

Paraendodontic surgery using Portland cement as retrofilling material: A 5-year follow-up case report

Ricardo **MACHADO**¹

Eduardo Donato Eing Engelke **BACK**²

Marcelo **AGNOLETTO**³

Luiz Fernando **TOMAZINHO**⁴

Marcos **JACOBVITZ**⁵

Emmanuel João Nogueira Leal **SILVA**⁶

Luiz Pascoal **VANSAN**⁷

doi: <http://dx.doi.org/10.1590/2178-3713.4.3.081-085.oar>

ABSTRACT

Introduction: The characteristics of the material used to perform root-end fillings are crucial to the success of surgical procedures in Endodontics. Several types of material have been proposed and used due to their physical, chemical and biological properties. **Objective:** The aim of this article is to describe a successful endodontic surgical management in which Portland cement was employed as root-end filling material. **Methods:** A 64-year-old female patient sought professional care due to moderate pain on chewing and previous episodes of swelling in the region of tooth #25. Clinical examination revealed normal periodontal structures and moderate pain during palpation. Radiographic examination revealed poor root canal treatment with a separated

instrument at the beginning of the apical curvature. Periradicular disease was also observed. Retreatment of root canal was performed and it was not possible to bypass the separated instrument. After two years, the patient returned showing outstanding signs and symptoms in the same region. A new radiographic examination revealed maintenance of the periradicular disease. The surgical procedure using Portland cement was then proposed and performed. **Results:** The 5-year follow-up demonstrates treatment success. **Conclusion:** The results of this case report suggest that Portland cement has the potential to be used as a root-end filling material.

Keywords: Retreatment. Oral surgical procedures. Dental cements.

¹Professor of Multidisciplinary Clinics I (Endodontics), Paranaense University (UNIPAR).

²MSc in Clinical Dentistry, University Positivo (UP).

³Specialist in Implantodontics, Institute of Postgraduate and Dental Education (IPENO/SC).

⁴Professor of Multidisciplinary Clinics I and II and Integrated Internship II (Endodontics), UNIPAR.

⁵PhD in Endodontics, State University of São Paulo (UNESP).

⁶Professor of Endodontics, University of Grande Rio (UNIGRANRIO).

⁷Professor, Department of Restorative Dentistry, School of Dentistry — University of São Paulo/Ribeirão Preto.

How to cite this article: Machado R, Back EDEE, Agnoletto M, Tomazinho LF, Jacobovitz M, Silva EJNL, Vansan LP. Paraendodontic surgery using Portland cement as retrofilling material: A 5-year follow-up case report. *Dental Press Endod.* 2014 Sept-Dec;4(3):81-5. DOI: <http://dx.doi.org/10.1590/2178-3713.4.3.081-085.oar>

» The authors report no commercial, proprietary or financial interest in the products or companies described in this article.

» Patients displayed in this article previously approved the use of their facial and intraoral photographs.

Submitted: March 05, 2014. Revised and accepted: March 10, 2014.

Contact address: Ricardo Machado
Rua Anibal Gaya, 898 – Casa 14 – Centro – Navegantes/SC – Brazil
CEP: 88.370-506 – E-mail: ricardo.machado.endo@gmail.com

Introduction

Endodontic surgery is a therapeutic modality often indicated when conventional root canal treatment fails or cannot be performed. This kind of treatment is generally achieved through radicular apical third resection, as well as preparation and filling of a retrograde cavity. This procedure aims at periradicular tissues healing, which leads to tooth functional rehabilitation.^{2,3,20,22,28,29}

A wide variety of materials has been proposed to be used as root-end filling material, namely: amalgam, gutta-percha, glass ionomer cement, composites, zinc oxide eugenol cements and mineral aggregates cements, such as MTA, Bioaggregate and Biodentine, as well as calcium aluminate cements.²² MTA is the most indicated root-end filling material, mainly due to its excellent physical and chemical properties and biocompatibility.^{18,19,27}

