

Chemical Processes in Endodontic Failure Due to Incidents and Accidents

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The fundamental principle that must guide the activity of each dentist is the conservative, hence the task of preserving, as much as possible, the teeth in the arches, knowing what important injury brings extractions to the individual. An essential concern of endodontic therapy is the thorny problem of infected canals. At present, it is essential for any practitioner to recognize the relationship between microbial oral and pulpal and periapical tissue, the notions of endodontic microbiology being the key to understanding the basic methods of debriding, modeling and obstructing canals. Among the pathological conditions that overrun the clinical picture of pulp sickness, not only at the local and general level, the simple or complicated pulp gangrene has a well-established role. The endodontic treatment has three basic stages: diagnosis, preparation of the channel that follows the debridement, its modeling and sterilization, and the root filling. The rationale behind the treatment of this disease is that the devital pulp does not have defense mechanisms, the endocannicular microbial flora finding under these conditions a favorable environment of development. Regardless of the degree of expertise, the accumulated experience, the responsibility and the correctness of medical care, certainly no dental practitioner has been circumvented by failures in endodontic therapy. The relatively high percentage of failures has led to countless attempts to improve the tools and materials made available to the dentist. Currently, he faces a new problem, that of choosing the most correct method of endodontic treatment. Material and Method: The structure of the study material was 240 cases taken into account, from 2012-2017. Results and Discussion: Because endodontic therapy requires very precise working techniques, it implies rigorous records, both in terms of the sequence of treatment phases, but also in relation to some technical aspects - such as - data on root canals, the chronology of the radiological examinations, the instruments and the substances used - the neglect of the correct records resulting in unnecessary time losses and traumatisations of the periodontal-apical area. Conclusions: Starting from the assumption that the radiological examination is the only objective way of initial assessment of dental morphology, the certification of the existing pathology and the establishment of a diagnosis, the orientation of the treatment plan and the verification of the correctness of the therapeutic variant chosen through a monitoring of the results over time, we sought to clarify the actual role and the actual value of the radiological examination in endodontic therapy.

Key words: endodontics, oral microbial flora, devital pulp, correct method of treatment.

The literature is abundant in articles that introduce or evaluate new techniques, tools and materials. Conclusions are often contradictory and make the specialist frustrated with failures and facing new dilemmas[1-3]. We consider that a critical reassessment of one's own attitude in endodontic treatment would be more useful, instead of abandoning a routine technique and replacing it with a new, inadequately tested method[4-6]. A large number of endodontic treatments cause a post-operative discomfort (pain, functional impotence and even edema) an obvious sign of a hyperemic apical periodontity, which fortunately has almost always benign prognosis. Analyzing the causes of the failures due to the incidents and accidents occurring during the treatments, we found that the vast majority of them are the particular root and canal morphology, the harmfulness of the substances used in endodontics and the incorrect surgical technique[7-9]. A relatively large

number of seemingly correct and successful root fillings will prove to be unsuccessful in determining chronic apical periodontides, intended for surgical interventions that help endodontic therapy[10-12]. The number and disposition of the main root canals that are always researched are known - their caliber and shape usually permitting their identification, permeability, enlargement and obturation[13-15].

The most difficult problem in endodontics is the knowledge of the aberrant channel morphology - unfortunately, the practitioners pay no attention or even ignore it. The qualities of the substances used in endodontics are generally well known: antimicrobial, lytic and detoxifying action, diffusion capacity, tolerability.

Most of the substances used in endodontics have an irritant effect on apical and marginal periodontal tissues: *antiseptics* have a detrimental effect on cellular and

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vascular elements as well as on the basic substance, irrespective of their mode of action (coagulating, oxidizing, precipitating or astringent) and the form under which they are used (gases, solutions, pastes); histological researches have proven the harmfulness of drastic antiseptics to periodontal tissues: by diminishing or even annihilating the biological capacity of tissue and humoral elements - healing is delayed - thus favoring the evolution towards acute inflammation; *antibiotics* have a very good antimicrobial action, good diffusion and good tolerability in periodontal tissues but, unfortunately, their applications are limited due to the risks of sensitiveness and development of the resistance towards microorganisms, plus the questionable utility in chronic processes and especially the diminishing of the immune response; *corticoids* also have a series of incapacitates that consist mainly in decreasing body defense processes: inhibiting the occurrence of antibodies and reducing the connective dam, to which we can add the inhibitory effect on mineralization (the Sinkford effect)[16-18].

