

METHODS OF PULPITIS TREATMENT. INDICATION AND CONTRAINDICATION FOR CONSERVATIVE METHODS OF TREATMENT (BIOLOGICAL METHODS). VITAL AMPUTATION. BIOLOGIC METHODS OF PULPITIS TREATMENT. THE MEDICAMENTOUS REMEDIES USED IN DIRECT AND INDIRECT CAPPING. MECHANISM OF THE ACTION.



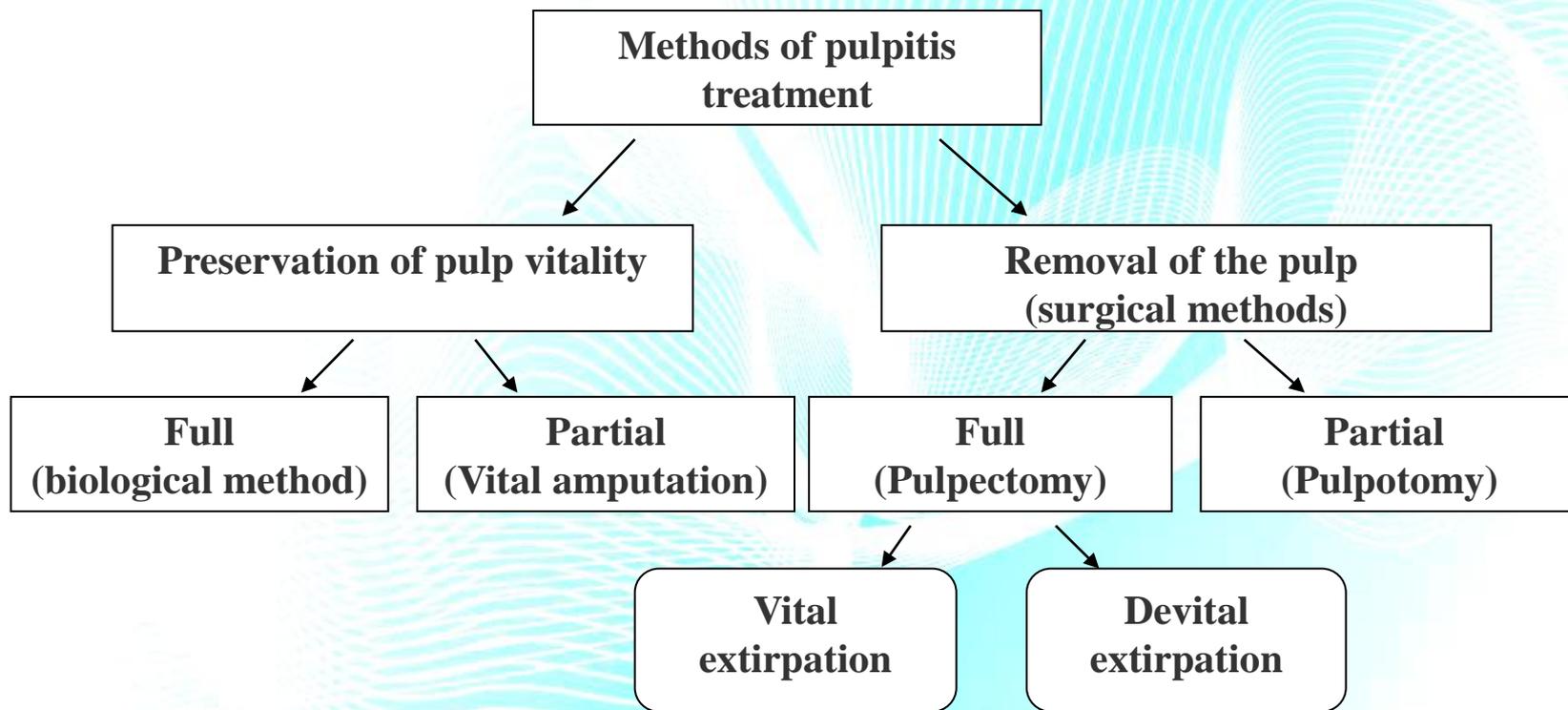
**Lectures
№ 5-6**



1. Methods of pulpitis treatment

In the treatment of pulpitis is necessary to resolve the following issues:

- ❑ Eliminate the painful symptoms;
- ❑ Eliminate the focus of inflammation in the pulp;
- ❑ Prevent periodontal tissue damage, to prevent the periodontitis development;
- ❑ Enable the root formation for the treatment of pulpitis at the child;
- ❑ Restore anatomic form and function of the tooth, as an organ.