MTA and Portland cement (PC) have the same initial manufacturing process as a result of clay and limestone fusion, resulting on the formation of little pebbles also known as clinkers. After its grinding, calcium sulfate is added to the resulting powder. Some additives are included in this mixture, mainly radiopacifier agents, thereby generating Mineral Trioxide Aggregate. Due to their chemical similarity, several investigations have demonstrated similar physical and biological properties between them.^{5,9,16,25} Wucherpfenning & Green³⁰ reported that MTA and PC were nearly identical macroscopically, microscopically and even when evaluated by X-ray diffraction analysis. Due to these similarities and favorable results, several authors suggest that it was reasonable to consider PC as a possible substitute for MTA in Endodontics.^{13,14} One of the concerns regarding the use of PC is the amount of arsenic present in the material.¹⁵ However, several investigations have demonstrated that the levels of arsenic released were similar for both PC and MTA, and were below those considered to be dangerous,⁸ thereby demonstrating no contraindication for the use of PC in clinical practice.

Thus, this case report demonstrates a successful surgical management of a large periapical lesion in which PC was employed as root-end filling material. The case had a 5-year follow-up.

Case report

A 64-year-old female patient sought professional care due to moderate pain on chewing and previous

episodes of swelling in the region of tooth #25. Clinical examination revealed normal periodontal structures and moderate pain during palpation. Radiographic examination revealed poor root canal treatment with a separated instrument at the beginning of the apical curvature. Periradicular disease was also observed (Fig 1A).

Root canal retreatment was proposed to the patient who was aware of the need for potential surgical complementation in the event of an unresponsive treatment.

For the first retreatment session, a rubber dam was positioned and disinfection of the operative field was performed with 2.5% sodium hypochlorite (Fórmula & Ação, São Paulo, Brazil). Subsequently, initial access was carried out by means of a high-speed 1016 HL spherical bur (KG Sorensen, Barueri, Brazil) complemented by an Endo Z bur (Dentsply/Maillefer, Ballaigues, Switzerland). After root canal location, orifice preparation was carried out by means of LA Axxess instruments (SybronEndo, Lone Hill, USA). Desobturation of the root canal filling material was performed by means of D1, D2 and D3 ProTaper Universal files (Dentsply/Maillefer, Ballaigues, Switzerland) under constant irrigation with 2.5% sodium hypochlorite (Fórmula & Ação, São Paulo, Brazil).

To bypass the separated instrument, the canal was irrigated with 17% EDTA (Fórmula & Ação, São Paulo, Brazil) and handled with a pre-curved 15 K-Flexofile (Dentsply/Maillefer, Ballaigues, Switzerland). After several unsuccessful attempts, the working length was set to the cervical portion of the separated instrument and instrumentation performed manually by following the principles of the crown-down technique, establishing a 55 K-file (Dentsply/Maillefer, Ballaigues, Switzerland) as the final instrument. Irrigation was performed with 2.5% sodium hypochlorite (Fórmula & Ação, São Paulo, Brazil) at each change of instrument. Then, the canal was flooded with 17% EDTA (Fórmula & Ação, São Paulo, Brazil) for three minutes under instrument agitation. Subsequently, the canal was dried and then filled with calcium hydroxide paste (Calen – SS White Dental Products Ltd., Rio de Janeiro, Brazil). Temporary restoration was performed with glass ionomer cement (Vitremex, 3M Dental Products, St. Paul, USA).

Fourteen days later, the patient returned for the second clinical session. A rubber dam was installed and the temporary sealing was removed by means of copious

irrigation with pre-heated 2.5% sodium hypochlorite (Fórmula & Ação, São Paulo, Brazil) complemented by the use of the final instrument under agitation. Prior to filling, 17% EDTA (Fórmula & Ação, São Paulo, Brazil) was applied for three minutes and irrigation with 5 mL of saline solution (Fórmula & Ação, São Paulo, Brazil) was performed. The root canal was completely dried by means of capillary tips (Ultradent, South Jordan-UT, USA) and paper points (Tanari, São Paulo, Brazil). Subsequently, root canal filling was carried out by means of the lateral condensation technique employing AH Plus sealer (Dentsply DeTrey, Konstanz, Germany). The temporary sealing was performed with glass ionomer cement (Vitremer, 3M Dental Products, St. Paul, USA) (Fig 1B). After treatment completion, the patient was referred for a definitive restorative procedure.

