POLTAVA STATE MEDICAL UNIVERSITY
Chair of propaedeutics of therapeutic stomatology

Treatment of apical periodontitis

Lecture for 3rd year students of international department

The lecturer – the senior lecturer of chair,
the candidate of medical sciences
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The lecture plan

1. Methods of periodontitis treatment.
2. Treatment principles.
3. Influence upon the macrocanal and its branches.
4. Influence upon system of microcanals.
5. Influence upon periapical tissues.
6. Treatment stages of acute purulent apical periodontitis. The urgent help.
7. Features of choosing filling materials for root canals.
8. Indications for treatment of periodontitis in reduced terms.

1.Methods of periodontitis treatment:

- **Conservative (therapeutic)**;
- **Conservative-surgical (resection of root apex, hemisection, root amputation, crown-radicular separation, replantation)**;
- **Surgical (tooth extraction)**.

The choice of treatment method depends on, first of all, expressiveness of local implication (the size of periapical distruction), general condition of the patient, presence of the locus-caused diseases.

- The inflammation centre of periodontitis is not located in the tooth, but behind its limits – in periodontium, bone. This odontogenous infection provokes occurrence and supports so-called locus-caused diseases (septic myocarditis, nephrite, rheumatic disease). Therefore, medical actions with periodontitis should be directed on treatment of not only causal tooth, but also actively influence on periapical infection centre.

2.Principle of periodontitis treatment – «The principle of triad influence» (I.G.Lukomsky, 1958)

- Influence upon the macrocanal and its branches;
- Influence upon the system of microcanals;
- Influence upon periapical tissues.

3. Influence upon the macrocanal and its branches

- Mechanical processing;
- Medicamentous processing.

Mechanical (tool) processing of root canals is operation of removing from the canal and its walls pulp decay (putrid masses) and infected dentine.

Removing of putrid masses is made stage by stage with pulp extractor, but not one-stage (as when pulp extirpation): from ostium, middle and apex parts of root canal, is necessary combining it with medicamentous disinfecting of putrid masses (under so-called «bath (basin) of antiseptic» or irrigation).

Antiseptic solutions for root canal processing (quick-acting)

- 2,5 %–5,25 % solution of hypochlorite natrium;
- 2 % a solution of chloraminum;
- 3 % a solution of hydrogen peroxide;
- 0,06 % - 1 % solution of chlorhexidinum;
- 0,1 % a solution of dimexidum;
- 3 % stabilisating solution Parsan (Septodont);
- Proposal (Densply).

Algorithm of putrid masses removing

- To bring in on bottom of tooth cavity with branches of tweezers, pipette, syringe some drops of antiseptic for formation of liquid layer over ostium of root canals;
- To introduce pulp extractor in ostium (orifice) of root canal, to turn, to extract;
- To wash out the tool in the drop of antiseptic;
- To repeat the same in middle and apex of root canal.

Removing infected dentine from walls of root canal

It is made with endodontic tools:

- For expansion of root canal ostium – «Gates Glidden», «Largo», «Orifice opener»;
- For passage of root canals – K-reamer, K-flexoreamer, K-nitiflex (reamming);
- For expansion and alignment of canal – K-file, K-flexofile, H-file, pro-files (filling).

Processing methods of root canal:

- **Step-Back – from apex to ostium, it means from smaller size of tool to larger;**
- **Crown Down (step forward) – from a ostium to apex. Is preferable with treatment of chronic forms of perodontitis because probability of pushing the infected contents of canal through apex to periodontium reduces**
- **Technique of "the balanced force» for very curved root canals. Rotary counter-clockwise movements are made. The canal would not be straightened, but in regular intervals would be expended with preservation of natural curvature. Tools with a nonaggressive tip (K-nitiflex, Batt-tip).**
- **Technique with machine rotating tools.**

Remedies for chemical expansion of root canal and simplification of processing

- 10 - 20 % solutions of EDTA (ethyl diamine tetraacetic acid);
- Trilon B – 10 % dinatrium salt of EDTA;
- Largal ultra (Septodont);
- Canal plus (Septodont);
- “HPU-15” (Spad)
- ЭндоЖи № 2 (mixture of potassium and sodium salts of EDTA (17%) and cetrimonium bromide);
- Эндогель (Владмива) – 15% EDTA and 10% peroxide
- 2,5 %–5,25 % solutions of hypochlorite natrium;
- Белодез (Владмива) – 3% solutions of hypochlorite natrium;
- Clorax (SPAD) – 5,25 % a solution of hypochlorite natrium;
- Verifix (SPAD) – solution of lemon and propionic acids;
- Vagotil – 36 % water solution of polymethylene-metakresatin-sulphonium acid.

