturi FOZ antiseptice

- Black FOZ cement (with cupric oxide adduct) - Bactericide -> Obstruction of temporary teeth cavities, especially when all the layers of altered dentin can not be removed

Cimenturi silico-fosfat (CSF)

addition of iron and aluminum oxides

3. PCZ cements (polycarboxilat de zinc) two-component system: powder / liquid

type I

- for fastening (gluing): bonding the orthodontic rings / long-term bonding of RPF(fixed prosthetics restauarations)

type II

- for base fillings and other uses: base filling / liners / temporary teeth filling

Characteristics :

- the ability to adhere chemically to dental tissues and other materials
- the paste resulting from the mixing of the powder with the liquid - has a thixotropic character (the viscosity decreases when the spattering speed increases)
- a bactericidal effect, probably due to zinc ions
- - are less toxic than ZOE cements and are less toxic than FOZ cements

4. Liners based on ionomeric cements and compomers

Liners-ionomers

- classic powder / liquid GIC system



- resins modified GIC cements (liners GIMR / compomers)
two-component system: powder / liquid
single-component system: paste



The recommendation to etch and GIC liner is unjustified because its surface is sufficiently rusty to ensure the micro-mechanical retention of the DRC.

However, if the etching of GIC liner is used, it will not be longer than 15s, in order not to damage the liner.

Sandwich technique - a filling technique that uses liner-ionomers in combination with composite materials.

5. Dental adhesives

- Roles:**
- desensibilization of dental pulp
 - obliteration of dentinal canals
 - providing a chemical bond with the coronary restoration material

Fourth generation

-> three-component adhesives: acid / primer / fluoro-resin (the adhesive itself)

-> Adhesives with self-etching primers -> The acid and primer are in a single vial



It requires the use of a desensitizer

- At the moment are used mostly dental adhesives from generations IV/ V and VI (VII/ VIII)



- Fourth generation** - combine etch, primer and fluid resin in the same vial,
with water solvent
- multiple layers are recommended
 - are more compatible with compomers than with composites

Generation VII The most used!!!

Indications for direct restorations:

- Restoration of all types of cavity with light-curing materials of composite and compomer class
- Desensitive of root surfaces
 - Dentin sealing before amalgam restorations
 - Protective coating (varnish) for glass ionomer restoration materials
 - Repair of composite and compomer restorations
 - Adhesive system for the application of sealing materials

One step, one layer to apply, over a 35-second period



III. Restorative materials

-nefizionomice



-fizionomice

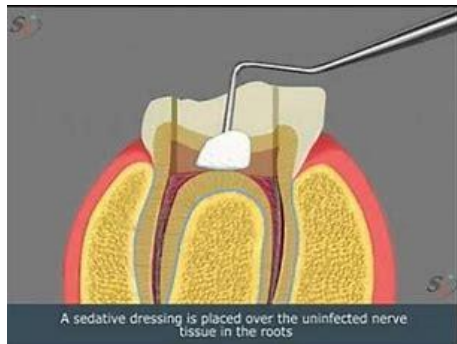


IV. Endodontic materials

Endodontic treatment:

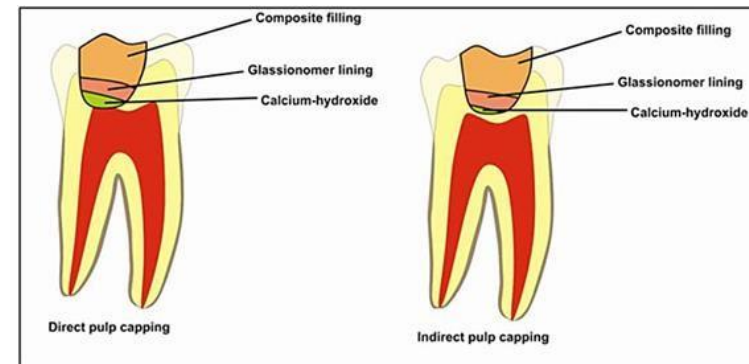
conservative - maintaining the pulp vitality totally or partially

