ENDODONTIC TREATMENT: FACTORS RELATED TO POSTOPERATIVE PAIN AND THE SUCCESS OF THERAPY

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ABSTRACT

The success of endodontic treatment is directly related to the infection control also depends on the instrumentation technique, the quality of their preparation, defined in degrees after the intervention in the root canal for treatment. Postoperative pain is characterized by pain manifestation of any degree and can occur soon after the beginning of root canal treatment, it is a condition that causes discomfort and pain due to infectious condition had as common in endodontic treatment, however, post-surgical pain does not influence the long-term success when the cause is diagnosed and opposed to time. In this sense, this study aims to verify the occurrence of postoperative pain in patients with endodontic treatments carried out in single or multiple session as well as to know the possible causes of postoperative pain and identify possible means to ensure the success of therapy endodontic. The success of this treatment depends on the fulfillment procedures following scientific, mechanical and biological principles, which are directly related to the successes and failures of endodontic treatment. Therefore, the procedures before and during endodontic treatment will provide a faster recovery of the patient, reducing infection rates and consequently the postoperative pain framework, contributing to the success of the intervention performed.

KEYWORDS: Endodontic treatment, postoperative pain, procedures, success.

1. INTRODUCTION

The endodontic treatment should be construed as a factor that can cause inflammatory reactions and thus causing postoperative pain. Regarding the treatment in a single session, even in the absence of microorganisms, resistance in vital pulp has a higher possibility of severe postoperative pain. In this perspective, a proper conduct of the preparation from the beginning, contributes to small trauma incidence, which leads to an inflammatory occurrence of low intensity¹.

However, if the preparation is more traumatic, inflammatory greater possibilities occur, as well as the increase in painful symptomatology. Nevertheless, it should be noted that the post-operative pain has been conceptualized as a pain of any degree, whose manifestation occurs so start root canal treatment in as endodontic flare-up has been described as the continuation of pain and or swelling after endodontic treatment which ends up interfering with the patient's daily life, it feels obliged to return to the dentist's office in search of a new intervention to contain the pain that bothers you¹.

Thus, the success of endodontic treatment is directly related to the control of infection, which in turn causes the pain. But there are other factors that can have a negative influence, as the instrumentation technique and the quality of interventions at all stages after the intervention in the root canal for treatment.

The literature reports that the most common problems that can lead to endodontic failure, can have multiple etiologies, with reports Luvisotto $(2007)^2$; the lack of aseptic control during treatment, improper access to the pulp cavity, undetected channels, fault instrumentation, inadequate and unsatisfactory fillings or missing coronal restoration after the endodontic treatment.

About this, Henriques *et al.* $(2011)^3$ explains that the etiology of endodontic failures have higher incidence in cases of persistence or reintroduction of microorganisms in the root canal system because of an irregular mechanical-chemical preparation, which thus breaks with the aseptic chain, in cases of extra root infections that microorganisms runs through the body's defenses and can remain alive in the periradicular space and accidents or iatrogenic caused by the professional during the treatment at an early stage.

Nonetheless, what are the procedures to identify the possible causes of postoperative pain in patients under-

going endodontic treatment in single or multiple session? What is the most appropriate procedure to avoid postoperative pain in patients who carried out ram endodontic treatments in both situations?

This study is justified by the importance of knowing the causes of postoperative pain, and these are related to the number of treatment sessions, allowing the adoption of targeted procedures aiming to reduce the incidence of postoperative pain in patients who underwent root canal treatments in a single session or multiple.

Thus, this study aims to verify the occurrence of postoperative pain in patients with endodontic treatments carried out in single or multiple session as well as to know the possible causes of postoperative pain in patients undergoing endodontic treatments and identify possible means to ensure the success of endodontic therapy.

2. MATERIAL AND METHODS

To carry out this study we chose the proposal of Ganong (1987)⁴, according to the following steps: 1) identification of the research question, followed by a search of the descriptors or keywords; 2) determining the criteria for inclusion or exclusion of research in online databases; 3) categorization of studies, summarizing and organizing relevant information; 4) assessment of studies for critical analysis of the extracted data; 5) discussion and interpretation of the examination results, contextualizing theoretical knowledge and evaluating their applicability as; 6) presentation of the integrative review and synthesis of knowledge of each article reviewed briefly and systematic way.

