Clinical Decision Making in Restorative Dentistry, Endodontics, and Antibiotic Prescription

Yehuda Zadik, D.M.D., M.H.A.; Liran Levin, D.M.D.

Abstract: The purpose of this study was to evaluate the influence of geographic location of graduation (Israel, Eastern Europe, Latin America) on decision making regarding management of dental caries, periapical lesions, and antibiotic prescribing routines. A questionnaire was given to ninety-eight general practitioners regarding demographic and work habits. Photographs of lesions were shown on a screen. Participants reported recommended treatment and whether they would routinely prescribe antibiotics following regular endodontic treatment, retreatment, and impacted third molar surgical extraction in healthy patients. There was a 94 percent (n=92) response rate, of which eighty-five responses were used in the data analysis. Surgical treatment of asymptomatic enamel caries lesions was not recommended by most of the subjects, and surgery was recommended for DEJ caries lesions in low or moderate caries risk patients, both without significant differences between geographic regions of dental school graduation. Israelis had a lower frequency of retreatment in asymptomatic teeth that demonstrated periapical radiolucency with post restoration (without crown) compared to Latin Americans and East Europeans. Most of the participants would not retreat asymptomatic teeth that demonstrated periapical radiolucency with post and crown. After third molar surgery, 46 percent of participants routinely prescribed antibiotics. Significantly more Latin American graduates prescribed antibiotics following endodontic treatment, retreatment, and third molar extractions (p<0.05). Overmedication (antibiotics) and overtreatment (caries) among young practitioners reflect failure of undergraduate education in proper use of antibiotics and management of the carious lesions according to the patient’s clinical presentation and caries risk assessment rather than routinely undertaking surgical caries treatment.

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The dental profession is unique among the various types of health care providers in that, in most instances, the dental practitioner alone is responsible for performing a diagnosis, determining treatment options, and performing the chosen treatment. Variations have been found among dental practitioners regarding diagnosis and treatment of dental caries lesions, periapical lesions, third molars, and malocclusions, as well as differences in antibiotic prescription habits after endodontic treatment and extractions. This variation can be explained by differences in culture, patient preferences, treatment methods, prevalence of disease, practitioner to patient ratio, available resources, reimbursement systems, postgraduation education, and the existence and application of clinical guidelines.

The dental profession in the Western world has moved from an intervening/invasive approach to a conservative/preventive approach in caries management during the past forty years. The main reasons for this shift are the establishment of effective preventive measures for dental caries, which lead to disease prevention and control of its progression, as well as the development of more conservative treatment methods and materials. According to the current literature, asymptomatic enamel- or DEJ-caries lesions should not be surgically treated in healthy patients with low or moderate caries risk unless there is visible cavitation.

An asymptomatic periapical lesion is not considered an indication for endodontic retreatment in a tooth with previous adequate endodontic treatment and restoration that has not been subjected to further restoration. Review of the literature indicates that there is no consensus about periapical diagnosis and treatment decisions among practitioners. In one study in which twelve general dental practitioners (GDPs) were compared with twelve endodontic postgraduate students, GDPs decided retreatment more often. The opposite was found in a Swedish study involving twenty GDPs and twenty endodontists. In a study conducted by Molven et al. that included one oral
surgeon, one endodontist, and an oral radiologist, the latter participant recommended more patients for retreatment. Reit and Hollender found consensus among practitioners for only 27 percent of pathologic patients and 37 percent of the healthy patients in a study involving three endodontists and three radiologists. When Molven et al. examined consensus between an oral surgeon and an endodontist, a 63 percent rate of agreement was found and 94 percent rate of agreement after joint evaluation of the two practitioners.

Factors that influence treatment decisions by GDPs, in cases of periapical lesions, include the technical quality of the original treatment and economics, but usually not the practitioner’s work sector (public vs. private). GDPs decide on endodontic retreatment according to the size of the periapical lesion. Periapical photos of similar diameter lesions, 0.5 cm, were used in the present study, which is usually considered “a disease” in continuum.

Perioperative use of antibiotic agents in third molar surgery and endodontic procedures has not been shown to reduce postoperative complications. Recently, amoxicillin/clavulanic acid has been reported to reduce post-third molar surgery complications, but no recommendations have been made to routinely prescribe amoxicillin/clavulanic acid after tooth extraction. Thus, routine use of antibiotics following third molar surgery and endodontic treatments in healthy patients is firmly contraindicated by the current literature as costly and harmful, with little or no effect.

