

## Analysis Of Posterior Teeth Receiving Crowns Following Root Canal Treatment - Retrospective Study

Research Article

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### Abstract

The aim of the study was to analyse the age, gender and teeth distribution in posterior teeth receiving crowns following root canal treatment. 86,000 patient records were reviewed between June 2019 to March 2020. Our study included all the patients who had undergone root canal treatment. A total of 5232 posterior teeth root canal treatment data and 1341 posterior single crown data was reviewed and analyzed. The collected data was tabulated using microsoft excel and analysed using SPSS. Incomplete data was excluded from the study. Statistical analysis was done using a chi-square test. In this study, most commonly involved teeth receiving crowns following posterior root canal treatment were the lower molars (8.68%) and the least were lower premolars (3.59%). However, the results were not statistically significant. Within the limitations of the study, age group between 30-60 years reported the most for crowns following root canal treatment. There was no significant association between gender and the type of teeth receiving crowns following root canal treatment. Overall the patient compliance reporting for crown following root canal treatment was very less, henceforth knowledge and awareness regarding the post endodontic restorations should be imparted to patients following root canal treatment.

**Keywords:** Root Canal Treatment; Crown; Post Endodontic Restoration; Patient Compliance.

### Background

Preservation of the natural dentition has long been a key dental therapeutic goal. Dentists and patients are regularly confronted by difficult treatment questions necessitating both quantitative and qualitative response. Dental caries are easily detectable and reversible at an early stage [1]. Bacteria play a major role in the formation and progression of pulpal and periapical diseases [2]. MMPs and tissue inhibitors of metalloproteinases (TIMPs) partially regulate the inflammatory pulpal tissue destruction [3]. Root filling, or endodontic treatment, is a fairly routine dental procedure in which the dental pulp is removed and replaced by a root canal filling [4]. It is usually indicated when there has been irreversible inflammation or necrosis of the pulp, consequent to caries or trauma [5]. Root filling and subsequent restoration represents a costeffective option when it is compared with tooth extraction followed by im-

plant placement [6]. Reported success to rates for conventional root canal treatment range from 40% to 97% depending on differences in study design, clinical procedures, criteria for evaluation and length of postoperative observation period [7]. These results are promising for the long-term function of root canal treated teeth, as long as the coronal restoration succeeding the endodontic therapy ensures longevity [8]. Clinical prosthetic procedures range from a conventional filling to complete coronal coverage by placement of a complete crown or fixed dental prosthesis. The treatment plan depends on patient related factors. In general, socioeconomic factors play an important role in decision making [9]. Endodontically treated anterior teeth with minimal loss of tooth structure may be restored conservatively with a bonded restoration in the access cavity [10]. Neither a post nor a crown is required unless a great deal of natural tooth substance is lost as a result of caries or fracture [11]. Castings such as gold onlay, gold crowns, metal-ceramic crowns, and all porcelain restorations

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**Received:** April 24, 2021

**Accepted:** July 09, 2021

**Published:** July 20, 2021

**Citation:** Sahil Choudhari, S Haripriya, Jaiganesh Ramamurthy. Analysis Of Posterior Teeth Receiving Crowns Following Root Canal Treatment - Retrospective Study. *Int J Dentistry Oral Sci.* 2021;8(7):3435-3437. doi: <http://dx.doi.org/10.19070/2377-8075-21000699>

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with cuspal coverage are used routinely as standard and acceptable methods to restore posterior endodontically treated teeth [12]. These restorations can provide endodontically treated teeth with the desired protection however, they require extensive tooth preparation and can be expensive [13]. If only a routine restoration is necessary, resin based composite with acid etching of enamel and dentin is the restoration of choice [14]. Unless the majority of natural tooth substance remains after endodontic treatment, it probably is safer to provide some kind of cuspal coverage in the final coronal restoration since most teeth that require endodontic treatment usually are damaged severely as a result of caries, fracture or both [15].

### Material And Methods

This study was conducted in a dental college between June 2019 to March 2020. 86,000 patient records were analyzed. Our study included all the people who had undergone root canal treatment. A total of 5232 posterior teeth root canal treatment data and 1341 posterior single crown data was reviewed and analyzed. Out of the 1341 single crowns, 1183 single crowns had been fabricated for the root canal treatment performed in our institution (Table 1). Patients below 18 years of age and patients who reported with adjacent edentulous space and received fixed partial denture using the root canal treated tooth as an abutment were excluded from the study. The data was cross verified by another examiner to avoid errors. Cross verification of data was done using photographs and RVGs. Sampling bias was minimised by verifying the photographs and radiographs by an external reviewer. After verification of the dental hospital management system, records of all patients, data such as name, age, gender, tooth number and post endodontic restoration of patients undergoing endodontic treatment 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 of less than 0.05 was considered to be statistically significant. Ethical clearance was obtained. Ethical approval number SDC/SIHEC/2020/DI-ASDATA/0619-0320.

