Evaluation of Cell Pack paper points: A microbiological study

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ABSTRACT

Introduction: The presence of humidity inside the root canal system after instrumentation and removal of the septic content can influence the apex sealing and, consequently, the success of the endodontic treatment. **Objective:** To evaluate the efficacy of the sterilization method used in these cell-packed paper points; to evaluate whether paper points were contaminated after opening, to evaluate the effectiveness of the autoclave to sterilize the contaminated paper points in their cell packs, and to evaluate whether the calibration of these paper points can contaminate them. **Methods:** Dentsply, EndoPoints, Precise, Protaper, SybronEndo, VDW and Tanari cell-packed paper points were used. Evaluations were made according to propositions. In all steps, the paper points were placed onto brain heart infusion broth and incubated at 37° C in a CO_2 atmosphere for 7 days. The BHI broth was checked daily for appearance of turbidity. **Results:** No paper point removed directly from the cell pack presented contamination; however, contamination was observed when the cell packs were violated; after sterilization, the contaminated paper points were decontaminated; and finally, no contamination was found in paper points seized with sterilized tweezers and placed on a sterilized millimeter ruler. **Conclusion:** The cell-packed paper points are sterilized and when violated during handling, autoclaving is necessary and effective.

Keywords: Endodontics. Dental sealers. Sterilization.

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Introduction

The aim of the root canal filling is to fill the space previously occupied by the pulp, making this space impermeable and blocking its communication with the periapical tissues.[1] Drying the root canal is therefore an important aspect for a successful hermetic sealing as both adhesion and physicochemical properties of the filling materials are altered by moisture.[2,3]

The use of absorbent paper points after root canal aspiration is the most used method to obtain dry walls before filling.[4,5,6] Although these paper points are manufactured under aseptic conditions and present some antibacterial action,[7] they can be contaminated by physical sources during storage process, handling or aerosols after opening.

Leonardo et al[8] have evaluated the sterility of 96 absorbent paper points (Tanari, Conne and Odahcan) immediately after being removed from their sealed packages, and it was found that all brands showed some degree of contamination. Tartarotti et al[9,10] have also evaluated such a contamination in the box of absorbent paper points used in endodontic practice by the students of dentistry and observed that all paper points were contaminated. Due to the contamination of paper points in single-box, manufacturers began to make cell-pack boxes, where the paper points are sterilized and packed individually in small numbers to prevent this type of contamination.

Based on the findings above, the purposes of this study were: 1) to evaluate the efficacy of the sterilization method used in these cell-packed paper points; 2) to evaluate whether the paper points were contaminated after the cell packs were opened, 3) to evaluate the effectiveness of the autoclave to sterilize the contaminated paper points in their cell packs and, 4) to evaluate whether the calibration of these paper points can contaminate them.

Material and Methods

The brands of cell-pack boxes evaluated in this work were: Dentsply (Dentsply Maillefer, Petrópolis, Brazil), EndoPoints (EndoPoints, Paraíba do Sul, Brazil), Precise (Precise Dental Products, Canoga Park, CA, USA), Protaper (Dentsply Tulsa Dental, Tulsa, Ok, USA), SybronEndo (SybronEndo, Orange, CA, USA), Tanari (Tanarinan Industrial, Manaus, Brazil), and VDW (VDW, GmbH, Munich, Germany).

Analysis of the sterilization process in cell-packed paper points

To evaluate the sterilization of the cell-packed paper points, ten cells of each brand were used. The groups evaluated were the following:

» Positive controls: Groups 1 to 7 represent positive controls of Dentsply (G1), EndoPoints (G2), Precise (G3), Protaper (G4), SybronEndo (G5), Tanari (G6) and VDW (G7), respectively. The paper points were removed from their cell packs, manipulated with gloves, contaminated in the clinical setting, and placed onto brain heart infusion broth (BHI, Hi-Media, Mumbai, India).