Palmer et al. reported an association between dentists’ awareness of guidelines for use of antibiotics in the dental setting and their place of practice. In a questionnaire regarding knowledge of the use of antibiotics, English dentists had a higher average score than their Scottish counterparts. It has been suggested that prescription of antibiotics is influenced by undergraduate and postgraduate education, publication, and advertising. Nevertheless, 43 to 58 percent of the members of the Connecticut Society of Oral and Maxillofacial Surgeons prescribe antibiotics following third molar surgery in healthy patients. A sample of English dentists has shown that 39 percent routinely prescribe antibiotics following third molar surgery and 8 percent for endodontic treatments. Furthermore, 12 to 19 percent of the members of the American Association of Endodontists routinely prescribe antibiotics following endodontic treatment of a necrotic pulp with mild or without preoperative symptoms, and 15 to 27 percent prescribe antibiotics following endodontic retreatment.

The purpose of this study was to evaluate the influence of place of graduation on decision making regarding management of dental caries and periapical lesions, as well as antibiotic prescribing routines, of young general practitioners who graduated from Latin American, East European, and Israeli dental schools and who are currently working in the same environment.

Methods

During a convention of the Dental Division of the Israeli Defense Forces, a convenience sample of ninety-eight general dental practitioners were asked to answer a questionnaire regarding demographics and work habits.

Participants were asked to report which treatment they would recommend in each case. The photos were of twenty-year-old, systemically healthy, low and moderate caries risk patients showing interproximal caries lesions in the enamel layer and in the dentino-enamel junction (DEJ).

The presented endodontic photos were of periapical radiolucencies, approximately 0.5 cm in diameter, around the mesial root apices of endodontically treated mandibular first molars (one lesion in each tooth). The photographic appearance of all endodontic treatments was with adequate condensed intra-canal material to a proper working length. All teeth were restored with a post and amalgam core (with or without porcelain-fused-to-metal crowns) and were not subjected to further rehabilitation. The participants were told that the endodontic treatment was done one year ago and the patients are newcomers without any information about the pretreatment diagnosis/presence of lesion or size of the pretreatment lesion. In all cases, the participants were told that the patient was asymptomatic and had come to the clinic for the first time for a routine dental examination.

Practitioners were also asked to describe whether antibiotics would routinely be prescribed following regular endodontic treatment, endodontic retreatment, and impacted third molar surgical extraction in healthy patients. A positive answer required the practitioners to report the antimicrobial agent they would use in a healthy, nonallergic patient.

Data were collected and analyzed by SPSS 10.0 (SPSS, Inc., Chicago, IL, USA). The associa-
tion between group scores was examined using a $\chi^2$ test. A value of $p<0.05$ was considered statistically significant.

**Results**

There was a 94 percent (ninety-two out of ninety-eight) response rate: fifty-two Israeli dental school graduates, twenty-two from Eastern European schools (twelve from Russia, four from Romania, four from Ukraine, and two from Hungary), eleven from Latin America (seven from Mexico and four from Argentina), five from Western Europe, and two from the United States and Canada. Practitioners from Western Europe and United States/Canada were excluded from the study due to the small number, thus producing a sample of eighty-five, made up of twenty-two women and sixty-three men. All participants were general dental practitioners less than ten years beyond graduation (mean 5.7±1.8). This sample may represent the dentists regularly practicing in the Israeli military.

Recommendations regarding dental caries treatment are summarized in Table 1. Surgical treatment of an asymptomatic enamel caries lesion was not recommended by most participants. However, surgical treatment of DEJ caries lesions, either in low or moderate caries risk patients, was recommended by most of the study participants, but with no significant differences between individuals who graduated from dental school in different geographic regions.

The Israeli graduates had a lower frequency of endodontic retreatment decisions in teeth with post restorations (without crown) compared to the other two groups. However, most of the participants decided not to endodontically retreat the tooth restored by a post and crown (Table 2).

