

# Clinical application of Portland cement

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## ABSTRACT

**Introduction:** Teeth with periapical lesions require special treatment. In this sense, periapical surgery followed by retrograde filling with a biocompatible material and induced tissue repair is indicated. The Portland cement (PC) has all the characteristics of mineral trioxide aggregate (MTA), indicated for endodontic treatment complex. The PC has no radiopacity, however presents low cost. **Objective:** To present a clinical case that conducted a

periapical surgery followed by retrograde filling sealed by PC. **Results:** After 40 months, radiographic images suggested repair of periapical lesion and the clinical appearance. **Conclusion:** Periapical surgery with retrograde filling with PC suggested efficacy. The treatment presented low cost to the patient. The PC is an alternative to make up the arsenal of the endodontist dental materials.

**Keywords:** Endodontics. Periapical abscess. Apicoectomy. Retrograde obturation. Dental materials.

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## Introduction

Teeth subjected to failed endodontic treatment or with apical lesions require special treatment to eradicate the microorganisms causing infectious periapical processes. Endodontic surgery associated with the placement of a local physical biological shield, compatible with periapical tissues, are resources that may be favorable to the teeth with negative predictions.<sup>1,2</sup> The mineral trioxide aggregate (MTA) was developed to be used in retrograde fillings and later to other endodontic situations. Studies have demonstrated the biocompatibility and regeneration of the periradicular tissues, such as periodontal ligament, cementum and alveolar bone, when the MTA was used.<sup>3,4</sup>

MTA is in the form of white or gray powder being composed of hydrophilic particles which solidify in the presence of water. Therefore, the contact with the periapical fluid acts as a stimulus for the beginning of the chemical reactions of setting. The main components of this material are tricalcium silicate, tricalcium aluminate, tricalcium oxides, silicate, bismuth, the latter being used to impart radiopacity to the product.<sup>5,6</sup> The PC, which is not exactly a dental material, it can be said that basically has the same chemical components of MTA. PC differs MTA by the absence of the bismuth oxide and the presence of potassium ions in its formula.<sup>7-10</sup>

From the biological and antibacterial point of view, the MTA and PC have demonstrated similar behaviors.<sup>8,11,12,13</sup> The scientific interest in the PC has increased because it is economically affordable and provide physical, chemical and biological properties similar to MTA. Marginal adaptation of MTA and PC in endodontic fillings is another important factor that presented similar results.<sup>14</sup> The possible replacement of MTA by PC in Endodontics has been considered by the authors on the basis of the promising results obtained in *in vitro* and *in vivo* studies with the PC.<sup>12,15,16,17</sup>

The aim of this study was to present a clinical case in which it was conducted an endodontic surgery followed by retrograde filling sealed with PC.

## Case report

Female patient, 52 years old, Caucasian, came to the clinic in 2006 complaining of moderate pain in the anterior left region of maxilla. It was performed anamnesis and physical examination, proceeded to

the clinical examination which confirmed the presence of a fistula located apically to the element 21. In the radiographic examination was found periapical lesion in teeth #21 and #12 (Fig 1). The patient was reported, however, opted to perform only endodontic treatment of the element #21. After 45 months, the patient returned to the clinic complaining of acute pain and throbbing, swelling and redness localized in the anterior right maxilla. There followed a routine protocol formalities before the dental clinician. During the intraoral examination, we noticed a bulge in the apical region of tooth #12 and hardened to the touch. We performed a radiograph of the region (Fig 2) and confirmed the increase of periapical lesion, compared with radiographs taken at the time of endodontic treatment of tooth 21.

It was reinforced the importance of performing endodontic therapy on that element.<sup>21</sup> The patient agreed to undergo treatment. It was established the treatment plan that involved the following steps: Bi-osecurity measures, coronary opening, drainage and neutralization of septic and toxic content. After 72 hours and relief from the symptoms, the root canal system was instrumented and it was performed bandage with calcium hydroxide (Ca (OH)<sub>2</sub>) associated with camphorated paramonochlorophenol (PMCC) (Fig 3). The patient returned after 15 days to remove the intracanal bandage when it was noted the persistence of the exudate. By such a situation, once again Ca (OH)<sub>2</sub> was used and waited for 2 weeks. In return, after removal of Ca (OH)<sub>2</sub> was observed that the exudate was still present. Facing the situation, we obtained the consent of the patient for root canal filling and, in the same session, the endodontic surgery followed by retrograde filling with PC. The patient was prepared by taking all precautions of biosafety. The tooth #12 were filled with cement of calcium hydroxide (Fig 4). After preparing the surgical table and operative field, analgesia was performed to anterior superior alveolar nerve by buccal and palatine, also to nasopalatine nerve. It was chosen the Neumann incision to raise mucoperiosteal flap.