Existing methods of treatment of pulpitis can be divided into:

- Conservative;
- Surgical;
- Surgical-conservative.

Biology (conservative) methods of pulpitis treatment is aimed at the removal of inflammation in the pulp with help of drugs, without removing the pulp, or partial removal of the pulp under anesthesia, and then save the remaining part of it (the method of vital amputation).

Surgical treatment methods of pulpitis (**vital** and **non-vital extirpation**) aimed at removing the pulp under anesthesia, or after pulp devitalization.

Methods of treatment of pulpitis can be classified as follows:

- 1) The methods of conservative treatment with preservation of the whole pulp (vital methods):
 - a) Indirect pulp capping;
 - b) Direct pulp capping.
- 2) The methods of conservative treatment with partial preservation of the pulp:
 - a) Vital amputation – Vital pulpotomy;
 - b) Non-vital amputation – Devital pulpotomy.
- 3) Surgical procedures to completely remove the pulp of a tooth:
 - a) Vital extirpation – Vital pulpectomy;
 - b) Non-vital extirpation- Devital pulpectomy.



There is also the following classification of methods of treatment of pulpitis:

1) Preservation of the pulp (vital methods) - conservative methods:

- The full preservation of the pulp (biological method);
- On the partial preservation of the pulp (vital amputation) - Vital pulpotomy.

2) Without the preservation of the pulp - surgical methods:

- Vital extirpation - Vital pulpectomy;
- Non-vital amputation - Devital pulpotomy;
- Non-vital extirpation - Devital pulpectomy.

2. Conservative treatment of pulpitis

The theoretical basis of biological treatment of pulpitis is its high viability, reactivity and plastically function.

The essence of the conservative (biological) treatment method of pulpitis is a complex of therapeutic measures aimed at microflora suppression, and the elimination inflammatory process with preserving maximum integrity of the tooth pulp.



Indications for conservative method:

1. Acute focal pulpitis;
2. Traumatically opened of tooth pulp at cavity preparing ;
3. Young age (28 years);
4. Absence of severe concomitant chronic or acute illness before or during the treatment;
5. No changes on X-rays in the apex of the root;
6. Lack of allergic reactions to drugs used;
7. The tooth is not subject to prosthetics;
8. Caries cavities are not to be localized in the cervical region;
9. The path of infection - only through the crown of the tooth;
10. From the point of pain should be less than 24 hours;
11. Electro excitability of pulp should be 20 - 25uA;
12. Supra pulpal dentin in consistency and color should be similar to normal (unaffected), dentin;
13. The sensitivity of the pulp in probing should be high - the patient must feel the lightest touch of the probe.



Contraindications:

1. Age over 40 years;
2. The general condition - chronic diseases (diabetes, atherosclerosis, and vitamin deficiency diseases, periodontitis, periodontal disease, etc.);
3. Cavities in the cervical region;
4. Reduction of pulp electro excitability more than 25uA;
5. Radiographic changes in the periapical area of the tooth;
6. Use of the tooth as a support for the prosthesis.

