

***Non surgical management of a chronic periapical lesion associated with traumatised maxillary central incisors: case report***

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A case is reported of a chronic periapical lesion involving maxillary central incisors with a history of traumatic injury eight years previously and subsequent development of a painful swelling that occasionally caused partial blockage of the nasal cavities. Retrograde surgery for removal of the suspected cystic lesion was scheduled. As a temporary measure before surgery, the necrotic pulp exudate was removed through standard endodontic access cavities prepared on the palatal surfaces of the crowns of the two central incisors, and a calcium hydroxide paste dressing material was placed inside the root canals up to the apices. The calcium hydroxide dressing was changed every four weeks and the case was followed up until healing of the periapical lesion occurred. The surgical procedure was postponed and finally cancelled when complete healing became evident in recall radiographs

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***Prevention of the ingress of a known virulent bacterium into the root canal system by intracanal medications***

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Contamination of the root canal system by persistent, enteric bacteria via leakage through interim restorations has been well documented. This in vitro study evaluated the ability of interappointment medications to prevent contamination of the root canal system by *Enterococcus faecalis*. Coronally unsealed, medicated tooth roots fixed in a closed system were contaminated daily with a standardized, aerobic, broth culture of *E. faecalis*. Four medications were evaluated (n = 15): group A, calcium hydroxide/methylcellulose paste; group B, camphorated parachlorophenol/calcium hydroxide paste; group C, 1% chlorhexidine/methylcellulose gel; and group D, calcium hydroxide points. The mean number of days to contamination as indicated by turbidity in the closed system was the following: group A, 37; group B, 46; group C, 16; group D, 5; and a positive control (no medication), 3. A one-way analysis of variance with a Scheffe post hoc test ( $p = 0.05$ ) detected significant differences in effectiveness with A and B superior to C and D, and C superior to D.

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## ***Long -Term bacterial leakage along obturated roots restored with temporary and adhesive fillings***

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The aim of this study was to examine whether obturated roots combined with several adhesive and temporary filling materials can be bypassed by bacteria. Standardized cavities were coronally prepared into 130 straight roots mimicking clinical access cavities. After obturation the roots were assigned to six test and three control groups and coronally sealed with either Clearfil, CoreRestore, IRM, Ketac Fil, or a combination of IRM/wax or Ketac Fil/wax. The roots were then fixed between a top and a bottom chamber each. The top chamber contained soy broth with 10<sup>8</sup> Staphylococcus epidermidis colony-forming units/ml, and the bottom chamber contained sterile soy broth. For 1 yr the mounts were checked on a regular basis for turbidity in their bottom chambers indicating bacterial growth. After 1 yr only three samples from the CoreRestore group and two samples from the Clearfil group resisted leakage. At termination there was no significant difference in number of leaking samples among the groups. At the beginning of the experiment IRM performed worst. Between months 5 and 10 Clearfil showed the least leaking samples; for some months this was statistically significant compared with IRM or Ketac Fil.

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## ***Bacterial leakage in obturated root canals following the use of different intracanal medicaments***

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The aim of this study was to examine whether intracanal medication prior to root canal obturation has an inhibitory effect on coronal-apical penetration of bacteria. 93 single rooted teeth were instrumented and sterilized with ethylene oxide. They were assigned to three control groups and four test groups with n = 20 each. For one week, they were dressed with different medicaments: The first group with a 5% chlorhexidine gel, the second with Ledermix, the third with a fresh mix of calcium hydroxide and water and the fourth without any medication. After obturation (lateral condensation, AH26) the roots were fixed between a top and a bottom chamber. The top chamber contained 3 mL trypticase soy broth with 10<sup>8</sup> Staphylococcus epidermidis CFU's/mL, whereas the bottom chamber contained sterile trypticase soy broth. For one year, the mounts were incubated at 37 degrees C. They were checked on a regular basis for turbidity in their bottom chambers indicating bacterial growth. None of the test samples leaked for three months. After one year, the calcium hydroxide group had only 6 leaking samples

whereas the chlorhexidine group had 14, the Ledermix group 15, and the unmedicated group had 13 leaking samples. It may be concluded that under the conditions of this study, calcium hydroxide was the medicament of choice to avoid bacterial penetration of the root canal. Ledermix did not perform better than no premedication. Chlorhexidine was superior to Ledermix in the second third of the observation period.

Endod Dent Traumatol. 2000 Dec;16(6):282-6.

### ***Comparison of calcium hydroxide and calcium oxide for intracanal medication***

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The authors show how the proper use of the root canal medication based on calcium oxide is determinant for causing a perfect asepsis of the root canal in the 58 teeth, taken in consideration, the calcium oxide is more efficacious than the calcium hydroxide not only because it produces a remarkable decrease of the bacterial quantity, but also because the recovery time of the lesion before the filling up of the root canal, is less than half time in comparison with that one got by means of the calcium hydroxide.

G Ital Endod. 1990;4(3):8-13

### ***Evaluation of the cytocompatibility of three endodontic materials***

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The goal of this in vitro study was to evaluate the relative cytocompatibility of three endodontic materials: calcium hydroxide, a calcium oxide-based compound, and a zinc oxide-eugenol-based sealer. The evaluation was conducted 24, 72, and 168 h after contact with the compounds and involved three complementary techniques: a colorimetric cytotoxicity test, scanning electron microscopy, and flow cytometry. The results we obtained confirmed the initial cytotoxicity of the zinc oxide-eugenol-based sealer and showed that the calcium oxide-based compound had the same relative cytocompatibility as calcium hydroxide.

