



Disinfection of gutta-percha cones. Their effects on apical adjustment.



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INTRODUCTION

A successful in endodontic therapy aims at eliminate the microorganisms found in the root canal and prevents its return. ⁽¹⁾

The endodontic procedures should be understood as a succession of steps of an aseptic chain. Opening the cavity, insulation, root canal instruments, irrigation, medication between sessions and finally sealing the coronal restoration are links in this chain. ⁽²⁾

Gutta-percha cones have been considered as the best material for the endodontic filling, regardless of the method used. ⁽³⁾⁽⁴⁾ Gutta-percha is a polymer obtained by coagulation of the latex produced by trees of the Sapotaceae family, ⁽⁵⁾ it is rigid at room temperature and becomes malleable between 25 and 30 °C, softens at 60 °C and melts at 100 °C with partial decomposition. Gutta-percha cones are made up of approximately 18 to 22% of gutta-percha polymer, 59 to about 75% zinc oxide and 1.1 to 17.2% of barium sulfate. ⁽⁶⁾

There is some controversy as to whether it is necessary or not the sterilization of gutta-percha, due to the characteristics of the component materials ⁽⁷⁾ and/or antibacterial activity of the sealant, which is normally used with gutta-percha during root canal filling. ⁽⁸⁾

It has been suggested to disinfect gutta-percha cones with sodium hypochlorite, although the deposit of crystals on the surface and the morphological changes that can cause, might influence the adjustment; it has been proposed to rinse with ethyl alcohol 96° to eliminate these crystals from hypochlorite.

OBJECTIVES

To check contamination of gutta-percha cones in their packaging, and once opened it, if contamination during handling and storage of them arise.

To assess whether the disinfection of gutta percha cones with sodium hypochlorite affects their apical adjustment and, determine if it is modified by a rinse with ethyl alcohol.

MATERIALES Y METODOS

To check the contamination of gutta-percha cones 30 gutta-percha cones n^o 35 were evaluated, divided by origin into two groups: Group 1 (n = 15): gutta-percha cones (Dentsply, Asia) randomly chosen from five tubes unopened boxes just from trade, and Group 2 (n = 15): gutta-percha cones collected from tubes in use for fifteen professionals attending a postgraduate course.

Each gutta-percha cone was placed in a tube containing thioglycolate broth with indicator and incubated at 37 ° C for 48 hours. Of the tubes in which bacterial growth was observed the broth was seeded into agar blood and agar CLDE broth, incubated and microorganisms were identified by conventional biochemical tests.