4. Influence upon system of microcanals

This is considerably infected zone and inaccessible for direct influence.

Applied remedies should possess such properties:

- ✓ **Diffusion** (hypochlorite natrium; chloraminum, hydrogen peroxide, chlorhexidinum);
- ✓ **Mucolytic** (enzymes, their combination with antibiotics (lincomycin - tripsinum mix), immosimase, cresofenum);
- ✓ **Impregnate** (depoforesis with copper-calcium hydroxide).

5. Influence upon periapical tissues

- **Medicamentous influence – passive injection (on wadded turundas) of medicinal substances with long action in periapical centre**;
- **Physical methods**:

- Electroforesum – active carrying of medicinal substances with help of electric current;
- Depoforesum of copper-calcium;
- Diathermocoagulation;
- UHF-therapy.

- Medical influence with gaseous Cl_2 and O_2;
- Move out of medical pastes, plastic not hardening filling materials for root canals in periapical centre (with treatment of chronic destructive forms of periodontitis)

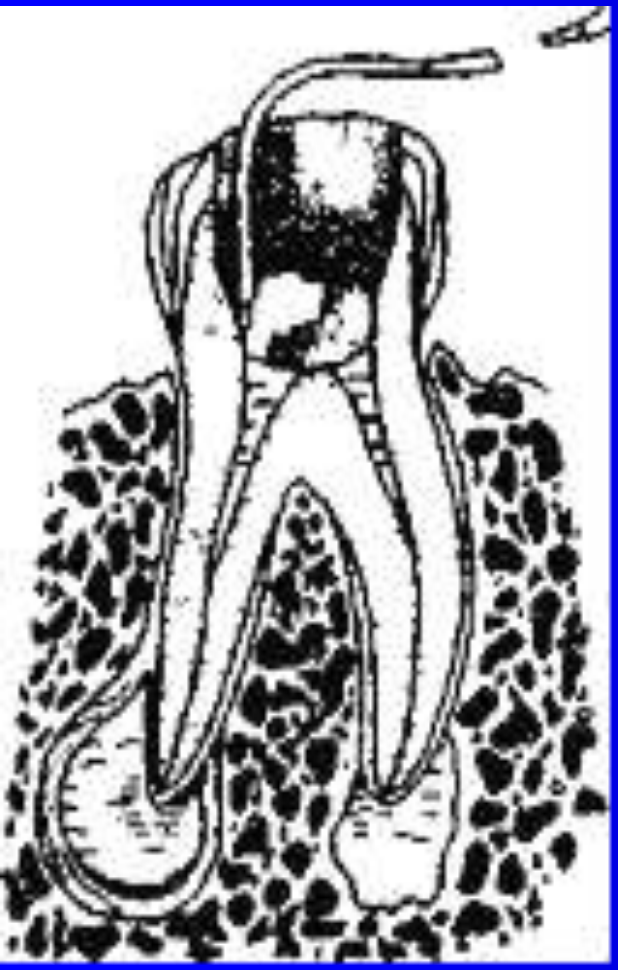
Remedies for influence upon microcanals and periapical centre (longly non-inactvated)

- Iodine substances (1 % iodinolum, 5-10% water sol. of kalii iodidum, 5 % Lugol's sol., 5 % alcohol sol. of iodine, iodoform, 1 % sol. of iodonatum). The action mechanism: sterilization of root canals, periapical infected centre, acceleration of granulation tissue maturing, arsenic antagonist;
- Microcidum;
- 0,5-1 % sol. of dioxydinum;
- Metronidazolum;

