

Original Article

Assessment of Correlation of Apical Periodontitis and Quality of Root Canal Therapy in patients undergoing Endodontic Therapy

Arundeeep S Brar¹, Deepak Kumar¹, Gursimran Singh², Sameer Khajuria³, Ravneet Kour²

¹PG student, Department of Periodontics, Desh Bhagat Dental College, Punjab, ²PG student, Department of Conservative dentistry, ³PG student, Department of Periodontics, BRS Dental College & Hospital, Sultanpur, Panchkula, Haryana, India

ABSTRACT:

Background: The tooth, the pulp tissue within it and its supporting structures should be viewed as one biologic unit. The interrelationship of these structures influences each other during health, function and disease. Ectomesenchymal cells proliferate to form the dental papilla and follicle, which are the precursors of the periodontium and the pulp respectively. Hence; we planned the present study to assess the prevalence of apical periodontitis and the technical quality of root canal fillings in a known population.

Materials & methods: The present study included assessment of prevalence of apical periodontitis in patients undergoing root canal therapy. A total of 50 patients were included in the present study. Periodontal condition of the patients undergoing root canal therapy was assessed. All the results were assessed by SPSS software. **Results:** 28 teeth were root canal treated with Apical periodontitis, while the remaining 22 teeth were root canal treated without apical periodontitis. **Conclusion:** A strong correlation exists between the quality of root canal therapy done and the prevalence of apical periodontitis.

Key words: Endodontic therapy, Periodontitis, Root canal

Corresponding Author: Dr. Arundeeep S Brar, PG student, Department of Periodontics, Desh Bhagat Dental College, Punjab

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INTRODUCTION

The tooth, the pulp tissue within it and its supporting structures should be viewed as one biologic unit. The interrelationship of these structures influences each other during health, function and disease. The interrelationship between periodontal and endodontic diseases has aroused much speculation, confusion and controversy.^{1, 2} The relationship between the periodontium and the pulp was first discovered by Simring and Goldberg in 1964. The periodontium and pulp have embryonic, anatomic and functional interrelationship. Ectomesenchymal cells proliferate to form the dental papilla and follicle, which are the precursors of the periodontium and the pulp respectively.^{3, 4} This embryonic development gives rise to anatomical connections, which remain throughout life.⁵ Hence; we planned the present study to assess the prevalence of apical periodontitis and the technical quality of root canal fillings in a known population.

MATERIALS & METHODS

The present study was conducted in the department of periodontics and endodontic of dental institution and included assessment of prevalence of apical periodontitis in patients undergoing root canal therapy. Ethical approval was taken from institutional ethical committee

and written consent was obtained after explaining in detail the entire research protocol. A total of 50 patients were included in the present study. One experienced endodontist and periodontist were recruited for evaluation of quality of root canal therapy. Radiographic criteria given previously in the literature were used for the examination of the teeth. Tooth with radiopaque material in pulp chamber and/or root canal(s). Periodontal condition of the patients undergoing root canal therapy were assessed as follows: Healthy periodontal ligament (intact, no sign of apical pathosis) or AP [widening of periodontal ligament (apical portion not exceeding 2× width of lateral periodontal ligament space) or apical radiolucency (radiolucency at root apex exceeding 2× width of lateral periodontal ligament)]. All the results were assessed by SPSS software. Chi- square test was used for assessment of level of significance. P- value of less than 0.05 was taken as significant.

RESULTS

In the present study, we included a total of 50 patients who underwent root canal therapy for permanent mandibular first molar. Out of 50, 28 teeth were root canal treated with Apical periodontitis, while the remaining 22 teeth were root canal treated without apical periodontitis.

Table 1: Prevalence of apical periodontitis (AP) in root canal treated teeth

Parameter	Total teeth	Root canal treated teeth with AP	Root canal treated teeth without AP
Number of teeth	50	28	22