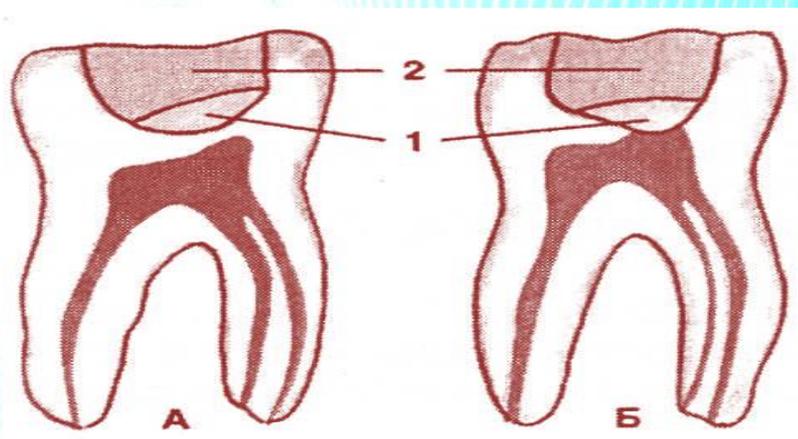


Fig. Biological methods of treatment pulpitis

A - Diagram of the indirect pulp capping with curative paste; B - Scheme of direct pulp capping with curative paste; 1-Therapeutic paste of calcium hydroxide; 2 -Filling (temporary or permanent).



The stages of biological treatment methods:

1. Treatment is carried out in one or two visits.
2. Anesthesia;
3. Mechanical manipulations of the cavity with the principles and stages of preparation. Carious cavity is prepared with sterile sharp spherical burs, which change as they approach the pulp of a tooth;
4. Cleaning of caries cavity must to do with not irritants antiseptic solutions, low concentration. We recommend the following drug:
 - 0,1 - 10% solution of Dimexidum;
 - 0,06 - 0,3% solution of Chlorhexidine;
 - 1% solution of Iodinol;
 - 1% solution of Betadine;
 - 0,02% solution of Furacilini (Frc);
 - 0,5% solution of Novocain;
 - Solutions of enzymes (trypsin, lysozyme, etc.).
5. Degrease and drying of the cavity - is carried with sterile cotton rolls and a jet of warm air. Alcohol and ether do not apply because it is irritant;
6. Using of curative pads (layer) and filling the cavity.



3. The method of conservative treatment of pulpitis

In the first visit:

- After make antisepsis of oral cavity - you must to apply analgesia.
- The painful tooth is isolated by cofferdam or by sterile cotton rolls.
- The surface of the affected and the two adjacent teeth treated with 2% iodine solution, 1% chloral hexidine or other antiseptics.
- After that, when continuously working suction-device, we must to prepare thorough the caries cavity. This operation should be carried out in a professional manner, with a clear representation of topographic relation – “carios cavity - the cavity of a tooth”.
- Carious cavity must be disclosed maximally as to, remove all infected tissue, and the other - a wider field of contact medicinal substances with the inflamed pulp. Special attention during the pre-parry should be paid to the state supra-pulpal dentin at the bottom of the cavity, this often depends success of biological treatment. Softened carious dentin was removed carefully with a sharp bur.
- Then apply curative base (layer). Curative base are applied with a thin layer (0.5 mm) at the bottom of the cavity.
- Temporary filling.



During the second visit, if the absence of patient complaints, maintaining airtight bandage the positive results of clinical studies, begin the second phase of treatment.

- Remove the temporal filling from the caries cavity;
- Irrigated with warm solution of the antibiotic or other drug;
- We impose a paste based on calcium hydroxide. Its alkaline reaction stimulates the production of secondary dentin.
 - a) For a direct pulp capping is advisable to use soft paste, slowly hardening (Reogan Rapid, Biopulp, etc.);
 - b) To cover indirect - such as hardening paste Dycal, Life, etc.

Pasta gently pressed to the bottom of the cavity and close by the temporary filling for 5-7 days. This manipulation produces cautious movements without the pressure of the back of the excavator, a slight smoothing of the drug with a sterile cotton swab (roll). In the second visit, the patients was marked by presence of pain. Then be re-imposition of medical dressings for another 1-2 days. If the pain does not disappear after a double overlay pad with medications, it is recommended to use one of the surgical method of treatments.

- If patient have not pain, after 5-7 days from placed of temporary fillings, the treatment will be finished in the third visit. Partially leave temporary filling. Impose a pad of glass-ionomer cement. Placing a permanent filling.



- Prior to the imposition of a permanent filling, is necessary to check vitality of pulp with a electro- and thermometer.
- A crucial step in the treatment of pulpitis by biological methods is the influence on inflamed pulp.

