

Association of Age Gender and Teeth Distribution in Patients Undergoing Endodontic Retreatment Procedures

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Abstract

Root canal system anatomy plays a significant role in endodontic success and failures. Several explanations for failure of root canal treatment have been proposed, including apical percolation, root perforation, unfilled canals, coexisting periodontal lesions, and gross over and underextension of filling materials. Endodontic retreatment is indicated when the root canal system becomes re-infected. Before commencing with any treatment, it is wise to fully consider all the various treatment options. Nonsurgical retreatment is often considered the treatment of choice if a previously treated tooth has persistent apical infections. 86000 patient records were reviewed between June 2019 to March 2020. A total of 269 patients who underwent endodontic retreatment procedures were reviewed and analyzed. The collected data was tabulated using microsoft excel and analyzed using SPSS. Incomplete data was excluded from the study. Statistical analysis was done in SPSS using chi-square test. Association between age and teeth that had undergone endodontic retreatment procedures showed that patients in the age group below 30 years were most commonly involved and the teeth involved were upper anterior (21.56%). Patients belonging to the age group above 60 years were least commonly involved in retreatment procedures (0.37%) ($p < 0.05$). Association between gender and teeth that had undergone retreatment showed that males had undergone a higher number of endodontic retreatment procedures when compared to females and teeth commonly involved were upper anterior (27.85%) ($p < 0.05$) and the least being lower anterior in females (1.12%).

Keywords: Endodontic failures; Endodontic treatment; Retreatment; Periapical pathologies

Introduction

Dental caries is the most common cause for the loss of tooth structure in clinical situations. ^[1] Bacteria plays a major role in the formation and progression of pulpal and periapical diseases. ^[2]

Matrix Metallo Proteinases (MMPs) and Tissue Inhibitors of Metallo Proteinases (TIMPs) partially regulate the inflammatory pulpal tissue destruction. ^[3] Ultimate aim of root canal treatment is to completely eliminate microorganisms from the root canal system through mechanical and chemical debridement. Over time, patients have become more confident selecting endodontic treatment because of the changing perception that pain can be managed, techniques have improved and long-term success of endodontic treatment is possible. ^[4]

In root canal treatment diagnosing the exact pulpal status by direct examination is uncertain due to the fact that the pulp is enclosed within a hard tissue, therefore numerous methods to assess pulp vitality is available. ^[5]

The cleaning and shaping of root canal space is one of the most important and fundamental aspects of endodontic therapy, if adequate biomechanical preparation is not done, need for retreatment arises. Irrigants play a crucial role in debridement and disinfection of the root canal space.

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Since microorganisms have been established as the sole entity responsible for initiating pulpal and periapical pathologies, mechanical instrumentation alone may not be sufficient to remove bacteria and necrotic tissue from root canals owing to the complex anatomy.^[6]

Saline can provide a flush out of debris and not the disinfection. Hence, the usage of disinfectants for irrigation is mandatory and universally accepted.^[7] Antibacterial effects of chemomechanical procedures can be enhanced by the subsequent placement of an antimicrobial intracanal medication, particularly in those cases of exudation, haemorrhage, perforation, root resorption, trauma or incomplete root formation.^[8]

With all the potential for endodontic success, the fact remains clinicians are confronted with post-treatment disease.^[9]

Before commencing with any treatment, it is wise to fully consider all the various treatment options.^[10,11] When the choice is endodontic nonsurgical retreatment, then the goal is to access the pulp chamber and remove materials from the root canal space and if present, address deficiencies or repair defects that are pathologic or iatrogenic in origin.^[12,13]

However, a clinical judgment to retreat surgically or nonsurgically is based on a number of factors such as, the presence and size of the apical lesion, the root end filling material, type and quality of the coronal restoration, the status of previous root canal treatment etc.^[14-16] Nonsurgical retreatment is often considered the treatment of choice if a previously treated tooth has persistent apical infections.

Previously our team had conducted numerous *in vitro* studies, clinical studies, reviews, and surveys^[17-24] in the last 5 years. Previously our team has a rich experience in working on various research projects across multiple disciplines.^[25-39] Now the growing trend in this area motivated us to pursue this project.

Now, we are focusing on retrospective studies. The aim of the study was to find out the association of age, gender and tooth number in patients undergoing endodontic retreatment procedures.

Materials and Methods

This study was conducted at Saveetha dental college between June 2019 to March 2020. 86000 patient records were analyzed. A total of 269 patients who underwent endodontic retreatment procedures were reviewed and analyzed. The data was cross verified by another examiner to avoid errors. Cross verification of data was done using photographs and RVGs. Sampling bias was minimized by verifying the photographs and radiographs by an external reviewer. After verification of dental hospital management system records of all patients, data such as name, age, and gender and tooth number of patients undergoing endodontic retreatment were tabulated in Microsoft Excel. Incomplete data and

radiographs which were not of adequate diagnostic accuracy were excluded from the study.

The statistical analysis was done using SPSS software (SPSS version 21.0, SPSS, Chicago II, USA). The data was analyzed using a chi-square test. The p value less than 0.05 was considered to be statistically significant. Ethical clearance was obtained. Ethical approval number DC/SIHEC/2020/DIASDATA/0619-0320.

