Clinical and radiographical evaluation of an paste of calcium hydroxide - iodoform in the treatment of chronic periodontitis

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Abstract

Because endodontic pathology is caused due to bacterial contamination of the root canal system, endodontic treatment should focus on eliminating microorganisms in root canals. Germs removal from endodontic system is achieved both by instrumentation, accompanied by the use of endodontic irrigants and in precise situations, by interposing intracanallary medication. The chemical's antiseptic properties of iodoform were first discovered in 1880, which made it medically quite important. Calcium hydroxide is an antiseptic due to OH ions which can diffuse into dentinal tubules in both the infected and the periodontal space, directly acting on microorganisms.

The objective of this study was to evaluate the clinical and radiographic action of a calcium hydroxide-iodoform paste in chronic apical periodontitis.

Keywords: endodontic treatment, calcium hydroxide-iodoform paste, chronic apical periodontitis.

INTRODUCTION

Iodoform is a yellow hexagonal crystals of characteristic color and flavor, unpleasant and persistent, very poorly soluble in water, used in medicine as antiseptic, anesthetic, scarring, etc. [1]. The iodoform resulting from complexation of iodine with a non-ionic surfactant has antiseptic and disinfectant action (by iodine) and cleansing (by detergent). The effect is maintained in the presence of biological products.

Iodoform is primarily used to treat minor skin conditions due to its antiseptic properties. It is also used in various human and animal disinfectant products, and in polarizing films for liquid crystal display (LCD) chemicals.

Iodoform, which is a yellow solid organic halogen compound, was first discovered in 1822. Also known as triiodomethane, iodoform is manufactured by electrolysis of an aqueous solution that contains sodium carbonate, acetone and inorganic iodides. The chemical's antiseptic properties were first discovered in 1880, which made it medically quite important. However, in more modern times, iodoform is not used as frequently due to the discovery of more effective chemical antiseptics.

Another reason that iodoform is no longer as commonly used in medical treatments is that it carries a slight risk of poisoning. Excessive amounts of iodoform that are absorbed into the skin or ingested can lead to systemic intoxication, which could cause symptoms such as vomiting, rapid pulse, hallucinations, delirium and fever. Iodoform poisoning has the potential to even lead to a coma or death. When ingested or absorbed into the skin, iodoform has also been known to cause vision impairment and possibly total blindness, although the vision usually slowly improves on its own over time.

It is recommended for routine use as a disinfecting root canal dressing between office visits to prevent flare-ups and for treatment of infected root canals, abscesses, periapical lesions, perforations, exudation, root resorption, traumatic injuries, and for apexification and apexogenesis.

Pulp therapy helps to preserve the tooth until it is exfoliated when the dental pulp in deciduous parts is compromised by cavities, dental trauma or other factors. One of the factors that can contribute to the success is the material used in the obturation, to avoid the presence of microorganisms and ensure a hermetic seal of the conduits without hurting the successor piece or avoiding affecting the health of the patient [2].

Calcium hydroxide in a saturated, ionic dissociation solution with release of hydroxyl ions (OH-) and Ca2 + ions, with a pH between 12.5 and 12.8 [3]. He stimulates calcification, activating reparative processes by osteoblastic activation, by increasing the pH in adjacent tissues [2]. It is antibacterial because the pH conditions lower the concentration of hydrogen ions and inhibit the enzymatic activity of the bacteria. It can sterilize up to 88% of the root canals [2].

Iodoform is a resorbable substance, radiopaque, easy to handle and does not produce changes in the dental germ of the successor piece. It is considered that it is tolerated in the periapical even in large overlaps [3]. One of the presentations used for almost a century is in the form of paste combined with calcium hydroxide and camphor chlorophenol [3]. The use of oily vehicles to transport calcium hydroxide generates a low solubility and low diffusion capacity in the tissues, in which the ionic dissociation does not occur, so that the effect of calcium hydroxide would be zero. Therefore, some authors consider that using an oil as a vehicle would be an error. Chemically it is impossible to measure the pH of an oil, since they do not allow the dissociation of H+ and OH ions, confirming the incompatibility of $Ca(OH)_2$ [2].

Aim and objectives

The objective of this study was to evaluate the clinical and radiographic action of a calcium hydroxide iodoform paste in chronic apical periodontitis.

MATERIALS AND METHODS

Patients who experienced one of the following clinical symptoms were enrolled in the study: pain, fistula. Prior to the start of the treatment, radiological investigations were performed. All patients signed informed consent. Provisional obturation of root canals with calcium hydroxide iodoform paste was applied until the painful symptomatology or fistula suppression was resolved.