After two years, the patient returned showing outstanding signs and symptoms in the region of tooth #25. Complaints of pain and swelling episodes in the region were also expressed by the patient. A new radiographic examination revealed maintenance of the periradicular disease (Fig 1C). Consequently, the surgical management was proposed.

In the following visit, after nerve blocking with 4% articaine and epinephrine 1:100,000 (Articaine – DFL Indústria e Comércio Ltda., Rio de Janeiro, Brazil) (Fig 1D), a total flap was performed to expose the whole area corresponding to bone resorption caused by the periradicular disease (Fig 1E). It was then removed by means of periodontal curettes and sent for histopathological examination (Fig 1F). Apicoectomy was carried out by means of a 170 bur (KG Sorensen, São Paulo, Brazil). A 3-mm safety margin was removed from all surrounding bone with a Zekrya bur (Dentsply/Maillefer, Ballaigues, Switzerland) under constant saline solution irrigation. The root-end cavity was prepared by means of an ultrasonic tip (KIS ultrasonic tips — Obtura Spartan Corp., Fenton, USA) coupled to an ultrasonic piezoelectric unit (Obtura Spartan Corp., Fenton, USA) (Fig 1G).

Subsequently, PC (Cimentos Votorantim, Rio Branco, Brazil) was mixed with saline solution (Fórmula & Ação, São Paulo, Brazil). The paste was used for root-end cavity filling. The suture was performed by means of a suture silk (Vicryl 4.0, Ethicon Inc., Somerville, USA) (Fig 1H). A 5-year longitudinal follow-up show the success of the procedure (Fig 1I).

