Abstract of the phd thesis

The importance of isolation, imagistic investigation and of the file systems in endodontics

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Endodontic treatment is composed from three main stages.

The first is the diagnostic phase- when after a detailed anamnesis the doctor states the diagnosis and a differential diagnosis of the problematic tooth. A correct diagnose is essential and for it the use of complementary examinations are necessary- vitality tests and imagistic investigations. Digital intraoral radiographs offer two dimensional images of the teeth and the surrounding bone. The introduction of the computer tomography in dentistry offers the possibility to obtain three dimensional images of the evaluated structures. CBCT scanned images are useful not only to state a diagnosis, but further on in the treatment phase also.

In the second phase of the endodontic treatment, the dental pulp is removed and the root canal is cleaned and shaped using endodontic files. Before the beginning of the treatment, the absolute isolation of the tooth is necessary in order to guarantee a clean surgical field and to protect the patient and doctor from unwanted accidents or infection. In this phase during preparation of the root canals procedural accidents may appear. Once produced, the clinician should immediately recognize the accident using radiographs or cone beam computed tomography images. Only a proper recognition and intervention can maintain a good prognosis of the tooth. Many instruments and techniques are available for root canal shaping. The conventional stainless steel hand files lost field in front of the Ni-Ti rotary file systems, due their properties and the simplicity of the working technique. It is the doctors' responsibility to choose the adequate system according to the anatomy of the tooth.

The final stage consists of the three dimensional filling of the root canal system.

The present work aimed to evaluate the importance of three of the most important factors that influence the success of the endodontic treatment: isolation, the imagistic investigations and the used file systems during shaping.

The **general part** includes the description of the accidents which appear during the three main stages of the root canal treatment, the prevention and the treatment of the accidents as well.

The personal contribution part includes three experimental studies.

The **first study** is a questionnaire survey about the prevalence of rubber dam usage among dental practitioners and final year students in Târgu-Mures, Romania.

The **second study** is an in vitro study. On extracted human molars procedural accidents were induced and digital intraoral radiographs and CBCT images were performed. The aim of the study was to evaluate the value of digital intraoral periapical radiographs compared to cone beam computed tomography images used to diagnose some procedural accidents- perforations, blocked instruments and ledges- which appear during root canal therapy.

The **third study** is an vitro study as well, where plastic simulated curved root canal models were used. Three of the most used Ni-Ti rotary file systems were compared to stainless steel hand files. The cleaning efficiency and the produced apical transportation was evaluated during the study.

GENERAL CONCLUSIONS

1. There is a positive tendency in the use of the rubber dam, because among the specialists and young practitioners higher percentages were found than in the older category.

2. The low percentage of the rubber dam usage presents quality issues, safety and medico-legal concerns for both the patient and the dentist.
3. Greater emphasis should be placed on the advantages of rubber dam.
4. CBCT scans are the best imaging method for the identification of procedural accidents.
5. Nevertheless, the digital intraoral periapical radiographs-almost as specific as the CBCT scans- still remain the most frequently used investigations during endodontic therapy.
6. The HyFlex and ProTaper system showed better results in cleaning the root canals than the other rotary file system, the K3XF and the hand K-files.
7. The most useful system turned out to be the HyFlex rotary files by presenting the highest mean when analyzing the cleaning efficacy and the lowest when evaluating the value of apical transportation.
8. Hand files still remain a good alternaive when choosing a file system for cleaning and shaping.

Keywords: endodontic treatment, rubber dam, digital intraoral radiography, CBCT, Ni-Ti rotary file systems, apical transportation