

## THE EFFECT OF THE DRESSING IN THE TISSUE REACTIONS FOLLOWING APICAL PLUGGING OF THE ROOT CANAL OF DOGS' PULPLESS TEETH WITH DENTIN CHIPS

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*ABSTRACT: The object of this paper was to observe whether a dressing has some influence in the periapical healing process after apical plugging of pulpless teeth with dentin chips. The dental pulp of dogs' teeth were removed and the root canals left exposed to the oral environment, until a periapical radiolucency was observed. The root canals were then instrumented and filled with zinc oxide eugenol cement and gutta-percha points, after an apical plugging of dentin chips, either in a single session or after two dressings with camphorated chlorophenol. Six months after the treatment, the histological data showed better results in the experimental group where camphorated chlorophenol dressing was employed.*

*KEY-WORDS: Dentin plug; pulpless teeth; dressing.*

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### INTRODUCTION

Dentin plug has been used objecting the stimulation of apical hard tissue deposition or to control the level of the filling material<sup>6,7,17,18,21,24,27</sup>. However, most of the scientific basis for the employment of the dentin plug was obtained in experiments on teeth with vital pulps<sup>2,3,8,10,29,32</sup>. Transference of these findings to teeth with necrotic pulps must be viewed with caution due to the possible deleterious effects of necrotic tissue, bacterial contamination, and existing periapical pathology<sup>15</sup>. These factors and the possibility of an accidental condensation of dentin chips during an endodontic treatment of pulpless teeth suggest the necessity of new studies about the subject.

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## MATERIAL AND METHOD

Thirty-five dogs' root canals were opened and left exposed to the oral environment until a periapical radiolucency was detected by a radiographic examination. With rubber dam in place, 13 root canals were instrumented up to the dento-cemental junction and irrigated thoroughly with saline solution several times. When the canals were considered clinically cleaned, they were overinstrumented up to the file number 25. After being irrigated and dried, the apical portion of the canals were filled with a plug of dentin chips collected from their own root canal walls. The root canals were then filled with zinc oxide-eugenol cement and gutta-percha cones, by the lateral condensation technique.

Other 13 root canals were instrumented up to the dento-cemental junction and, after being dried up, they were dressed for 2 days with a paper point lightly dampened with camphorated chlorophenol. In a second session the canals were overinstrumented up to the file number 25 and again dressed with camphorated chlorophenol for more 2 days. In a third session, the canals were irrigated with saline solution, dried and filled, in the same way as for the single session experimental group.

Nine root canals were taken as control of the obtained periapical radiolucency.

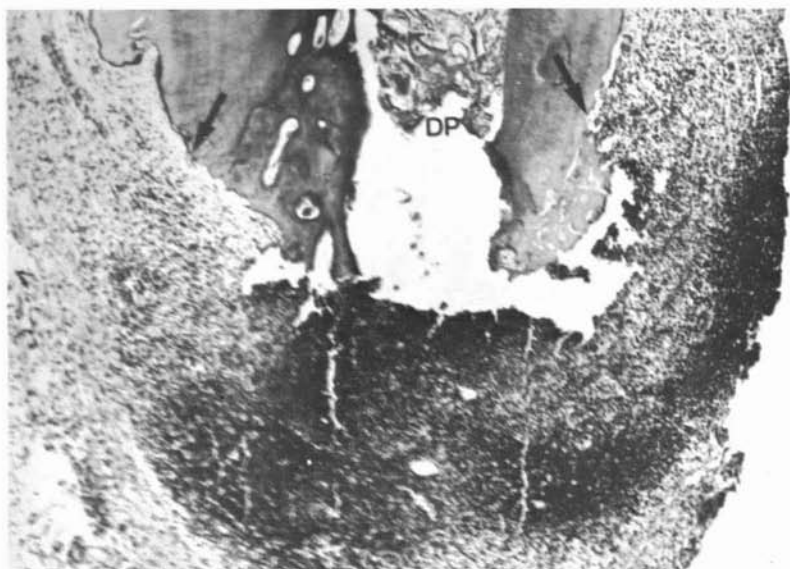
Six months after the treatment, the animals were killed; the pieces were fixed in 10 percent neutral buffered formalin solution and demineralized in formic acid-sodium citrate solution. Sections of the jaws, each containing one root, were prepared for histological examination. Serial sections 6 microns thick were cut and stained with hematoxylin and eosin.