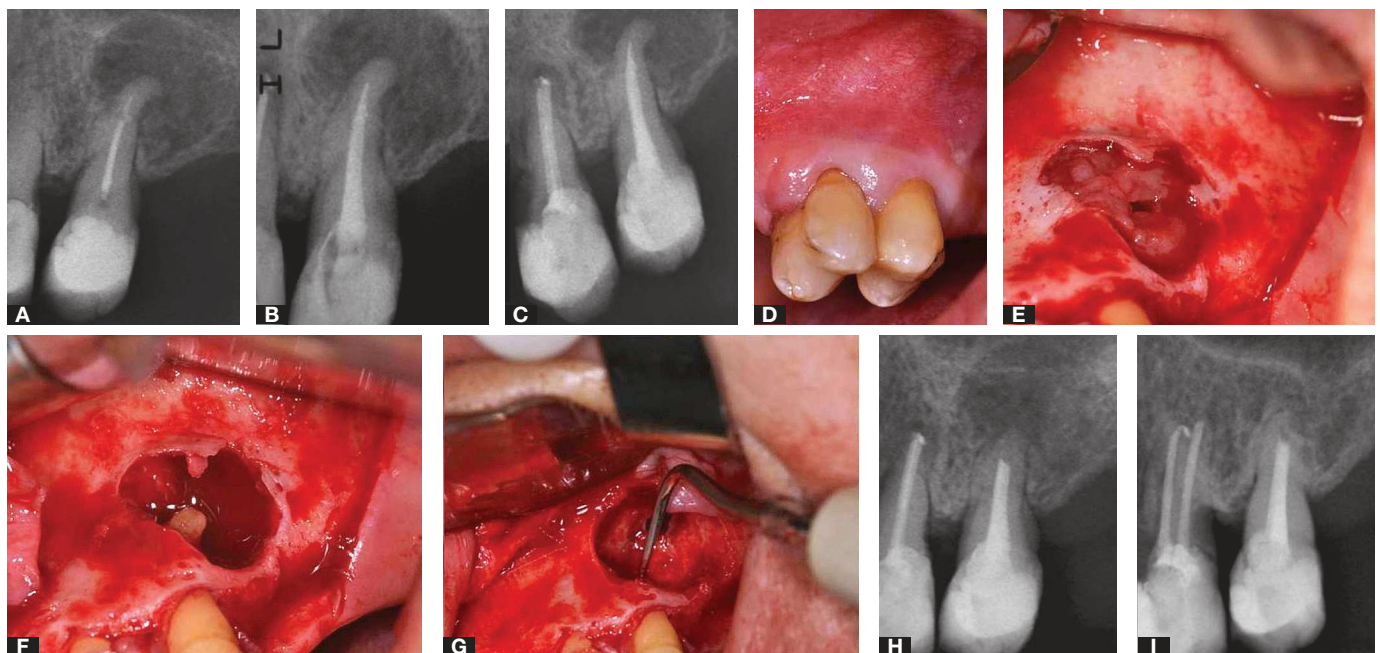


Figure 1. A) Initial radiograph; B) Final radiograph after retreatment; C) Radiograph two years after retreatment; D) Pre-surgical clinical photograph; E) Flap displacement; F) Removal of the pathological structure; G) Ultrasonic root-end cavity preparation; H) Final radiograph after the surgical procedure; I) Five-year follow-up radiograph.

A biopsy report confirmed the periapical pathology to be a periapical cyst.

Discussion

The characteristics of the types of material used to perform root-end fillings are crucial to the success of surgical procedures in Endodontics. Several types of material have been proposed and used due to their physical, chemical and biological properties.^{17,22,23,28}

Within the endodontic scientific and technological revolution of the recent years, endodontic material based on PC is gaining ground among its various indications: basic root-filling material,¹⁰ root-end filling cement in endodontic surgery,⁴ perforations and others.^{11,12} Although several studies have shown that PC is biocompatible, presenting a suitable capacity of mineralization and the potential for being used as an endodontic material,^{11,14,24} PC itself has low radiopacity compared with adjacent bone and dental structures.⁷ This material, in its natural state, is slightly radiopaque, but it does not meet the minimum requirements for radiopacity set out in ISO 6876:200113.

From a clinical perspective, this is an important factor to be considered. Figure 1H reveals that the radiopacity of PC was similar to that of dentine. Similar condition was previously observed in an apical plug case.⁷ In the present case, the absence of radiopacity did not hinder the proper execution of the apical surgery; however, it masks the presence of material in a radiographic follow-up.

For this reason, some studies have proposed several radiopacifying agents be added to PC formulation.^{6,13}

Depending on the proportion of the radiopacifier added to PC, there is some concern that it could affect its physical, chemical and biological properties. For instance, bismuth oxide, zinc oxide and calcium tungstate can affect some properties, such as pH, calcium ion release, setting time, and solubility setting of PC, depending on their concentration.^{1,6,11} According to these findings, the association of PC with radiopacifiers must be subjected to several tests in order to analyze potential changes on its features.

Nevertheless, despite its low radiopacity, it is also necessary to consider all positive factors regarding the use of PC, as shown in previous studies: biocompatibility,¹¹ sealing,²⁴ antimicrobial effects²¹ and induction of bone formation.²⁶ In the case presented herein, these factors associated with correct root planning, flattening and a well condensed root-end filling were favorable to the healing of the infectious process showed after five years.

The results of this case report suggest that PC has the potential to be used as a root-end filling material. However, some modifications to the material as well as subsequent extensive tests are rendered necessary with a view to ensuring that the resultant material meet the medical device requirements set out by FDA. Thus, more studies using this material may expand its clinical applications.

Conclusions

Considering the desired clinical outcomes presented in this case report, Portland cement can be considered a viable material to be used as root-end filling material in surgical endodontic procedures.

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