

INTRODUCTION

The restorative phase of treatment planning after endodontic therapy for a patient comes with the dilemma of deciding what option would be best for the patient and the long-term prognosis of the tooth. Patients that present for endodontic therapy often don't understand the importance of finalizing the tooth's treatment restoratively. As providers we need to be able to educate the patient in the importance of placing an indirect or direct restoration after completing the endodontic therapy. Additionally, there also comes the decision of adding a post & core in addition to a crown which is dependent on factors such as remaining tooth structure. In this critical review, the survival rate against fracture of endodontically treated teeth will be examined in teeth with full coverage crowns and those with direct composite restorations.

CLINICAL QUESTION

Is the risk of fracture affected when choosing direct versus indirect restorative approaches for endodontically treated tooth?

Population (P): endodontically treated teeth
Intervention (I): crown
Comparison (C): composite build up
Outcome (O): risk of fracture

Direct vs Indirect

Direct restoration

- Material placed by the clinician in a single procedure



Indirect restoration

- Fabricated outside of the mouth
- Mainly full cuspal coverage



RESULTS

- 91.7% of teeth with indirect restorations, 86.5% of teeth restored with amalgam and 83% of composite restored teeth survived over a mean follow-up period of 38 months (*Lynch et al. 2004*)
- *Pratt et al. (2016)* showed that teeth that received direct restorations (amalgam and composite) were 2.29 times more likely to be extracted than teeth that received a crown.
- *Mannocci et al. (2002)* demonstrated that direct composite restorations in root filled premolars with Class II cavities performed as well as teeth restored with single unit crowns
- A systematic review showed that posterior teeth restored with full coverage crowns had better 10-year survival (81% +/- 12%) than teeth restored with direct restorations (63% +/- 15%) (*Stavropoulou & Koidis 2007*).

- Systematic review compared single crowns with direct fillings for the restoration of root filled teeth, concluding that there is insufficient evidence to assess the effects of crowns or direct fillings on root filled teeth. *Sequeira-Byron et al. (2015)*
- Systematic review on the outcome of direct and indirect restorations on root filled teeth, made a weak recommendation for indirect restorations on teeth with extensive coronal damage. Indirect restorations, such as full coverage crowns, had higher 5- and 10- year survival rates, with no significant difference was observed in the short term. *Shu et al. (2018)*
- Main reasons for failure of direct resin restorations in root filled teeth were vertical root fracture, cusp fracture, restoration fracture, secondary caries and loss of adhesion *Lempel et al (2019)*.

CONCLUSION

After completing analysis of the above studies, it can be concluded that endodontically treated teeth require careful analysis of many factors in order to properly plan the treatment. All papers presented analysis of various restorations, and the status of the endodontically treated tooth varied as well in these studies. Based on the findings of the above articles, treatment planning a full coverage crown for patients with endodontically treated teeth can be a valid choice. As the articles discussed, the success rate was better for indirect restorations rather than direct restorations. Additionally, there was mention that when testing full coverage teeth with posts and without posts, there was no statistically significant difference in fracture rate. This finding is supported by another article by Assif et al, where fracture resistance of endodontically treated premolars restored with complete cast crowns was examined. They also found that whether the crowned tooth included a post or not did not alter the fracture resistance. Additional research needs to be done however, to explore the "post-less" approach proposed by Pascal Magne et al. It is understood that preservation of tooth structure of endodontically treated teeth is key to the success of restorations and longevity of the tooth. However, not enough clinical evidence is available to properly evaluate more modern techniques in adhesive dentistry that refrain from using posts for example.

REFERENCES

- Assif D, Bitenski A, Pilo R, Oren E. Effect of post design on resistance to fracture of endodontically treated teeth with complete crowns. *J Prosthet Dent.* 1993 Jan;69(1):36-40.
- Carvalho MA, Lazari PC, Gresnigt M, Del Bel Cury AA, Magne P. Current options concerning the endodontically-treated teeth restoration with the adhesive approach. *Braz Oral Res.* 2018 Oct 18;32(suppl 1):e74.
- Dammaschke T, Nykiel K, Sagheri D, Schäfer E. Influence of coronal restorations on the fracture resistance of root canal-treated premolar and molar teeth: a retrospective study. *Aust Endod J.* 2013 Aug;39(2):48-56.
- Lynch CD, Burke FM, Ni RR, Hannigan A (2004) The influence of coronal restoration type on the survival of endodontically treated teeth. *The European Journal of Prosthodontics and Restorative Dentistry* 12, 171-6.
- Shu X, Mai QQ, Blatz M, Price R, Wang XD, Zhao K (2018) Direct and indirect restorations for endodontically treated teeth: a systematic review and meta-analysis. *IAAD 2017 Consensus Conference Paper. Journal of Adhesive Dentistry* 20, 183-94.
- Lempel E, Lovász BV, Bihari E et al. (2019) Long-term clinical evaluation of direct resin composite restorations in vital vs. endodontically treated posterior teeth—Retrospective study up to 13 years. *Dental Materials* 35, 1308-18.
- Mannocci F, Bertelli E, Sherriff M, Watson TF, Pitt Ford TR (2002) Three-year clinical comparison of survival of endodontically treated teeth restored with either full cast coverage or with direct composite restoration. *The Journal of Prosthetic Dentistry* 88, 297-301.