



Study of Calcium Hydroxide in Endodontic Treatment in Chronic Apical Periodontitis: in Vivo Study

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ABSTRACT: This study aims to determine the efficiency of endodontic therapy with calcium hydroxide in cases with chronic apical periodontitis by measuring the microbial viability from root canal space in different stages of treatment. The microbiological calculations that have been made have called forth an establishment that calcium hydroxide is a redoubtable antimicrobial activity, but only with the condition of long-lasting contact with the root canals.

KEYWORDS: chronic apical periodontitis; endodontic microflora; calcium hydroxide

I. INTRODUCTION

This study was made on twenty teeth with chronic apical periodontitis. Biological samples were taken from root canal space in order to isolate and identify microbial species and strains involved in the chronic periapical process¹. The main aim of this study was to access in vivo antimicrobial activity and efficiency of calcium hydroxide endodontic dressing on endodontic microflora. Informed consent of patients was taken before starting the present study.

II. MATERIAL & METHOD

Microbiological determinations were carried out as follows: in the first treatment session: before biomechanical endodontic treatment, after its completion, and in the second treatment session. In this session, biological samples were taken from root canal space in order to access the microbial population that resisted the antibacterial effect of calcium hydroxide endodontic antiseptic. The procedure of endodontic microflora sampling was: placing in the root canal a sterile paper cone as

deep as 1-2 mm of apex and maintaining it at this level 1-2 minutes. Bacteriologically positive samples were seeded on special solid environments enriched with growth factors and incubated under anaerobic environment for 72-96 hours². In the first treatment session, after the biomechanical treatment had been completed, the endodontic dressing in form of the calcium hydroxide paste (Metapex) was placed. Then the endodontic access cavity was closed with a temporary restoration, Cavit, thus preventing endodontic microleakage and contamination³.

The sampling for the assessment of the antimicrobial activity of calcium hydroxide was made differently for the two parts of the group of patients included in the study: for the first half the study lot (10 patients) after 48 hours and for the other half of the study lot (10 patients) after 10 days.

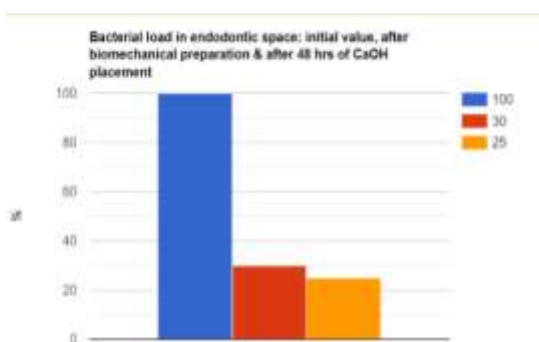
It is well known that calcium hydroxide has chief bactericidal action as a result of its high alkalinity, pH ~ 12.5, although its action is slow and on long term⁴. The antimicrobial effect is significant after approximately seven days after intra-radicular placement, reaching maximum efficiency after approximately 10-14 days^{5,6}. As such, we have made two endodontic samplings and evaluations of endodontic microflora: -for 10 teeth the sampling took place at 48 hours and for the other half of the tested group (10 teeth) the sampling was done at 10 days. The bacteriological diagnosis has been confirmed on the grounds of morphological, specific, and biochemical characteristics.



III. RESULTS

Following the bacteriological diagnosis, it was concluded that initially all the samples were positive for the anaerobic and aerobic germs, in accord to literature dates⁷. Microbial strains belonging to the following types were included: Fusobacterium, Porphyromonas, Prevotella, Bacteroides, Peptostreptococcus, Veillonella, Actinomyces, Eubacterium, Clostridium. Following antibacterial therapy, the following results were attained:

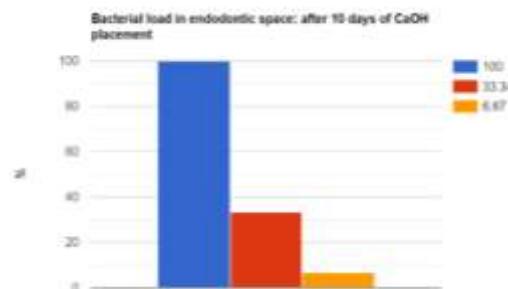
- i) The results acquired at 48 hours suggest that from 20 initially microbial species identified, biomechanical endodontic treatment succeeded in the removal of 14 species. The amount of strains isolated after 48 hours of endodontic calcium hydroxide antiseptic treatment is 5, meaning 25% of the initial value. Percentage is demonstrated by a success value of 16.67% over the 48-hour interval.



- ii) The results obtained for the second half of the group of patients treated with calcium hydroxide and assay of biological results at 10th day are:

- a) the number of initially isolated microbial species: 15
- b) the mechanical treatment of the canal, together with endodontic lavage with sodium hypochlorite, reduced the number of species identified at 5
- c) after a 10-day interval we detected only 1 microbial species which survived inside endodontic

space, representing 13.34%. Within 10 days, calcium hydroxide paste cutdown microbial load from 33.31% (resulting from biomechanical treatment) to 6.66%. so, according to this study, calcium hydroxide shows 80% efficiency at 10th day.



IV. DISCUSSION

The result of this study revealed two apparent aspects of the bactericidal effect on endodontic flora which seem to be inconsistent: calcium hydroxide is highly efficient when placed inside the root canals for a longer period of time (10 days) and, correspondingly, very low in effectiveness on endodontic germs after 48 hours. Calcium hydroxide is most efficient when it remains in the root canal for atleast aweek. Effectively most of the microorganisms are removed by root canal preparation. Most of the bacteria that continue to thrive in the endodontic space even after an efficiently executed biomechanical treatment are found in the ramifications of the root system¹⁰. The endodontic therapy in chronic apical periodontitis addresses precisely these microbes. Calcium hydroxide also has the ability of denaturing the proteins inside the root canal space, making them less toxic to the host organism. Nevertheless, it takes a period of time ranging from week to month to act on residual germs inside dentinal tubules from the root canal walls¹¹. Undeniably, from this point of view, calcium hydroxide is one of the most valuable endodontic medications.

Table 1 Bacteria species initially identified, after biomechanical treatment and after 48-hours calcium hydroxide endodontic treatment

Species	Initial no	%	No after biomechanical treatment	%	No after CaOH treatment	%
Clostridium	3	15.00	2	10.00	2	10.00
Peptostreptococ	3	15.00	1	5.00	1	5.00
Veillonella	1	5.00	-	-	-	-
Eubacterium	3	15.00	-	-	-	-
Fusobacterium	3	15.00	1	5.00	1	5.00



Prevotella	4	20.00	1	5.00	1	5.00
Bacteroides	1	5.00	-	-	-	-
Porphyromonas	2	10.00	1	5.00	-	-
Total	20	100	6	30	5	25

Table 2 Bacteria species initially identified, after biomechanical treatment and after 10 days calcium hydroxide endodontic treatment

Species	Initial no	%	No after biomechanical treatment	%	No after CaOH treatment	%
Clostridium	2	13.33	1	6.67	1	6.67
Peptostreptococ	3	20.00	1	6.67	-	-
Eubacterium	2	13.33	-	-	-	-
Fusobacterium	4	26.67	2	13.33	-	-
Prevotella	1	6.67	1	-	-	-
Actinomycetes	3	20.00	-	6.67	-	-
Total	15	100	5	30	1	6.67

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