## RESULTS

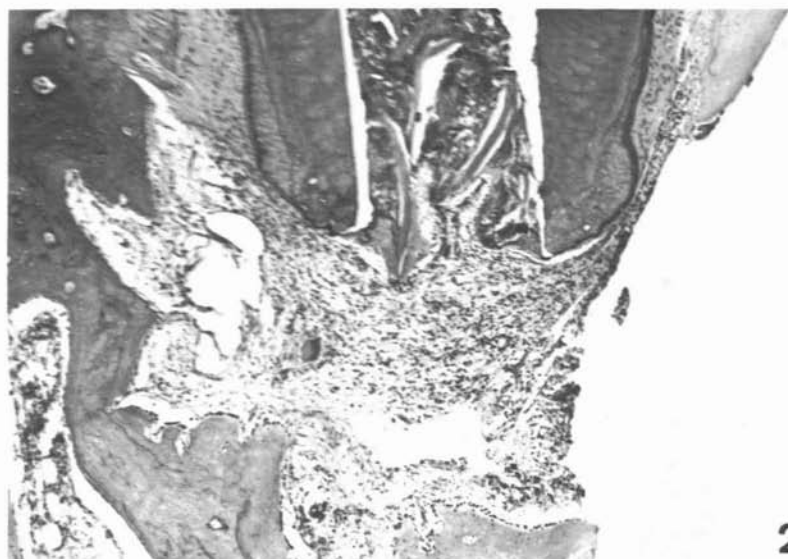
**Control Group** – All the specimens, not treated, showed the periapical space greatly enlarged and occupied by granulation tissue. Areas of bone and cementum resorption were frequently observed.

**Root canals treated in a single session** – The periapical space of most of the roots not dressed was thicker than the one of the control group. A granulation tissue was always present and some microabscess were usually observed. Comparatively to the control group, areas of bone and root resorption were more extensive and more frequently observed. The inflammatory reaction was more intense next to the foramina of the apical delta and next to the dentin chips (Fig. 1).

**Root canals treated in three sessions** – The roots dressed showed a periapical space thinner than the one observed in the control group. The periapical space was occupied by a connective tissue in different degrees of organization and with a mild to moderate chronic



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FIG. 1 - Root canal treatment in a single session. There are granulation tissue and microabscess. Note cementum resorption (arrows) and the dentin plug (DP). H.E. 40X

FIG. 2 - Root canal treatment in three sessions. Neof ormation of cementum and bone tissue is evident. There is a chronic inflammatory reaction in the periodontal ligament. H.E. 40X

inflammatory reaction. Neoformation of cementum was usually observed, being evident the healing of the areas of the roots, previously reabsorbed. In most cases there was deposition of cementum in direct contact with the dentin chips of the plug, but total closure was not observed. Areas of bone resorption were rarely observed, being frequent the presence of neoformed hard tissue (Figs. 2 to 4).

## DISCUSSION

The presence of dentin chips between the filling material and the pulp stump has been related not only to a milder inflammatory reaction but also to the deposition of cementum in the area<sup>16,19,34</sup>. Some authors believe that dentin chips act as a nidus for hard tissue formation in the apical region<sup>4,5</sup>. It was demonstrated complete biologic sealing of the apical foramen after the use of an apical dentin plug before the final filling of the root canal<sup>10,32</sup>. However, this complete biologic sealing was observed only after root canal treatment in cases of vital pulpectomy. In this work we noted partial closure by cementum deposition only in the experimental group whose root canals were treated in three sessions. Complete adverse results were observed after root canal treatment in a single session. This fact suggests the dressing as an important factor in eliminating microorganisms from the root canal walls.