pulpotomy



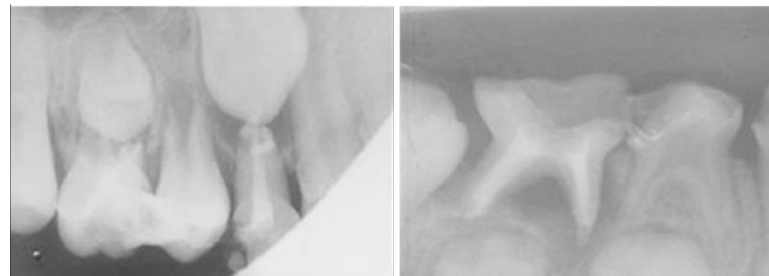
Direct pulp capping

Indirect pulp capping



radical

-pulpectomy



Materials for root canal filling in temporary teeth

PROPERTIES

- To be resorbable at a rate parallel to the physiological resorption of the root
- Allow the permanent tooth bud to migrate to the alveolar rebord
- Be antiseptic
- Easy to apply in root canals
- They adhere to the canal walls
- Do not contract
- Be radioopaque
- Do not color the tooth



resorbable materials

- ♦ iodoformed paste
- ♦ calcium hydroxide pastes
- ♦ ZOE-based pastes

1. The iodoformed paste

Walkhoff paste (iodoform powder + paramonochlorophenol solution, camphor and menthol)



2. Pastes based on calcium hydroxide

Indications :

- endodontic therapy of young permanent teeth with a wide open apex -> apexification
- re-implanted or transplanted teeth therapy with resorption and / or necrosis
- Simple or complicated gangrene therapy



Properties:

- Antibacterial effect
- It improves the inflammatory effect
- Stimulates the reconstruction of destroyed periapical tissues while stimulating the odontoblast to create reparative dentin
- Protects pulp from thermoelectric stimulus
- Prevents penetration of the exudate into root canals

Comercial products



3. Pastes based on ZOE

Endometazona (Septodont)



- is not approved by the European Endodontic Society
- contraindicated by many societies due to the content of paraformaldehyde and hydrocortisone => increased cytotoxicity

!!! the partial disappearance of the material from the channels when the eugenol is used as liquid and not the liquid in the original vial

Sealers based on resins

Spad, Traitement Spad - tricomponent system: powder + 2 liquids



Forfenan (Septodont) - three-component system:
powder + 2 liquids
-> to fill infected root canals of the temporary
and permanent teeth

Foredent (Spofa Dental) - three-component
system: powder + 2 liquids
!!! If no curing fluid is added, the paste
obtained is resorbable, allowing the
physiological resorption of the primary teeth

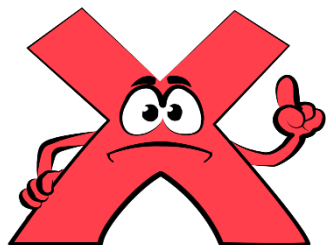


To fill the temporary teeth root canals, the most recommended material is a mixture of **calcium hydroxide** and **iodoform**.

Properties:

- easy to apply in root canals
- it is even slightly faster than the physiological resorption of the primary teeth
- It's radioopac
- it does not have toxic effects on the permanent successor

!!! To avoid:



paraformaldehyde
formaldehyde
corticosteroids
lead compounds, mercury, bismuth.