In the literature, too little attention is paid to iatrogenics during endodontic treatments that cause the apical paradont injury and forgets that maintaining its integrity is the essential purpose. There were numerous statistics on accidents during endodontic therapy. These are obvious and therefore easy to diagnose and the remedy is conservative or surgical. But we find it interesting to assess the importance of mistakes that usually go unnoticed during treatments and which will cause their failure[19]. These are elementary mistakes in channel preparation, irrigation with antiseptic solution and final obturation. We are convinced that they cause a large part of past failures in the category of unexplained, inevitable and therefore excusable failures.

Experimental part

Material and method

The structure of the study material was 240 cases taken into account, from 2012-2017, in the Dental Clinic of which endodontic success had 166 cases, 69.16%, and endodontic failure 74 cases - 30.84% (fig. 1).

The structure of the study material in relation to the sex of the patients is as follows: men -120 cases 50%; women 120 cases 50%. The structure of the study material in relation to the age of the patients has: - up to 20 years - 18 cases - 7.5% ; 21-30 years - 60 cases - 25% ; 31-40 years - 60 cases - 25% ; 41-50 years - 54 cases - 22.5% ; 51-60 years - 32 cases - 13.3% ; >60 years - 16 cases - 6.7% (fig. 2).

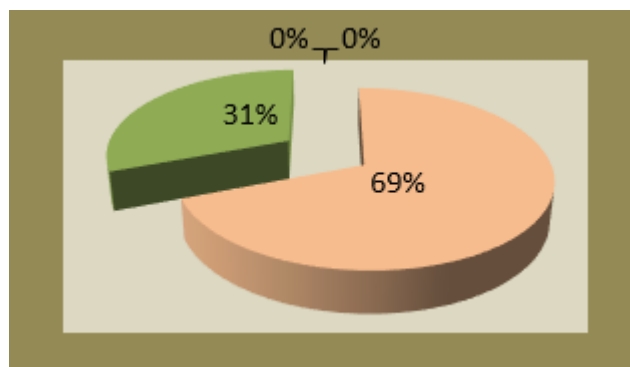


Fig. 1.Reparation of the cases studied according to the treatment resultFrom the point of view of the topography of the cases we have: - maxillary: incisors and canines - 60 cases; premolars and molars - 60 cases - mandible - incisors and canines - 60 cases; premolars and lolar 60 cases.

years - 32 cases 13.3% ; over 60 years - 16 cases -6.7% (fig. 2).

Special attention should be paid to chemical substances with necrotising action: the chemotoxic effect depends of course on the chemical nature of the substance, its concentration and duration, its presentation form (liquid,

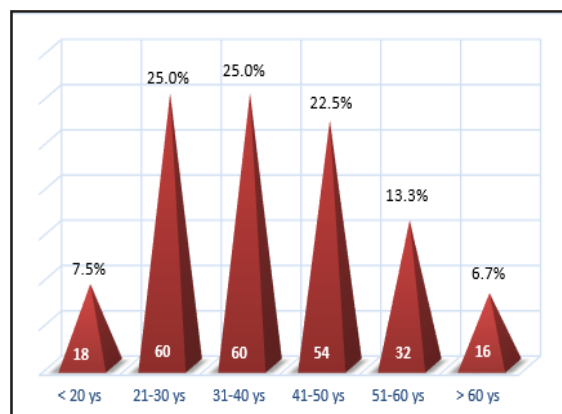


Fig.2. Structure of the study material in relation to the age of the patients

powder, paste, fibers, granules), but it is obvious that most of the chemotoxic incidents and incidents are of a iatrogenic nature on a ground that offers favorable conditions. In connection with the change of the dental crown colour, we mention that this incident is exceptionally the cause of the action (this is due, in fact, to dentinal impregnation with blood pigment decomposition products as a result of remaining in the pulp chamber after extirpation or after necrosis).