TORNECK *et alii*<sup>31</sup>, although agreeing with the possibility of stimulating the depositions of hard tissue, call attention to the fact that the dentin chips may also irritate and delay or hinder the repair. It is clear that several factors may interfere with the treatment results when there are dentin chips in the apical region<sup>9,11,15,20</sup>. Among these factors, the contamination of the dentin chips is one of the most problematic, and the results that we observed after root canals treatment in a single session support that affirmative. These adverse results reinforce the necessity to obtain a thorough cleansing of the root canals during instrumentation<sup>22</sup>. It is a well-known fact that an undesired condensation of dentin chips on apical region frequently occurs when the instrumentation is not accompanied by an efficient and abundant irrigation<sup>11</sup>. PATTERSON *et alii*<sup>24</sup> observed 77% of the demonstrable plugs of dentin chips in 43 canals where no attempt was made to form or avoid forming a plug. These observations and the adverse results noted in our work may explain part of the unsuccess obtained in the treatment of pulpless teeth. We think this problem must be in mind mainly in cases of root canal treatment in a single-session.

PEARCE<sup>25</sup> believes that non surgical single-visit endodontic treatment is no longer limited to teeth that are uninfected or with vital pulps. Rather, application of this type of endodontic treatment has been expanded to include teeth with obvious periapical involvement. In a root canal culturing survey, TROPE & GROSSMAN<sup>33</sup>

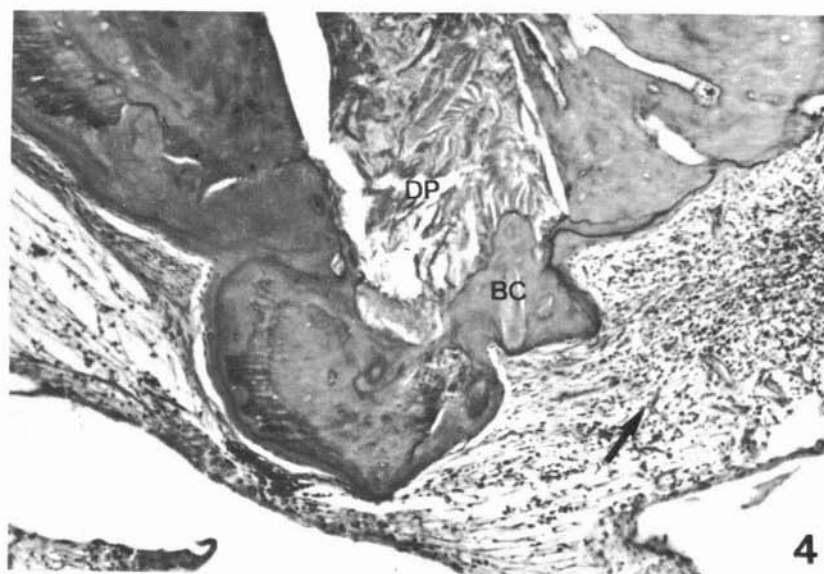
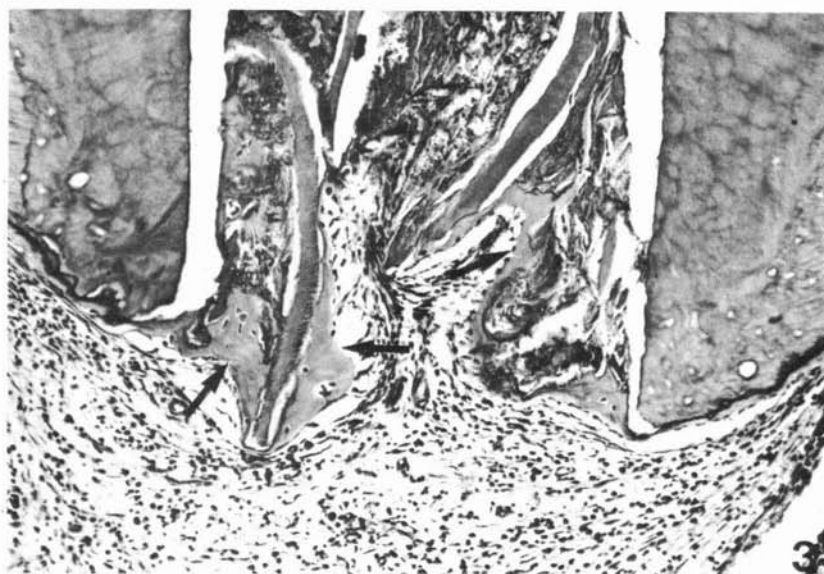