- 0,1 % sol. of dimexidum;
- Camphorofenolum (Dicamphen);
- Antibiotics (biomycinum, lincomycinum, streptomycinum, penicillinum);
- Enzymes (trypsinum, chymotrypsinum, terrilytinum, pancreatinum, desoxyribonucleasa);
- Immosymasa (complex of bacterial proteinases);
- Stomatosymum;
- Kresofenum (antibacterial substances on dexamethasonum base);
- Orthofenum 2,5 % sol. – not steroid hormone

- **Formula:**
  Dexamethazone, thymol,camphor, eugenol, excipient.
- **Indications**
  Antiseptic processing of root canals and carious cavities.
- **Properties and directions for use:**
  The combination of powerful germicide and corticosteroid substances in this preparation makes it useful for the antiseptic treatment of canals and carious cavities.
  After extirpating the pulp as completely as possible, enlarge the canal using chemical and endodontical methods. Then rinse it with water and dry thoroughly.
  Apply 1 drop of the liquid into the canal for 1-2 minutes. Remove the rest of the liquid with turunda and seal the canal.
  This liquid has no irrigating effect and allows to reach the pulp and apex without negative reactions. Its germicidal action penetrates the narrowest fissures.
  Dexamethasone which is 35 times more active corticosteroid then cortisone allays inflammation and allergic processes.
  Unlike the most of antiseptics, which are used for root canals this liquid may be combined with antibiotic treatment.

Electroforesum – the combined influence of medicinal substances ions and constant current



Transcanal electrophoresis is applied with treatment of teeth with chronic destructive forms of periodontitis and bad passableness, very infected root canals.

Iodine-contain remedies, enzymes are introduced.

Mechanism of potassium iodide action:

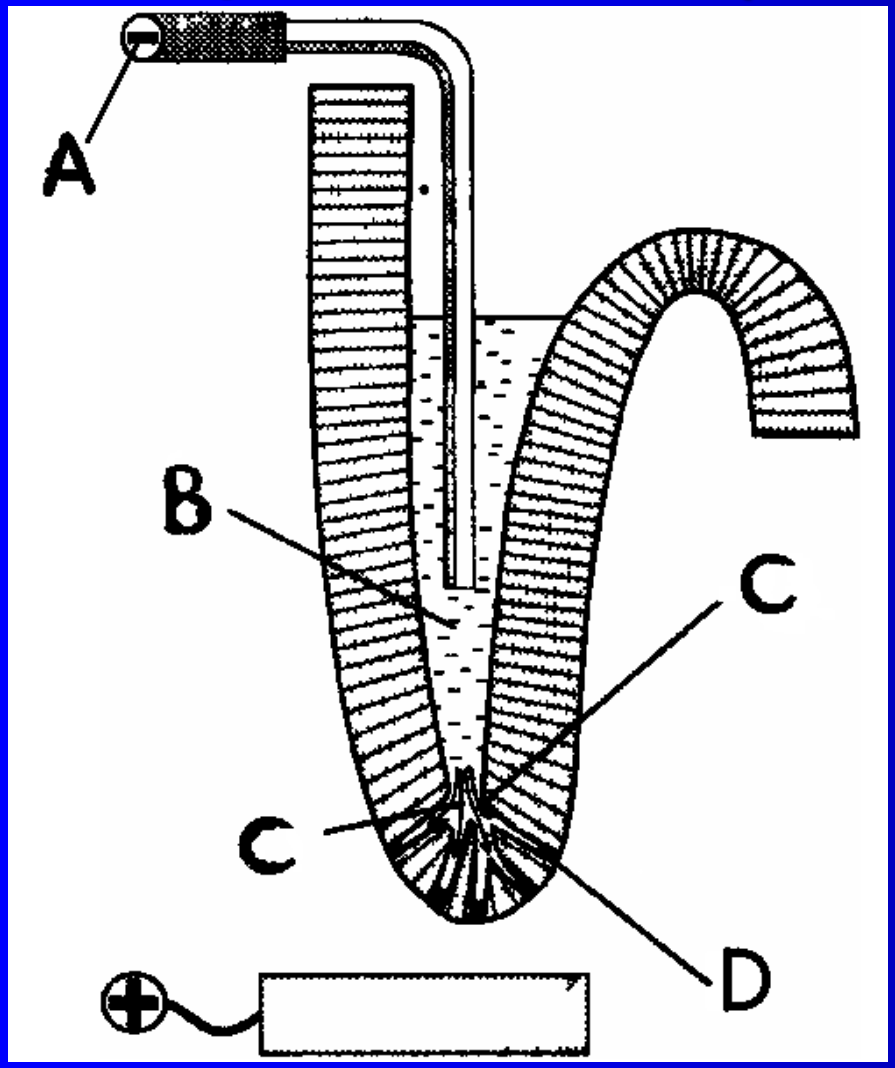
- ✓Sterilisation of root canals and centre of periodontitis;
- ✓Acceleration of granulation tissue maturing;
- ✓ Arsenic antagonist.