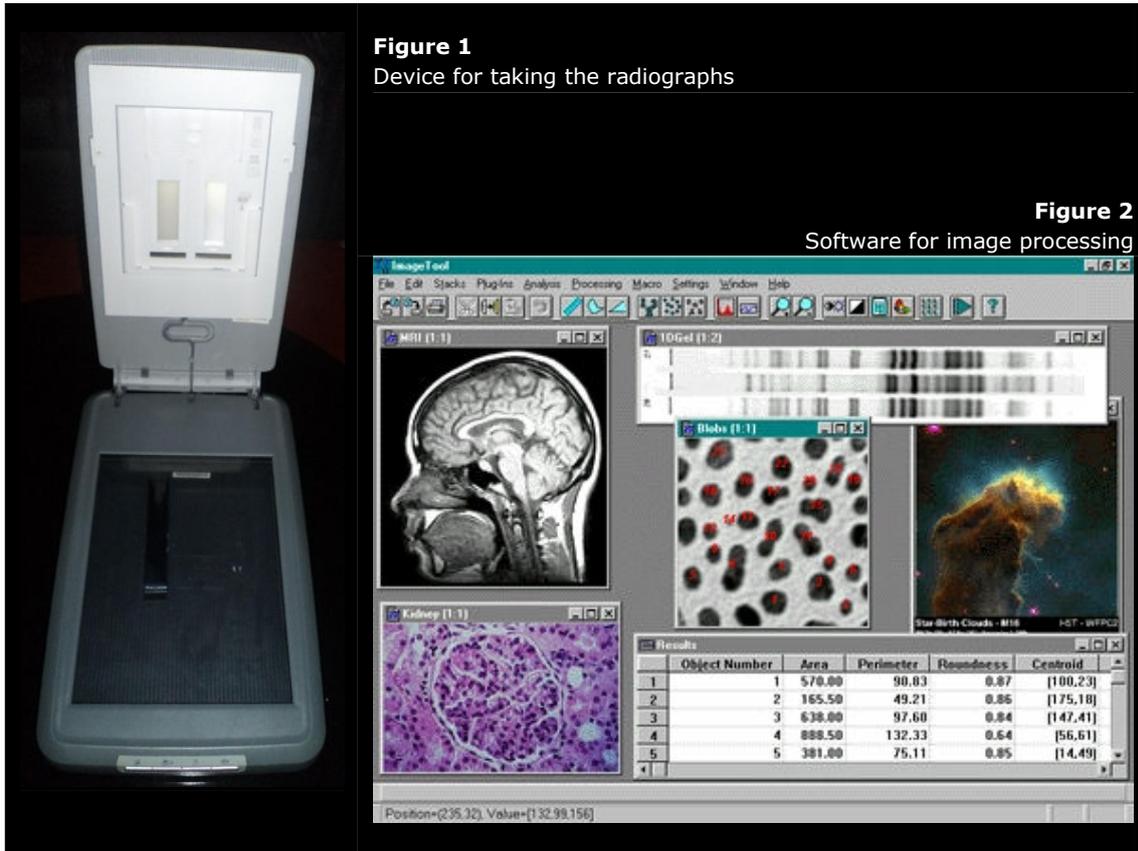
To evaluate the effect of disinfection maneuvers with sodium hypochlorite solution in gutta-percha cones thirty extracted upper incisors were selected, they were sterilized for biosafety reasons according to the principles of Tate and White⁽⁹⁾ and maintained in saline solution until its use in the experiment. During the different stages of this work the teeth were kept in a lidded container, to maintain moisture at room temperature. We performed the cavity opening to access the pulp chamber and determined the working length of each of the teeth by passing a K file number 10 through the root apex, withdrawing until it is flush, that length was recorded as total length and subtracted two millimeters to establish the working length. The teeth were instrumented with sequential technique with K files, the apical master file was established using an instrument number 50. During the instrumentation sodium hypochlorite solution 5.25% was used as irrigant, making a final inactivation of this solution at the end of the surgical preparation with distilled water by irrigation and aspiration. The canals were dried with paper cones.

Standardized gutta percha cones number 50 (Dentsply, Asia) were selected and paired with one of the teeth of the sample. Each one was tested, before disinfection, in the corresponding tooth to check if the gutta-percha cone adjusts in the apical matrix, it was evaluated visually, tactile and radiographically.

For the visual inspection it was checked that the gutta-percha cone reached the working length, marking the cone by pressing a cotton pliers in the coronary reference height used for surgical preparation; in each one of the cones a mark with ink was also made, to identify the face of the cone corresponding to the palatal part of the tooth, to ensure to after replace it in the same position.

The tactile control was performed assessing that there was some resistance to its displacement from the tooth (retention).

To perform the radiographic control the teeth were mounted in a device designed for this purpose built self-curing acrylic that allowed linking the teeth so that they could be assembled and disassembled in the same position. A periapical radiographic film was adapted to device. For evaluation, radiographs were digitized using a transparency scanner (HP Scanjet 4070 Photosmart Scanner, China) and were evaluated with an image processing software (Image Tool 3.00 - University of Texas Health Science Center in San Antonio, United States-).



The teeth were randomly divided into three groups (n = 10), in which the gutta-percha cones received a different disinfection protocol:

- **GROUP A:** gutta-percha cones were disinfected with sodium hypochlorite 5.25% for one minute;
- **GROUP B:** after disinfection (performed as in the group A) gutta-percha cones were rinsed in alcohol;
- **GROUP C:** cones received no treatment.

