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ORIGINAL RESEARCH

Evaluation of correlation of Apical Periodontitis and Quality of Root Canal Therapy in patients undergoing Endodontic Therapy

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ABSTRACT:
Background: According to the European Society of Endodontology (1994), the assessment of endodontic treatment requires clinical as well as radiological follow-ups at regular intervals. The radiographic evidence of success is the presence of a normal periodontal ligament space around the root. AP is often associated with endodontically treated teeth with a percentage between 18.2% and 61%. Some studies have shown that the success rate of endodontic treatment is over 90%; [6] many of these, however, were reported from specialists in endodontics or university clinics. Therefore, the quality of endodontic treatment appears to be crucial for maintaining the health of periradicular tissues. **Aim of the study:** To evaluate correlation of apical periodontitis and quality of root canal therapy in patients undergoing endodontic therapy. **Materials and methods:** The present study was conducted as a joint effort by Department of Periodontics and Department of Endodontics of the Dental institution. For the study, a total of 80 patients who underwent root canal therapy for permanent mandibular first molar were selected to participate in the study. 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)]. **Results:** In the present study, a total of 80 patients were studied. The number of male patients in the study group was 41 and number of female patients was 39. The mean age was 43.86 years. We observed that at 6 months follow up, 68 patients had healthy periodontal ligament, 8 patients had apical periodontitis and 4 patients had apical radiolucency. At 12 months follow up, the healthy periodontal ligament was seen in 74 patients. The prevalence of apical periodontitis reduced to 4 patients and apical radiolucency to 2 patients. **Conclusion**: Within the limitations of the present study, it can be concluded that apical periodontitis and apical radiolucency significantly improves with good quality endodontic therapy.
Keywords: Apical periodontitis, apical radiolucency, endodontic therapy, root canal treatment

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INTRODUCTION

According to the European Society of Endodontology (1994), the assessment of endodontic treatment requires clinical as well as radiological follow-ups at regular intervals. The radiographic evidence of success is the presence of a normal periodontal ligament space around the root. If radiographs reveal that a lesion has remained the same or has only diminished in size, the treatment is not considered a success.[1,2] Apical periodontitis (AP) appears to be a pathological condition common in adults, as reported in several epidemiological studies conducted in Europe, North America and Australia, which show a prevalence of AP ranging from 27% to 70%. [3] AP is often associated with endodontically treated teeth with a percentage between 18.2% and 61%. [3, 4, 5] In fact, according to literature, a major cause of AP is the poor quality of endodontic treatment. [3] Some studies have shown that the success rate of endodontic treatment is over 90%; [6] many of these, however, were reported from specialists in endodontics or university clinics. [3, 6] In fact, if we analyze the studies in which endodontic treatments were performed by general practice, this percentage falls within a range that varies from 65% to 75%. [3, 6] Therefore, the quality of endodontic treatment appears to be crucial for maintaining the health of periradicular tissues. Hence, the present study was conducted to

evaluate correlation of apical periodontitis and quality of root canal therapy in patients undergoing endodontic therapy.

MATERIALS AND METHODS

The present study was conducted as a joint effort by Department of Periodontics and Department of Endodontics of the Dental institution. The ethical clearance for the study was approved from the ethical committee of the hospital. For the study, a total of 80 patients who underwent root canal therapy for permanent mandibular first molar for apical periodontitis were selected to participate in the 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 at 6 months and 12 months 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)].

The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student's t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistically significant.

RESULTS

In the present study, a total of 80 patients were studied. The number of male patients in the study group was 41 and number of female patients was 39. The mean age was 43.86 years. [Fig 1 and Table 1] Table 2 shows the periodontal conditions at follow up period of 6 months and 12 months. We observed that at 6 months follow up, 68 patients had healthy periodontal ligament, 8 patients had apical periodontitis and 4 patients had apical radiolucency. At 12 months follow up, the healthy periodontal ligament was seen in 74 patients. The prevalence of apical periodontitis reduced to 4 patients and apical radiolucency to 2 patients. On comparison, the results were found to be statistically significant.

