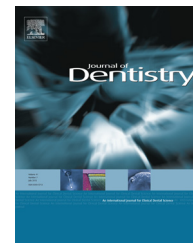


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Review article

Amalgam and resin composite longevity of posterior restorations: A systematic review and meta-analysis



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ABSTRACT

Objectives: The aim of the present review was to evaluate by means of a systematic review and meta-analysis the hypothesis of no difference in failure rates between amalgam and composite resin posterior restorations.

Data: Randomized controlled trials, controlled clinical trials and prospective and retrospective cohort studies were included in this review. The eligibility criteria included clinical trials in humans with at least 12 months of follow-up comparing the failures rates between occlusal and occlusoproximal amalgam and composite resin restorations. Clinical questions were formulated and organized according to the PICOS strategy.

Source: An electronic search without restriction on the dates or languages was performed in PubMed/MEDLINE, Cochrane Central Register of Controlled Trials, and Web of Science up until March 2015.

Study selection: The initial search resulted in 938 articles from PubMed/MEDLINE, 89 titles from the Cochrane Central Register of Controlled Trials, and 172 from the Web of Science. After an initial assessment and careful reading, 8 studies published between 1992 and 2013 were included in this review. According to the risk of bias evaluation, all studies were classified as high quality.

Conclusions: The results of this review suggest that composite resin restorations in posterior teeth still have less longevity and a higher number of secondary caries when compared to amalgam restorations. In relation to fractures, there was no statistically significant difference between the two restorative materials regarding the time of follow-up.

Clinical significance: There is currently a worldwide trend towards replacing amalgam restorations with mercury-free materials, which are adhesive and promote aesthetics. It is important to perform an updated periodic review to synthesize the clinical performance of restorations in the long-term.

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1. Introduction

For decades, various materials have been used in direct restorations of posterior teeth, such as amalgam and composite resin. In recent years, on account of an increasing demand for aesthetic restorations, composites have gained a prominent role in restorative dentistry. However, despite aesthetic requirements being fundamental, the mechanical properties, longevity and mainly the functional rehabilitation should be the most important criteria when choosing the restorative material.¹

Although amalgam restorations still have the highest functional durability,² its use has been questioned in recent decades due to the incorporation of mercury to the metal alloy.³ In addition, the need for more dental preparation, necessary to promote greater restoration retention, make amalgam questionable for conservative dentistry. For these reasons, the use of composite resins has been increasing throughout the world for direct posterior teeth restorations.^{4,5}

The higher sensitivity in the manufacturing technique, in addition to limitations such as the contraction during polymerization and possibility of forming marginal gaps, can be critical factors for the durability of composites.⁶ However, studies^{7,8} have shown a low annual failure average for composite resins in occlusal and occlusoproximal restorations, varying from 1 to 3%. The most frequent reason for failure are recurrent or secondary marginal restoration caries,⁹ thus indicating possible failures in the adhesion process. On the other hand, amalgam restorations reduce the possibility of secondary caries over time by forming oxides in the margin of the cavities as a result of the natural corrosion of the material, mainly in alloys with high copper content.

Data from longitudinal clinical studies comparing the longevity of restorations, especially in posterior teeth, should be interpreted with caution, because numerous confounding factors may be involved. The experience and skill of the professional, the size of the cavities, the quality and correct indication of material and type of occlusion are factors that

can influence the restorations performance. Due to these variables, randomized clinical trials (RCTs) are necessary for this type of research. However, to date, few RCTs^{10,11} have compared the longevity of amalgam versus composite resin restorations.

The aim of this study was to evaluate by means of a systematic review and meta-analysis the hypothesis of no difference in failure rates between amalgam and composite resin posterior restorations.

2. Material and methods

The methodology of this study followed the recommendations of the *Cochrane Handbook for Systematic Reviews of Interventions*¹² and PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses).¹³ The clinical reasoning was broken down and organized according to the PICOS strategy.

2.1. Objective

The aim of the present review was to evaluate by means of a systematic review and meta-analysis the hypothesis of no difference in failure rates between amalgam and composite resin posterior restorations.

2.2. Focused question

What is the longevity of occlusal and occlusoproximal amalgam and composite resin posterior restorations?

2.3. Search strategy

An unrestricted electronic search of dates or languages was performed in PubMed/MEDLINE, Cochrane Central Register of Controlled Trials, and Web of Science until March 2015. The search strategy and the PICOS tool can be seen in [Table 1](#). In addition, the list of references of included studies was accessed in search of new studies.

Table 1 – Systematic search strategy (PICOS strategy).

Search strategy	
Population	#1 Dental caries[MeSH] OR dental restoration failures[MeSH] OR dental restorations (permanent)[MeSH] OR posterior teeth OR molar[MeSH] OR premolar[MeSH] OR class I OR class II OR class I cavities OR class II cavities OR occluso cavities OR occlusoproximal cavities.
Intervention	#2 Dental restoration[MeSH] OR amalgam restoration OR composite restoration OR dental amalgam[MeSH] OR dental composite OR dental composite restoration OR restoration posterior teeth OR composite posterior teeth OR direct class I OR direct class II OR class I restoration OR class II restoration OR occlusal restoration OR occlusoproximal restoration.
Comparisons	Amalgam vs. composite resin
Outcomes	#3 Survival OR success OR failure OR longevity OR amalgam longevity OR resin longevity OR composite resin longevity OR long-term OR follow-up OR prospective study[MeSH] OR retrospective study OR randomized controlled trial[MeSH] OR controlled trial.
Study design	Randomized controlled trials, controlled clinical trials, prospective and retrospective cohort studies
Search combination	#1 AND #2 AND #3
Database search	
Language	No restriction
Electronic databases	PubMed/MEDLINE, Cochrane Central Register of Controlled Trials and Web of Science

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