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## ***Octacalcium phosphate-based cement as a pulp-capping agent in rats***

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**OBJECTIVE:** The purpose of this study was to evaluate the pulpal response to an octacalcium phosphate (OCP)-based cement used as a pulp-capping material. **STUDY**

**DESIGN:** The pulps of 60 maxillary first molars of male Sprague-Dawley rats were exposed and then capped directly by using either OCP-based cement or a calcium hydroxide slurry (control). Histologic examinations were performed at 1, 2, and 5 weeks after the surgical procedure, and the results were analyzed statistically by using the Mann-Whitney U test ( $P < .05$ ). **RESULTS:** One week after pulp capping, the initial formation of reparative dentin in the exposed areas was more notable in the calcium hydroxide group than in the OCP-based cement group. At 2 weeks, reparative dentin covered by a layer of odontoblast-like cells was observed in both groups. However, at 5 weeks, reparative dentin consisting of regular dentinal tubules was observed more frequently in the OCP-based cement group. **CONCLUSION:** OCP-based cement allowed favorable healing processes to occur in the dental pulp. Copyright 2004 Elsevier Inc.

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## ***FT-Raman spectroscopy of calcium hydroxide medicament in root canals***

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Kwon TY, Fujishima T, Imai Y. FT-Raman spectroscopy of calcium hydroxide medicament in root canals. International Endodontic Journal, 37, 489-493, 2004. **Abstract** Aim To investigate chemical changes in calcium hydroxide introduced into human root canals as a medicament using Fourier transform-(FT) Raman spectroscopy. **Methodology** Ten necrotic maxillary anterior teeth were selected in 10 patients. The teeth were divided into five treatment groups, according to the survey time. Root canal instrumentation was performed with hand instruments until the master apical file was size 40. Calcium hydroxide paste, in a 1 : 1.25 mixture by weight of powder and distilled water, was introduced directly into the root canal with a lentulo-spiral filler and then condensed with a finger plugger. The access cavity was sealed with a temporary dressing. After 2 and 4 days, then 2, 4 and 6 weeks, the calcium hydroxide paste was sampled with a K-file and then analysed using FT-Raman spectroscopy. The excitation source was an Nd : YAG laser with an excitation wavelength of 1064 nm. All spectra were taken with a laser power of 200 mW, 275-1185 scans, and 4  $\text{cm}^{-1}$  resolution. The conversion of calcium hydroxide to calcium carbonate was calculated on the basis of the

spectral data obtained from the mixtures of both compounds. Results The calcium hydroxide paste in the apical region showed weak bands at 1088 and 284  $\text{cm}^{-1}$ , in addition to bands associated with calcium hydroxide. The weak bands, assigned to calcium carbonate, became stronger with time. Calcium carbonate content increased rapidly in the first 2 days and then tended to increase slowly. Approximately 11% of the calcium hydroxide at the apical portion of the canal was converted to calcium carbonate after 6 weeks. However, little alteration of the paste was noticed in the samples from the middle portion of the canal. Conclusions Calcium hydroxide medicament in root canals became transformed into calcium carbonate in the apical region within 2 days. Although the transformation continued with time, approximately 90% of the calcium hydroxide remained unchanged after 6 weeks.

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### ***Effectiveness of 2 % chlorhexidine gel and calcium hydroxide against Enterococcus faecalis in bovine root dentine in vitro.***

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AIM: To evaluate the effectiveness of 2% chlorhexidine gluconate gel and calcium hydroxide ( $\text{Ca}(\text{OH})_2$ ) as intracanal medicaments against *Enterococcus faecalis*.

METHODOLOGY: One hundred and eighty dentine tubes prepared from intact freshly extracted bovine maxillary central incisors were infected in vitro for 7 days with *E. faecalis*. The specimens were divided into four groups, according to the intracanal medicament used, as follows: Group 1: 2% chlorhexidine gluconate gel; Group 2: calcium hydroxide in a viscous vehicle (polyethyleneglycol 400); Group 3: 2% chlorhexidine gluconate gel + calcium hydroxide and Group 4: Brain Heart Infusion (BHI) broth (control group). The medicaments were placed into the canal lumen and left there for experimental times of 1, 2, 7, 15 and 30 days. After each period, irrigation with sterile saline to remove the medicament was performed and the canals were dried with sterile paper points. Dentine chips were removed from the canals with sequential sterile round burs at low speed. The samples obtained with each bur were immediately collected in separate test tubes containing BHI broth. The tubes were incubated at 37 degrees C and daily observed for microbial growth, visualized by the medium turbidity. RESULTS: Chlorhexidine gel alone completely inhibited the growth of *E. faecalis* after 1, 2, 7 and 15 days. Calcium hydroxide allowed microbial growth at all experimental times. The combination of chlorhexidine and  $\text{Ca}(\text{OH})_2$  was effective after 1 and 2 days demonstrating 100% antibacterial action; however, its antibacterial activity reduced between 7 and 15 days. CONCLUSION: Under the conditions of this study, it can be concluded that 2% chlorhexidine gel alone was more effective against *E. faecalis* than calcium hydroxide ( $P < 0.05$ ). However, its antibacterial activity depended on how long it remained inside the root canal.