It is known the direct and indirect capping of the pulp.

Direct pulp capping - when caries cavity communicate with tooth cavity (accidental opening of the pulp during the treatment of deep caries).

Indirect pulp capping - supra-pulpal dentin is intact (Caries cavity don't connect with tooth cavity).

Treatment in two-step includes:

In the Ist visit - the imposition of glyuco-cortico-antibiotic paste under the bandage (temporal filling) for 3-7 days.

In the IInd visit - the imposition of calcium hydroxide or zinc oxide Eugenol paste. When result of treatment is negative – must be produced vital extirpation.



Evaluating the effectiveness of the treatment is carried out in 2 years. It depends on:

- ❖ The patient's age,
- ❖ Limitation of pulpitis,
- ❖ Pathway of infection,
- ❖ X-Ray data,
- ❖ Electrometric data,
- ❖ Thermometric data,
- ❖ Correct treatment.

The method is technically very simple. But the difficulty of identifying the early stages of inflammation of the pulp and mistakes in diagnosis lead to a rare use it.

4. The medicamentous remedies used in direct and indirect capping

As a basis for therapeutic pads can be used sulfanilamide drugs, antibiotics, steroids, enzymes, pastes - containing Eugenol , oil solution of vitamin "A", Heparins and bone meal (1:10), Remodent and preparations based on calcium hydroxide.



Standard tools for this method was the calcium hydroxide in numerous forms, which has a bactericidal effect, normalizes the acid-alkaline balance of the inflamed pulp, has anti-inflammatory, the dehydration effect, stimulates remineralization of softened dentin and secondary dentin formation.

TABLE. Calcium hydroxide curing materials for direct and indirect pulp capping. The materials of chemical crystallization.

Name of material	Manufacturer	Characteristics	The method of application
Calcimol	«VOCO» (Germany)	On the basis of 26% solution of Ca(OH)₂. System "paste-paste"	Equal parts of main paste and catalyst and mixed for 10 Sec, and used for indirect pulp capping. Crystallization time – 45Sec.
Calcimol Hydroxide	«Degussa» (Germany)	On the basis of hydro- calcium. Bases paste and catalyst	Equal parts are mixed on the paper block 10-15Sec. Direct and indirect pulp capping. Crystallization time – 40Sec.
Alcaliner MiniTip	«ESPE», « 3 M » (Germany)	On the basis of calcium hydroxide in the cartridge MiniTip, Bases paste and catalyst	Equal parts are mixed 10Sec. Crystallization time –50Sec.



Septocalcine Ultra	«Septodont» (France)	Bases paste and catalyst in tubes.	Equal parts are mixed on paper block 10Sec. Crystallization time –40Sec.
<i>Life</i>	«К e Г Г» (USA)	Material based on calcium hydroxide in the two tubes (base and catalyst)	Equal parts are mixed on paper block -10Sec. Crystallization time –30Sec
Dycal	«Dentosplay» (USA)	On the basis of calcium hydroxide and butylenes displisilat In the two tubes	Equal parts are mixed on paper block -10Sec. Crystallization time –45Sec.

The success of the therapeutic effect of **antibiotics** is largely determined by the sensitivity to them. The most sensitive flora of the inflamed pulp to neomycin sulfate, chloramphenicol, polymyxin M sulfate, monomitsin, bitsillina, chlor tetracycline hydrochloride. The concentration of antibiotics in the paste should not exceed 500-1000 units. in 1 ml of solution. Excessive their content inhibits the phagocytic activity of cells in the pulp and protective processes in it. Large doses of antibiotics can lead to necrosis of the pulp.



The use of **antibiotics** for conservative treatment of pulpitis does not always succeed, because provides the only antibacterial therapy, as justified by a combination of antibiotics with drugs that stimulate the plastic and regenerative functions of the pulp: sulfanilamid drugs, corticosteroids, vitamins and enzymes.