Table 1: Demographic data of the study population

Variables	Number
Total no. of patients	80
No of male patients	41
Number of female patients	39
Mean age (years)	43.86

Fig 1: Demographics

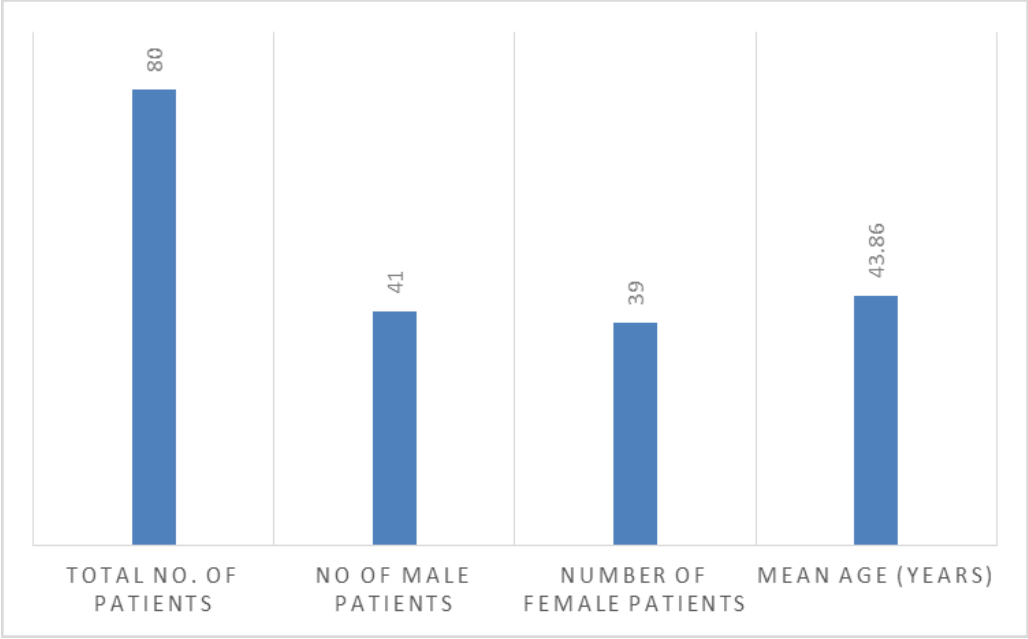
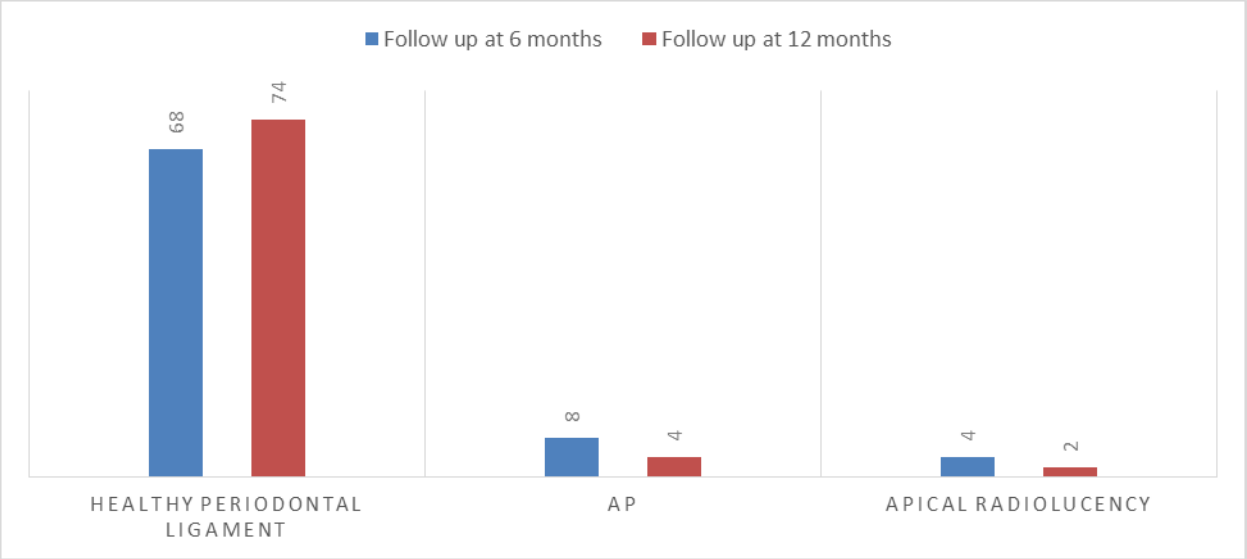