In the present study the guiding question of the integrative review was: verify the occurrence of postoperative pain in patients with endodontic treatments carried out in single or multiple session as well as to know the possible causes of postoperative pain in patients undergoing endodontic treatments and identify possible means to ensure the success of endodontic therapy.

Bases (Latin American and Caribbean Literature on Health Sciences) LILACS, SciELO (Scientific Electronic Library on Line) and PubMed (- NCBI US National Library of Medicine National Center for Biotechnology Information) were consulted. Studies that have addressed the thematic, published from 2000 to 2015, regardless of the languages of publication were included. The following controlled for the search and also used as keywords descriptors were used: Endodontic treatment, postoperative pain, procedures, success.

3. LITERATURE REVIEW

Endodontic treatment

Endodontic treatment, as explained Waskievicz *et al.* $(2013)^5$, is to restore normalcy to the periapical tissues in abnormal state, minimizes the concentration of microor-

ganisms present on site that are causing infection, pulp necrosis and pain. In this way of intervention, the incidence of post-operative pain, after treatment, almost always as a result of acute inflammation response of periradicular tissue, and can take a few hours or days after endodontic treatment. Watanabe (2012)⁶ notes that the endodontic treatment usually consists of a combination of a chemical-mechanical working, at which the root canal space undergoes preparation for the introduction of a biocompatible material to seal the channel along its length. By this action, the microorganisms and organic matter rather than proliferate are removed by favoring the health of periradicular tissue. Following this line of reasoning, Petrini (2010)7, points out that the endodontic treatment is designed as a basic procedure in dentistry that can cause postoperative pain, regardless of the degree she started, or conceptualized flare-up as the moment the commencement or continuation of pain and/ or swelling after endodontic treatment. The occurrence of postoperative pain is usually caused by acute inflammation, such as periradicular tissue response, beginning shortly after the endodontic procedure. It is noted that the endodontic treatment is a common intervention in dentistry that may lead to postoperative pain, regardless of the number of sessions. However, the prevalence of postoperative pain or flare-up are important factors when deciding the clinical procedure to be used, which requires attention and care.

Based on several studies, Luckmann *et al.* $(2013)^7$ reported that the process of a proper root canal treatment requires at least the following: the correct handling of cases the method of treatment and filling, the expertise of the operator, the technical difficulties of the case, the resources of time of treatment, the complete knowledge of dental anatomy, obtaining quality radiographs for the study, the presence of calcifications and the slopes of the teeth in relation to the arcade, determining the length of work, disinfection between sessions and radiological quality control shutter. All these procedures should be done with caution, considering each case.

Pain incidence in endodontic treatment

The incidence of pain in endodontic treatment, has been a topic of discussion ever since there professionals who believe that the success and decreased pain, endodontic treatment, is the result of a single query for treatment. However, many professionals believe that when endodontic procedures are performed in multiple sessions, ensure proper cleaning of the root canal system, prioritizing the shutter, allowing enough time to have a thorough cleaning of the root canal system. The pathogenesis of complications, endodontic post-treatment indicate that the causes of flare-up include mechanical factors, chemical and microbial or affecting the periapical tissues¹.

Pinheiro et al. (2003)⁸ conducted a study with 60 teeth that had persistent apical periodontitis after endodontic treatment to evaluate the microbiota present. It was found microorganisms on teeth 51 and only one or two species per channel. The isolated microorganisms 57.4% and 83.3% anaerobic facultative were Gram-positive. The most commonly found species was Enterococcus faecalis. However, in teeth with clinical symptoms, it was noticed polymicrobial infections and strict anaerobes. It is noteworthy that the emergence of post-operative pain is often associated with acute inflammation as a response of the periradicular tissues. The research aimed to evaluate postoperative pain after endodontic treatment in dental school in Sudan. Where were selected 234 patients aged 18-62 years. Endodontic treatment was performed by undergraduate students in single and multiple sessions. The postoperative pain was reported by each patient using scale in two time intervals, 12 hours and 24 hours. It was found that there was no significant difference in postoperative pain between one visit and multi-session⁶.