Clinical protocol:

1. Contact anesthesia with Lidocaine 2% followed by infiltrative anesthesia based on articaine with adrenaline 1/100000
2. Absolute isolation of the operative field with rubber dam (Figure 1)
3. Access to the pulp chamber (Figure 2)
4. When the pulp chamber is exposed and free of decay, it is irrigated with 5.25% sodium hypochlorite and dried with sterile cotton swabs
5. Manual mechanical instrumentation to the canals and length measurement using apex locator (Figure 3)
6. Between a file and another of a wider caliber, the canal is irrigated with 2% or 5.25% sodium hypochlorite.
7. Once the instrumentation is finished, it is dried with paper tips of the same number as the last file with which it was instrumented
8. Closure of the root canals with iodoform calcium paste (Figure 4). It is carried to the canals with lentulo carrier, placing a stop half a millimeter less than the measurement used to implement.
9. Obturation of root canals with gutta after remission of pain or fistula.

Figure 1. Isolation of the operative field with rubber dam

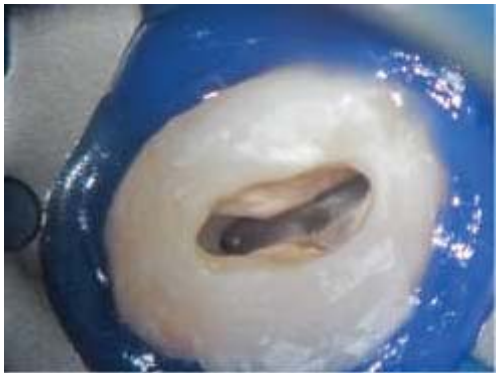

Figure 2. Access to the pulp chamber

Figure 3. Manual mechanical instrumentation to the canals and length measurement using apex locator

Figure 4. Iodoform calcium paste used in the study

RESULTS

The purpose of using calcium hydroxide-iodoform paste is to reduce the bacterial load in the endodontic system, combat microbial proliferation between treatment sessions and prevent recontamination.

The iodoform calcium hydroxide paste was maintained in the root canals for approximately 75 days, after which each case was radiologically evaluated (Figures 5,6). In mostly cases intermediate treatment was a success. Even if the radiological appearance was not improved, after this period the endodontic space was filled.

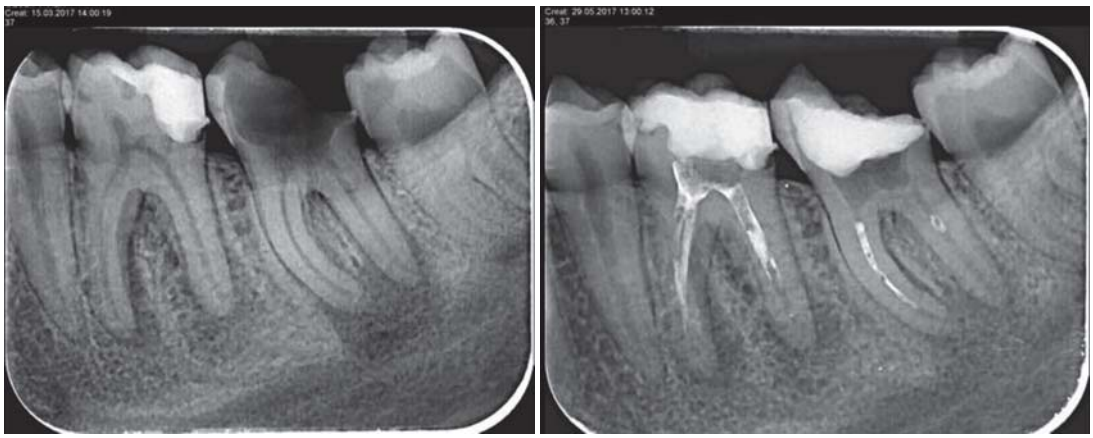

Figure 5. Tooth 37 after 75 days of treatment with calcium hydroxide-iodoform paste, and the beginning of treatment at 36, after remission of the painful symptomatology at the second molar

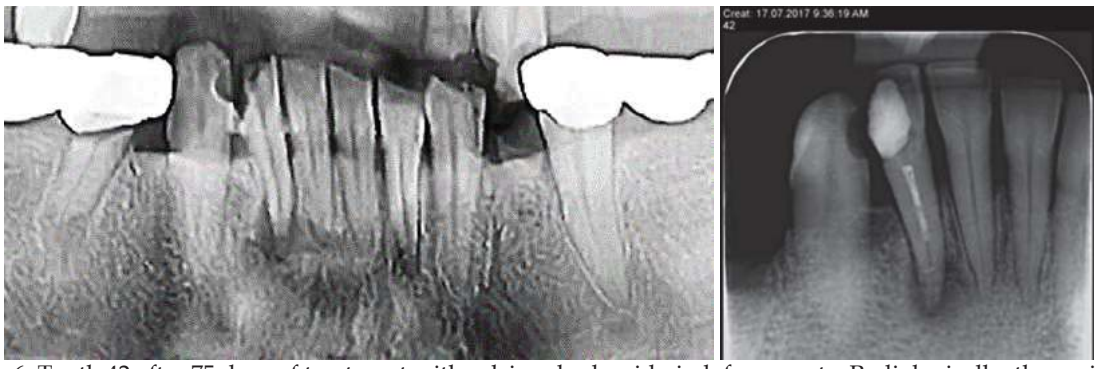

Figure 6. Tooth 42 after 75 days of treatment with calcium hydroxide-iodoform paste. Radiologically, the periapical lesion persists

The risk of such intermediate treatment is that some patients "forget" to return to the office (Figure 7).