Table 2: Periodontal conditions at follow up period: 6 months and 12 months

Periodontal condition	Follow up at 6 months	Follow up at 12 months
Healthy periodontal ligament	68	74
AP	8	4
Apical radiolucency	4	2

Fig 2: Periodontal health at follow up



DISCUSSION

In the present study, we studied health of periodontium of 80 patients who underwent endodontic treatment of mandibular first molar over a period of 12 months. We observed that the health of periodontal ligament significantly improved over the period. At 6 months follow up, 8 patients had AP and 4 had apical radiolucency. The AP improved to healthy PDL in 4 patients at 12 months follow up and AP was seen only in 4 patients. Similarly, apical radiolucency was seen only n 2 patients at 12 months follow up. Hence, endodontic therapy significantly improves the health of periodontium. The results of our study are statistically significant. Kabak Y et al [7] 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. 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. 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. They concluded that the probability of AP increased significantly after root canal treatment and was closely correlated with the quality of the root filling. Restrepo-Restrepo FA et al [8] determined retrospectively after a 1- to 12-year follow-up period, the strength and independence of the association of various patient-, tooth- and treatment-related prognostic variables with the outcome of root canal treatment in patients with pre-therapeutic apical periodontitis. The study included 125 teeth in 84 individuals. The postoperative clinical signs/symptoms, plus DPR/CBCT-PAI estimations, were used to determine the healing outcome. The success rate was 53.6%.

Stassen IG et al[9] investigated a number of clinical and treatment variables that might have influenced the prevalence of apical periodontitis in root-filled teeth in a population of periodontally compromised patients. A total of 272 root-filled teeth in 94 patients were evaluated. The periapical condition was significantly influenced by the quality of the root filling and the coronal filling. More apical periodontitis was seen when the coronal level of the root filling exceeded the marginal bone level. The marginal periodontal condition seemed to influence the periapical status. Teeth with apical periodontitis were associated with significantly more extended marginal bone loss. Significantly less apical periodontitis was seen in patients that had received marginal periodontal treatment, compared with untreated periodontal patients. They concluded that signs of periodontal disease, as reflected by marginal bone loss, are of importance for the periapical condition of root-filled teeth. Efforts should be taken in preventing spread of infection through the periodontal-endodontic pathway by periodontal infection control and a high quality of root filling and coronal filling. Loftus JJ et al [10] determined the prevalence of apical periodontitis and the quality of root fillings in an adult Irish population using a retrospective analysis of orthopantomograms (OPGs). They studied clinical records and OPGs of 302 adult patients attending the Dublin Dental Hospital, Ireland. Of the 7427 teeth examined 2% had root fillings. Apical periodontitis was evident in 1.6% of all nonroot filled teeth whilst 33.1% of

the subjects had at least one tooth with apical periodontitis. Of the root filled teeth, 25% had apical periodontitis and 52.6% were considered technically inadequate by ESE guidelines. There was a statistically significant negative correlation between the quality of the root fillings and the prevalence of apical periodontitis. Posterior root filled teeth (premolars and molars) had a greater prevalence of apical periodontitis than anterior root filled teeth.

de-Figueiredo FED et al [11] assessed post-operative pain and healing of apical periodontitis following endodontic therapy with a reciprocating system compared to a crown-down technique with hand files and lateral compaction filling. One-hundred and twenty nonvital anterior teeth with apical periodontitis were randomly treated using either a reciprocating single file followed by matching-taper single-cone filling or a hand file and lateral compaction filling. Postoperative pain was assessed during the 7 days after the treatment, using a visual analogue scale and a verbal rating scale. Apical healing was assessed using the periapical index score after a 12-month follow-up. Regardless of the assessment time, no difference in incidence (38%-43% at first 24h), intensity of postoperative pain, and incidence of flare-up (≈ 3%) was observed between the two endodontic protocols. Both protocols resulted in a similar healing rate of apical periodontitis. After 12 months, the success rate ranged from 73% to 78% and the difference between the treatments fell within the pre-established equivalence margin.

CONCLUSION

Within the limitations of the present study, it can be concluded that apical periodontitis and apical radiolucency significantly improves with good quality endodontic therapy.

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