After the described treatment, gutta-percha cones were repositioned in the teeth and the adjustment was thereof evaluated similarly to the aforementioned (visual, tactile and radiographic).

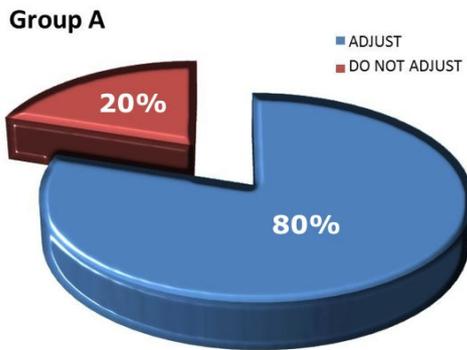
RESULTS

None of the gutta-percha cones from the boxes directly tested from the manufacturer (GROUP 1) were positive for bacterial growth, while three (20%) of the cones recollected in clinics (GROUP 2) were contaminated.

The broths that were positive for bacterial growth (n = 3) were seeded, and the development of more than one microorganism by contaminated cone was observed; totaling twelve isolations contaminating microorganisms identified is presented in Table I. The most frequently gender (84%) was *Staphylococcus*.

MICROORGANISM	%
<i>Staphylococcus grupo epidermidis</i>	42
<i>Staphylococcus grupo saprophyticus</i>	25
<i>Staphylococcus aureus</i>	17
<i>Bacillus spp</i>	8
<i>Micrococcus spp</i>	8

Table 1: Contaminants microorganisms of gutta-percha

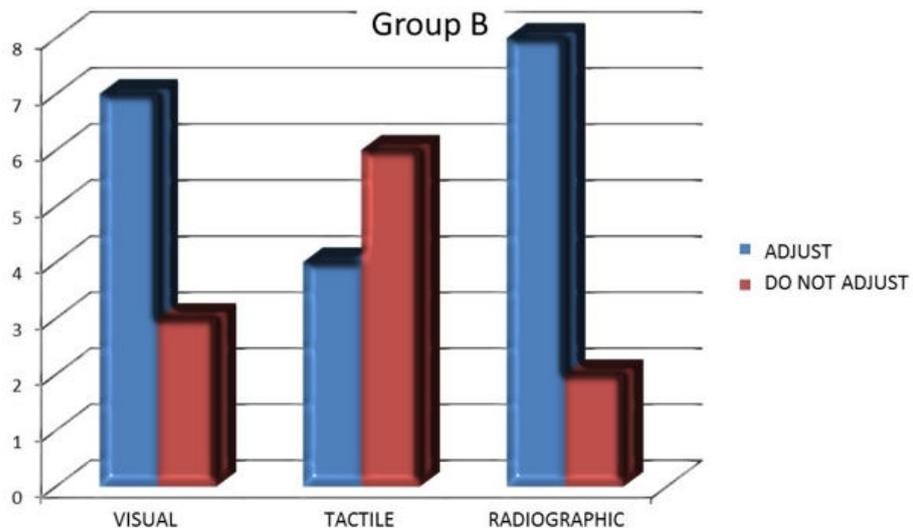


Graphic 1: Adjustment of cones in Group A tactile test

The average length of the teeth was 21.3 mm, with a range between 18 and 26 mm.

The gutta-percha cones were tested before disinfection and all adjusted satisfactorily. After performing the proposed disinfection strategies, in group A, two cones (20%) did not pass the tactile test (Graphic 1), while in group B, six cones (60%) did not pass the tactile test, three (30%) the visual and two (20%) the radiographic one (Graphic 2).

Cones in group C adjusted successfully initially and when were removed and repositioned into the root canal to working length.



Graphic 2: Adjustment of group B cones.

