Restoring endodontically treated teeth with Ceramic Onlays: A Systematic Review

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INTRODUCTION

Over the last 20 years, ceramics have been considered the material of choice in dental restorations. Adding to ceramic material development, advances in adhesive and cementation technologies have provided a new conservative, tooth-colored, and durable therapeutic option.
To preserve the residual tooth structure, indirect partial restoration such as onlays are a reliable minimally invasive alternative. Several clinical studies have confirmed the promising outcome of ceramic onlays to restore posterior teeth. However, there is no review evaluating the outcomes of ceramic onlay restorations in endodontically treated teeth (ETT).

AIMS

This systematic review aimed :
- to evaluate the durability of ceramic onlays in the restoration of endodontically treated teeth (ETT).
- -to identify the type of complications associated with the survival rate.

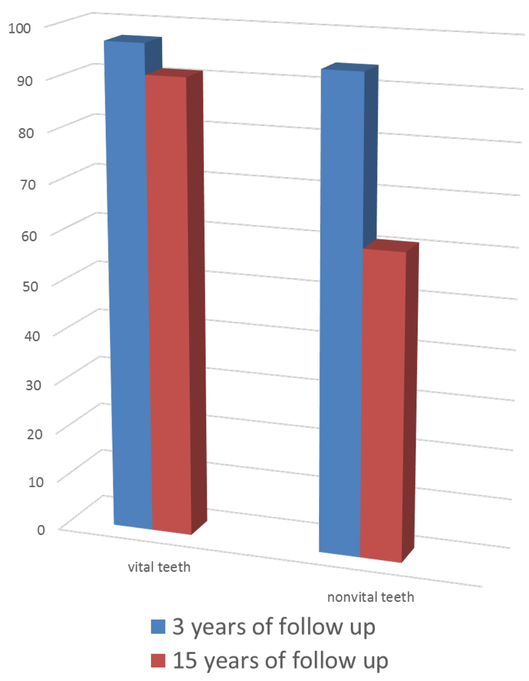
METHODS & MATERIAL

Adhering to PRISMA guidelines, an electronic search, from 01/2020 to 06/2020, with no date restriction was conducted in 2 research databases: Pubmed and Cochrane.
-A manual search in the bibliographies of the studies selected was complemented. Case reports and in vitro studies were excluded. No year limit was applied.
-The search was conducted in the MEDLINE database through PubMed and Cochrane Library.
-The Boolean operator of the PubMed dataset was implemented to combine the following mix of keywords: “ceramic”, “dental porcelain”, inlays”, and “tooth, nonvital”.

RESULTS

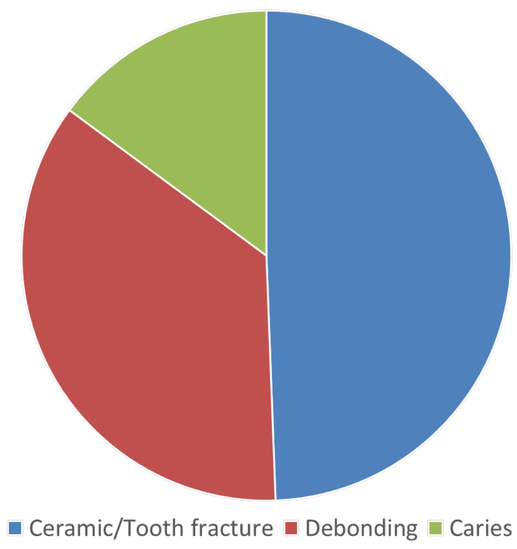
-A total of 7 articles were included in this systematic review.
-The survival rate had a range of 94.34%-100%.
-The most common failure in the medium-term was debonding and, in the long-term, was fracture