Corticosteroids relieve pain component, have a pronounced anti-inflammatory effect, but at the same time reduce the reactive state of the pulp, preventing the formation of granulation tissue, facilitating the regeneration of the pulp. Not-lasting effect on the pulp (4-6 days) does not cause adverse changes in it. However, the use of corticosteroids in the form of dressing is advisable to limit further 3-5 days to replace them with a means to promote the dentin-formation. The formation of dentinal bridge in pulp is accelerated by using a combination of corticosteroids with preparations containing calcium hydroxide.

Calcium hydroxide in different prescriptions affects the pulp has better than other funds.

Normalizing acid-alkaline balance of the inflamed pulp, they have anti-inflammatory, the dehydration effect, stimulate the processes of demineralization of softened dentin and secondary dentin formation. In this regard, extensive use of finished dosage paste containing calcium hydroxide, in combination with antibiotics, sulfanilamide preparations, corticosteroids, etc.

These pastes are divided into self curing (chemically cured) and light-cured and used in direct and indirect pulp capping.



TABLE. Light-cured calcium containing material to cover the dental pulp

Name of material	Manufacturer	Characteristics	The method of application
Calcesil LC	«ВладМиВа» (Russia)	On the basis of calcium hydroxide. Available in bottles of 6 g	It is used for indirect pulp capping, introduced at the bottom of the cavity. Layer -1 mm. Polymerized 20 Sec
Calcimol LC	«VOCO» (Germany)	On the basis of 5% solution of calcium hydroxide with prolonged action. Available in tubes of 5 g	In the cavity of 1 mm thick material is introduced. Polymerized 30 Sec. Used to indirect pulp capping.
Septocal LC	«Septodont» (France)	On the basis of hydroxyl-apatite, calcium fluorine. Available in 10 g syringes	Apply at the bottom of the cavity for indirect pulp capping. Light-curing 10 Sec.
Ultra-Blend	«Ultradent» (USA)	On the basis of calcium hydroxide, hydroxyl apatite, calcium, and glass-ionomer cement. Available in 10 g syringes	Extruded directly onto the horn of the pulp or the bottom of the cavity. Polymerized 20 Sec.
Lica	«Dentamerica» (USA)	On the basis of calcium hydroxide. Available in 10 g syringes	It is used for indirect pulp capping. Layer - 2 mm. Light-curing – 30 Sec.



In biological method of treatment of pulpitis using proteolytic enzymes.

The rationale for use of enzymes is their property of melt nonviable tissue, dissolving micro-tombs, improve the flow of fluid, reduce antibiotic resistance of microorganisms.

From this point of view is very promising is the use of proteolytic enzymes (trypsin, chymotrypsin, lysozyme) and their inhibitors (kontrikala, ambena) in the treatment of inflammation of the pulp.

5. The method of vital amputation

The method of vital amputation related to biological methods, as can maintaining the vitality of the pulp. The method requires rule execution of asepsis and antisepsis. Necessary to exclude the ingress of saliva into the cavity of a tooth. Necessary to use sterile instruments and materials, often replace sterile burs. This type of treatment used in multi-rooted teeth.

The essence of this method is surgical removal of the focal area of inflammation (coronal and orifices pulp). For the remainder part of pulp (stump) must be placed medicamentous remedies (paste).



The method is based on the ability of the root pulp to the reparative processes. The limit of surgical intervention should be a sensitive, bleeding, pink pulp, which retained viability.

Indications: amputation should be performed in all cases, where conservative treatment for any reason can't or has not given effect.

- Acute focal pulpitis;
- Accidental exposure of the pulp (pulpitis traumatic);
- Chronic fibrous pulp – electro excitability to 40uA;
- Age - children and young people;
- Condition - the patient is clinically healthy;
- Direct and indirect pulp capping has not given effect;
- There is use only in multi rooted teeth, where the coronal pulp clearly separated from the root;
- A tooth with unformed roots.



The objectives of the treatment:

- Removal of painful symptoms as a cardinal sign of pulpitis;
- Removal the source of infection and intoxication by the pulp necrectomy of necrotic tissue;
- Disclosure of the source of focal inflammation;
- Stopped inflammation's promotion by pulpotomy or pulpectomy;
- Stop bleeding of the pulp;
- Treatment of the pulp stump with antiseptics or antibiotics to relieve inflammation;
- Application of pastes, contributing to the final resolution of the inflammatory process for stimulate and restore normal function;
- Restoration of anatomical forms and physiological functions of tooth (tooth filling).