Waskievicz $(2013)^4$ studied the severity of post-filling pain in adolescents undergoing endodontic treatment on one or both visits. They evaluated 121 patients aged from eleven to eighteen who had molars with pulp necrosis and were distributed between the two groups at random. For observation, all dental elements were prepared using a pre-cervical enlargement and a standard technique in instrumentation entire length of the root canal. In this study, postoperative pain was assessed on a visual analogue scale of 0-5. In the results it was observed that the rate of pain was 10.5% (6 of 57 cases) group in a single visit, and 23% (14 of 61 cases) in two visits group. It was found that there was no significant difference between groups. During the observations it was established that the intensity of pain was similar in both cases, particularly as the flare-ups, with a prevalence of 1.75% in single-visit group and 1.67% in the two group visits. It was concluded that the post-dental filling pain was more frequent in the group submitted to two sessions, but without significant differences.

The study conduced by Petrini $(2010)^6$ aimed to compare the incidence of flare-up after filling of root canals procedures performed in single or multiple session in the one year period and establish the relationship between pre- and post-operative pain, setting the decrease in pain at intervals of 1, 7 and 30 days after root canal filling. To this end, there was existing clinical factors before, during and after the complete endodontic treatment of each tooth, including teeth with pulp vitality, presence or absence of preoperative pain, postoperative flare-up, and decreased pain postoperative. In patients requiring endodontic treatment in more than one tooth, the service had four weeks between each tooth. The pulp vitality was determined by combined electrical test with the presence of bleeding pulp. Revisions attendances after root canal filling given in 1, 7 and 30 days. To give more authenticity to the study, effected up interviews with patients to determine whether or not painful symptoms between visits and when there was; how was the decrease in the range of queries. Pain was recorded as follows: no pain, negligible or moderate / severe. The flare-up endodontic been reported when patients have uncontrolled pain requiring medication and / or volume. Therefore, it treated endodontically 283 teeth in 255 patients; of these 56 were excluded for not attending the revaluation, 10 flare-up occurred in 21 multi-session and 19 in a single session. Of the 107 teeth that had the full treatment in one session, 67 had preoperative pain and 50 reported postoperative pain. Of the 40 teeth that had no preoperative pain, 8 had postoperative pain. In multi-session, 88 teeth presented with preoperative pain and 55 with postoperative pain. Of the 48 teeth that had no preoperative pain, only 6 had postoperative pain. Teeth with vitality had less postoperative pain than non-vital (not statistically significant). The single session of patients index showed that postoperative pain negligible on the 1st and 7th days were respectively 35.5% and 16.3%. In multiple session was 30.2% and 9.8%. Patients who had moderate / severe pain on the 7th day was higher in multi-session than in single session. On the 30th day there was no postoperative pain. It found a higher incidence of postoperative pain and flare-up after endodontic treatment in one query. However, the single session has been a more effective alternative to the multi-session, especially in communities where patients are often lacking after the first visit to attenuate the pain.

In this regard, Watanabe $(2012)^5$ noted the clinical causes of failure and limitation of previous endodontic treatment by an inspection of the root apex and root surface dry with magnification of 26 times using a surgical microscope during endodontic microsurgery. Data were collected from patients between March 2001 to January 2011. Among the 493 teeth included in this study, we obtained the following results: infiltration by filling material (30.4%); channels not found and not treated (19.7%); insufficient dental fillings (14.2%); over-dental fillings (3.0%), anatomical complexity (8.7%), iatrogenic problems (2.8%); Apical calculations (1.8%) and cracks (1.2%). It is suggested that the clinical use of the microscope can make a more favorable prognosis.

4. DISCUSSION

Studies report that many factors influence the implementation and success of Endodontic treatment, among them, there is the perfect sterilization and disinfection of instruments and equipment to be used in the treatment, as if the residue remains in the files will be contamination leads producers to patient, which will cause failure in endodontic treatment¹⁰.

