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CASE REPORT

Management of an internal root resorption on a permanent tooth. A case report.

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Abstract: Internal root resorption (IRR) is a rare pulp disease. Its etiology involves late pulpal inflammations and trauma, among others. IRR may also show some symptoms, and is usually detected by X-rays. However, its diagnosis is significantly improved by the use of cone beam computed tomography (CBCT). The objective of this case report was to account for the diagnosis and management of an internal root resorption without perforation. The patient, a 26-year-old male, went to the School of Dentistry at Universidad Andres Bello, Concepción, without having symptoms in the tooth 1.1. Anamnesis revealed the presence of previous symptoms. CBCT examination showed absence of bowl-shaped calcified dentin tissue on the inner walls of the root canal with apical lesion but without perforation of surrounding tissues. Endodontic treatment was performed using the following methods: irrigation of the root canal with 2% chlorhexidine (CHX) using a Max-i-probe cannula and simultaneous cavitation of the irrigant Then calcium hydroxide (CH) was applied as intracanal medication for a week and Schilder's technique for vertical compaction was used. The patient was checked after one week and then after six months. He did not have any symptoms. Early diagnosis using modern imaging equipment, appropriate use of ultrasound for chemomechanical debridement and thermoplastic filling techniques contribute to a more favorable prognosis of patients with internal root resorption.

Keywords: *Internal root resorption, Molecular pathogenesis, Thermoplastic filling with gutta-percha.*

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INTRODUCTION.

The Glossary of the American Association of Endodontists, defines internal root resorption (IRR) as a condition associated with a physiological or pathological process that results in the loss of dentin, cement and bone[1].

Root resorption may originate internally in the dentin-pulp complex or externally in the periodontal area. This process often occurs following trauma, cracks, orthodontic movements or chronic inflammatory processes[2].

Bell (1830) first reported about IRR[3]. Mummery (1920) called it "pink tooth of Mummery" due to the presence of pink discoloration on the crown[4]. This condition, although rare, is more frequent in the male population. The IRR is more common in the presence of a periapical lesion[5]. Its prevalence was estimated between 0.01% and 1% depending on the inflammatory condition of the pulp. Its molecular pathogenesis has not been fully understood[5,6].

This condition can be classified as: inflammatory internal resorption, internal resorption caused by replace-

ment and transient apical breakdown[2,7].

The IRR could be caused by several stimuli: trauma, chronic inflammation of pulp/periodontal ligament, heat created by the friction of drills during the preparation of cavities, cracked tooth syndrome, tooth reimplantation and orthodontic treatment[7]. There have also been reported cases of internal reabsorption caused by Herpes Zoster virus[8].

The pulp surface is located inside the dentin. There we find the odontoblast layer and the pre-dentine; these two layers form a defense barrier[9]. If they get damaged, mineralized dentin is exposed to odontoclasts, which otherwise do not adhere to non-mineralized collagen matrices[7,8].

The IRR is caused by inflammatory stimuli which produce an alteration of the odontoclast inhibitory mechanism resulting in an alteration of the pre-dentine layer. The vascular change in the pulp produces hyperemia increasing oxygen tension, and causing an acidic pH level that attracts multinucleated cells, odontoclasts and dentinoclasts[9]. Dominance of inhibitory substances such as OPG (osteoprotegerin) as activators of RANKL (receptor activator of factor kappa B ligand) followed by swelling, results in the rupture of protective coatings allowing the invasion of odontoclasts and initiating resorptive patterns. Connective, post-resorptive activity tissue transforms into metaplastic granulation tissue[5,7,9].

The progression of the lesion causes pulp necrosis limiting the development of IRR, however, the presence of lateral and accesory canals could keep blood supply from the periodontal ligament maintaining the resorptive proccess[9].

Generally IRR detection is done by X-rays, however, the use of cone beam computed tomography (CBCT) has been reported to be highly useful for diagnosis in endodontics, since it shows the lesion in detail and includes information about adjacent anatomy, which X-rays does not provide[10].

The periapical radiography is limited because it provides a two-dimensional image[11], whereas diagnosis by CBCT shows images in all their dimensions through tomographic slices, without image overlay[12,13]. Also, diagnosis by CBCT may improve the accuracy and efficiency in the prognosis of the tooth[14,15].

The purpose of this case report is to describe the diagnosis and clinical management of an internal root resorption.

CASE REPORT.

Male patient, 26 years old, treated at the dental clinic of the School of Dentistry at Universidad Andres Bello, Concepción, Chile. The patient was referred from the undergraduate dental service due to an apparent internal root resorption in tooth 1.1 detected by X-rays. The patient reported no symptoms at the time of appointment. His medical record included Diabetes Mellitus Type I under treatment with injectable insulin.

