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Analysis of Periapical Radiolucency in Teeth Treated with Retrograde RCT

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ABSTRACT

Background: Persistent apical periodontitis following orthograde root-canal treatment is common among adult populations in various countries, with prevalence rates varying between 27%-70% and increasing with age. The most common pathologic conditions that involve teeth are the periodical lesions, usually composed of solid soft tissue (granulomas) or semisolid, liquefied cystic area (cyst). Aim of the study: To analyseperiodical radiolucency in teeth treated with retrograde RCT. **Methods:** The present study was conducted in the Department of Conservative Dentistry and Endodontics of the institution. For the study, we reviewed the records of patients treated with peri-apical surgery between 2017-2019 at the Department of Endodontics of the Dental institution. An informed written consent was obtained from the individuals whose records were reviewed. The records of the patients included initial clinical examination, chief complaint and initial symptoms, pre-operative and post-operative radiographs, summary of treatment provided and history of patients. **Results:** We observed that maxillary anterior teeth were 50%, maxillary premolar teeth were 9%, and maxillary molars were 8%. Similarly, mandibular anterior teeth were 17% and mandibular premolars were 9%. We observed that no radiolucency was seen in 28 patients, radiolucency <5 mm was seen in 21 patients, radiolucency >5 mm was seen in 13 patients and radiolucency >10 mm was seen in 8 patients. **Conclusion:** From the results of the present study, we conclude that periodical surgery is fairly successful approach for the management of periodical lesions which cannot be approached through conventional methods. Further studies are required in this context.

Keywords: Periodical lesion, apical radiolucency, Retrograde RCT

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INTRODUCTION

Persistent apical periodontitis following orthograde root-canal treatment is common among adult populations in various countries, with prevalence rates varying between 27%-70% and increasing with age.[1] Conventional root-canal treatment is considered to be the best method of managing periapical disease, with success rates varying between 48%-98%.[2] If root canal treatment fails, the reasons for this must be accurately assessed before any further intervention. Whenever possible, nonsurgical retreatment is regarded as the treatment of choice.[3] However, where nonsurgical retreatment is not an option, periapical surgery (endodontic surgery) is considered to be a viable alternative.[4] The most common pathologic conditions that involve teeth are the periapical lesions, usually composed of solid soft tissue (granulomas) or semisolid, liquefied cystic area (cyst). They are the result of a localized inflammatory reaction to infection within the root canal system reducing mineral density of the affected periapical bone, resulting in resorption identified as radiolucencies in radiographs. It is essential to correctly diagnose these lesions as the choice of treatment is dependent on it.[4-6] Hence, the present study was conducted to analyze periapical radiolucency in teeth treated with retrograde RCT.

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MATERIALS & METHODS

The present study was conducted in the Department of Conservative Dentistry and Endodontics of the institution. Prior to starting the study, we had approval from the ethical board of the institute for the study. For the study, we reviewed the records of patients treated with peri-apical surgery between 2017-2019 at the Department of Endodontics of the Dental institution. An informed written consent was obtained from the individuals whose records were reviewed. The records of the patients included initial clinical examination, chief complaint and initial symptoms, pre-operative and post-operative radiographs, summary of treatment provided and history of patients. The patients whose records had faulty or low-quality radiographs were excluded from the study. Also, the patients whose records did not have complete information regarding the treated tooth were excluded from the study. A total of 70 patients were selected for the study.

The records and radiographs were analysed visually by 2 oral surgeons and 2 endodontists. A periapical lesion was considered as radiolucency of more than 1 mm. For the lesions with diameter > 5 mm, they

were labelled as large lesions. Whereas, for the lesions with diameter <5 mm was labelled as small lesions. They also assessed the clinical status of the said tooth for each patient. For the clinical status evaluation, complete tooth along with periapical tissues were analysed.

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 statistical significant.

RESULTS

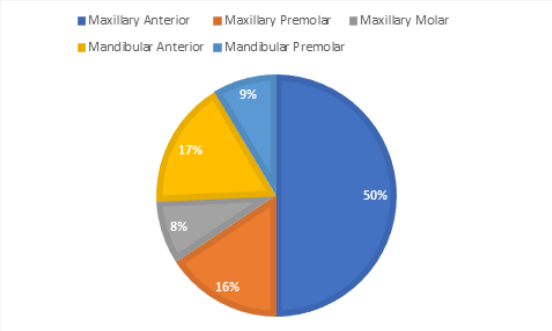

Figure 1: Distribution of treated teeth

Table 1: Distribution of teeth according to periapical radiolucency status

Radiolucency status	No of patients	p-value
No radiolucency	28	0.12
Radiolucency < 5 mm	21	
Radiolucency > 5 mm	13	
Radiolucency > 10 mm	8	

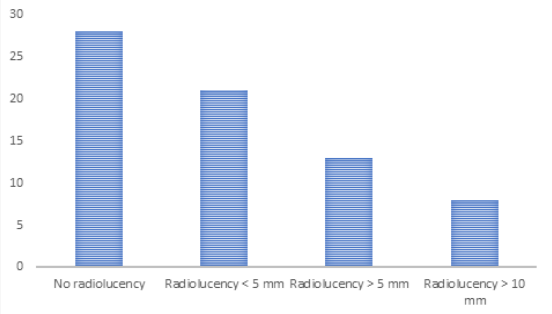

Figure 2: Periapical radiolucency status in various teeth

[Figure 1] shows the distribution of treated teeth. We observed that maxillary anterior teeth were 50%, maxillary premolar teeth were 9%, and maxillary molars were 8%. Similarly, mandibular anterior teeth were 17% and mandibular premolars were 9%. [Table 1] shows the distribution of teeth according to periapical radiolucency status. We observed that no radiolucency was seen in 28 patients, radiolucency <5 mm was seen in 21 patients, radiolucency >5 mm was seen in 13 patients and radiolucency >10 mm was seen in 8 patients. The results were compared and were seen to be statistically non-significant. [Figure 2]