Figure 7. Tooth 12 after 1 year and 7 months. Calcium hydroxide-iodoform paste was completely resorbed

DISCUSSIONS

Because endodontic pathology is caused due to bacterial contamination of the root canal system, endodontic treatment should focus on eliminating microorganisms in root canals. A number of materials have historically been used in endodontic treatments, but unfortunately, none of these have been able to satisfy the total requirements of an ideal sealer [4-6].

Many studies indicate the use of calcium hydroxide as an antiseptic in cases where a root canal is infected due to OH ions which can diffuse dentinal tubules in both the infected and the periodontal space directly acting on microorganisms [7-9].

Calcium hydroxide is an effective disinfectant material removing bacterium from root canals in necrotic teeth, as he stimulate calcification, in a way very clear. He activate reparative processes by osteoblastic activation, the increase in pH in the dental tissues, decreases edema and destroys the exudate, and generates a mechanical barrier apical scarring and sealed duct system [7,9,10].

Some researchers found favorable radiographic results at 6 months using 2 commercial pastes with iodoform, one with calcium hydroxide and another with zinc oxide (Vitapex® and Metapex®), in the treatment of temporary teeth. [10].

Prior to performing the root canal final filling, it is necessary to obtain a dentin surface completely released from the calcium hydroxide-iodoform paste residue, to allow an optimal adhesion of the sealant to the lateral walls of the root canal [11-13].

CONCLUSIONS

Endodontic treatment is today among the most demanded dental procedures. In addition to eliminating the pain caused by various factors, it is also a perfect alternative to save a tooth from extraction. A saved tooth can be used successfully in prosthetic or orthodontic treatments, and can make a difference between a fixed prosthesis and a mobilizable one.

Intermediate treatment with calcium hydroxide-iodoform paste may be a way to gain patient confidence in successful endodontic treatment in apical periodontitis with very painful symptoms.

Provisional obturation of the root canals with calcium hydroxide-iodoform paste was clinically and radiographically successful, in mostly cases. The study should be extended in the long term and compared with other techniques.

REFERENCES

1. Ladines MC. Medicación Intraconducto con Hidróxido de Calcio, Yodoformo Paramonoclorofenol Alcanforado en dientes necróticos. Universidad de Guayaquil. Facultad de Odontología. 2013. pp 23-33
2. Seale NS, Col JA. Vital pulp therapy for the primary dentition. General Dentistry. 2010 (32) pp 194-200
3. Marianella MR. Pulpectomía Utilizando Pasta Premezclada De Hidróxido De Calcio Con Yodoformo, Como Material De Obturación, En Piezas Temporales. Universidad Latinoamericana De Ciencia Y Tecnología Facultad De Odontología. 2010. pp 12-38
4. Fratila D, Agop-Forna D, Forna NC. Materials Used for Diagnostic and Treatments in Dental Practice, Rev. Chim.(Bucharest), 66, no. 6, 2015, p. 840-842
5. Motoc O, Popovici P, Onisei D, Podariu AC. Toxicological Activity of Some Compounds with Application on Dentistry Field. Experimenral Study, Rev. Chim.(Bucharest), 66, no.7, 2015, p. 1024-1026
6. Rodig T, Sedghi M, Konietschke F, Lange K, Ziebolz D, Hulsmann M. Efficacy of syringe irrigation, RinsEndo and passive ultrasonic irrigation in removing debris from irregularities in root canals with different apical sizes. Int Endod J. 2010 Jul;43(7):581-9
7. Carotte P. Calcium hydroxide, root resorption, endo-perio lesions, British Dental Journal 2004; 197: p. 735-739
8. Roman I, Bocskay S, Torcatoru A. Patologia şi terapia cariei complicate, Endodontie, University Press Târgu Mureş, 2009, p. 255-257
9. Fava LR, Saunders WP. Calcium hydroxide pastes: classification and clinical indications. International Endodontic Journal 32, 1999, p. 257–282
10. Cabrera Dávila MJ. Eficacia Del Uso De Hidróxido De Calcio Vs Óxido De Zinc Eugenol En Tratamientos De Pulpotomías En Niños De 5 A 11 Años De Edad [tesis]. Ecuador. Universidad Católica De Santiago De Guayaquil Facultad De Ciencia Medicas Carrera De Odontología. 2010. pp 49-54
11. Calt S, Serper A. Dentinal tubule penetration of root canal sealers after root canal dressing with calcium hydroxide. J Endod. 1999; 25: 431-433
12. Contardo L, Deluca M, Bevilaqua L, Breschi L, Dilenarda L. Influence of the calcium hydroxide debris on the quality of endodontic apical seal, Minerva Stomatologica. 2007; 56:509-51
13. Ballal NV, Kumar SR, Laxmikanth HK, Saraswathi MV. Comparative evaluation of different chelators in removal of calcium hydroxide preparations from root canals. Aust Dent J. 2012; 57:344-348