Vitality tests using EndoIce (Coltene, Switzerland) were performed; they gave negative response. The patient did not present tooth mobility and periodontal pockets. Likewise, no volume alteration was observed, although there was a slight tenderness in the soft tissues. (Fig. 1.A) Because conventional X-rays showed limitations on the image from vestibular to palatal, the patient was sent to CBCT, performed with I-CatFLX (Pennsylvania, United States), in order to get a better view of the tooth. (Fig. 1.B)

Analysis by Vision ICAT software (Imagine Sciences International-Kavo Kerr Group, Hatfield, PA, United States) with a cutoff of 0.2mm showed that IRR did not reach the surrounding tissues in any of the walls of the canal. The prognosis was favorable because the lesion did not perforate any of the internal walls; the diagnosis was Asymptomatic Apical Periodontitis with internal root resorption. (Fig. 2.A, 2.B, 2.C, 2.D.)

Endodontic treatment was suggested; therefore, isolation protocol was performed to make the cavity opening later. Then conductometry radiograph with #15 K-file Flexo and apex locator (Propex II, Dentsply Maillefer, Ballaigues, Switzerland) was performed, resulting in a working length of 22mm. (Fig. 1.B and 1.C)

During conductometry, purulent exudate caused by apical periodontitis was observed. Irrigation was perfor-

Figure 1. A. Intraoral examination B. First X-ray C. Access cavity D. Conductometry.

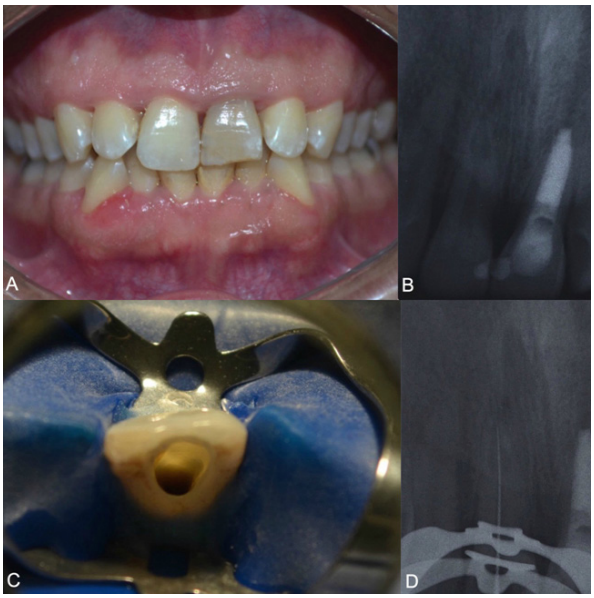


Figure 2. A. Panoramic view, B. Coronal view, C. Sectional view y D. Sagittal view.

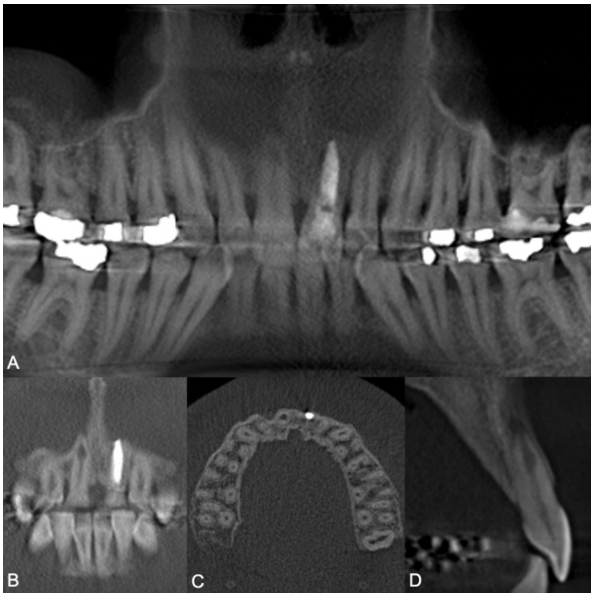
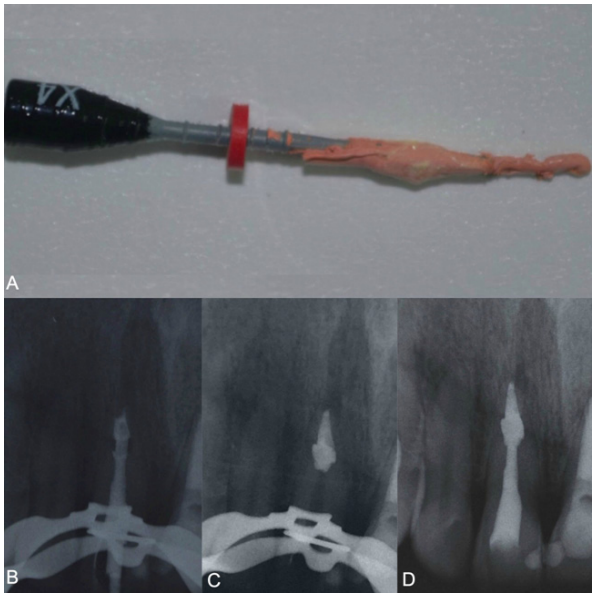