DISCUSSION

Our results show that, although gutta-percha cones are produced under aseptic conditions and potentially have antimicrobial properties especially due to its composition of zinc oxide, can become contaminated during handling, aerosol and physical contact, which coincides with that expressed by da Motta et al. ⁽¹⁰⁾

The cones in group 1 (evaluated directly from freshly opened containers) showed no microbial growth with the methodology used, which is consistent with the results of Doolittle et al., ⁽¹¹⁾ Kos et al., ⁽¹²⁾ and Pang et al. ⁽¹³⁾ Although they differ with the findings by Montgomery, ⁽¹⁴⁾ probably because they are currently used in different methods of manufacture, and exposed by Gomes et al. ⁽¹⁵⁾ who found 5.5% of contaminated cones but after 21 days of incubation, which increases the risk of cross contamination.

A 20% (n= 3) of the cones exposed in clinics were contaminated, which is similar to what described by Pang et al. ⁽¹³⁾ (19.4%), probably this is due to errors in the management of cones, which should always be handled with pliers and sterile gauze.

The gender most frequently found (84%) in contaminated cones was *Staphylococcus*, which agrees with the description by Pang et al. ⁽¹³⁾ and Gomes et al. ⁽¹⁵⁾ who report a similar contamination to that found in our study .

The presence in a greater number of *Staphylococcus epidermidis group* is not surprising because it is normal flora of the skin and mucous membranes. ⁽¹⁶⁾

The possibility of microbial growth on the surface of the gutta-percha, despite their limited antibacterial activity, make us agreed with Stabholtz et al. ⁽¹⁷⁾ in that it is necessary to discard the gutta-percha that have been in contact with patients.

The inability to sterilize gutta-percha by conventional methods (dry or moist heat) and the results of our work highlight the need to standardize a method of quick disinfection of gutta percha cones without altering its structure, which agreed with Senia et al. ⁽¹⁸⁾ Frank et al. ⁽¹⁹⁾ de Souza et al. ⁽²⁰⁾ Pang et al. ⁽¹³⁾ and Gomes et al. ⁽¹⁵⁾ among others, considering also that the biofilm that forms on the external area of the cone may play a role at the start of an infectious biofilm overfilling cases presenting periapical lesions. ⁽²¹⁾⁽²²⁾⁽²³⁾

The gutta-percha cone fitting, or adjustment on the walls of the root canal, promotes a better endodontic sealing. The degree of widening and instrumentation technique influence adaptation of the master gutta-percha cone. ⁽²⁴⁾

The tip, shape and dimensions of the master cone should be close to those of the last instrument used for the conformation of the apical third of the root canal. To achieve this adaptation is essential to correlate the number of the master cone with the last instrument used in the conformation of the apical third. As this correlation is subjective, just placing the cone in the canal allow us to assess its adaptation. When properly adjusted, the cone should offer discreet tensile strength; seems *caught* in the canal. The care and sensitivity are essential to be able to prove the cone adjust. ⁽²⁵⁾

Disinfection of gutta-percha cones with sodium hypochlorite solution has been proposed, among other solutions, by different authors. ⁽¹⁵⁾⁽¹⁸⁾⁽²⁴⁾

However, they have shown some risks, such as the deposit of crystals on the surface of the gutta-percha cone ⁽²⁵⁾ and the deformation produced by the action of hypochlorite in the cones. ⁽¹³⁾⁽²⁷⁾⁽²⁸⁾

These risks of disinfection of gutta-percha cones with sodium hypochlorite solution, involves morphological changes that could undermine the placement and adjustment of the master cone in the apical matrix, increasing sealant film, and be detrimental to the quality of endodontic obturation.

In our experience, the disinfection of gutta-percha cones with sodium hypochlorite solution 5.25% for 1 minute did not affect the apical adjustment, but this was changed when a rinse in ethyl alcohol was used.

Although disinfection time of gutta-percha cones depends on the contaminating microorganisms and varies according to the type and concentration of disinfectant used, if sodium hypochlorite 5.25% was chosen the time should not exceed the minute, so that the cone not show morphological changes described by different authors, and then they have to be dried on sterile gauze without other treatment.

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