

Original Research

Radiographic status of periapex of endodontically treated teeth restored with direct or indirect restoration

Dr. Syed Manzoor ul haq Bukhari¹, Dr. Geethanjali Puttappa²

¹Department of conservative and endodontics, KVG Dental College, Kurungibagh, Sullia, Dakshin kannad, Karnataka state, India;

²Department of prosthodontics, KVG Dental College, Kurungibagh, Sullia, Dakshin kannad, Karnataka state, India

ABSTRACT:

Purpose: Endodontic procedure leads to weakening of tooth structure. To restore the natural form of coronal tooth structure two basic techniques are used that is direct and indirect technique. The aim of this study was to evaluate and compare choice of posterior restorative material on the outcome of root canal treatment radiographically. **Material and method:** radiographic and clinical examination of 188 posterior mandibular molars was performed, the quality of treatment and periapical status was observed. **Results:** there was even distribution between left (48.2%) and right (51.8%) mandibular molar. A significantly higher survival rate of indirect restoration $p < 0.001$ was observed as compared to direct restoration. **Conclusion:** No significant correlation was found between coronal restoration and PAI score between indirect and direct coronal.

Key words: coronal restoration, direct restoration, indirect restoration

Received: 23/07/2020

Modified: 18/08/2020

Accepted: 20/08/2020

Corresponding Author: Dr. Syed Manzoor ul haq Bukhari, Department of conservative and endodontics, KVG Dental College, Kurungibagh, Sullia, Dakshin kannad, Karnataka state, India

This article may be cited as: Bukhari SM, Puttappa G. Radiographic status of periapex of endodontically treated teeth restored with direct or indirect restoration. J Adv Med Dent Scie Res 2020;8(9):239-242.

INTRODUCTION

Endodontic prognosis varies based on position of tooth in arch, size of periapical radiolucency, quality of root filling and coronal restoration, magnification, illumination, time between provisional and definitive restoration^[1] Provisional restorative material are not able to prevent microleakage, placement of definitive restoration must fulfill criteria of bacterial seal and esthetics.^[2]

Endodontic treated tooth (ETT) can be restored by means of direct or indirect restoration. Direct restoration includes materials placed directly in patients mouth while indirect restorations are fabricated outside patients mouth in dental lab. Direct restoration is completed in one appointment while indirect restoration needs further appointment to be set at later date.^[3]

Endodontically treated tooth is said to undergo loss of water content and resiliency, additionally endodontic treated tooth are affected by caries and loss of tooth structure which makes ETT prone to fracture and necessitates the need for full coverage of cusps^[4, 5] Direct adhesive based restorative material are conservative in tooth preparation while indirect restoration needs to prepare tooth to best receive restoration passively leading to extensive loss of tooth preparation.^[6]

Studies have confirmed efficacy of both direct and indirect restoration in positive outcome of endodontic treated tooth.^[7] While other studies have pointed, full coverage crown as restoration of choice for ETT.^[8, 9] To further validate and build an agreement this study was aimed to evaluate and compare choice of posterior

restorative material on the outcome of root canal treatment.

METHOD:

Patients case records were examined who had undergone root canal treatment by the postgraduates at the department of conservative and endodontics, during the period between May 2018 to June 2019. An institutional ethical clearance was obtained. Following inclusion and exclusion criteria were followed.

Inclusion criteria:

- Mandibular first molar which received complete endodontic treatment
- Teeth restored with full coverage PFM crowns
- Teeth restored with direct composite post endodontic restoration
- Case record available with preoperative radiograph
- Postoperative follow up radiograph with showed adequate length and density of root canal treatment

Exclusion criteria

- Uncooperative patients
- Untraceable patients
- Insufficient data available

After inclusion and exclusion criteria were met patients were contacted and explained about the study. An appointment was made, a written consent was obtained and clinical and radiographic examination was done for all the participants.