DISCUSSION

In the present study, we observed 55 patients who underwent periapical surgery. We observed that the apical surgery was done mostly in case of maxillary anteriors and mandibular anteriors. Also, we observed that 28 patients had no radiolucency post surgically. Only 8 patients had radiolucency >10 mm. The results were compared and were found to be statistically non-significant. The results were compared to previous studies from literature. Gambarini G et al evaluated the relationship between the quality of the coronal restoration and the root canal filling on the periapical status of endodontically treated teeth using CBCT. CBCT data were obtained from the records of patients who deny any dental treatment in the 2 years prior to the CBCT examination. CBCT images (90 kVp and 7 mA, exposure time of 23 s, and a voxel size of 0.2 mm, with a field of view of 13 cm × 13 cm) of 1011 endodontically treated teeth were observed. A score was given to the quality of the root filling and the quality of the coronal restoration. Absence of periapical periodontitis was found in 54.9% of the cases. The periapical outcome was not related to gender or dental group (P > 0.05). A statistically significant factor resulted when different qualities of sealing were compared. They concluded that CBCT showed that high-quality root canal treatments followed by an adequate coronal sealing restoration avoid the presence of periapical periodontitis in time. Ramis-Alario a et al compared the sensitivity and measurements obtained from teeth with apical lesions scheduled for periapical surgery using three different diagnostic methods: periapical radiography, panoramic radiography and cone beam computed tomography (CBCT). This cross-sectional study involved 35 patients (45 teeth) scheduled for periapical surgery in which periapical radiographs, panoramic radiographs and CBCT scans had been obtained. The images were used to analyze the maximum vertical and horizontal dimension and the resulting areas of the periapical lesions based on the three diagnostic methods. The two-dimensional techniques (periapical radiography and panoramic radiography) yielded a sensitivity of 82% versus 100% in the case of CBCT. The mean vertical dimension of the apical areas was 5.48 mm with periapical radiography and 5.04 mm with panoramic radiography – the difference with respect to CBCT being statistically significant (6.36 mm for the coronal sections). There were no significant differences among the three techniques in terms of horizontal dimension (p>0.05) or lesion area. They concluded that the sensitivity of periapical radiolucencies detected using CBCT was significantly greater than with the two-dimensional imaging techniques. Significant differences between the latter and CBCT were only observed in the case of the vertical measurements.[7,8]

Kruse C et al assessed the diagnostic validity of PR and CBCT for determining inflammation in SER cases that were re-operated (SER-R) due to unsuccessful healing, using histology of the periapical lesion as reference for inflammation. Records from 149 patients, receiving SER 2004-10, were screened. In total 108 patients (119 teeth) were recalled for clinical follow-up examination, PR and CBCT, of which 74 patients (83 teeth) participated. Three observers assessed PR and CBCT as "successful healing" or "unsuccessful healing" using Rud and Molven's criteria. SER-R was offered to all non-healed teeth with expected favourable prognosis for subsequent functional retention. During SER-R, biopsy was performed and histopathology verified whether or not inflammation was present. All re-operated cases were assessed non-healed in CBCT while 11 of these were assessed successfully healed in PR. Nineteen biopsies were examined. Histopathologic diagnosis revealed 42% (teeth = 8) without periapical inflammation, 16% (teeth = 3) with mild inflammation and 42% (teeth = 8) with moderate to intense inflammation. A correct diagnosis was obtained in 58% with CBCT (true positives) and 63% with PR. They concluded that of the re-operated teeth, 42% had no periapical inflammatory lesion, and hence no benefit from SER-R. Not all lesions observed in CBCT represented periapical inflammatory lesions. Grønkjær LL et al determined the prevalence and predictors of periapical radiolucency in patients with cirrhosis and the association with systemic inflammation status and cirrhosis-related complications. A total of 110 cirrhosis patients were consecutively enrolled. Periapical radiolucency was defined as the presence of radiolucency or widening of the periapical periodontal ligament space to more than twice the normal width. Predictors of periapical radiolucency and the association with systemic inflammation markers and cirrhosis-related complications were explored by univariable and multivariable logistic regression analyses. Periapical radiolucency was present in one or more teeth in 46% of the patients. Strong predictors were gross caries and severe periodontitis. Also old age and smoking were predictors. However, cirrhosis etiology (alcoholic vs nonalcoholic) or severity (Model of End-Stage Liver Disease score) were not predictors. The patients with periapical radiolucency had higher C-reactive protein and lower albumin contents than those without. Furthermore, the patients with periapical radiolucency had a higher prevalence of cirrhosis-related complications such as ascites, hepatic encephalopathy, and/or variceal bleeding. They concluded that periapical radiolucency is often present as an element of poor oral health status and likely has an adverse clinical significance, which should motivate diagnostic and clinical attention to the findings.[9,10]

CONCLUSION

From the results of the present study, we conclude that periapical surgery is fairly successful approach for the management of periapical lesions which cannot be approached through conventional methods. Further studies are required in this context.

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