FIG. 3 - Higher magnification of figure 2, showing cementum deposition (arrows) in direct contact with the dentin chips of the plug. H.E. 100X

FIG. 4 - Root canal treatment in three sessions. The serial sections show the biological closure by cementum deposition (BC), in direct contact with de dentin plug (DP), is partial. There is a chronic inflammatory reaction in the periodontal ligament (arrow). H.E. 100X

observed that one-visit endodontics is practiced in more than a half of the United States schools, when a vital pulp is removed, but only about one-third performed treatment on teeth with necrotic pulps in a single visit.

There are several articles about root canal treatment in a single visit<sup>1,23,25,26,30</sup>, but only a few report treatment in cases of necrotic pulps with periapical involvement<sup>23,26,30</sup>. Most of these works are related with the incidence of postoperative pain after single and multiple visit endodontic procedures<sup>1,28</sup>. The incidence of pain is important, but we think the range of success and failure is more important. Some few clinical studies show us that the incidence of failure following single-visit endodontic therapy is similar to multiple visit<sup>23,26,30</sup>. Nevertheless, some histological analyses do not support that clinical data. It was observed better results in treatment with multiple visits<sup>12,13,14</sup> and that observations is in agreement with the results of this work.

Considering the great possibility of one makes an unintentional dentin plug<sup>24</sup> and considering the results of this and another work on infected dentin chips<sup>15</sup>, we think the single-visit root canal treatment must be done with caution.

The results of this research on root canal treatment with multiple visit show us that it is possible to obtain a dentin plug that works in cases of pulpless teeth. But, clinically we will never be sure the dentin chips employed is free from microorganisms.

## CONCLUSIONS

Based on our experiment we may conclude that to make a dentin plug on pulpless teeth in a single session treatment may delay or hinder the repair. Better results can be obtained if the plug was made after two dressings with camphorated chlorophenol.

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HOLLAND, R. *et alii* – *Efeito do curativo de demora na reação tecidual de dentes de cães após o emprego de plug de raspas de dentina em casos de necropulpectomia*. **Rev. Odont. UNESP, São Paulo, 18: 101-108, 1989.**

*RESUMO: O objetivo deste trabalho foi observar se o curativo de demora tem alguma influência no processo de reparo após o emprego de um plug de raspas de dentina em casos de necropulpectomia. Dentes de cães foram submetidos à pulpectomia e os canais deixados expostos ao meio oral até que lesões periapicais fossem detectadas radiograficamente. Os canais radiculares foram a seguir preparados e obturados com cones de guta-percha e cimento de óxido de zinco e eugenol, após a confecção de um plug apical de raspas de dentina, em sessão única, ou depois da aplicação de dois curativos de demora com para-monoclorofenol-canforado. Seis meses após o tratamento, a análise histológica mostrou melhores resultados no grupo onde se empregou o curativo de demora.*

*UNITERMOS: Plug de dentina; necropulpectomia; curativo de demora.*

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