The main protocol of treatment followed by postgraduate’s was rubber dam isolation, access opening under local anesthetic, instrumentation via machine driven rotary NiTi files, irrigants primarily used were 2.5% NaOCl and 17% EDTA and intracanal medicaments used are CaOH and 0.2% chlorhexidine. Canals were obturated using cold lateral condensation technique and zinc oxide eugenol-based sealer. Direct coronal restoration with adhesive composite and 5th

generation bonding agent was included in the study. Indirect restoration using porcelain fused to metal bonded via glass ionomer luting cement was included.

Adequate length and density were considered when root filling material was within 0 to 2 mm of radiographic apex and presented a smooth adherence to root canal walls with no voids and irregularities. The patients were divided into two groups; Group 1: tooth restored with indirect coronal restoration, Group 2; tooth restored with direct coronal restoration. One hundred and two teeth were included in group 1 and 86 teeth were included in group 2.

The success of coronal restoration was determined by considering the apical radiolucency on pre- and post-operative periapical radiograph. The periapical index (PAI) was used for scoring, single observer was used to eliminate intra-observer variability. All records were digitalized and radiographs were observed under magnification. PAI scores of 1-2 were considered success and 3-5 were considered a failure.

STATISTICAL ANALYSIS

Statistical analysis was performed using statistical package SPSS version 25.0 (IBM Corporation). Chi-square analysis was done to calculate the values.

RESULTS:

A total of 188 participants were included in the study, there was even distribution between left (48.2%) and right (51.8%) mandibular molar. Demographics of participants showed a mean age was 47 years (27-65 years) and female to male ratio of 1:0.8, the mean observation period between root canal treatment and follow up radiograph for the study was 8 months (6 to 18 months). One tooth has been extracted due to failure. A significantly higher survival rate of indirect restoration $p < 0.001$ was observed as compared to direct restoration (Table 1). No significant correlation was found between coronal restoration and PAI score $p > 0.001$ between indirect and direct coronal restoration (table 2).

Coronal Restoration	Total observed	survival	percentage
Indirect	102	102	100%
Direct	86	85	98.8%
Total	188	187	99.4%

Coronal restoration	PAI 1-2	PAI 3-5	Chi-square	P value
Indirect restoration	97 (98.94%)	5	3.72	0.09
Direct restoration	84 (97.7)	2		

DISCUSSION:

This study is based on radiographic assessment of periapex of endodontically treated teeth restored with indirect or direct restoration. The disadvantage of radiograph being it's a two-dimensional projection of three-dimensional objects. Thus, a complete assessment of the coronal seal can't be estimated.^[10] Patients prognosis depends on preoperative factors as well as patients oral and systemic health all of which can influence the periapical status of the tooth,^[3] in this study these factors could not be standardized, hence can be considered as a drawback of this study.

The indirect restoration included in this was porcelain fused to metal and direct restoration being the adhesive composite material. Recently conservative access cavity designs have been an area of focus, the use of loupes, microscopes and illumination have helped preserve tooth structure, thus making direct adhesive bonded restorative material more viable.^[11] As the size of composite restoration increases the viability of restoration decreases. The teeth needing cuspal coverage are still treated with PFM crowns because of their conservative tooth preparation design and economics.^[12]

An indirect restoration has been advocated for better survivability in the oral environment.^[7] A study comparing indirect and direct restoration showed, crowns and onlays were superior in fracture resistance than direct restoration, which can be attributed to its bracing action, also reparability as a prognostic factor showed better results statistically for full coverage restoration.^[13]

Periapical index scoring is a system of grading periapical status according to radiolucency observed in intraoral radiograph. It was proposed by Orstavik and was used in the present study to analyze the periapical status of the root canal treated tooth. This system is suitable for the retrospective analysis of treatment results in endodontics.^[14] Successful endodontic treatment results in reduction or stable PAI score.^[3]

Since indirect restoration needs additional lab fabrication, temporization becomes necessary. Survivability of ETT have showed to be greatly reduced if the time period between provisional and definitive restoration is more than 4 months and initial endodontic treatment.^[15] Certain endodontic treated tooth maybe restored with direct composite restoration due economic reasons as well as prognosis maybe be considered poor for the tooth, thus leading to bias.^[3]

Several authors have suggested indirect restoration as a better option than direct restoration. Bacterial leakage has considered one of the main reasons for root canal treatment failure.^[16] Some authors have suggested coronal restoration doesn't have any effect on outcome of endodontically treated tooth.^[17] The results of this study suggest indirect and direct restoration have no

statistically significant difference on the periapical index scores.