6. The method of vital amputation

The method of vital amputation is a number of techniques, that are carried consecutively:

1. Antiseptic treatment of the surgical field. Rinse the orifices with warm solution of permanganic acid (1:5000), or 1 - 2% solution of baking soda, "Stomatidina», «Tantum Verde», Furachillini solution, etc.



2. Preparation of the operative field is carried out by mechanical and chemical treatment of the painful tooth, and two neighboring teeth. It is necessary to apply a mild antiseptics. Painful tooth and neighboring teeth must be carefully cleared from the soft deposits.

3. Anesthesia. This is a crucial step that allows a painless treatment. The technique is performed under infiltration or conduction anesthesia.

4. Treatment of caries cavities. Preparation of caries cavities and disclosure of tooth cavity must be doing with compliance of asepsis and antisepsis. Preparation of caries cavities should be done very carefully. At first, remove the overhanging edge of the enamel. Fissure, globular, or conical burs wide open, and expanding caries cavity, excised nonviable tissue of dentin. With a sharp excavator removes softened infected dentin in the walls and bottom of the caries cavity. After mechanical processing of caries cavity - needed to do antiseptic processing.

5. Opening the cavity of the tooth - the creation of a point (one point) communications of caries cavity with a pulp chamber. Communications with a tooth cavity can be detected by probing. Opening the tooth cavity (the pulp horns) is carried out with applying antiseptic. In this case must be use sterile round bur medium size, without undue pressure.

6. The opening of the tooth cavity - removal the roof of a tooth cavity for create access to the pulp chamber and root canal orifices. The roof of the tooth cavity is removed with a sterile fissure bur.



The requirements for opening tooth cavity:

- ✓ Walls of the formed cavity coincide with the walls of the tooth cavity;
- ✓ Lack of a set of tooth cavity and its overhanging edges;
- ✓ Free tool access to the root canals (at the entrance of the root canal instrument is not curves).

7. Amputation of coronal pulp. Amputation is removal of the coronal pulp with preservation of the root pulp. Amputation is carried with a sharp excavator or round bur. In the orifices of the root canal pulp is cut with the least trauma. Wound should be cut and not torn.

The tooth cavity is rinsed with warm antiseptic: 0.02% solution of Furacilini (Frc), 1% solution of iodinol, 0.5% hydrogen peroxide solution, 1% solution of "Betadine".

8. Expansion of the orifices of the root canal. Spherical, pear-happed or hastate burs corresponding sizes (№ 1 and 3) expand the orifices of the root canal, which prevents the possibility of complications. After expansion, the orifices must be funnel form.



9. Treatment of the wound surface of the pulp stump. In the process of opening the tooth cavity and pulpotomy, the caries cavity we must irrigate anti-inflammatory solutions. In order to prevent infection into root pulp, all manipulations should be carried out accurately and rapidly. We must quickly change the cotton rolls, preventing the ingress of saliva into the tooth cavity. Irrigation is done by introducing a warm antiseptic, drops with sterile syringes for 3 - 5 minutes.

10. Stop the bleeding. In the case of bleeding from the orifices of the root channels used: 5% solution of aminocaproic acid, 0.5-1% solution of hydrogen peroxide, hemostatic sponge, a solution of adrenalin, which are introduced into the cavity of the tooth for 3 - 5 minutes on sterile cotton swabs.

11. Drying of the pulp chamber. Drying is carried out with sterile cotton swabs or a jet of warm air (ether do not use!).

12. The application of treatment paste. The purpose of this stage -to prevent the development of the inflammatory process in the remaining root pulp, and stimulate repair processes in pulp.