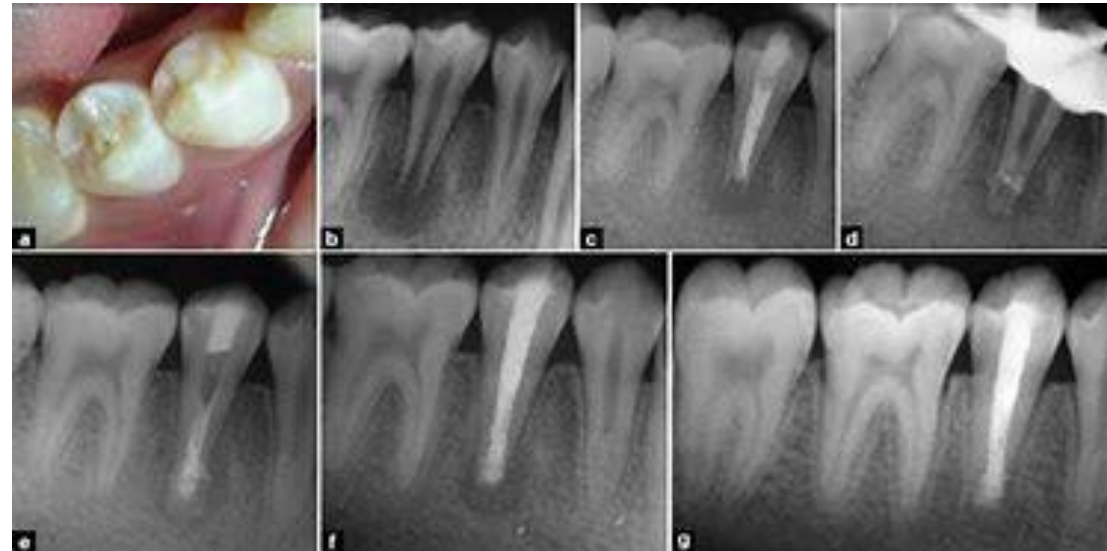
Materials used for apexification

Apexification

- the last treatment in the list of options
- It is preferable, when possible, to maintain the vitality of the apical pulp portion, which promotes apexogenesis (further increase of the root and formation of a morphologically normal apex).

Determining the degree of closure of the apex is difficult:

- the last decreasing diameter is vestibulo-oral
- an apex that appears relatively closed in the mesio-distal sense - may have divergent vestibular and oral walls
- !!! panoramic x-ray -> two-dimensional image (mesio-distal and vertical)



Calcium hydroxide

electi

MTA



The time required for apexification is between 6-24 months.

Treatment is considered complete when, radiologically, apexification becomes apparent.

Properties:

- releases calcium: it speeds up the formation of mineralized tissues.
- the only dental material capable of inducing periradicular cement neoformation.
- friendly with the wet environment: do not lose its properties due to moisture from the tissues.
- increased alkalinity: bactericide.
- slightly soluble: does not disintegrate.
- biocompatible with oral tissues.
- adequate compressive strength.
- more radioopaque than dentin and bone.
- less sink time than similar cements.



The main component of **MTA** is calcium oxide which, in contact with ambient moisture, is converted into calcium hydroxide.





Advantages

- sure and easy to use.
- Replaces natural dentin having the same mechanical properties.
- Provides exceptional marginal closure to prevent secondary caries.
- conserve the vitality of the dental pulp in the long run.
- favoring the mineralization of the affected area, thus initiating the production of repair dentin.
- is biocompatible.
- is a bioactive and bacteriostatic action due to alkaline pH that promotes disinfection of the area and inhibits bacterial growth.
- can easily be identified on an X-ray being a radiopaque.
- Release Ca - it helps to mineralize, differentiate and propagate cells from the pulp tissue, it heals faster.

Materials used as apical barriers

- methods of treatment consisting of the creation of artificial apical barriers to allow immediate root canal filling
- materials: tricalcium phosphate / calcium hydroxide / MTA

Calcium phosphate

- is compacted in the last 2 mm apical, forming an apical stop that resists the forces developed at condensation of guttaperca



MTA

The best choice for accomplishment an apical barrier



Materials for devitalization and non-vital amputation

I. With arsenic

Caustinerf Arsenical

-> is maintained for 7 days



Caustinerf Rapide

-> is maintained for 3 days



II. Without arsenic

slower necrotising action than arsenic products: Aeslick formula -> devitalization and fixation of pulp tissue in 7-10 days after application.

