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Differences in disinfection protocols for root canal treatments between general dentists and endodontists

A Web-based survey

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ABSTRACT

Background. The purpose of this study was to determine whether differences exist in disinfection protocols between endodontists and general dentists.

Methods. The authors sent an invitation to participate in a Web-based survey to 950 dentists affiliated with the Spanish Board of Dentistry. Participants responded to 9 questions about irrigation protocols and other factors related to disinfection during root canal therapy.

Results. A total of 238 (25.05%) study participants successfully completed and returned the surveys. Among these participants, 50% were general dentists and 50% were endodontists. The authors found no statistically significant differences in respondents' first choice of an irrigant solution (that is, sodium hypochlorite), but they noted statistically significant differences in the protocols used by general dentists and by endodontists in relation to the concentration of sodium hypochlorite ($P = .0003$), the use and type of irrigant used to remove the smear layer ($P = 5.39 \times 10^{-10}$), the use of adjuncts to irrigation ($P = 5.98 \times 10^{-8}$), the enlargement of the apical preparation when shaping a necrotic tooth ($P = .001$), and the maintenance of apical patency throughout the debridement and shaping procedure ($P = .04$).

Conclusions. General dentists and endodontists embrace different disinfection protocols. The results of the survey demonstrated that endodontists keep up to date with protocols published in the literature, whereas general dentists use protocols learned during their dental training. Both groups of clinicians should be aware of the importance of disinfection techniques and their relationship to treatment outcomes.

Practical Implications. Controlling microorganisms during a root canal treatment, especially in cases with necrotic pulp, is essential to improve treatment outcomes. Clinicians should update their protocols and also consider referring patients to a specialist when their protocols are based on traditional techniques, especially in those cases with necrotic pulp.

Key Words. Disinfection; endodontist; general dentist; instrumentation; irrigation; root canal.

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During the past decade, clinicians have placed substantial emphasis on having the enhanced ability to clean and shape the root canal space with the new iterations in nickel titanium rotary file designs. The technology and improved instrumentation protocols that are available now can eliminate a reasonable amount of microorganisms from a root canal system.[1-4] Despite these technological improvements, the percentages of treatment outcomes related to root canal therapy remain unchanged primarily because files cannot eradicate the microbial contamination within the labyrinthine anatomy of root canal systems.[5] According to the literature, the presence of intracanal microorganisms is the most common cause of persistent apical periodontitis.[6,7] In a prospective study, Ng and colleagues[5] observed that for each millimeter of a periapical lesion, the odds of successful root canal therapy decreased by 14%. Accordingly, Ricucci and colleagues[8] reported that biofilms were present in 62% to 82% of the cases with small and large apical radiolucencies, respectively. Considering the results of these studies, it is reasonable to conclude that having an apical lesion is a good indicator of having an intracanal infection and that the presence of mature biofilms presents a

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significant challenge to the disruption of a microbial complex with a high organization level and defensive mechanisms.[9]

In 1956, Strindberg focused on the influence that microorganisms have on the outcome of endodontic therapy.[10] Of 258 patients recalled, Strindberg observed that in cases with apical periodontitis, the percentage success rate decreased by 23%. The investigators of more recent studies[5,11] have demonstrated that this pattern has remained consistent over time. Recalls of 816 patients after 5 years demonstrated that the percentages were virtually identical (92.3% and 82.7% for vital cases and teeth with apical periodontitis, respectively) to those obtained by Strindberg[10] 55 years previously. These results are in agreement with Friedman and colleagues[12] who reported that when there was a preoperative presence of inflammation in the apical tissues, the treatment outcomes decreased by 10% to 25%.

Therefore, current disinfection protocols strategically impact treatment outcomes. In this study, we analyzed those factors that had a significant effect on disinfection of the root canal system. Investigators have reported scientific correlations with endodontic treatment outcomes and the following factors: type of irrigant, irrigant concentration, smear layer removal, apical enlargement, apical patency, adjuncts to irrigation, type of intracanal medication, and the circumstances within which medication was used.[5,13-17]

Alley and colleagues[18] reported that root canal treatments were more successful when performed by endodontists, compared with general dentists. However, the reality is that general dentists provide the most endodontic therapy to dental patients. The results of a 2005-2006 survey conducted by the American Association of Endodontists[19] (AAE) showed that an estimated 15.1 million root canal treatments were performed annually. General dentists performed 10.9 million procedures (72%), whereas endodontists performed 4.2 million procedures (28%).

The investigators of previous studies surveyed endodontists about the irrigant solutions or activation techniques they used.[20-22] Considering the fact that general dentists perform the most root canal treatments, it is clinically relevant to analyze their disinfection protocols. The aim of this study was to evaluate current disinfection protocols among Spanish general dentists and endodontists as well as to determine the influence of the clinician's specialization level on protocols and strategies.

METHODS

We e-mailed an invitation to participate in a Web-based survey (using www.EncuestaFacil.com) to 950 dentists affiliated with the Spanish Board of Dentistry. We asked participants to answer 9 questions that had an emphasis on disinfection and, more specifically, on irrigation. We provided multiple-choice questions with an option for write-in answers and numeric rankings where appropriate (Figure 1). We sent the e-mail only once to all participants with the condition that they respond to the survey within an 8-week time frame.

Data analysis included descriptive statistics. We analyzed comparisons between the irrigation protocols used by general dentists and endodontists by using the Fisher exact test when the variable was dichotomous (for example, apical enlargement depending on pulpal vitality status) or by using the χ^2 test if the variable was not dichotomous. We calculated the odds ratios (OR) and the 95% confidence intervals (CI) for those irrigation protocols that differed significantly between the 2 groups of professionals.

RESULTS

Participants successfully completed a total of 238 surveys; therefore, the overall completion rate was 25.05%. Among the participants, 119 were general dentists (50%) and 119 were endodontists (50%). The table displays the results for each question of the survey.

We found no significant differences between the groups of clinicians in their choice of the primary irrigant solution, nor in their use of chlorhexidine as a secondary irrigant, as well as the concentration of chlorhexidine they used. Of the respondents, 93.3% (111) of the general dentists and 98.3% (117) of the endodontists used sodium hypochlorite (NaOCl) as the first choice of irrigant. When asked about the use of chlorhexidine as a secondary irrigant, 45.4% (54) of general dentists and 55.4% (66) of endodontists reported that they used chlorhexidine as a secondary irrigant without statistical differences. In relation to concentration of chlorhexidine, 68.5% (81) of generalists and 75.8% (90) of endodontists used a 2% concentration of chlorhexidine.

We found statistically significant differences, however, when we compared the following factors:

- Percentage of NaOCl used ($P = .0003$). Although almost 50% of the general dentists preferred to use a concentration of NaOCl lower than 2.5%, most endodontists (77.3%; 92) used a concentration of NaOCl greater than 2.5% (OR = 3.24; 95% CI, 1.9-5.7) (Figure 2).
- Type of irrigant used to remove the smear layer ($P = 5.39 \times 10^{-10}$). Five percent of endodontists did not remove the smear layer, in comparison with 26.9% (32) of general dentists who did not remove the smear layer (OR = 8.39; 95% CI, 3.1-22.4). In fact, as shown in the table, although the preference among endodontists

ABBREVIATION KEY. **AAE:** American Association of Endodontists. **ANP:** Apical negative pressure. **EDTA:** Ethylenediaminetetraacetic acid. **NA:** Not applicable. **NaOCl:** Sodium hypochlorite. **PUI:** Passive ultrasonic irrigation.