Figure 3. Calcium hydroxide.

Figure 4. A. Guttacore Obturator B. Filling with Guttacore system C. Verification 5mm Schilder's filling D. Filling Schilder's technique.



med with saline and then with 5% sodium hypochlorite (NaClO), using endodontic cannula Max-i-probe (Dentsply Maillefer, Ballaigues, Switzerland). The patient experienced discomfort, so it was decided to change the irrigating agent and use 2% chlorhexidine (CHX) with saline as a neutralizer.

Chemical-mechanical instrumentation was performed with a file Small #21/06 (Waveone, Dentsply Maillefer, Switzerland). Then cavitation of the irrigating agent was done using the Endo-activator system cannula 25-Me-

Figure 5. Clinical examination after 6 months

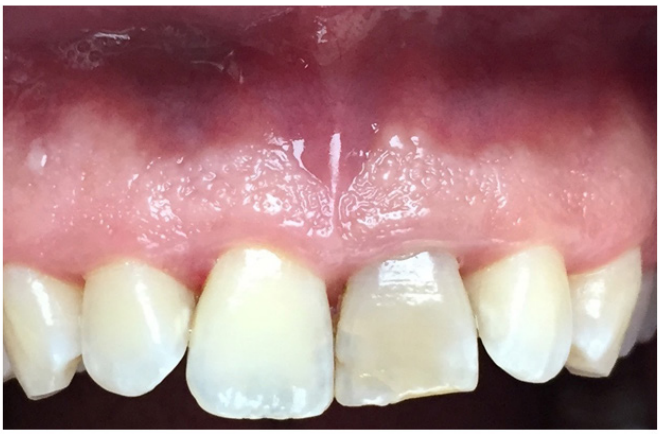


Figure 6. X-ray after 6 months.

dium (Dentsply Maillefer, Ballaigues, Switzerland). The sequence continued until the use of the file Large #40/08 (Waveone, Dentsply, Maillefer, Ballaigues, Switzerland). The apical master file was loose; therefore, apical diameter was increased manually. Final diameter was obtained with file #80 K. Calcium hydroxide (CH) in combination with propylene glycol-404 as a vehicle for one week was prescribed as intracanal medication (Fig. 3).

After removing CH, the corresponding irrigation was repeated with the repetitive use of cavitation and 17% EDTA was used as final irrigant.

After removing the medication, we proceeded to the filling using thermoplastic gutta-percha filling with a "Guttacore Obturator" diameter Nº40 (Maillerfer Dentsply, Ballaigues, Switzerland). As a clinical difficulty, it is important to say that we did not have the rod with the exact diameter for this particular filling, therefore, rod Nº40 was used. (Fig. 4A)

The procedure did not fill the canal and the IRR three-dimensionally. Then the Guttacore Obturator was removed smoothly because the cement acted as a lubricant and it came out easily (Fig. 4B). Then we proceeded to use the Schilder's vertical compaction technique and apical filling at 3 and 5mm was verified. Next a master cone #80 (Dentsply Maillerfer, Ballaigues, Switzerland) was used.

Finally, we proceeded to perform the backfill for filling middle and cervical third. (Fig. 4.C and 4.D)

Schilder's vertical compaction technique achieved a good result. Upon completion of the treatment, the patient was checked after one week and then after 6 months. The patient showed no symptoms during palpation and percussion tests and there was absence of tenderness in soft tissues.

Radiographic analysis showed that periodontal ligament was normal. The use of CBCT before discharging the patient is recommended, but it was not done because of budget restrictions. (Fig. 5 and 6.)

DISCUSSION.

IRR detection in this patient was initially performed by X-ray examination. According to literature, diagnosis done with CBCT offers advantages over conventional X-ray allowing dentists to visualize the extent of the lesion and set the parameters for the most appropriate treatment[11,12,15].