*Influence of the vitality of the tooth on the durability of ceramic onlays



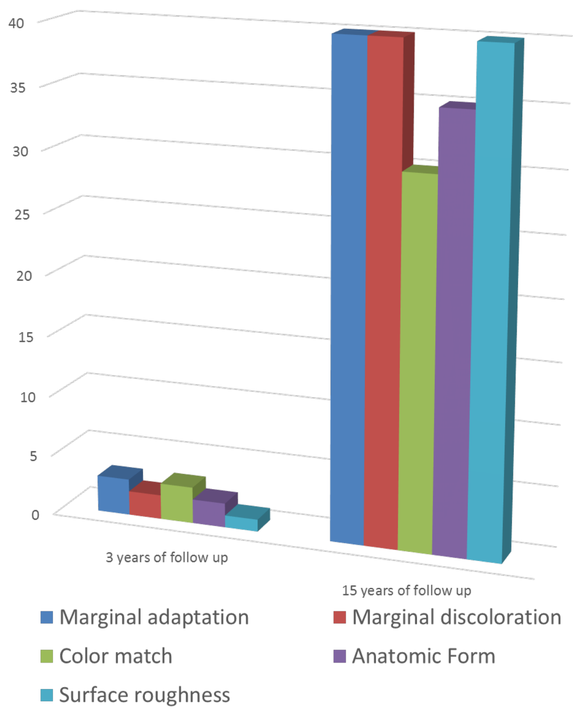
•The global survival rate was 97% with 94.5% for nonvital teeth after three years of follow up.
•In the long-term study, the survival rate was 91%, with 61% for nonvital teeth after 15 years of follow-up.

*Failure modes of ceramic onlays in endodontically treated teeth



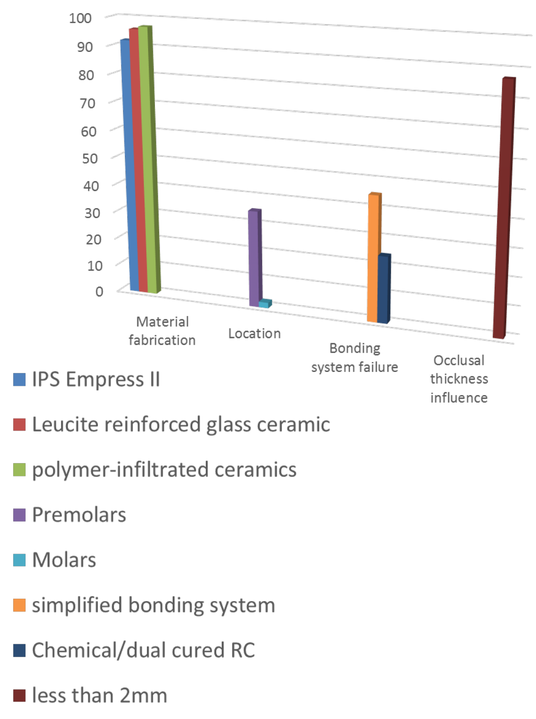
•Failure modes were observed in the different studies and were grouped as ceramic or tooth fracture (49%) , debonding (36%), caries (15%), and other causes such as loss and pain leading to extraction.

*Clinical parameters based on USPHS



•Four of the clinical studies looked at a set of clinical parameters, based on modified United States Public Health Service (USPHS) criteria.
•It included marginal adaptation, marginal discoloration, anatomic form, surface roughness, and color match.

*Factors influencing Onlays Outcome



•Several technical factors influence ceramic onlays outcomes:
-**Fabrication materials**: polymer-infiltrated ceramics onlays succeeded with 97%
-**Restoration location**: heavy occlusal loads in the posterior region leads to the onlay fracture
-**Cementation system**: simplified bonding system failed with 45%
-**Occlusal thickness**: 85.7% of the failed restorations had occlusal thicknesses less than 2mm

DISCUSSION AND CONCLUSION

-The survival rate of ceramic onlays in the restoration of ETT provides an acceptable clinical outcome with a medium-term survival rate of 94.34%-100%.
-In the medium-term survival, debonding is the most common cause for ceramic onlay failure. It consists on the failure at the cementation interface. This failure is related to the difference in substrate to which the primers where applied: hydrophilic dentin in vital teeth versus more sclerotic less-water containing dentin tissue in ETT.
-In the long-term survival, bulk fracture is the most frequent failure, which can be related to ceramic vulnerability to fatigue because of ceramic’s high modulus of elasticity and crack propagation from internal or external surfaces. A minimum of 2 mm of occlusal surface thickness is recommended to avoid the risk of fracture, which can be attributed to the resistance of flexion and crack propagation.

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