Results and Discussion

The study included 269 patients who had undergone endodontic retreatment procedures. Endodontic retreatment was done most commonly in the age group between 30 to 60 years (51.7%). Males (60.6%) had undergone a higher number of endodontic retreatment than females.

Higher numbers of the endodontic retreatments were done in the upper anterior teeth (42%). Association between age and teeth that had undergone endodontic retreatment procedures showed that patients in the age group below 30 years and the upper anteriors (21.56%) had undergone maximum number of retreatment procedures.

Patients belonging to the age group above 60 years and the upper anteriors (0.37%) were least commonly involved in retreatment procedures ($p < 0.05$), statistically significant [Graph 1]. Association between gender and teeth that had undergone retreatment showed that males had undergone a higher number of endodontic retreatment procedures when compared to females, teeth commonly involved were upper anteriors (27.85%) and the least being lower anteriors in females. (1.12%) ($p < 0.05$), statistically significant [Graph 2].

In our study, the participants were grouped in age groups of below 30 years, 30-60 years and above 60 years. 60.6% of the participants who reported for retreatment were males and 39.4% were females.

Age group between 30 to 60 years reported with the highest incidence of endodontic retreatment procedures (51.7%) and age group above 60 years of age reported with the least incidence for endodontic retreatment procedures (5.2%). Endodontic retreatment was done with a higher incidence in upper teeth (63.6%).

In a study done by Imura et al. the results for the retreatment group were influenced by tooth type and by age. The multirooted (molars) teeth in the non-surgical retreatment sample had a significantly higher percentage of incidence than premolars and anterior teeth.

It is conceivable that the anatomy of molar teeth presented a greater challenge for elimination of root canal infection, especially in nonsurgical retreatment cases. Regarding age, higher percentages of retreatment procedures were done in between 30-60 years which is in line with the results of our study. Also, males reported with higher incidence for retreatment procedure which is consistent with the findings in our study.^[40]

In a study done by Farzaneh et al. on endodontic retreatment, the study results suggested that age was not a significant predictor of outcome. Females reported with a higher incidence of endodontic retreatment which is not in line with the results of our study. However, maxillary teeth reported with higher incidence than mandible teeth for retreatment procedures which is in line with the results of our study.^[41]

Studies in medicine suggest that practitioner's personal variables, such as gender and age, do not have a significant effect on their clinical decision making.^[42,43] Hoskinson et al.^[44] reported that a 1 mm increase in the size of the preoperative periapical lesion resulted in an 18% increase in the risk of a negative outcome. In another study, a 1 mm loss of working length during initial treatment resulted in a 14% increase in the failure rate.^[45]

Sjogren et al.^[46] found that 94% of periapical lesions healed when the root filling was within 2 mm of the apex, a significant difference when compared with overfilled canals (76%) and those more than 2 mm short of the apex (68%). Gorni et al.^[47] reported an overall success rate of 69% of retreated cases. Teeth that were free of technical errors such as transportation, stripping, perforation, and internal resorption achieved a success rate of almost 87%, but those exhibiting one or more of the technical problems succeeded only 47% of the time.

Endodontic retreatment presents many problems, not the least of which is the decision of whether to retreat, extract, or perform surgery. If the clinician is confident that a root fracture, a ledged canal, or a perforation is not present, then retreatment is the least invasive treatment alternative.

In many cases there is no apparent reason for failure, and the retreated canal may have the same radiographic appearance as it did originally. Recent publications reported failure rates of 14%–16% for initial root canal treatment.^[48,49] Lack of healing is attributed to persistent intraradicular infection residing in previously uninstrumented canals, dentinal tubules, or in the complex irregularities of the root canal system.^[50]

The extraradicular causes of endodontic failures include periapical actinomycosis,^[51] a foreign body reaction caused by extruded endodontic materials, an accumulation of endogenous cholesterol crystals in the apical tissues, and an unresolved cystic lesion.^[52,53] Our institution is passionate about high quality evidence based research and has excelled in various fields.^[54-60] We hope this study adds to this rich legacy.

For non-surgical endodontic retreatment, the reported frequency of successful cases varies between 60% and 80%.^[61,62] Engstrom et al.^[63] followed 192 cases 4 to 5 yr after nonsurgical retreatment and reported 50% failure rate when the initial periapical radiolucency was >5 mm in diameter, but only 25% when the lesion size was <5 mm.

The limitations of our study were that it was an institutional based study; the duration of cases taken into account was only 1 year and limited sample size. Future scope includes taking a larger population into account and populations from different geographical locations.

Table 1: Age distribution of patients undergoing endodontic retreatment procedures.

	Age	Number of teeth	Percent	Valid percent	Cumulative percent
Valid	Below 30 years	116	43.1	43.1	43.1
	30 to 60 years	139	51.7	51.7	94.8
	Above 60 years	14	5.2	5.2	100.0
	Total	269	100.0	100.0	

Table 1 shows the age distribution of patients undergoing endodontic retreatment procedures. 43.1% of the patients belonged to the age group below 30 years, 51.7% belonged to

the age group between 30 to 60 years and 5.2% belonged to the age group of above 60 years.

