

Doctoral thesis abstract:

"Modern guidelines to dental pulp conservative treatment of deep caries lesions"

Author: *Alexandru Sitaru*

Advisors: *Prof. Alexandru Monea*
Prof. Sorin Popșor

Keywords: *dental pulp, pulp capping, deep caries, tertiary dentin*

The thesis is divided into a general part in which the current state of knowledge is presented and a special part of personal contribution, consisting of 3 clinical trials.

The general part contains four chapters, summarizing the information related to the structure and function of dental pulp, including its physiological and pathological aspects of microcirculation and structural changes. A special interest is given to the odontoblast, the representative cell of dentin pulp complex, due to its responsibilities in tooth development and in mature teeth subjected to various methods of conservative treatment. Dental pulp is a highly vascularized tissue with great potential for healing, that has to fulfill a number of important functions throughout life; therefore, maintaining its vitality is worth every effort from the practitioner.

The general part concludes with the structural pulp changes discussion represented by progressive processes, which are defense reactions manifested by qualitative and quantitative dentine changes biologically correlated with dental pulp and regressive processes, these degenerative lesions so frequent that express reduced pulp functional capacity with undesirable repercussions on the conservative treatment outcome.

The personal contribution is divided into three chapters, which include experimental, clinical and histological studies designed to fully cover the theme issue. The purpose of the thesis is to contribute, through undertaken research, in substantiating the theories about treatment of deep carious lesions.

The first chapter is entitled "**Experimental study of capping materials biocompatibility**" and its aim is the assessment of the biocompatibility degree of the materials used in the dental pulp treatment, represented by mineral trioxide aggregate (MTA), Life - cement with Ca(OH)₂ and Calxyd - paste with Ca(OH)₂, during direct pulp capping, by comparing the inflammatory response induced by subcutaneous and intramuscular implantation in laboratory rats. The biocompatibility of materials used in the pulp chamber opening treatment has been assessed in laboratory rats; we used a control group of 6 animals

and three working groups of 6 young animals. The severity of the inflammatory response was higher for all the materials studied, but the most severe reaction was observed with Calxyd, followed by MTA, Life and control group.

Tissue reactions observed with MTA and Life cement are comparable, which demonstrates that there are no significant differences between the degrees of biocompatibility of the two materials. Our results show that MTA has the potential to be used in the same clinical situation as Life cement, but although encouraging, these findings must be supported by clinical studies.

The thesis continues with the study entitled "**Success of therapy with different capping materials in deep decay**". The aim was to compare the results from treatment of direct pulp capping with MTA and Life cement by statistical analysis and probability calculation using Fisher test. We recorded any significant difference statistically related to patient age, tooth location, diagnosis, bleeding pulp pattern, the obtained cavity type, which had a value of "p" <0.05. Data analysis shows no significant correlation between capping method, patient age and tooth location. On the other hand, there are differences in the success of treatment depending on the type of pulp exposure and the kind of the prepared cavity.

Thesis ends with a "**Clinical and histological study of the results of indirect pulp capping with calcium hydroxide and Mineral Trioxide Aggregate**" a study in which we conducted a histological comparison of indirect pulp capping results using calcium hydroxide and MTA in simple deep caries, at 2-6 weeks intervals, based on morphological characteristics of tertiary dentin and the underlying pulp inflammation degree. Statistical analysis of the study groups was based on the One-Way ANOVA test of GraphPad® Prism statistical software that was used to determine if there was a difference between the study groups regarding the appearance of inflammation of the pulp (1-3 degree), dentin reaction (score 1-3) and tertiary dentin morphology (score 1-4) according with the used capping material, the statistical significance level was set at $p < 0.05$.

The results show statistically significant differences in terms of tertiary dentin deposition and its morphology, by the influence of the two used materials: Life cement and MTA. In terms of inflammation degree there was no differences between pulp reactions generated by the two materials. This latest study fills a gap in our country literature by studying the occurrence of tertiary dentin and the dental pulp neodentinogenetic capacity.

The final conclusions are the following:

- MTA has the potential to be used in the same clinical situations as Life cement.
- While the clinical results showed no statistically significant differences between treatments using MTA and products based on calcium hydroxide, the morphological study of tertiary dentin and the neodentinogenesis phenomenon showed significant differences of the influence of the two used materials (Life cement and MTA) in regard to the tertiary dentin deposits and its morphology.