Results and discussions

Regarding the harmfulness of substances used in endodontics, we can say that the occurrence of incidents and a cognition is due to insufficient knowledge of the favored field, the inaccuracy of diagnosis and therapeutic indication, the use of chemicals without their knowledge of the composition and the effects on the biological structures, last, but not least the incorrect working technique. The results regarding the forms and the proportion of incidents and accidents occurring during endodontic therapy they found: Mechanical - 52 cases - 70.27% of which we have: false paths and perforations - 4 cases -5.40%; breaks of instruments in channels - 28 cases - 37.83%; traumatic apical periodontitis - 12 cases - 16.21%, traumatic marginal periodontitis 4 cases - 5.40%

Chimio-toxic - 16 cases 21.62% of which we have: chemotoxic apical periodontitis -2 cases -2.70%; marginal chemotoxic periodontitis - 4 cases -5.41%; crown colour change - 10 cases - 13.51%

Other incidents and accidents - 3 cases - 4.05%; residual pulpitis - 3 cases - 4.05%. Results on the distribution of incidents and accidents in relation to the topography of cases:

Mechanical - (most of all the needle breaks in the channels, followed by the chemo-toxic ones): false paths and perforations - *maxilar* - 6 lateral teeth; *jaw*-2 lateral teeth, tear of instruments in maxillary-16-teeth lateral teeth; *mandible* - 4 front teeth and 8 lateral teeth; traumatic-maxillary apical periodontitis - 8 frontal teeth and 2 lateral teeth; mandible - 2 lateral teeth, traumatic marginal periodontitis - maxillary - 4 lateral teeth,

Chemotoxic: chemotoxic apical periodontitis - maxillary - 2 front teeth, chemotoxic marginal periodontitis -

maxillary - lateral; mandible -2 frontal teeth, change of crown-maxillary colour - 4 front teeth, 2 lateral teeth; mandible - 2 front teeth and 2 lateral teeth;
Other incidents and accidents: - residual pulpitis - maxillary - 4 lateral teeth; jaw -2 lateral teeth.

Thus: maxillary 50 teeth - 68% mandibles - 24 teeth - 32%, frontal - 22 teeth - 30%, lateral 52 teeth - 70%.

a) *Mechanic*

- false paths and perforations (8) - women - 6 cases; men -2 cases

- tool breaking in channels (28) - women-20 cases; men - 8 cases

- traumatic apical periodontitis (12) - women - 4 cases; men - 8 cases

- traumatic marginal periodontitis (4) - women - 4 cases

b) *Chemotoxic*

- chemotoxic apical periodontitis (2) - males - 2 cases

- chemotoxic marginal periodontitis (4) - women - colour change of the crown (10) - women - 8 cases; males -2 cases

c) *Other incidents and accidents* - residual pulpitis (6) - women -6 cases Total 74 incidents and accidents of which women 44-70% and men 30-30%.

The selection of the study material was difficult - the constitution of equal lots (maxillary teeth / mandibular teeth, frontal teeth / lateral teeth, female teeth / male teeth) - implying the need to perform comparative analyzes, except for the age criterion, of the objective reasons, this was not possible.

The assessment of the results based on the clinical criteria is dependent on many topography parameters and the duration of the treatment of the treated cases, gender, age, sensitivity threshold and patient reactivity, observer's ability to discern - what can lead to errors of interpretation. Radiological criteria is considered mandatory in the assessment of therapeutic results, although radiological diagnosis is difficult: in radiological investigations there are always differences of interpretation due to angulation changes and exposure time from one exam to another, not to mention the quality of the radiographic image-dependent on the contrast and intensity obtained by developing; to avoid misinterpretation, therefore, an impeccable technical execution is necessary; however, the majority of authors give the radiographic criteria an absolute value, considering it strictly objective.

We believe that the analysis of the results through the interaction of the two criteria is much more objective than the separate assessments (clinical and radiological) - the claim being strongly supported by the inconsistency between the results, clinical and radiological, in some cases. Although it is widely accepted that favorable endodontic treatment results can not be 100% we consider that in our case the immediate endodontic failure due to incidents and accidents was unexpectedly high.

Without the intention of a personal discourse, we consider that the possible explanations of this result are unsatisfactory - the very rigorous selection of the cases and the relative experience of the operator.

The study revealed that the incidents and accidents were more numerous: maxillary teeth compared to the jawbone; to the lateral teeth in relation to the frontal teeth, to the teeth of women to those of the men; in the teeth of the elderly versus young teeth.

a) We view the higher incidence and incidence of incidents and accidents in the maxillary teeth compared to the mandibular as due to the more complicated root

morphology and canal and the more difficult approach of the first

b) The same explanation is also valid for the greater number of incidents and accidents in the lateral teeth in relation to the fronts.

c) The fact that incidents and accidents were more numerous in women's teeth than in men's teeth could be explained through more difficult access to root canals due to lower crown morphology, reduced canal size, difficult approach - especially in lateral teeth.

d) Although there are objective causes that could justify the greater number of incidents and accidents occurring in the elderly - such as reduction of channel permeability, diminishing reactivity, interpretation would lead to errors - because the batches by age groups were not equal.