In this view, the success rates and failure for root canal treatments, is a topic discussed and researched over the years, and today, with data collected at different times suffer a 53% increase to 95%, and research conducted in recent years indicate values close between 90% and 95%, due to the use of a modern, scientifically grounded best therapy that is constantly evolving. When performed endodontic retreatment the success rate approaches 80% thus becomes an effective alternative for cases of endodontic failure¹¹.

According to research conducted by Luckmann et al. (2013)⁷, endodontic treatment aims to maintain the dental element in function of the stomatognathic system, in which one of the main focuses is to keep special care to preserve the health of the patient. The success of this treatment depends on the fulfillment procedures following scientific, mechanical and biological principles, which are directly related to the successes and failures of endodontic treatment. The same researchers admit that the combination of the essential factors in endodontic success can be summarized in: clinical silence (absence of pain, swelling, fistula), average periapical bone structure (uniformity of lamina dura, regular periodontal space, absence or reduction of bone thinning, absence or interruption of root resorption), tooth in function and presence of coronary perfect sealing. Alert also to achieve a better result in teeth that are vital when compared to treatment with teeth that have had a necrotic pulp.

Other studies reported the successful endodontic treatment depends on the canal preparation, which comprises an intervention that could generate a tissue injury, and may thereby produce a postoperative framework sometimes with inflammation in tissues periradicular^{3,5,12,13}. It is important to emphasize that to get success rate in treatment of root canals of teeth with apical periodontitis, it is necessary to consider such factors as: the neutralization and removal of necrotic-toxic contents of the root canal system, a suitable mechanical preparation, employment a dressing used and the sealing of root canals by dental filling¹⁴.

The study conducted by Henriques *et al.* $(2011)^3$, states that the success of an endodontic treatment is associated with the achievement of several factors, which begins with the selection and diagnosis of the case to be treated, including their therapy and prognosis, passing by careful execution of chemical mechanical preparation technique considering the complex morphology of the root canal system, three-dimensional shutter, as well as the maintenance of aseptic chain, among other operative steps by clinical monitoring and periodic patient over time of treatment. It is noteworthy that even with all the evolution of technology have endodontics, there are still many cases of failure related to microbiology, morphol-

ogy and technique used in endodontic treatment routine. In cases of failure of this type of treatment, the most suitable and used alternative is the endodontic retreatment.

Given these findings, recapitulate Strela (2004)¹⁴, writing that the American Association of Endodontics (1994) classifies the case as endodontic success based on the following criteria: a) Clinical: absence of periodontal disease or dental endodontics related to mobility; absence of fistula; absence of symptoms to percussion or palpation; tooth function; no edema or signs of infection; absence of other symptoms previously described by the patient. b) Radiographic: normal periodontal ligament space or lesser thickness than 1 mm; absence of pre-existing bone thinning; Normal hard blade in relation to the adjacent teeth; absence of resorption compared to the original x-ray; three-dimensional filling space channel, within the limits of its space to approximately 1 mm short of the radiographic apex.

According this line of reasoning, Henriques et al. (2011)³, mentions the European Society of Endodontics, which in 1994 listed out some essential clinical criteria for endodontic success, such as the absence of pain, infection, swelling, symptoms on palpation and percussion, fistula, periodontal disease associated with endodontium, tooth function in the arcade, the absence of subjective symptoms reported by the patient and X-ray as a space of normal periodontal ligament or insignificant thickness (less than 1 mm), elimination of a previous thinning periradicular, regular hard blade in relation to the adjacent bone, absence of resorption compared to the original three-dimensional X-ray and shutter the visible channel space within the limits of its space to approximately 0.5 mm short of the root apex are suggestive of success when considering a proservation period of approximately two years . Therefore, more important than the number of sessions, is how the professional proceeds to perform endodontic therapy, because success depends on the professional awareness, proper hygiene, disinfection and preparation of the channels, it is of decisive actions to percentage of successful therapy.