### Results And Discussion

In this study, association between age groups and teeth that received crowns showed that the patients in the age group between 30-60 years reported the most for crowns following root canal treatment (12.44%) and the least is patient above age group of 60yrs (1.78%) (p<0.05 - statistically significant). Association between gender and the teeth that received crowns following root canal treatment showed that female patients (11.41%) reported for crowns more than males (11.20%) however it was not statistically significant (p<0.05). Most commonly involved teeth receiving crowns following posterior root canal treatment was the lower molars (8.68%) and the least being lower premolars (3.59%) (p>0.05) however the results were not statistically significant. Our study analysed the age, gender and teeth distribution in posterior teeth receiving crowns following root canal treatment. Among the 5232 posterior root canals assessed, age group between 30-60 years underwent the maximum number of posterior root canal treatment (58.5%). Lower molars were the most treated teeth (38.3%). Patients reporting for post endodontic crowns were only 22.6%. Age groups between 30 to 60 years reported the maximum for crowns following post endodontic treatment (12.44%). The reason for lower number of patients reporting for root canal treatment in the younger age group may be due to lesser incidence of caries and better oral care. Older patients reported the least for crowns following root canal treatment which may be attributed to the difficulty in complying with the multiple dental appointments. In a study done by Lazarski et al [16] 33,002 non surgical root canal therapy cases were evaluated of which 16,562 (50.23%) patients were females and 16,440 (49.77%) patients were males. The average female patient was 41.81 years old at the time of

Figure 1. Bar chart showing the association between the type of teeth and number of teeth that received crown following root canal treatment. X axis represents the type of teeth and Y axis represents the number of teeth. In upper premolar teeth, 16.53% of the teeth did not receive crown and 5.01% of the teeth received crown following root canal treatment. In lower premolar teeth, 10.44% of the teeth did not receive crown and 3.59% of the teeth received crown. In upper molar teeth, 20.78% of the teeth did not receive crown and 5.33% of the teeth received crown. In lower molar teeth, 29.64% of the teeth did not receive crown and 8.68% of the teeth received crown. Chi-square test was done and the association was found to be statistically not significant. Pearson's Chi-square value = 7.774, df = 3, p value 0.051 (>0.05). There was no significant association between type of teeth and the teeth that received crowns following root canal treatment.

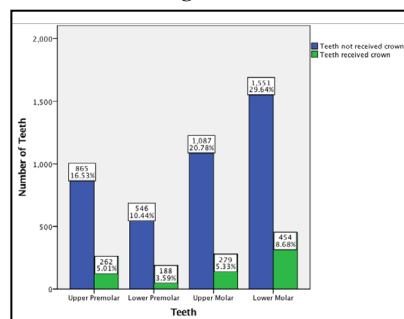


Table 1. Shows the distribution of teeth receiving crown following root canal treatment. Only 22.6% of teeth received crown following root canal treatment and the remaining 77.4% did not receive crown following endodontic treatment.

Received Crown		Number of Teeth	Percent	Valid Percent	Cumulative Percent
Valid	No	4049	77.4	77.4	77.4
	Yes	1183	22.6	22.6	100
	Total	5232	100	100	

initial root canal therapy, compared with male patients who were significantly older at 43.40 years. In the same study, root canal treated teeth which did not undergo restoration were only 29% contrasting to the results in our study (77.4%). There is convincing evidence that cuspal coverage should be provided for posterior teeth. An *in vitro* study by Panitvisai and Messer [17] demonstrated that access preparations result in greater cuspal flexure, increasing the probability of cuspal fracture. A retrospective study evaluated 1273 endodontically treated teeth to determine which factors were significant causes of failure and concluded that the presence of cuspal coverage was the only significant restorative variable to predict long-term success. [18] In a systematic review by Stavropoulou et al, [19] showed that root canal treated teeth followed by crowns have a higher long-term survival rate ( $81 \pm 12\%$  after 10 years) than root canal treated without crown coverage ( $63 \pm 15\%$  after 10 years). However, it should be highlighted that the survival rate for root canal treated teeth without crown coverage was quite satisfactory for the first 3 years ( $84 \pm 9\%$ ), while there was a significant decrease in the survival of root canal treatment after this period. Despite strong evidence of the benefits of cuspal coverage, a study by Scurria et al [20] found that only approximately 50% of endodontically treated, posterior teeth were restored with cuspal coverage restorations. The overall results of our study pointed out at the fact that along with good treatment planning and delivery, it is equally important for the dentists to educate the patients on the importance of post endodontic restoration. This is important to improve the longevity of the tooth. Such patient education should begin from the primary health care setup. Decreasing the number of appointments along with reduced cost of the treatment will lead to an increase in the number of patients completing the treatment which directly influences the overall prognosis of the tooth.

## Conclusion

Within the limitations of the study, age group between 30-60 years reported the most for crowns following root canal treatment (12.44%) and it was statistically significant. There was no significant association between gender and the type of teeth receiving crowns following root canal treatment. Overall the patient compliance reporting for crown following root canal treatment was very less, henceforth knowledge and awareness regarding the post endodontic restorations should be imparted to patients following root canal treatment. It is commonly stated that endodontically treated teeth are more susceptible to fracture as a result of increased brittleness. The overall results of our study pointed out at the fact that along with good treatment planning and delivery, it is equally important for the dentists to educate the patients on the importance of post endodontic restoration. This is important to improve the prognosis of the tooth. Decreasing the number of appointments along with reduced cost of the treatment will lead to an increase in the number of patients completing the treatment which directly influences the overall prognosis of the tooth.

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