We can assert that the high volume of therapeutic demands and the unfavorable conditions offered by root and canal morphology favor the occurrence of incidents and accidents.

Incorrect surgical technique where surgical technique mistakes are the most common cause of endodontic failure: the difficult approach of the work field, the intensely aggressive action of the instrument, and the lucrative character of endodontic therapy (the most frequent mistakes: mistaking the patient's position or the modification of the head position during endodontic maneuvers, the beginning of the treatment without the elementary data on the endodontic space - thus in the absence of the radiographic examination, the incorrect opening of the pulp chamber - considered the main cause of mechanical incidents and accidents, nor the opening the camera will not perform properly unless the projections of the root canal holes are known, the root canal holes are detected with rough movements, the root canal permeability is examined with inadequate or electrically operated instruments, is inadequate endodontic instrumentation as a size or worn out, lack of prophylactic measures for the slip of the needles, the making of untimely movements, incomplete removal of a vital pulp, lack of caution in the exploration of vitality by certain methods or during electrocautery of gingival proliferation; incorrect instrumentation - which can cause accidental damage to the apical periodontium, both in the ligament fibrous tissue and in the bone; the main cause of this accident is the lack of knowledge of the true length of the root canals and the instrumentation without the determination of the working length; mistakes in performing the radicular obliteration: the root filling made without cones favors the occurrence of accidents at eventual deforestation; subtraction is considered to be the main cause of failure - not only by anatomical conditions but, very often, through technical mistakes - exudative infiltration always occurs in root blanks, producing a series of irritating phenomena that lead to a state of permanent inhibition in the apical periodontium; supercoiling - which is not always avoidable - usually produces a reaction from the apical periodontium; this manifestation of response to mechanical-chemical aggression produced by superobstruction can cause tissue reactions and cellular infiltrations of resorbive nature, other technical mistakes directly refer to incidents and chemical-toxic incidents: incorrect hemostasis, blood clots in the pulp chamber, dosing errors or long-term maintenance of chemical substances (especially those that are not necrotic), neglecting in making provisional coating fillings.

We noticed that, many of the incidents and accidents occurring during endodontic therapy are related to some organizational circumstances - such as - planning of

insufficient working time, non-observance of the succession of the treatment phases, incorrect records - each of them contributing in one way or another to an incorrect surgical technique.

Occasionally unexpected events that prolong working time often occur in endodontics, it is good to have enough time or resume treatment in another session - to avoid producing, hurriedly, incidents and unpleasant injuries. Since endodontic therapy requires very precise working techniques, it implies rigorous records, both in the sequence of treatment phases, but also in some technical aspects - such as data related to root canals, working length, execution timeline radiological examinations, instrumentation and substances used - neglecting the correct records resulting in unnecessary time losses and traumatizations of the periodontal-apical area. Investigation of the degree of endodontic success or failure is done by comparative analysis of the various variables. Because the appearance of pain sensation in any region of the body is an alarming factor as the individual pays more attention to the region (patients being asked to follow this symptom) - we appreciate that if the patients were not warned and asked to follow the painful reaction, the frequency would be much lower.

Conclusions

Radicular obturation is the result of the whole treatment, and its incorrectness may be the expression of an earlier stage of miscarriage or neglect throughout the endodontic therapy.

The prophylactic and responsible attitude of each stage in the course of endodontic therapy will certainly cause a marked decrease in the failures that cause the injury apical periodontium, with well-known consequences. The assessment of the results based on the clinical criteria is dependent on many topography parameters and duration of the treatment of treated cases, gender, age, sensitivity threshold and patient reactivity, observer's ability to discern - which can lead to interpretation errors.

Endodontic failure can have numerous causes, among them, the incidents and accidents that may occur during endodontic therapy with a significant value.

Therefore, the theoretical knowledge of all forms of incidents and accidents, their prophylaxis and their treatment is of a particular importance in avoiding endodontic failure. The most important cause of endodontic failure is the reinfection of the root canals with bacteria from the oral cavity due to one of the reasons.

The prophylaxis of endodontic failures due to incidents and accidents is the exact, individualized knowledge of radiculo-canal morphology, the adaptation of therapeutic actions to the particularities of the treated endo-canal system, the correctness of the diagnosis and the therapeutic indication, as well as an irreproachable surgical technique.

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