The importance of final rinse after disinfection of gutta-percha and Resilon cones

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Objectives. The aim of this study was to evaluate the morphologic alterations on the surface of gutta-percha and Resilon cones exposed to disinfectant solutions.

Study design. Fifty-six gutta-percha and Resilon cones were used. Seven groups were analyzed: G1: control; G2, G3, and G4: 5.25% NaOCl, 2% CHX, and MTAD, respectively, without final rinse; G5, G6, and G7: the same solutions with final rinse. Then the samples were analyzed by means of scanning electron microscopy and energy dispersive spectroscopy.

Results. Regarding the use of NaOCl without rinse, there was chloride crystal formation in all samples. When the cones were rinsed, the crystals were removed. When 2% chlorhexidine was used, no change was observed. MTAD without rinse showed the presence of a precipitate in gutta-percha cones. When the cones were rinsed, it was eliminated.

Conclusions. The final rinse is essential, especially when NaOCl and MTAD are used in the cones’ disinfection process. (Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2011;111:e21-e24)
Group 1—control: The samples were removed from the box and observed under SEM to evaluate their surface topography. No solution was used.

Groups 2 (NaOCl), 3 (CHX), and 4 (MTAD)—without rinse: The cones were immersed in the solutions for 1 minute and then removed and allowed to air-dry for 30 minutes.

Groups 5 (NaOCl), 6 (CHX), and 7 (MTAD)—rinsed with distilled water: After immersion in the solutions, the cones were rinsed individually with 1 mL distilled water and allowed to air-dry for 30 minutes.

The samples were mounted on stubs, coated with gold, and analyzed with SEM and energy-dispersive spectroscopy (EDS) to assess, respectively, topography and chemical elements present on their surface. Three microphotographs (×300 magnification) of each sample were made, and 1 area was randomly chosen to be evaluated by EDS.

RESULTS

Figure 1 illustrates the topographic findings. The gutta-percha and Resilon cones immersed in 5.25% NaOCl revealed chloride crystal formation in all samples (Fig. 1, a and b). Size, location, and amount of crystal varied. Figure 2, a, shows a representative EDS spectrum of 1 sample of group 2. In the spectrum, Na⁺ and Cl⁻ were detected, characterizing the presence of a
salt. When the cones were rinsed with distilled water (Fig. 1, c and d), the chloride crystals were removed.

When 2% chlorhexidine was used, the groups without (Fig. 1, e and f) and with (Fig. 1, g and h) rinse showed no topographic change on the surface. EDS spectrum (Fig. 2, b) shows the presence of the component chlorine (Cl\(^{-}\)) of the CHX for samples before rinsing. After rising, the Cl\(^{-}\) was no longer detected.

The gutta-percha cones immersed in MTAD without rinse (Fig. 1, i and j) showed the presence of a layer covering all samples. When the cones were rinsed with distilled water (Fig. 1, k and l), this layer was completely removed. In this case, when MTAD is used, the rinse is essential for surface cleanness. EDS showed no significant change in the composition of the cones after MTAD immersion (data not shown).

**DISCUSSION**

Even though gutta-percha and Resilon cones are usually sterile during storage, they can be easily contaminated if incorrectly manipulated. Gomes et al.\(^{8}\) verified that 100% of the gutta-percha cones manipulated with gloves showed microbial growth, thus demonstrating the importance of the disinfection procedures.

Three solutions, 5.25% sodium hypochlorite, 2% chlorhexidine, and MTAD, are usually used in rapid chair-side chemical disinfection.\(^{3,6,10,13-16}\)

The present study evaluated by means of SEM the changes in the surface of cones after disinfection procedures. When 5.25% NaOCl was used without a final rinse, the presence of chloride crystals was observed. On the other hand, such crystals were removed after rinse with distilled water, which is corroborated by Short et al.\(^{12}\) Pang et al.\(^{17}\) also verified the presence of crystals on the surface of gutta-percha cones.

When 2% chlorhexidine was used, no topographic changes were observed either with or without rinse. This finding is in accordance with Gomes et al.,\(^{2}\) who did not find alterations in the cone surface after rinse with distilled water. However, Valois et al.\(^{18}\) and Isci et al.\(^{19}\) detected surface alterations after short periods of exposure to 5.25% NaOCl and 2% chlorhexidine. Such difference in the findings may be due to the different techniques used in the analyses, because Valois et al.\(^{18}\) and Isci et al.\(^{19}\) had used atomic force microscopy analysis and our study used SEM.

Royal et al.\(^{10}\) demonstrated that MTAD, an irrigant introduced as a final irrigant for disinfection of the root canal system, can be used in the rapid disinfection of gutta-percha and Resilon cones. Their study demonstrated that this solution was effective against Enterococcus faecalis, and that 1-minute immersion was adequate to disinfect them. Although that study demonstrated that this solution is effective in the disinfection of the cones, in the literature there is a lack of data regarding the action of MTAD on the topography of the Resilon and gutta-percha cones.

The present study evaluated the action of MTAD on the topography of the cones and verified that the use of MTAD without rinse caused significant changes in the surface of gutta-percha cones. When the solution dried on the surface of gutta-percha, it formed a layer that solidified and modified completely the topography. After rinse, this layer was removed. In this case, the EDS analyses showed no significant change in the composition of the cones after MTAD immersion with and without rinse. This finding could be due to the organic characteristic of the solution.

Owing to the fact that MTAD creates a layer that covers the surface of gutta-percha cones, the final rinse is indispensable after the process of disinfection, because this layer will impair the contact between the cone and the sealer and compromise the obturation seal and consequently the success of endodontic therapy.

Regarding the Resilon cone surfaces, MTAD did not cause changes either with or without final rinse. Again, the EDS analyses showed no significant change in the composition in both cases.

**CONCLUSIONS**

The final rinse with distilled water after disinfection procedures is essential, mainly when NaOCl and MTAD are used, because these solutions cause modifications on the surface of cones and thus impair the obturation seal as a result.

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**REFERENCES**


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