Table 2: Gender distribution of patients undergoing endodontic retreatment procedures.

	Gender	Number of teeth	Percent	Valid percent	Cumulative percent
Valid	Female	106	39.4	39.4	39.4
	Male	163	60.6	60.6	100.0
	Total	269	100.0	100.0	

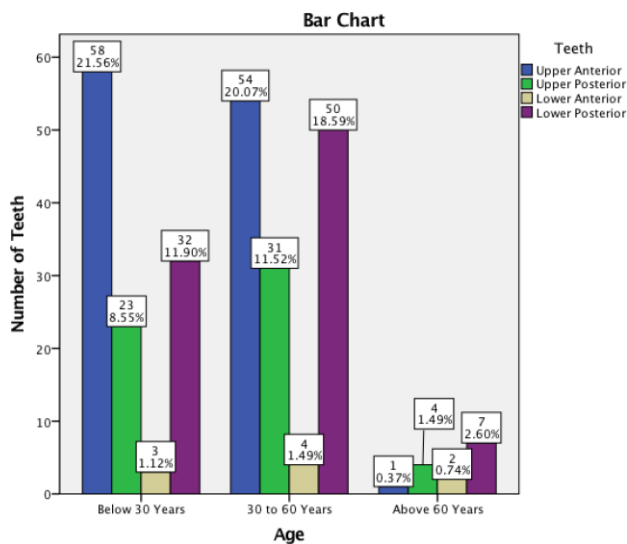
Table 2 shows the gender distribution of patients undergoing endodontic retreatment procedures. 60.6% of the patients

were males and 39.4% of the patients were females.

Table 3: Teeth distribution of patients undergoing endodontic retreatment procedure.

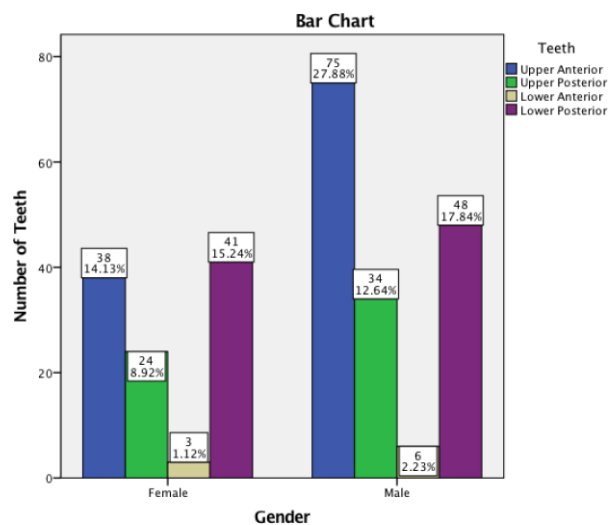
Teeth	Number of teeth	Percent	Valid percent	Cumulative percent
Upper anterior	113	42.0	42.0	42.0
Upper posterior	58	21.6	21.6	63.6
Lower anterior	9	3.3	3.3	66.9
Lower posterior	89	33.1	33.1	100.0
Total	269	100.0	100.0	

Table 3 shows the teeth distribution of patients undergoing endodontic retreatment procedure. 42% of the retreatment procedures were done in the upper anterior teeth, 21.6% of the retreatment procedures were done in the upper posterior teeth, 3.3% of the retreatment procedures were done in the lower anterior teeth and 33.1% of the retreatment procedures were done in the lower posterior teeth.



Graph 1: Bar Graph showing the distribution between age group and number of patients undergoing retreatment procedures. X axis represents the age and Y axis represents the number of patients.

Patients in the age group below 30 years were most commonly involved in endodontic retreatment procedures, and the teeth commonly retreated were upper anteriors (21.56%) (blue bar). Patients above the age group above 60 years and the upper anteriors (0.37%) are least involved in retreatment procedures (blue bar). Chi-square test was done to find the association between age and patients undergoing retreatment procedures. Pearson’s chi-square value=14.581, df=6, p value 0.024 (<0.05) hence statistically significant.



Graph 2: Bar Graph showing the association between gender and number of patients undergoing retreatment procedures. X axis represents the gender and Y axis represents the number of patients.

Males underwent the highest number of endodontic retreatment procedures and the most commonly involved teeth being upper anteriors (27.85%) (blue bar) and the least being lower anteriors in females (1.12%) (beige bar). Chi-square test was done to find the association gender and number of patients undergoing retreatment procedures. Pearson’s Chi-square value=3.467, df=3, p value=0.325 (>0.05) hence statistically not significant.

Conclusion

In the present study, it was evident that endodontic retreatment was done most commonly in the age group between 30 to 60 years (51.7%). Males (60.6%) had undergone a higher number of endodontic retreatment than females. Higher numbers of the endodontic retreatments were done in the upper anterior teeth (42%). Association between age and patients that had undergone endodontic retreatment procedures showed patients in the age group below 30 years had undergone most of the retreatment procedures in upper anteriors (21.56%). Association between gender and patients that had undergone retreatment showed that males had undergone a higher number of endodontic retreatment