DISCUSSION

The etiologic factors involved in the evolution of perio-endo lesions can be of a varied nature. However, it is widely accepted that microbial agents are the main cause. The formation of bacterial plaque on denuded root surfaces, following periodontal disease, has the potential to induce pathologic changes in the pulp through lateral or accessory canals.⁶⁻⁸ This process, the reverse of the effects of a necrotic pulp on the periodontal ligament, has been referred to as retrograde pulpitis.⁹ Hence; we planned the present study to assess the prevalence of apical periodontitis and the technical quality of root canal fillings in a known population. Kabak Y et al estimated the prevalence of teeth with apical periodontitis (AP) and technically failed root fillings in an adult Belarusian population. Panoramic radiographs of all 1423 patients over 15 years of age not seeking emergency dental care, and attending the Dental School of the Belarusian Medical University for the first time during the period from 1 January to 31 December 2001 were examined. The quality of root fillings was scored according to criteria of length proposed by De Moor et al. [International Endodontic Journal 33 (2000) 113] and the periapical status of all teeth (except third molars) was categorized on the basis of presence or absence of radiographic signs of AP. The data were analysed using the chi-square test and odds ratio. Radiographs indicated that 8632 teeth (22% in the maxilla; 21% in the mandible) were missing leaving a total of 31,212 teeth to be assessed. Twenty per cent of the teeth had some filling material in the root canal(s). AP was found in 1141 subjects (80%) and 12% of the teeth. AP was more frequently associated with molar teeth (23%) than premolar (14%), canine (4%) and incisor teeth (6%). AP was diagnosed in 45% of root filled teeth, the remaining cases with AP had not been root filled. Statistical analysis showed that the probability of radiological detection of AP in root filled teeth was 25-fold higher than when the root canals had not been filled ($\chi^2 = 8636.04, P < 0.001$, odds ratio with 95% confidence intervals: $23.01 < 25.17 < 27.45$). Periapical radiolucencies with adequately filled root canals occurred significantly less often than with teeth in which the root canal was filled more than 2 mm from radiographic apex or when filling material was extruded through the apex. The prevalence of AP in all age groups in Belarus was higher than in other populations. The probability of AP increased significantly after root canal treatment and was closely correlated with the quality of the root filling.¹⁰

Peculiene V et al investigated the technical quality of root fillings in root filled teeth, their association with periapical status and prevalence of apical periodontitis.

The sample consisted of 83 subjects, presenting consecutively as new patients seeking dental care (prosthetic, endodontic and cariological treatment) in the years 2005/2006. Clinical and radiographic examination on each patient was performed using the scoring system (Periapical index (PAI)) proposed by Ørstavik et al. From the periapical radiographs status of endodontically treated teeth was recorded. For each tooth the following items were surveyed: the presence of a root filling, its quality (lateral seal and length in the root canal) and the periapical status. Of the 2186 functional teeth, 283 had undergone root canal treatment (13%). Amongst 283 root filled teeth, 122 teeth (43.1%) had radiological signs of a periapical lesion (PAI>2). Only 28.6% of the root filled teeth fulfilled the criteria of an acceptable root canal filling. Inadequate lateral seal of root filling was observed in 165 (58.3%) of 283 endodontically treated teeth. Inadequate length of endodontic treatment was discovered in 183 (64.7%) out of 283 teeth. Root filled teeth without voids had apical periodontitis in 25 (21.0%) out of 118 of cases, whereas if voids were detected, disease was present in 97 (58.8%) out of 165 teeth ($p < 0.001$). Apical periodontitis was found in 23 (23.0%) out of 100 teeth with adequate length of root filling, whereas if the filling was too short or long, periapical lesions were present in 99 (54.0%) out of 183 teeth ($p < 0.001$). Apical periodontitis was present in 43.1% of root filled teeth. Only 28.6% of the root filled teeth fulfilled the criteria of an acceptable root canal filling. The results of this study indicated that inadequate root fillings were more often associated with an increased prevalence of apical periodontitis. On the contrary, adequate root fillings significantly reduced the prevalence of disease. Many root canal treatments were technically unsatisfactory and substantial efforts must be made to improve the standard of endodontic treatment.¹¹ Kamberi B et al investigated AP and endodontic treatment in an adult Kosovar population based on radiographic examination. The sample used for this study consisted of randomly selected individuals referred to the University Dentistry Clinical Center of Kosovo in the years 2006-2007. Orthopantomographs of 193 patients were evaluated. The periapical status of all teeth (with the exception of third molars) was examined according to Ørstavik's Periapical Index. The quality of the root canal filling was rated as 'adequate' or 'inadequate' based on whether all canals were filled, the depth of fill relative to the radiographic apex and the quality of compaction (absence/presence of voids). Out of 4131 examined teeth, the prevalence of apical periodontitis (AP) and endodontic treatment was 12.3% and 2.3%, respectively. Of 95 endodontically-treated teeth, 46.3% were associated with AP. The prevalence of AP increased with age. The prevalence in subjects aged over 60 years old (20.2%) was higher than in other age groups. A statistically significant difference was found for the frequency of endodontically-treated teeth associated with AP in the 40-49 year age group ($P < 0.001$). Of some concern was the discovery that only 30.5% of the endodontically-treated teeth examined met the criteria of

an acceptable root canal filling. Inadequately root-filled teeth were associated with an increased AP risk. The prevalence of AP and the frequency of endodontically-treated teeth with AP in this Kosovar population are higher than those found in other countries. Inadequate root canal fillings were associated with an increased prevalence of AP.¹¹

CONCLUSION

From the above results, the authors concluded that a strong correlation exists between the quality of root canal therapy done and the prevalence of apical periodontitis. However, future studies are recommended.

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