Research Article

JRAD Journal of Research and Advancement in Dentistry

J Res Adv Dent 2019;9:2:103-107.

Analysis of Periapical Radiolucency in Teeth Treated with Periapical Surgery

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ABSTRACT

Background: Apical surgery belongs to the field of endodontic surgery, which also includes incision and drainage, closure of perforations, and root or tooth resections. The objective of apical surgery is to surgically maintain a tooth that primarily has an endodontic lesion that cannot be resolved by conventional endodontic (re-)treatment.

Aim of the study: To analyze periapical radiolucency in teeth treated with periapical surgery.

Materials and 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 2016-2018 at the Department of Endodontics of the dental institution. 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 55 patients were selected for the study.

Results: We observed that the number of maxillary anterior teeth was 22, maxillary premolar teeth was 6, and number of molars was 3. Similarly, the number of mandibular anterior teeth were 19 in number and mandibular premolars were 5 in number. We observed that no radiolucency was seen in 25 patients, radiolucency <5 mm was seen in 19 patients, radiolucency >5 mm was seen in 7 patients and radiolucency >10 mm was seen in 4 patients.

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.

Keywords: Endodontics, periapical surgery, radiolucency.

INTRODUCTION

Apical surgery belongs to the field of endodontic surgery, which also includes incision and drainage, closure of perforations, and root or tooth resections. The objective of apical surgery is to surgically maintain a tooth that primarily has an endodontic lesion that cannot be resolved by conventional endodontic (re-)treatment.[1, 2] It is therefore of clinical relevance to perform a thorough clinical and radiographic examination of the tooth before apical surgery (including adjacent and opposing teeth), in

Received: Oct. 26, 2018**: Accepted**: Jan. 10, 2019
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pISSN 2278-0076
eISSN 2321-9270

order to decide whether surgical or non-surgical endodontics should be considered. The evaluation of a case referred for apical surgery must always include a careful weighing of the advantages and disadvantages of surgical and non-surgical intervention, i.e., the possibility of a conventional root-canal (re-)treatment should be considered as a therapeutic option.[3, 4] Advantages and disadvantages of all procedures should be discussed with the referring dentist and the patient. Written informed consent must be obtained from the patient prior to apical surgery. The indication for apical surgery must be based on a careful and thorough clinical and radiographic examination.[5, 6] Hence, the present study was conductedto analyze periapical radiolucency in teeth treated with periapical surgery.

MATERIALS AND 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 2016-2018 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 55 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.

Table 1: Distribution of treated teeth.

	Maxillary			Mandibular	
	Anterior	Premolar	Molar	Anterior	Premolar
Number of teeth	22	6	3	19	5

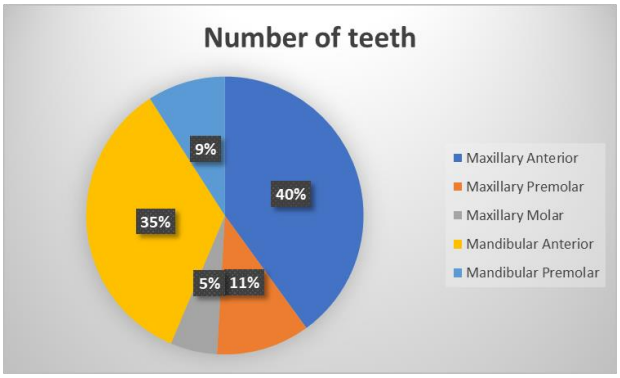

Fig 1: Distribution of teeth.

Table 2: Distribution of teeth according to periapical radiolucency status.

Radiolucency status	No of patients	p-value
No radiolucency	25	0.221
Radiolucency < 5 mm	19	
Radiolucency > 5 mm	7	
Radiolucency > 10 mm	4	

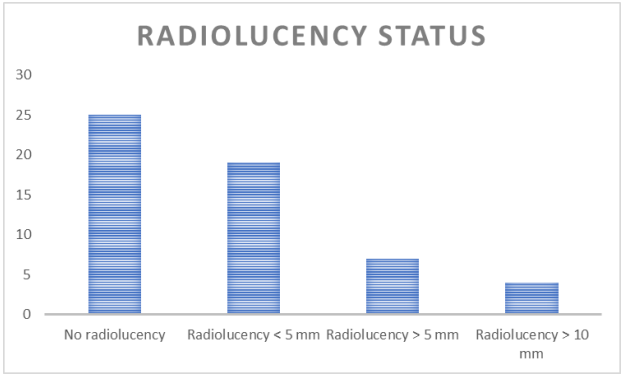

Fig 2: Radiolucency status.

