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Review article

Clinical performance of glass ionomer cement and composite resin in Class II restorations in primary teeth: A systematic review and meta-analysis

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ABSTRACT

Objectives: This study compared the clinical performance of glass ionomer cement (GIC) compared to composite resin (CR) in Class II restorations in primary teeth.

Data: Literature search according to PRISMA guidelines including randomized controlled trials comparing Class II restorations performed with GIC, compared to CR, in primary teeth.

Sources: PubMeb, Scopus, Web of Science, VHL, Cochrane Library, Clinical Trials and OpenGrey, regardless of date or language.

Study: Ten studies were included in qualitative synthesis, and 9 in the meta-analyses (MA). Six studies were classified as low risk of bias, and 4 as "unclear". Heterogeneity ranged from null to high (0% to 73%). GIC and CR presented similar failure patterns (risk difference −0.04 [−0.11, 0.03]; p = 0.25, I^2 = 51%), and the exclusion of studies with follow-up period < 24 months, or grouping according to the type of GIC (conventional or resin-modified), or according to the type of isolation (cotton roll or rubber dam), or according to the evaluation criteria applied did not affect the pattern of the results obtained. GIC exhibited significantly lower values of secondary carious lesions (SCL) than CR (SCL: risk difference 0.06 [0.02, 0.10], p = 0.008, I^2 = 0%). The materials presented similar performance (p > 0.05) regarding the overall effect, as well as for marginal discoloration, marginal adaptation and anatomical form. The superiority of GIC was maintained when resin-modified GIC and rubber dam isolation were analyzed separately.

Conclusions: GIC and CR presented similar clinical performance for all criteria analyzed, except for secondary carious lesions, in which GIC presented superior performance, especially for the resin-modified GIC and with rubber dam isolation.

1. Introduction

Dental caries is one of the most prevalent diseases in the oral cavity, and its high prevalence is related to inadequate oral hygiene habits and ingestion of carbohydrate-rich foods [1], as well as socioeconomic and behavioral factors. The proximal surfaces are the greatest contributors to the high prevalence of this disease [2], especially in the primary dentition. Since the direct visual inspection of carious lesions in proximal surfaces is impaired by the presence of a contact surface between primary posterior teeth [3,4], more invasive interventions are commonly performed, given that carious lesions in these surfaces are often detected in more advanced stages when compared with smooth surfaces. In these cases, restorative treatment is the most frequently performed.

Although amalgam restorations present high longevity [5], their use has been increasingly discontinued, since they require more invasive operative techniques, demanding wear of intact tooth structure for adequate material retention [6], in addition to concerns related to toxicity and environmental pollution [7]. The aforementioned disadvantages, along with the poor esthetics of amalgam restorations, increased the attention to materials as composite resin (CR) and glass ionomer cement (GIC), due to the greater maintenance of intact tooth structure and their adhesion to the remaining tooth structure. These characteristics allow the use of more conservative restorative techniques, limiting the cavity preparation mainly to decayed tissue removal, thereby preserving the intact tooth structures.

Despite the favorable esthetic and mechanical properties of CRs, the

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Box 1
Search strategy for each database Feb 6th 2018.