Table 3 shows that 46 percent of all general dentists in this sample routinely prescribed antibiotics

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<tr>
<th>Table 1. Practitioners’ recommendation regarding treatment for caries lesions</th>
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<td><strong>Place of Graduation</strong></td>
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<td><strong>Recommendation</strong></td>
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<tr>
<td>Surgical treatment for enamel caries</td>
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<tr>
<td>Surgical treatment for DEJ caries in a low caries risk patient</td>
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<td>Surgical treatment for DEJ caries in a moderate caries risk patient</td>
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<th>Table 2. Practitioners’ recommendation regarding endodontic retreatment of asymptomatic periapical lesions (all teeth were not subjected to further rehabilitation)</th>
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<td><strong>Place of Graduation</strong></td>
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<tr>
<td><strong>Recommendation</strong></td>
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<tr>
<td>Retreated a post-restored tooth with asymptomatic periapical radiolucency</td>
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<tr>
<td>Retreated a post and crown restored tooth with asymptomatic periapical radiolucency</td>
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* $p<0.05$

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<th>Table 3. Participants’ habits of routine antibiotic prescription</th>
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<td><strong>Place of Graduation</strong></td>
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<td><strong>Recommendation</strong></td>
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<td>Antibiotics prescribing after endodontic treatment</td>
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<td>Antibiotics prescribing after endodontic retreatment</td>
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<td>Antibiotics prescribing after tooth extraction</td>
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* $p<0.05$
after third molar surgery. Amoxicillin was the most common antibiotic agent prescribed for exodontia in all groups, reported by thirty-five (89.7 percent) of the thirty-nine antibiotic prescribers.

Discussion

Most of the dentists in our study, from all groups, surgically treated DEJ caries in a moderate caries risk patient, and most of the Israeli and East European dentists surgically treated DEJ caries in a low caries risk patient. Previous studies reported overtreatment in restorative dentistry among Australian dentists but not among Scandinavian practitioners.2,3 There were significant differences among practitioners according to place of graduation with regards to endodontic decision making. This finding agrees with Aryanpour et al.,8 who found that “school-effect” provides an explanation for the disagreement among European practitioners regarding periapical disease treatment decisions.

Our results, in which 2 to 27 percent of the dental practitioners prescribed “prophylactic” antibiotics following endodontic treatment, 4 percent to 27 percent following endodontic retreatment, and 39 percent to 64 percent following third molar surgery, are similar to previous studies.20,21,34,35 These reports support the need for continuing postgraduate education regarding proper antibiotic use in dental practice.

Our study isolated the geographic location of GDPs’ dental school education as a potential parameter in dental decision making; the study participants did not differ in working environment, and no distinctive financial or economic factors were present. Participants were young general practitioners who graduated from Israeli, East European, and Latin American dental schools and serve as permanent dental surgeons in the Israeli military.

The Israel Defense Forces do not have any medical or dental schools. The GDPs in this study all graduated from certified dental schools and had a practicing license from the Israeli Ministry of Health. The working environment is unique because of the eighteen- to fifty-year-old healthy patient population, the uniform availability of equipment and materials, and the absence of any financial undertaking. Treatment is provided free, and the dental practitioner does not gain financially according to his or her production.

According to the results, dental surgeons who graduated from different dental schools in different locations differed in their practicing habits and decision making. This observation is important since foreign-trained dentists play an important role in dental practice in Western countries.36-38 Moreover, sometimes the foreign-trained dentists are invited to bridge the gap in manpower. For example, in the last decade the State of California invited Mexican dentists to practice in areas that have low access to dental care.37 The health authorities must keep in mind that foreign-trained dentists may have clinical philosophies that differ from the local common practice.38

Although all participants graduated less than ten years before this study was conducted, in an era in which treatment philosophy emphasizes less intervention, our results suggest some degree of overtreatment in restorative dental care, regardless of the GDPs’ location of predoctoral dental education. More East European graduates recommended endodontic retreatment when it was unnecessary, and more Latin American graduates prescribed unnecessary postoperative antibiotics.

In a previous study by Zadik and Levin that assessed decision making in third molar surgery in the same population of dental practitioners, Israeli graduates more often recommended removal of the mandibular third molar than their Latin American and East European counterparts.17 However, the authors concluded that decisions regarding third molar treatment were not evidence-based and not rational among practitioners in all three groups.

An important limitation of this study is the rather small cohort of subjects from two of the geographic regions. This was a result of the convenience cohort design of the study.

Conclusion

Overmedication of antibiotics and overtreatment of caries among these relatively young practitioners (average of 5.7 years of practice), who had received undergraduate education in an era characterized by the emergence of antibiotic resistance and decrease in caries prevalence, reflects the failure of undergraduate education to prepare graduates for the
proper use of antibiotics and train graduates in the management of the caries lesion according to the patient’s clinical presentation and caries risk assessment rather than routinely surgical caries treatment.

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REFERENCES