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

Table 1 shows the distribution of treated teeth. We observed that the number of maxillary anterior teeth was 22, maxillary premolar teeth was 6, and number of molars was 3. Similarly, the number of mandibular anterior teeth were 19 in number and mandibular premolars were 5 in number. [Fig 1] Table 2 shows the distribution of teeth according to periapical radiolucency status. We observed that no radiolucency was seen in 25 patients, radiolucency <5 mm was seen in 19 patients, radiolucency >5 mm was seen in 7 patients and radiolucency >10 mm was seen in 4 patients. The results were compared and were seen to be statistically non-significant. [Fig 2]

DISCUSSION

In the present study, we retrospectively analysed 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 25 patients had no radiolucency post surgically. Only 4 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. Şimşek-Kaya G et al analyzed and evaluate the factors that affect the decision-making process for periapical surgery. This study retrospectively assessed clinical and radiographic data from patients undergoing periapical surgery. The factors involved in deciding to perform periapical surgery were classified into technical, biological, and combined factors. Out of 821 patients, 544 (66.3%) underwent endodontic treatment/retreatment, 204 (24.8%) were treated with coronal restorations and 60 (7.3%) were treated with post. Periapical surgery was indicated for biological reasons in 35% of patients and for technical reasons in 17.9%. The common biological factor was persistent clinical symptoms (19.7%). The most common technical cause was failure of previous endodontic treatment (66.3%). Nearly half of all periapical lesions (45%) were <5 mm in size. Periapical surgery was justified in only 434 (52.9%) subjects. They suggest that it is very important for patients to be informed and encouraged about endodontic retreatment in order to reduce unnecessary surgical procedures. von Arx T et al retrospectively assessed clinical and radiographic data of 330 teeth that had been referred to a specialist in apical surgery with regard to the treatment decisions made in those teeth. The treatment decisions included apical surgery (59.1%), tooth extraction (25.8%), no treatment (9.1%), and nonsurgical endodontic retreatment (6.1%). Variables that showed statistically significant differences comparing treatment decisions among subcategories included probing depth, clinical attachment level, tooth mobility, pain, clinical signs, length and quality of the root canal filling, and size and location of the periapical lesion. This study showed that apical surgery was the most frequently made treatment decision in teeth referred to a specialist in apical surgery, but every fourth tooth was considered nonretainable and was scheduled for extraction. The data showed that the most common variables that influenced the decision to extract teeth were teeth with an increased probing depth and tooth mobility and teeth presenting with lesions not located at the apex.[7, 8]

Ng YL et al investigated the probability of and factors influencing tooth survival following primary (1°RCTx) or secondary (2°RCTx) root canal treatment. This prospective study involved annual follow-up of 2 (100%) to 4 years (50%) of 1°RCTx (759 teeth, 572 patients) and 2°RCTx (858 teeth, 642 patients) carried out by Endodontic postgraduate students. Pre-, intra- and post-operative data were collected prospectively from consented patients. Information about extraction of the root filled tooth was sought from the patient, the referring dentist or derived from the patient's records and included the timing and reasons for extraction. Tooth survival was estimated and prognostic factors were investigated using Cox regression. Clustering effects within patients were adjusted in all models using robust standard error. The 4-year cumulative tooth survival following 1°RCTx or 2°RCTx was similar. Thirteen prognostic factors were identified. Significant patient factors included history of diabetes and systemic steroid therapy. Significant pre-operative factors included narrow but deep periodontal probing depth; pain; discharging sinus; and iatrogenic perforation (for 2°RCTx cases only). Significant intra-operative factors included iatrogenic perforation; patency at

apical terminus; and extrusion of root fillings. Significant post-operative restorative factors included presence of cast restoration versus temporary restoration; presence of cast post and core; proximal contacts with both mesial and distal adjacent teeth; and terminal location of the tooth. The presence of pre-operative pain had a profound effect on tooth loss within the first 22 months after treatment with a lesser effect beyond 22 months. Patency at the apical terminus reduced tooth loss within the first 22 months after treatment but had no significant effect on tooth survival beyond 22 months. Extrusion of gutta-percha root filling did not have any effect on tooth survival within the first 22 months but significantly increased the hazard of tooth loss beyond 22 months. They concluded that the 4-year tooth survival following primary or secondary root canal treatment was 95%, with thirteen prognostic factors common to both. Christiansen R et al compared healing after root-end resection with a root-end filling of mineral trioxide aggregate (MTA) or smoothing of the orthograde gutta-percha (GP) root filling. Forty-four patients (consisting of 52 teeth with periapical infection), average age of 54.6 years (range 30-77) participated in a randomized clinical trial (RCT) comparing the MTA and GP treatment methods. Radiographs produced 1-week and 12 months post-operatively were compared after blinding for treatment method, and healing was assessed as complete, incomplete, uncertain, or unsatisfactory. Six teeth were not available for the 12-month follow-up: three teeth (GP) had been re-operated because of pain and two teeth (one GP, one MTA) had been extracted because of root fracture (these five teeth were classified as failures). One patient (GP) was not available for recall. In the GP group, seven teeth (28%) showed complete healing, six teeth (24%) incomplete healing, six teeth (24%) uncertain healing and two teeth (8%) unsatisfactory healing after 1 year. In the MTA group, 22 teeth (85%) showed complete healing, three teeth (12%) incomplete healing, and none were scored as uncertain or unsatisfactory healing after 1 year. The difference in healing between the GP and the MTA groups was significant. The results from this RCT emphasize the importance of placing a root-end filling after root-end resection. Teeth treated with MTA had significantly better healing (96%) than teeth treated by smoothing of the orthograde GP root filling only (52%).[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.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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