PubMed (n=2.154)	#1 glass ionomer cement[MeSH Terms] OR glass ionomer cement[Title/Abstract] OR glass ionomer[Title/Abstract] OR GIC[Title/Abstract] OR glass polyalkenoate cement[Title/Abstract] OR glass-ionomer cement[Title/Abstract] OR resin-modified glass ionomer[Title/Abstract] OR resin modified glass ionomer[Title/Abstract] OR RMGIC[Title/Abstract] #2 composite resin[MeSH Terms] OR composite resin[Title/Abstract] OR composite dental resin[MeSH Terms] OR composite dental resin[Title/Abstract] #3 child[MeSH Terms] OR child[Title/Abstract] OR children[Title/Abstract] OR tooth, deciduous[MeSH Terms] OR tooth deciduous[Title/Abstract] OR teeth deciduous[Title/Abstract] OR deciduous dentition[Title/Abstract] OR primary dentition[Title/Abstract] OR milk tooth[Title/Abstract] OR milk teeth[Title/Abstract] OR primary teeth[Title/Abstract] OR primary tooth[Title/Abstract] OR baby teeth[Title/Abstract] OR baby tooth[Title/Abstract] OR primary molar[Title/Abstract] OR deciduous molar[Title/Abstract] OR molar[Title/Abstract] OR molar[MeSH Terms] OR dental restoration, permanent[MeSH Terms] OR dental restoration permanent OR restoration[Title/Abstract] OR dental permanent filling[Title/Abstract] OR posterior restoration[Title/Abstract] OR class II[Title/Abstract] OR dental restoration, temporary[MeSH Terms] OR temporary dental restoration[Title/Abstract] OR temporary dental filling[Title/Abstract] #1 AND #2 AND #3
Scopus (n=2.138)	#1 (TITLE-ABS-KEY (glass ionomer cement) OR TITLE-ABS-KEY (glass-ionomer cement) OR TITLE-ABS-KEY (glass ionomer) OR TITLE-ABS-KEY (gic) OR TITLE-ABS-KEY (glass polyalkenoate cement) OR TITLE-ABS-KEY (resin-modified glass ionomer) OR TITLE-ABS-KEY (resin modified glass ionomer) OR TITLE-ABS-KEY (rmgic)) 2 (TITLE-ABS-KEY (composite dental resin) OR TITLE-ABS-KEY (composite resin)) #3 (TITLE-ABS-KEY (child) OR TITLE-ABS-KEY (children) OR TITLE-ABS-KEY (tooth deciduous) OR TITLE-ABS-KEY (teeth deciduous) OR TITLE-ABS-KEY (deciduous dentition) OR TITLE-ABS-KEY (primary dentition) OR TITLE-ABS-KEY (milk tooth) OR TITLE-ABS-KEY (milk teeth) OR TITLE-ABS-KEY (primary teeth) OR TITLE-ABS-KEY (primary tooth) OR TITLE-ABS-KEY (baby tooth) OR TITLE-ABS-KEY (baby teeth) OR TITLE-ABS-KEY (molar) OR TITLE-ABS-KEY (primary molar) OR TITLE-ABS-KEY (deciduous molar) OR TITLE-ABS-KEY (permanent dental restoration) OR TITLE-ABS-KEY (dental permanent filling) OR TITLE-ABS-KEY (posterior restoration) OR TITLE-ABS-KEY (class II) OR TITLE-ABS-KEY (temporary dental restoration) OR TITLE-ABS-KEY (temporary dental filling)) #1 AND #2 AND #3
WEB OF SCIENCE (n=725)	#1 Topic:(glass ionomer cement) OR Topic:(glass-ionomer cement) OR Topic:(GIC) OR Topic: (glass polyalkenoate cement) OR Topic:(glass ionomer) OR Topic: (resin-modified glass ionomer) OR Topic:(resin modified glass ionomer) OR Topic: (RMGIC) #2 Topic:(composite dental resin) OR Topic:(composite resin) #3 Topic:(Child) OR Topic: (children) OR Topic: (tooth deciduous) OR Topic: (teeth deciduous) OR Topic: (deciduous dentition) OR Topic: (primary dentition) OR Topic: (milk tooth) OR Topic: (milk teeth) OR Topic: (primary teeth) OR Topic: (primary tooth) OR Topic:(baby teeth) OR Topic: (baby tooth) OR Topic: (primary molar) OR Topic: (molar) OR Topic:(deciduous molar) OR Topic:(permanent dental restoration) OR Topic: (dental permanent filling) OR Topic: (posterior restoration) OR Topic: (class II) OR Topic:(temporary dental restoration) OR Topic: (temporary dental filling) #1 AND #2 AND #3
VHL (n=206)	#1 (mh:(glass ionomer cement)) OR (tw:(glass ionomer cement)) OR (tw:(glass-ionomer cement)) OR (tw:(glass ionomer)) OR (tw:(glass polyalkenoate cement)) OR (tw:(GIC)) OR (tw:(resin modified glass ionomer)) OR (tw:(resin-modified glass ionomer)) OR (tw:(RMGIC)) #2 (mh:(composite dental resin)) OR (tw:(composite dental resin)) OR (mh:(composite resin)) OR (tw:(composite resin)) #3 (mh:(child)) OR (tw:(child)) OR (tw:(children)) OR (mh:(molar)) OR (tw:(molar)) OR (tw:(primary molar)) OR (tw:(deciduous molar)) OR (mh:(tooth, deciduous)) OR (tw:(tooth deciduous)) OR (tw:(teeth deciduous)) OR (tw:(deciduous dentition)) OR (tw:(primary dentition)) OR (tw:(milk tooth)) OR (tw:(milk teeth)) OR (tw:(primary teeth)) OR (tw:(primary teeth)) OR (tw:(baby teeth)) OR (tw:(baby tooth)) OR (mh:(dental restoration, permanent)) OR (tw:(permanent dental restoration)) OR (tw:(dental permanent filling)) OR (tw:(posterior restoration)) OR (tw:(class II)) OR (mh:(dental restoration, temporary)) OR (tw:(temporary dental restoration)) OR (tw:(temporary dental filling)) 1 AND #2 AND #3
COCHRANE LIBRARY (n=431)	#1 MeSH descriptor: [Glass Ionomer Cements] explode all trees; #2 glass ionomer cement or glass ionomer or GIC or glass-ionomer cement or glass-ionomer cement; #3 glass polyalkenoate cement; #4 resin-modified glass ionomer or resin modified glass ionomer or RMGIC; #5 = #1 or #2 or #3 or #4; #9 MeSH descriptor: [Child] explode all trees; #10 child or children; #11 #9 or #10; #12 MeSH; descriptor: [Tooth, Deciduous] explode all trees; #13 tooth deciduous or teeth deciduous; #14 #12 or #13; #15 deciduous dentition or primary dentition; #16 milk tooth or milk teeth or primary teeth or primary tooth or baby teeth or baby tooth; #17 MeSH descriptor: [Molar] explode all trees; #18 deciduous molar or primary molar or molar; #19 #17 or #18; #20 MeSH descriptor: [Dental Restoration, Permanent] explode all trees; #21 dental restoration permanent or restoration or dental permanent filling or posterior restoration; #22 #20 or #21; #23 class II; #24 MeSH descriptor: [Dental Restoration, Temporary] explode all trees; #25 temporary dental restoration or temporary dental filling; #26: #24 or #25; #27 = #11 or #14 or #15 or #16 or #19 or #22 or #23 or #26 #6 MeSH descriptor: [Composite Resins] explode all trees; #7 composite resin or composite dental resin; #8 = #6 or #7 #5 and #8 and #27
OPENGREY (n=0)	#1 glass ionomer cement OR glass-ionomer cement OR GIC OR glass polyalkenoate cement OR glass ionomer OR resin-modified glass ionomer OR resin modified glass ionomer OR RMGIC #2 composite dental resin OR composite resin #3 Child OR children OR tooth deciduous OR teeth deciduous OR deciduous dentition OR primary dentition OR milk tooth OR milk teeth OR primary teeth OR primary tooth OR baby teeth OR baby tooth OR primary molar OR molar OR deciduous molar OR permanent dental restoration OR dental permanent filling OR posterior restoration OR class II OR temporary dental restoration" OR temporary dental filling 1 AND #2 AND #3