Copper-calcium depoforesum (Prof. Knappvost, 1998)

It is applied in case of impassability of root channels as a result of its tortuosity or obturation.

The action mechanism: under the influence of a constant electric current hydroxide-ions and hydroxile-copper ions get in and accumulate in apical part, drop out in precipitate, forming copper stoppers. Due to alkalisation of environment the function of osteoblasts and regeneration of bone is stimulated. A passable part of the canal fills with special alkaline cement «Atasamitum».

The scheme of copper-calcium depoforesum (Prof. Knappvost, 1998)



A – active electrode;

B – suspension of hydroxyde copper-calcium;

C – deposition and precipitation of hydroxyde copper-calcium;

D –precipitation hydroxyde copper and corking of deltoid canals.

Diathermocoagulation

The diathermical current renders anaesthetising and hemocoagulating action. The acting mechanism: in place of coagulation the products of tissue decay are destroyed, microorganisms die, and coagulative thrombosis of vessels slows down absorption of toxins. The zone of diathermisation where amplifies flow of blood and lymph is around formed, also shaft of leycocytes is formed, exchange processes comes better that strengthens regenerative properties of nearby tissues.

The method of periapical diathermocoagulation is indicated with treatment of chronic granulating, granulematosis periodontitis, cystogranuloma and cyst.

6. The purpose and stages of acute purulent periodontitis treatment

Treatment is directed on:

- ✓ Removing of painful sensations;
- ✓ Creation of conditions for outflow of exudates;
- ✓ Elimination of the inflammation reason and stopping of inflammatory effects development;
- ✓ Restoration of lost functions of periodontium.

At conservative method of treatment the drainage of periodontal space carried out through root canal is optimum way for outflow of exudates.

The first visit

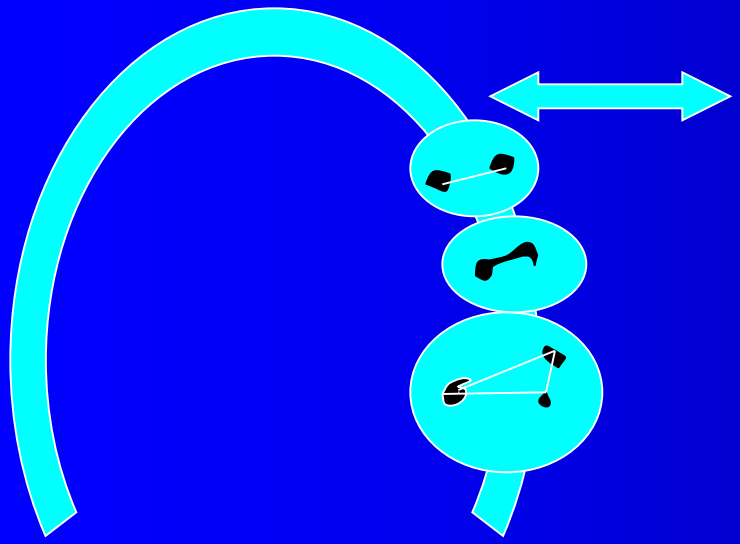
1. Anaesthesia. Highly-effective anaesthetics, possessing minimal toxic action and able not inactivate in inflammation centre: 2-4 % ultracainum, 4 % alphakainum, 4 % septanest, 4 % ubistesinum, 2 % lidocainum with addition of vasoconstriktors (0,05 % noradrenalinum, 0,1 % adrenalinum, epinephrinum – 1 drop on 10-15 ml of anaesthetic).