» Negative controls: Groups 8 to 14 correspond to negative controls of Dentsply (G8), EndoPoints (G9), Precise (G10), Protaper (G11), SybronEndo (G12), Tanari (G13) and, VDW (G14), respectively. In this case, the paper points were removed from their cell packs, placed on appropriate paper, autoclaved and placed onto BHI medium.

» Experimental groups: The paper points were removed from their cell packs and immediately placed onto BHI medium as follows: Dentsply (G15), EndoPoints (G16), Precise (G17), Protaper (G18), SybronEndo (G19), Tanari (G20) and VDW (G21), respectively.

Analysis of paper points after opening the cell packs

In this step, ten cell packs were randomly selected for study. The cells remained partially opened in clinical setting during one month. Then, they were removed from their cells and placed onto BHI culture medium.

Analysis of the sterilization of the contaminated paper points

Ten cell packs of each brand were selected and used. The cells remained partially opened in clinical setting during one month. To ensure the total contamination of the paper points, they were manipulated with contaminated gloves. Then the cell packs with their contaminated points were placed on appropriate paper and autoclaved. Then, the points were removed from the cell packs and placed onto BHI.

Simulating clinical use

Again, ten cell packs were randomly selected for study. This step was carried out in clinical setting.

The paper points were seized with sterilized tweezers and placed on a sterilized millimeter ruler to simulate the contact, which occurred during endodontic therapy. Next, the points were placed in sterilized Eppendorf tubes to simulate the placement into the root canal. After that, the samples were removed from the tubes and placed onto BHI.

In all steps, the tubes were vortexed and incubated at 37° C in a CO_2 atmosphere for 7 days, with BHI broth being checked daily for appearance of turbidity. After this period, blood agar plates were inoculated with 10 mL from each tube and left at 37° C for 24-48 days in appropriate gaseous conditions in order to investigate all possible bacterial growth.[10] The data were evaluated qualitatively by the presence of turbidity broth (Fig 1).

Results

Regarding the analyses of the sterilization process in cell-packed paper points, in all samples, excluding positive controls (groups 1 to 7), the point cells were free of contamination.