In the presence of IRR, pulp necrosis is favorable for the tooth, as long as there is pulp vitality there will be

resorption[9]. It is for this reason that the debridement of the internal resorption can be challenging in irrigation and intracanal medication with respect to the removal of bacteria and traces of necrotic tissue within the canal, which pose even greater difficulty in removal[2,20,22].

The irrigant most commonly used is Sodium Hypochlorite for its bactericidal properties; however, it was decided to change the irrigant and use CHX because the patient had discomfort[16].

Although there was not perforation of the inner walls, dentinal tubules may reach the surrounding tissues and cause discomfort[7].

The use of CHX is an alternative to Sodium Hypochlorite and has proven effective in removing biofilm[16-17]. The most significant property of CHX is substantivity, which provides adhesion to dentin, allowing antimicrobial action even after completion of irrigation[17].

The Max-i-probe cannula was used for irrigation. The advantage of this cannula is its hermetic end and its side opening that allows the irrigant to come out without overreaching the apex[18].

Irrigation alone does not achieve maximum effectiveness, therefore, we decided to use ultrasonic activation based on the hydrodynamic phenomenon of liquids to remove tooth smear[19]. Activation of irrigant is effective in removing debris and opening dentinal tubules, regardless of the solution[2,5,20].

CH has shown positive results as intracanal medication[2,5]. CH dissociates into calcium ions and hydroxyl radicals, so it has poor water solubility and remains active for long periods of time[5]. Upon dissociation CH produces high pH (12.5-12.8) preventing the dissolution of mineral components of dentin, in addition to activating alkaline phosphatase, which plays an important role in the formation of hard tissue[5-21].

Studies show that the combination of CHX and CH seems to have effective antimicrobial action. Also, ultrasonic activation of CH increases pH and calcium release[21,22].

There are methods that allow three dimensional root canal filling, such as: gutta-percha Guttacore Obturator injection, continuous wave technique and gutta-percha; however, some of these techniques have the disadvantage of transferring heat to the outer root surface, possibly causing cell necrosis of periodontal ligament and bone[23].

The abovementioned techniques were based on Schilder's. Several studies show that vertical compaction technique has significant advantages over lateral condensation technique. Guttacore system produces almost the same results as the vertical compaction technique. This system gives dentists more control over the gutta-percha, avoiding empty spaces[24].

CONCLUSION.

The treatment of internal root resorption can be challenging. The decision to make a good diagnosis by using CBCT images, irrigation with sonic activation for a better cleaning and the adequate planning of the treatment are essential for the preservation of the tooth. Despite the positive results, more studies must be performed beacuse there ir not an established protocol.

Manejo de una Reabsorción Radicular Interna en una Pieza Permanente. Reporte de Caso.

Resumen: La reabsorción radicular interna (RRI) es una condición pulpar poco común, cuyo origen etiológico incluye procesos inflamatorios tardíos de la pulpa, traumatismos, entre otros; por otra parte ésta podría presentar sintomatología. Generalmente es detectada por hallazgo radiográfico, sin embargo, requiere de un mejor método de diagnóstico por imagen como es la tomografía computarizada cone beam (TCCB). El objetivo de este reporte de caso fue detallar el diagnóstico y manejo de una reabsorción radicular interna sin perforación. El paciente de sexo masculino, 26 años de edad acudió a la Facultad de Odontología de la Universidad Andrés Bello sede Concepción, sin presentar síntomas en el diente 1.1. La anamnesis refirió presencia de sintomatología con anterioridad. La evaluación mediante la TCCB demostró ausencia de tejido dentinario calcificado en forma de cuenco en las paredes internas del conducto radicular con

presencia de lesión apical sin evidenciar perforación hacia tejidos circundantes. Se realizó el tratamiento endodóntico, usando los siguientes métodos: el conducto radicular se irrigó con Clorhexidina (CHX) al 2% usando cánula Max-i-probe y simultáneamente fue realizada la cavitación del irrigante, luego se colocó Hidróxido de Calcio (HC) como medicación intraconducto por una semana. Se usó la técnica de compactación vertical de Schilder más un control del paciente a la semana y a los 6 meses. El paciente no presentó sintomatología. El diagnóstico temprano mediante herramientas imaginológicas contemporáneas, la utilización del ultrasonido para el desbridamiento químico-mecánico y las técnicas de obturación termoplásticas usadas acorde al caso hacen que las piezas con reabsorción radicular interna tengan un pronóstico más favorable.

Palabras clave: *Reabsorción radicular interna, Patogénesis molecular, Obturación termoplástica.*

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