METHODS FOR PRESERVING THE PULP OF HUMAN TEETH

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Introduction. There are many circumstances in which the state of the pulp of the root canal due to real or potential risk, pain, infection, inflammation or functional disorders is subject to acute, irreversible pulpitis with transition to chronic pulpitis in the conditions of development of necrosis and its consequences [1, 9]. There are other circumstances in which pulp injuries are not always irreversible: initial pulpitis, iatrogenic pulp fracture, trauma, dystrophic disorders [7, 12]. A high success rate with endodontic therapy testifies to the elimination of the disorder and the absence of a tendency to necrosis. However, in most cases, inevitable pulpectomy occurs, which often leads to the loss of the entire dental organ [3, 8, 11]. Even successful endodontic treatment greatly weakens the whole structure of the tooth and often dictates further prosthetics, with subsequent increase in tissue loss [2, 10]. In order to preserve the mass of root tissues and tooth crowns with the possibilities of regeneration, it is necessary to direct the search for methods of conservative treatment to preserve the vitality of the teeth, which improve the prognosis of tooth preservation. It is necessary to develop a strategy for treating pulpitis in different types of situations, based on a thorough analysis of emerging risks.

Aim. Conduct an analysis of treatment methods while maintaining the viability of the pulp.

Material and methods. The analysis of own and accessible literary data.

Results. An analysis of the current state of the issue of preserving the viability of human pulp pulp showed that at the present stage the methods of treatment are actively developed by many scientists who successfully solve the problems of dentistry [6, 7]. The development of pulp therapy methods is a vital issue for many patients, since pulp disease of the tooth is the main cause that negatively affects the condition of the oral cavity [4]. Extirpation of pulp is currently the main method of dental treatment. Along with the development of minimal invasive cosmetic dentistry, with the use of various technologies for processing materials and pathogenetically substantiated preservation of healthy dental tissue with the growth of tooth crowns, the urgency of problems that require immediate resolution in the dental clinic is growing. The experience and knowledge on methods of endodontic treatment require generalization. Solving the problems of tooth pulp regeneration with the help of modern diagnostic and treatment technologies is possible on the basis of cellular technologies [5].

Discussion. Tissue repair of human tooth pulp is possible only if there is a deep knowledge of the sources of development and mechanisms of regulation of migration and adhesion of stem pulp cells, the composition of cellular ensembles that cause secretion signal molecules of a certain direction in differentiation of odontoblasts.

References

1. **Aksel H, Öztürk Ş, Serper A, Ulubayram K.** VEGF/BMP-2 Loaded Three-Dimensional Model for Enhanced Angiogenic and Odontogenic Potential of Dental Pulp Stem Cells.//Int Endod J. 2017. - Oct 28.
2. **Brin I, Ben-Bassat Y, Heling I, Engelberg A.** The influence of orthodontic treatment on previously traumatized permanent incisors. Eur J Orthod.- 1991.- 13(5):372–377.
3. **Caviedes-Bucheli J, Moreno JO, Ardila-Pinto J, Del Toro-Carreno HR, Saltarin-Quintero H, Sierra-Tapias CL, Macias-Gomez F, Ulate E, Lombana-Sanchez N, Munoz HR.** The effect of orthodontic forces on calcitonin gene-related peptide expression in human dental pulp. J Endod .- 2011.-37(7):934–937.
4. **Chae HS, Park H, Hwang HR, Kwon A, Lim W, Yi WJ, Han D, Kim YH, Baek J.**) The effect of antioxidants on the production of pro-inflammatory cytokines and orthodontic tooth movement. Mol Cell.- 2011.-32(2):189–196.
5. **Derringer KA, Linden RWA.** Vascular endothelial growth factor, fibroblast growth factor 2, platelet derived growth factor and transforming growth factor beta released in human dental pulp following orthodontic force. Arch Oral Biol.- 2004.- 49(8):631–641.
6. **Han JW, Lee BN, Kim SM, Koh JT, Min KS, Hwang YC.** Odontogenic Potential of Parathyroid Hormone-related Protein (107-111) Alone or in Combination with Mineral Trioxide Aggregate in Human Dental Pulp Cells.//J Endod. 2017 Oct 20. pii: S0099-2399(17)30960-3.

7. **Joo KH, Song JS, Kim S, Lee HS, Jeon M, Kim SO, Lee JH.** Cytokine Expression of Stem Cells Originating from the Apical Complex and Coronal Pulp of Immature Teeth.//J Endod. 2017 Oct 24. pii: S0099-2399(17)30962-7.

8. **Kumar A, Kumar V, Rattan V, Jha V, Pal A, Bhattacharyya S.** Molecular spectrum of secretome regulates the relative hepatogenic potential of mesenchymal stemcells from bone marrow and dental tissue.//Sci Rep. 2017. Nov 8;7(1):15015.

9. **Qin W, Huang QT, Weir MD, Song Z, Fouad AF, Lin ZM, Zhao L, Xu HHK.** Alcohol Inhibits Odontogenic Differentiation of Human Dental Pulp Cells by Activating mTOR Signaling.// Stem Cells Int. 2017;2017:8717454.

10. **Tomás-10. 10. Catalá CJ, Collado-González M, García-Bernal D, Oñate-Sánchez RE, Forner L, Llena C, Lozano A, Moraleda JM, Rodríguez-Lozano FJ.** Biocompatibility of New Pulp-capping Materials NeoMTA Plus, MTA Repair HP, and Biodentine on Human Dental Pulp Stem Cells.//J Endod. 2017 Oct 24. pii: S0099-2399(17)30906-8.

11. **Uribe-Etxebarria V, Luzuriaga J, García-Gallastegui P, Agliano A, Unda F, Ibarretxe G. Notch**/Wnt cross-signalling regulates stemness of dental pulp stem cells through expression of neural crest and core pluripotency factors.//Eur Cell Mater. 2017 Nov 1;34:249-270.

12. **Zhang M, Jiang F, Zhang X, Wang S, Jin Y, Zhang W, Jiang X.** The Effects of Platelet-Derived Growth Factor-BB on Human Dental Pulp Stem Cells Mediated Dentin-Pulp Complex Regeneration.//Stem Cells Transl Med. 2017 Oct 24.