Current Trends in Endodontic and Periodontal Treatment

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ABSTRACT

Endodontics is a branch of dentistry that studies the structure, functions of the pulp and periapical tissues, it is aimed at studying the physiological state and diseases of the pulp and periodontium, as well as their prevention. The modern concept of endodontic treatment is to eliminate infection from the root canal, treat the foci of periapical lesions to restore the integrity of the periodontal tissue barrier, and prevent microbial invasion. This article discusses the current trends in endodontic and periodontal treatment and provides examples.

Keywords: Endodontics, periodontology, plasma therapy, microscope, modern treatment.

Main part:

By performing the following tasks, we can achieve the following endodontic treatment goals:

1. Cleaning and disinfection of the root canal to remove pulp tissue, microorganisms and their metabolic products.
2. Preparation of the root canal with mechanical excision of infected dentin.
3. Three-dimensional obturation of the root canal system and creation of a biological barrier to prevent reinfection.

Endodontics is the only dental discipline in which doctors work “in the dark.” We cannot see and do at the same time. We must rely on various feedbacks to ensure predictability in our radicular endodontic intervention and obturation. Today, endodontics uses advanced technology and advanced education to study the time-tested endodontic triad, available for study by any dentist willing to learn and master them [1]. The main technological trends in the endodontic triad today are the use of new tools and materials:

- Root canal cleaning is performed using endoactivators, lasers and multi-purpose ultrasound.
- Special heat treated files are used to create minimally invasive, tapered root canal preparation instruments. This allows only the required amount of dentin to be removed, facilitating cleaning and preparing a soft "funnel" shape for easy obturation hydraulics [1,2].
- In the field of obturation, developments are moving towards increasing precision and achieving a finely divided nanostructure of gutta-percha [3,4,5].
- New generation carriers are also used for obturation of root canals [6].

Not all technologies are available today in our country, but the speed of technological progress is amazing - this allows us to hope that in the near future most innovations can be seen at least in all major clinics.

There are several modern technologies in endodontics:

1. 3D printing technology for endodontic instruments.

3D printing technology has revolutionized the creation of endodontic instruments. We can now create custom instruments with complex parts specifically for specific patients and individual clinical cases.

2. Automated root canal filling systems.

More advanced obturation systems designed to provide dentists with a fast and effective method for filling root canals. The systems also have the ability to measure the depth of the root canal and monitor the progress of the filling procedure, calculating the depth and anatomy of the canals.

3. Endodontic microscopes with smartphone support.

The microscopes are designed to use a smartphone as a display, allowing the practitioner to view and manipulate images of root canals in real time. This technology provides improved visibility and precision in endodontic procedures, allowing practitioners to address problems that would otherwise be undetectable using standard dental microscopes. In addition, endodontists no longer require long-term adaptation to the dental microscope [6].

4. Intelligent imaging systems for improved diagnosis.

State-of-the-art AI-powered software uses computer vision, learning AI and machine learning to assist in diagnosis, treatment planning and monitoring of endodontic procedures. Essentially, such systems are a complement to CBCT, where artificial intelligence helps with root canal detection, creates automated digital imaging to detect caries, and ultrasound imaging to determine the position of instruments inside the root canal.

5. Root canal treatment with laser.

Laser energy is used to remove diseased tissue and reshape the walls of the root canal.

6. High resolution intraoral cameras.

Intraoral cameras are becoming increasingly smart, providing increasingly clear images, they do not fog up and will soon make endomicroscopes optional for most clinical situations.

7. Wearable sensors to monitor the progress of treatment and recovery.

The sensors work by measuring certain parameters such as temperature and pressure around the root canal. They can also monitor changes in the shape of the root canal as a result of treatment or changes in surrounding tissue due to inflammation.