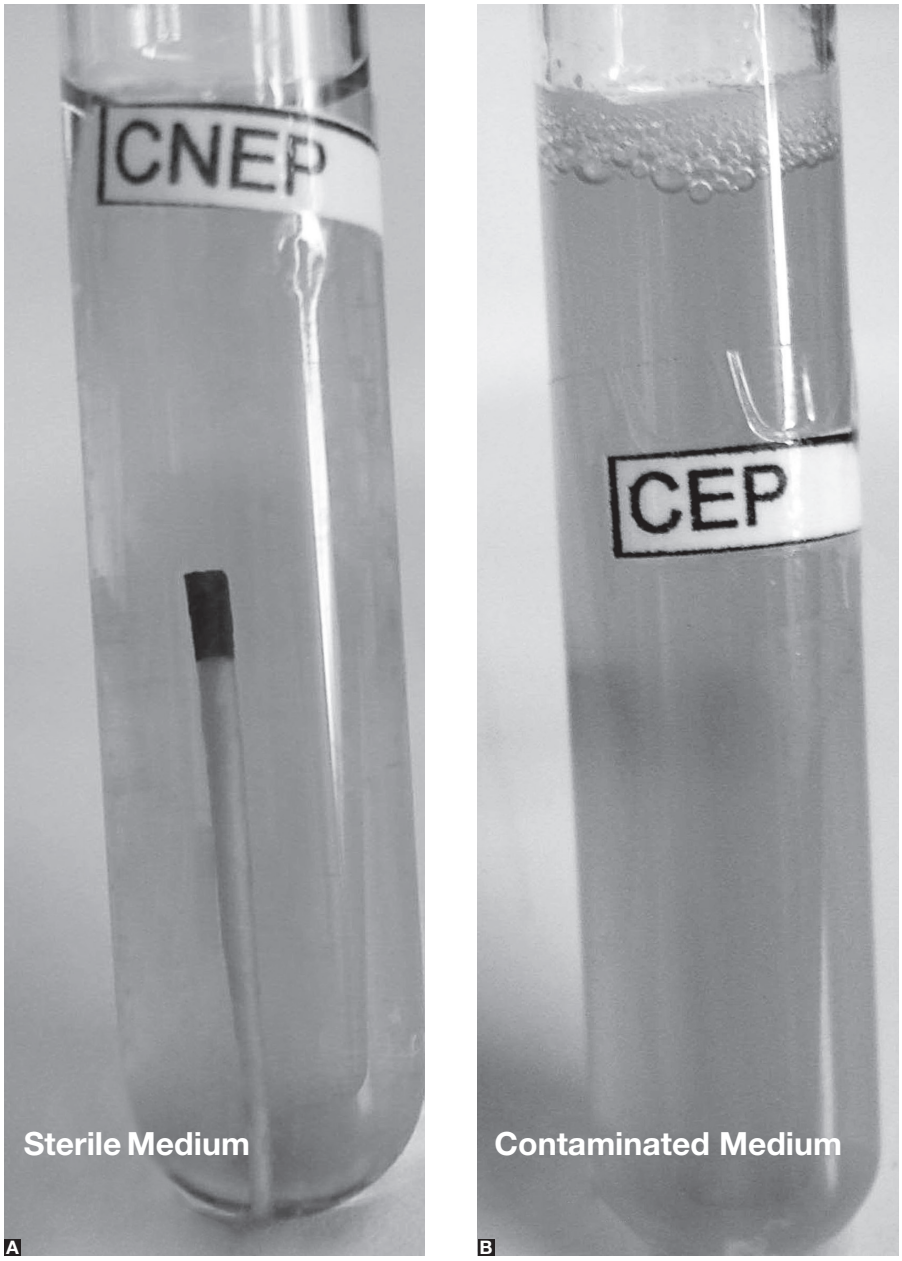

Figure 1. Broth appearance.

After exposure to clinical setting during one month, all cell packs were shown to be contaminated, and following the process of sterilization, no degree of contamination was found in these point cells.

With regard to the clinical application, the paper points seized with sterilized tweezers and placed on a millimeter ruler showed no contamination

Discussion

Endodontic therapy is associated with infection control and the maintenance of the aseptic chain is crucial to provide a better prognosis.[11] Thus, the use of sterilized paper point is essential during this therapy.

Although the literature presents many studies evaluating the absorbing capacity of paper points,[12-16] which is directly associated with the seal of the filling[2,3] few studies on microbiological evaluation are available.

In the present study, it was initially evaluated whether the cell-packed paper points were sterilized. According to the results, the point cells from all brands evaluated were sterilized. In this aspect, all manufactures, excluding the EndoPoints brand, affirm that cell packs were sterilized. Almeida et al[17] observed contamination in EndoPoints brand in their study. They also reported that these cells were easily violated during the handling.

These are packed side by side and during the removal of one cell, violation of the adjacent cell can occur. Thus, this study also evaluated whether the paper points were contaminated after the cell packs were violated and remained in clinical setting. The results showed that after violation the contamination occurred in all points.

As this point cells can be violated and the EndoPoints manufacture did not report the effectiveness of its sterilization process, the present study evaluated the efficacy of autoclaving process to sterilize the point in their cells and observed that this process was effectiveness. So, when the cell packs are violated, autoclaving of these points is necessary. With regard to this aspect, the literature shows that the sterilizing process does not affect the absorption capacity of paper point when submitted to fewer cycles.[18]

Finally, the present study has evaluated the clinical environment associated with the interactions between these paper points and endodontic instruments. This step of the endodontic therapy is critical because paper points are not like gutta-percha and Resilon points as the latter can be disinfected by using substances such as sodium hypochlorite and chlorhexidine.[19,20,21] Thus, care with sterilized paper points is crucial to avoid contamination of the root canal through them. The use of a sterilized millimeter ruler is essential at the moment of calibration and measurement of the paper point so that the root canal is not contaminated.

Conclusions

The cell-packed paper points are sterilized and when these cells were violated during handling, autoclaving this package is necessary and effective

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