5. CONCLUSION

The positive result depends on the level of knowledge of pulp anatomy, obtaining good quality radiographs to study anatomical abnormalities or inclination of the dental element with the use of appropriate instruments as essential conditions to prevent operative accidents and achieve positive rates of procedures. The care before and during endodontic treatment will provide a faster recovery of the patient, reducing infection rates and consequently the postoperative pain framework, essential factors for successful treatment.

REFERÊNCIAS

- [01] Rigo L, Petrini I, Lodi L. Dor pós-operatória em tratamento endodôntico realizado em sessão única e múltipla. Rev. Int J Dent, Recife, 2012; 11(1):29-37, IJD ISSN:1806-146X 2, jan/mar.
- [02] Luvisotto AFR. Sugestão de um protocolo para retratamentos endodônticos. Monografia apresentada à Faculdade de Odontologia de Piracicaba, da Universidade Estadual de Campinas, SP: [s.n.], 2007.
- [03] Henriques LCF, Castro AC, Diniz V, Cardoso F P, Tavares W LF, Rosa CCS. Arq. Odontol., Belo Horizonte. 2011; 47(supl. 2).
- [04] Ganong LH. Integrative reviews of nursing research. Res Nurs Health, 1987; 10(1):1-11.
- [05] Waskievicz AL, Baldissarelli F, Vanni JR, Hartmann MSM, Fornari VJ. Avaliação da dor pós-operatória em dentes tratados endodonticamente em uma ou multiplas sessões. Curso de Especialização em Endodontia da Faculdade Meridional/IMED – CEOM, Passo Fundo – Rio Grande do Sul. 2013.
- [06] Watanabe VM. Índices de sucesso do retratamento endodôntico: uma revisão de literatura. Monografia apresentada à Faculdade de Odontologia de Piracicaba, da Universidade Estadual de Campinas, como requisito para obtenção do Título de Especialista em Endodontia. Piracicaba. 2012.
- [07] Petrini I. Dor pós-operatória em tratamento endodôntico realizado em sessão única. Monografia apresentada à unidade de Pósgraduação da Faculdade Ingá – UNINGÁ – Passo Fundo-RS. 2010.
- [08] Luckmann G, Dorneles LC, Grando CP. Etiologia dos insucessos dos tratamentos endodônticos. Vivências: Revista Eletrônica de Extensão da URI ISSN 1809-1636 Vivências. 2013; 9(16):133-139.
- [09] Pinheiro ET, Gomes BPFA, Ferraz CCR, Sousa ELR, Teixeira FB, Souza-Filho FJ. Microorganisms from canais of root-filled teeth with periapical lesions. Endodontic Department, Piracicaba Dental School, State University of Campinas, UNICAMP, Piracicaba, SP, Brazil. International Endodontic Journal. 2003; 36: 111.
- [10] Guadagnin V, Bruschi LS, Carla Thais Rosada Peruchi C TR, Arruda MEBF, Duque TM. Avaliação microbiológica da eficácia dos métodos de limpeza de limas endodônticas: revisão de literatura. Brazilian Journal of Surgery and Clinical Research – BJSCR. Aceito para publicação em 22/08/2015.
- [11] Henriques LCF, Castro AC, Diniz V, Cardoso FP, Tavares WLF, Rosa CCS. Arq. Odontol., Belo Horizonte. 2011; 47(supl. 2).
- [12] Chagas L, Lopes MG, Gurgel Filho ED, Coutinho Filho T. Tratamento endodontico em sessão única. Revista Gaucha de Odontologia, Porto Alegre. 2000; 48(3):137-140.
- [13] Soares JÁ, Cesar CAS. Avaliação clinica e radiográfica do tratamento endodontico em sessão única de dentes com lesões periapicais crônicas. Pesquisa Odontologica Brasileira/ Brazilian Oral Research, São Paulo. 2001; 15(2):138-144.
- [14] Nery MJ, et al. Estudo longitudinal do sucesso clínico-radiográfico de dentes tratados com medicação intra-

canal de hidróxido de cálcio.Rev. odontol. UNESP, Araraquara. 2012; 41(6):396-401.

[15] Estrela C. Ciência Endodôntica. Artes Médicas. São Paulo. 2004; 2.