Periodontology is a science that studies the structure of periodontal tissues (periodontium), their diseases and treatment methods. Periodontal disease – periodontitis – occurs in more than 80% of the adult population [7]. In modern dentistry, PRF therapy (also known as plasma therapy, “plasmolifting”, in various sources) is successfully used for the treatment and prevention of periodontal phenomena. It, as a natural method of combating various diseases, appeared in 2004, when the positive effect of plasma on various organ systems was discovered.

This unique procedure is based on PRF therapy technology. This technique is used in the treatment of atrophic, inflammatory diseases of the oral cavity, as well as to optimize and accelerate the regeneration of bone tissue during implantation and osteoplastic surgery [7,8]. The goal of plasmolifting is to achieve not just the removal of the inflammatory process of the periodontium, but to start the process of natural recovery color, shape and structure of the gums, prevent bone loss. Plasmolifting is carried out in the form of injections of plasma obtained from the patient’s blood - autoplasma - into the problem area [9].Plasma is injected locally into damaged gum tissue, implant or bone graft installation sites, in the area of sinus lift, extracted tooth socket, in the area of osteosynthesis or installed membrane, in the maxillofacial areas of soft tissues during acute and chronic infectious and inflammatory processes.

Platelet plasma introduced into tissue, thanks to the growth factors it contains, causes capillary sprouting, normalizes hemodynamics, tissue respiration, and metabolism. At the same time, the process of strengthening bone tissue, the formation of a collagen and bone matrix occurs with the participation of bone morphogenetic

collagen proteins, as well as the activation of local immunity.

The components contained in plasma are absolutely natural for humans, they are not mutagens and cannot cause oncology, tumors or other negative reactions. In dental practice, plasma therapy is considered completely safe, since plasma is isolated from the patient's blood. No chemical additives are added to it. Therefore, the risk of developing allergic reactions is virtually eliminated.

Indications:

- Generalized periodontitis (1, 2, 3 severity);
- Gingivitis;
- Localized periodontitis;
- Alveolitis;
- Implantation and tooth extraction operations;
- Peri-implantitis;
- Prevention of periodontal tissue diseases;
- Inflammatory or long-term non-healing phenomena of the oral mucosa and the red border of the lips.

Effect of the procedure:

- Elimination of bleeding;
- Decreased mobility;
- Pain relief;
- Elimination of bad breath;
- Prevention of periodontal diseases;
- Stopping the progression of periodontal diseases;
- Acquisition of physiological color and anatomical shape by the gum;
- Acceleration of healing of the area of the sockets of extracted teeth;
- Reducing the risk of tooth loss;
- Reducing the risk of implant rejection;
- Restoration of chewing function;
- General improvement in the patient's quality of life.

Contraindications:

Despite the popularity of the plasma lifting procedure in dental practice and its harmlessness to the human body, there are a number of contraindications that exclude the introduction of platelet plasma. This is due to the fact that in patients who suffer from serious illnesses at the time of such a procedure, the structure of the plasma itself may change and the result of plasma lifting may be negative. Today, dentists do not resort to treatment using this technique if the patient has the following chronic diseases:

- Hepatitis;
- HIV infection;
- Infectious nature of diseases;
- Blood diseases;
- Allergy to heparin;
- Malignant tumors;
- Endocrine diseases;
- Diabetes mellitus (decompressed form).

Conclusions:

- New technologies have brought endodontics out of the dark and given dentists new levels of competence, consistency and confidence in procedures.
- The results indicate improved quality of care, which will help reduce the need for repeat procedures and document the quality and outcomes of endodontic procedures for patients.
- Endodontics occupies a significant place in complex treatment, along with implantation.
- As for periodontics: modern plasma therapy treatment does not require significant material investments for a medical organization; minimally invasive; has no risk of developing allergic reactions and negative effects on organs and systems of the human body; significantly changes the course of clinical manifestations of the disease - it stops inflammation and stabilizes regenerative processes in a shorter time; reduces the frequency of relapses of periodontal diseases; When using the technique, its prolonged effect is noted.

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