CONCLUSION

The distribution of indirect and direct restoration shows that these are equally acceptable among clinicians as coronal restoration. The indirect restoration shows higher survivability than direct restoration while no correlation between PAI and the choice of coronal restoration.

REFERENCES:

1. Restrepo-Restrepo FA, Cañas-Jiménez SJ, Romero-Albarracín RD, Villa-Machado PA, Pérez-Cano MI, Tobón-Arroyave SI. Prognosis of root canal treatment in teeth with preoperative apical periodontitis: a study with cone-beam computed tomography and digital periapical radiography. *International endodontic journal*. 2019;52(11):1533-46.
2. Srivastava PK, Nagpal A, Setya G, Kumar S, Chaudhary A, Dhanker K. Assessment of Coronal Leakage of Temporary Restorations in Root Canal-treated Teeth: An in vitro Study. *The journal of contemporary dental practice*. 2017;18(2):126-30.
3. Stenhagen S, Skeie H, Bårdsen A, Laegreid T. Influence of the coronal restoration on the outcome of endodontically treated teeth. *Acta odontologica Scandinavica*. 2020;78(2):81-6.
4. Helfer AR, Melnick S, Schilder HJOS, Oral Medicine, Oral Pathology. Determination of the moisture content of vital and pulpless teeth. 1972;34(4):661-70.
5. Sornkul E, Stannard JGJJoE. Strength of roots before and after endodontic treatment and restoration. 1992;18(9):440-3.
6. Edelhoff D, Sorensen JAJJoP, Dentistry R. Tooth structure removal associated with various preparation designs for posterior teeth. 2002;22(3).
7. Stavropoulou A, Koidis PJJod. A systematic review of single crowns on endodontically treated teeth. 2007;35(10):761-7.
8. Sequeira-Byron P, Fedorowicz Z, Carter B, Nasser M, Alrowaili EFJCdosr. Single crowns versus conventional fillings for the restoration of root-filled teeth. 2015(9).
9. Mannocci F, Bertelli E, Sherriff M, Watson TF, Ford TPJTJopd. Three-year clinical comparison of survival of endodontically treated teeth restored with either full cast coverage or with direct composite restoration. 2002;88(3):297-301.
10. Hommez G, Coppens C, De Moor RJIEJ. Periapical health related to the quality of coronal restorations and root fillings. 2002;35(8):680-9.
11. Clark D, Khademi JAJDC. Case studies in modern molar endodontic access and directed dentin conservation. 2010;54(2):275-89.
12. Laegreid T, Gjerdet N, Johansson A, Johansson AJOD. Clinical decision making on extensive molar restorations. 2014;39(6):E231-E40.
13. Xie K, Wang X, Gao X, Yuan C, Li J, Chu CJJej. Fracture resistance of root filled premolar teeth restored with direct composite resin with or without cuspal coverage. 2012;45(6):524-9.

14. Ørstavik D, Kerekes K, Eriksen HMJDT. The periapical index: a scoring system for radiographic assessment of apical periodontitis. 1986;2(1):20-34.
15. Pratt I, Aminoshariae A, Montagnese TA, Williams KA, Khalighinejad N, Mickel AJJoe. Eight-year retrospective study of the critical time lapse between root canal completion and crown placement: its influence on the survival of endodontically treated teeth. 2016;42(11):1598-603.
16. Kalender A, Orhan K, Aksoy U, Basmaci F, Er F, Alankus A. Influence of the quality of endodontic treatment and coronal restorations on the prevalence of apical periodontitis in a Turkish Cypriot population. Medical principles and practice : international journal of the Kuwait University, Health Science Centre. 2013;22(2):173-7.
17. Ricucci D, Bergenholtz GJJEJ. Bacterial status in root-filled teeth exposed to the oral environment by loss of restoration and fracture or caries—a histobacteriological study of treated cases. 2003;36(11):787-802.