Above the orifices of the root canal is applied calcium hydroxide therapeutic paste, without pressure. Paste isolate by water dentin, then placing glass-ionomer cement and permanent filling. Sometimes the treatment is carried out in two visits. We apply the treatment pads with calcium hydroxide. After this the temporary filling on basis of zinc-eugenol paste is set on 3 - 4 weeks. In the absence of the pain, the temporary filling change for permanent.



As a result of the treatment on the surface of the amputation wound, formed connective tissue capsule and dentin bridge, that maintains a viable root pulp.

The patient is taken to the dispensary registration and subsequent control of the state of the root pulp with electric pulp test methods (EDI) and X-Ray imaging.

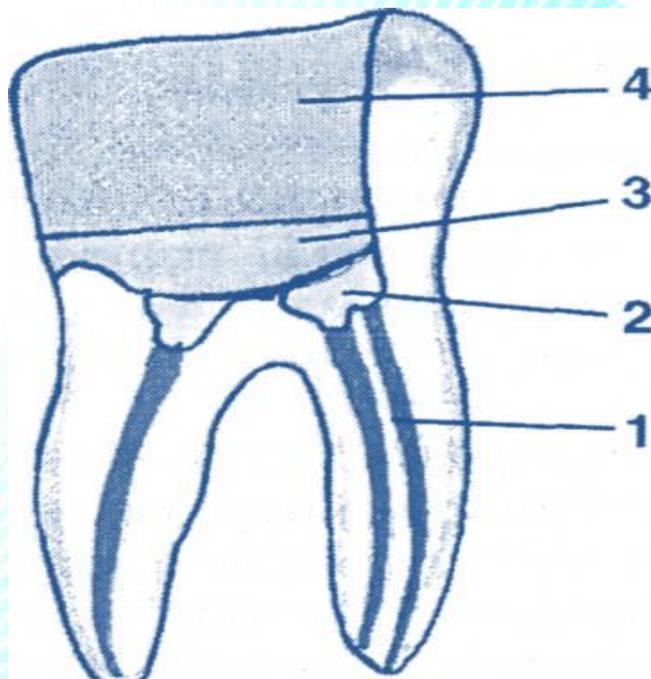
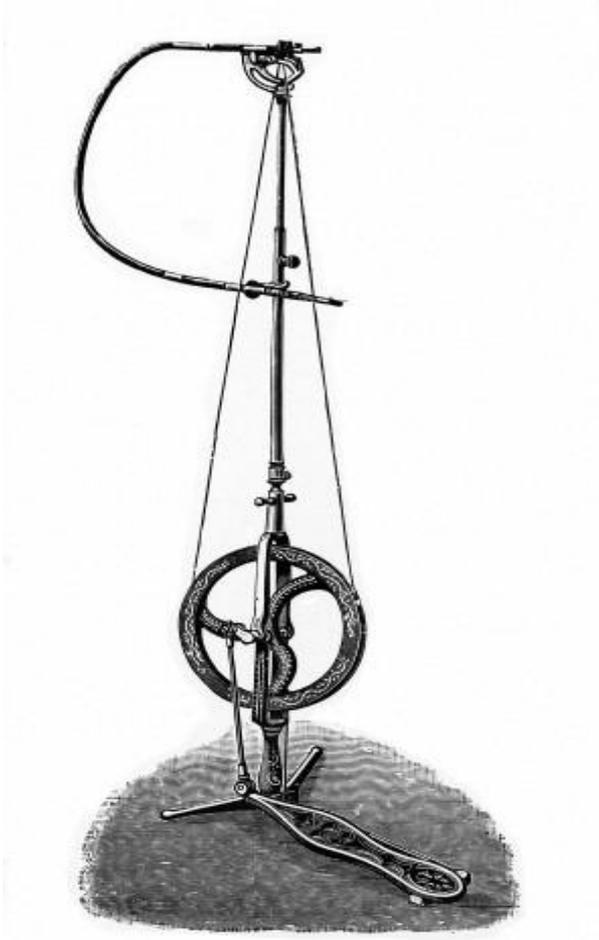


Fig. Diagram of a tooth filling after pulpotomy

1 - Stump of the root pulp, 2 - Medicinal paste to the root of the pulp stump, 3 - Isolating pads, 4 - Permanent filling.

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