The apical area of the osteotomy for root apex exposure was initiated with goivo chisel (Quinelato, Rio Claro, Brazil) for visualization of the apical portion of root. Then we performed periradicular planing and straightening for removal of granulation tissue.



**Figure 1.** Suggestive area of periapical lesions in teeth #12 and #21.



**Figure 2.** Suggestive area of extensive periapical lesion on tooth #12.



**Figure 3.** Extravasation of calcium hydroxide in the apical area of #12.



**Figure 4.** Root canal obturation, Endodontic surgery and retrograde filling with Portland cement and iodoform, tooth #12.



**Figure 5.** Control radiograph after 7 months of the proposed procedure.



**Figure 6.** Control radiograph after 32 months of the proposed procedure.

With cone shaped bur #700 (KG Sorensen, Barueri, Brazil) mounted in the straight part of the micromotor (Dabi-Atlante, Ribeirão Preto, Brazil) and under abundant irrigation with saline 0.9% was held in the perpendicular cut to the long axis of the tooth at an angle of 45° from distal to mesial, completely severing the apical portion of root. The retrocavity was conducted under irrigation with saline, with a low speed round bur #4 (KG Sorensen, Barueri, Brazil).

Then, the manipulation was done with the PC associated with iodoform. The ratio of the two products was 4:1 by weight, respectively. The application of PC (Votoram, Rio Branco do Sul, Brazil) associated with iodoform in retrocavity was performed using the following precautions: Excess removal, induction of bleeding allow PC contact with the blood and set, reposition of the flap and suture. After 6 months, the radiographic image suggested bone formation (Fig

5). After 40 months of case monitoring, the radiographic image (Fig 6) suggested normal bone formation and integrity of lamina dura.

## Discussion

Progress in understanding the infectious process from the root canal system and periapical region added to the advances in dental techniques and biocompatible materials employed in Endodontic surgery has been great allies in cases of treatment and retreatment or endodontic failure.<sup>1,2,18</sup> Due to the lack of clinical work related to the use of PC in endodontic practice, this study presented a case in which this material was used for retrograde filling after Endodontic surgery.

For clinical conditions where there is presence of anaerobic micro-organisms that cause pain in the acute stage, large destruction apical region and

the presence of exudate, the use of  $\text{CaOH}_2$  is established.<sup>19,20,21</sup> Thus, in the present study the author has made use of  $\text{CaOH}_2$  paste associated with CPMC, and subsequently the material was used alone in order to control pain and to restore the periapex integrity. However, the effect of  $\text{CaOH}_2$  to cease production of exudate has been unsuccessful. Perhaps the continuing use of the drug based on  $\text{CaOH}_2$  could determine the interruption of the liquid resulting from the inflammatory periapical process. However, the patient asked for special reasons the rapid processing proposed; being complied with promptly by the author.

The biocompatibility of the PC is similar to the MTA, even when added in the formula of the PC the bismuth oxide.<sup>18</sup> The decision to use the PC in this case report took into account the known biocompatibility of this material when in direct contact with the periapical tissues and also for its low cost, as has been reported in scientific studies.<sup>12,15,16,17</sup>

The main drawback of PC is the absence of bismuth oxide, which makes it radiolucent.<sup>7-10</sup> Aiming to correct this problem in the PC, it was added iodoform prepared to perform the portion of the retrograde filling of the tooth #12, as quoted in the proportion of case report and recommended by other authors.<sup>10</sup> A study to evaluate the radiopacity of white PC with iodoform was performed founding an radiopaque effect of the mixture product.<sup>22</sup> Moreover, our study suggested an association is not to interfere with the action of

PC. The use of iodoform in endodontics is enshrined as an antibacterial agent and for radiopaque effect.<sup>23</sup>

The root planing and flattening, Endodontic surgery and retrograde filling with PC described in this report was very favorable to the tooth #12, as the result obtained suggested that the biofilm accumulated in the apical region was removed, and also that the PC had antibacterial activity by alkaline action, confirming the main scientific findings involving this material for unconventional use in Dentistry.<sup>1,8,11,12,13</sup> In literature, there are two studies that evaluated the *in vitro* antimicrobial capacity of different cements used in Endodontics. In these studies the authors were in agreement by the absence of antimicrobial activity of the MTA and the PC, however, emphasized that the pH of the cements reached 12.5, similar to that observed in cements based on calcium hydroxide of known antibacterial and inducer effective tecidual repair.<sup>7,25</sup>

The radiographic images presented in this study suggested the damage repair of the periapical tissues during the 40 month follow-up. However, the association of endodontic surgical techniques presented here combined with the use of PC suggested efficacy, since the repair of the injury was effected. These findings reinforce the importance of investing in PC since this material has low cost,<sup>7,12,15,16,17</sup> and in a country with social and economic distortions like Brazil, to democratize the use of dental materials that improve oral health indices at low costs are a paramount need.

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