Painlessness of preparation is reached by tooth fixing with fingers of the left hand, using of turbine handpiece, sharp cutter burs, thanks to what vibration and pressure upon the tooth is excluded and what is the pain reason.

2. Preparation of caries cavities (trepanation of tooth crown, removing of old filling).

It is necessary to open caries cavity on chewing (on molars and premolars) or oral (in incisors and canines) surfaces, that further will provide good access to root channel. Cavity which is near of the tooth neck is necessary to preparate and to fill.

3. Disclosing of tooth cavity (removing of pulp chamber arch) is made with control of tooth cavity topography.



4. Removing of tooth cavity contents (putrid decay, the rests of filling material).

5. Expansion of root canals ostium.

6. Removing of pulp decay from root canals.

7. Medicamentous processing of root canals.

8. Disclosing of apex aperture for outflow of exudate (acute forms of inflammation) and possibilities to influence on periapical centre (chronic). Criterion of the disclosing is the doctor's sensation to fall in (through) and appearance of exudates in cavity of root canal. At purulent periodontitis it leaves out under pressure and the patient feels considerable simplification of pain.

9. Medic. processing of the canal. Exudates is removed with wadded turundas, pins. **The tooth is left opened.**

Recommendations to the patient: frequent gargling by a hypertonic solution (salt+hydrate of sodium), suction from tooth. During meal tooth had to be closed with wadded ball for the prevention of root canal obturation. At the expressed intoxication of organism it is possible to appoint physical procedures: currents of UHF, diadynamyc currents and nonspecific antiinflammatory remedies (paracetamolum by 0,5g 2-3 times a day), sulfanilamyds.

Following visiting will be in 3-5 days after liquidation of inflammation symptoms. Increasing of the inflammatory effects says us about complication of periodontitis with periostitis and it is necessary to make outflow of exudates by another way (section of periost).

The second visit

1. Mechanical and medicamentous processing of root canals;

2. Influence on periapical tissues with one of methods specified above;

3. Applying of hermetic bandage.

If the tooth «maintain hermetism», there is no exacerbation of inflammatory process, then:

At the third visit make:

1. Removing of a hermetic bandage;

2. Filling of root canals;

3. Constant filling of pulp chamber and crown cavity;

4. Polishing of the filling.

Patient T, 32 years, diagnosis: Chronic granulating Pt 46. Treatment with conservative method

Before treatment

After treatment

Patient K, 10 years, diagnosis: cystogranuloma 36. Treatment with conservative-surgical method

Before treatment

After treatment

Features of filling material choice

During filling of root canals of periodontitis teeth the filling material should possess not only good obturation properties, but also antiinflammatory, antiseptic, osteotropic acting, to promote inflammation liquidation, periodontium cicatrization, bone restoration.

Discussion about degree of root canal filling proceeds: to take out (lead out, move out) or not to take out the material through aperture of apex. Some scientists (Anishenko, Groshikov M. I, Marchenko A.I.) consider, that the moving out material stimulates maturing processes of granulating tissue, its transformation in cicatricial, stimulate osteogenesyse.

Others – consider that it is either not essential, or even harmful: at insignificant destructive changes of periapical tissues the filling material moving out through root apex acts traumatically and blocks restoration of bone.

For today it is considered, that obturation of root canals it should be made at level of physiological aperture.

For obturation such materials is applied:

- ✓ Plastic not hardening;
- ✓ Plastic hardening (sealers);
- ✓ Firm (pins).

Plastic not hardening (Phosphodent-bio, iodoforme, timole pastes) are applied for temporary obturation of root canal for the purpose of acceleration of inflammation liquidation, healing of bone defect. Are used for about 1-2 months with the subsequent refilling of the canal with hardening materials.

Periodontitis treatment in reduced terms

Indications:

1. Single-root teeth with well passable canal and opened fistula (the absolute indication);

2. All chronic forms of a periodontitis in teeth with well passable canals (single-rooted teeth);

3. An exacerbation of chronic forms in teeth with well passable canals in the presence of indications to dissecting of subperiostal or subgingival abscesses.

THANKS FOR ATTENTION!