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10-Minute EBD: Do Posterior Composite Restorations Have Longer-Term Success Than Glass Ionomer?

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Do Posterior Composite Restorations Have Longer-Term Success Than Glass Ionomer?

By Eleni Langas, DDS, Mridula Manoj, DDS, and Kelsey Carreras-Simons, DDS

A clinical examination of a 26-year-old autistic patient found occlusal decay on tooth number 30. This patient has a high caries risk with poor oral hygiene, and the patient's mother, the legal guardian, stated that the patient was uncooperative with home care. Evaluation of the patient's behavior during the examination concluded that he would require protective stabilization throughout a restorative procedure. The mother was advised that an occlusal restoration was recommended, and she requests no "metal fillings" in her child's mouth due to something she read about them containing mercury. Choices are complicated because the patient may not be cooperative enough to achieve adequate isolation to place a composite restoration.

Although the evidence does not support a correlation between amalgam restorations and autism, an evidence-based approach in treatment planning incorporates the patient's and caregiver's wishes. Furthermore, other non-metallic restorative options exist, such as resin-modified glass ionomers with fluoride-releasing properties, which require less isolation during placement. It seems like a resin-modified glass ionomer could be the ideal restorative material for this patient with special needs. However, you are unsure of the long-term success of glass ionomer restorations in comparison to composite restoration. Therefore, you decide to conduct a thorough search of the literature to find an answer.

Do posterior composite restorations have longer-term success than glass ionomer restorations?

Clinical Scenario



A patient's mother requests no metal fillings to restore a cavity for her autistic adult child. Because the patient is uncooperative and isolation is difficult, to determine the best care option we questioned if glass ionomer is comparable to composite resin for long-term restorative success?

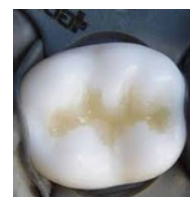
Literature Search Strategies



Databases – PubMed
Search terms – Glass ionomer restorations, composite restorations, posterior, success, clinical performance, secondary decay.

Six articles addressed our search criteria.

Evidence Summary



Direct composite restorations have greater long-term success than glass ionomer restorations in adults requiring Class I restoration of posterior teeth.

PICO question

The following PICO question was formulated: In adults with posterior decay, do glass ionomer restorations, in comparison to composite restorations, result in equal long-term success?

- P** = Patients with posterior caries.
- I** = Glass ionomer restorations.
- C** = Composite restorations.
- O** = Long term success (secondary caries).

Literature search pathway

A literature search was conducted using PubMed with the search terms "glass ionomer restorations," "composite restorations," "posterior," "success," and "clinical performance."

A combination of the search terms

listed above was applied to a PubMed search to identify 305 relevant articles which addressed our PICO question. Criteria for study selection included the type of study, the year published, and the clinical outcomes considered by the researchers. Our search criteria limited the type of study to identify the strongest evidence to answer our PICO question by using search engine filters for "randomized controlled trials," "systematic reviews," and "meta-analyses." We then reviewed and evaluated the studies found using these search criteria to identify whether they provided evidence addressing our PICO question.

Evidence summary

In evaluating the literature to answer whether direct glass ionomer

posterior restorations have equal long-term success to direct composite restorations, the evidence suggests that direct composites are superior. Out of the 305 collected studies, four met the search criteria. Two out of the four collected articles concluded that direct composites have greater long-term success, while the other two concluded that there was no significant difference in the long-term success of the materials.

In the article by Heintze et al., a longitudinal study using linear mixed effects models was performed. The outcome that they sought to assess was adjusted median survival. The results showed that the adjusted median survival of composite restorations was superior to that of compomer and GI restorations. While these results do show a difference in

adjusted median survival, no statistical tests were included showing adjusted survival curves. Furthermore, the authors failed to include a hazard ratio. These shortcomings make it hard to draw conclusions from this study.

The Gurgan et al., 2020 study found significant differences in surrogate outcomes such as color, but found no significant changes in anatomical form, secondary caries, post-operative sensitivity, surface texture, and retention for either restorative material. These assessed criteria presented with a p-value of greater than 0.05, indicating that we would fail to reject the null hypothesis that there is no difference between the two restorative materials.

The Vetromilla study conducted a network meta-analysis. In the study,

binary data is presented comparing multiple different restorative materials with associated risks ratios (RR). The data revealed more favorable outcomes for composite resin restorations compared to GI restorations, with a RR of 1.73 and a confidence interval (CI) of 1.67-1.79. The risk ratio was greater than 1, indicating an increased risk for failure compared to composite resin or amalgam restorations. This article specifically evaluated large posterior restorations.

The Mickenautsch et al., 2015 systematic review showed no difference in failure rates between composite resin and high or low-viscosity glass ionomer restorative cement. However, the lack of research directly comparing the two restorative materials necessitated the inclusion of
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Table of Evidence

	Citation	Study	Restoration Success/Conclusion
1	Heintze et al., 2021 ¹	Meta-analysis (longitudinal study with linear mixed effects models)	<ul style="list-style-type: none"> ■ Posterior resin composite restorations showed best performance for Class I or Class II restorations. ■ Compomer and glass ionomer restorations showed less longevity for Class I or Class II restorations. ■ Mean overall survival rate of resin composite restorations was about 95-97% but dropped to 85-90% after 10 years. <ul style="list-style-type: none"> ● Main reason for failure: bulk fractures (70%), recurrent caries, retention loss, unacceptable color match, inadequate marginal integrity, endo treatment or cuspal fracture. ■ Mean overall cervical rate of glass ionomer restorations after four years was 87% and 80% after 6 years. Main reason for failure: loss of anatomical contours, proximal contact and retention.
2	Gurgan et al., 2020 *Revised-10 year ²	Randomized clinical trial	<ul style="list-style-type: none"> ■ Both acceptable success rates for Class I and Class II restorations after 10 years. ■ No significant difference between composite resin and GI in the rate of secondary caries.
3	Vetromilla et al., 2020 ³	Systematic review and meta-analysis	<ul style="list-style-type: none"> ■ Glass ionomer restorations are more prone to failure than direct composite resin for large posterior restorations. ■ 95% CI and P-value for comparison of glass ionomer restorations compared to direct resin restorations: CI: 1.68-1.79, P-value: 0.79, RR= 1.73
4	Mickenautsch et al., 2015 ⁴	Systematic review	<ul style="list-style-type: none"> ■ No difference in failure rate. ■ Additional evidence required for optimal conclusion. ■ 95% CI and P-values for four ITC comparisons: <ul style="list-style-type: none"> ● CI: 0.02-59.90, P-value: 0.95 ● CI: 0.001-6.08, P-value: 0.2 ● CI: 0.17-1.97, P-value: 0.65 ● CI: 0.38-2.73, P-value: 0.96

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studies comparing high and low-viscosity glass ionomer restorative cement vs. amalgam and amalgam vs. composite in order to draw indirect comparisons.

Conclusion

While evidence in the literature plays a role in clinical decision-making, it is ultimately up to the clinician to consider all factors, including the patient's needs and desires, in recommending care choices for a patient. Most patients will benefit from a well-done direct composite restoration under ideal conditions. The patient discussed in the clinical scenario required a Class I restoration, meaning it had a complete enamel margin to promote a bonded marginal seal. This may not be the same with a Class V restoration where the apical margin is below the CEJ. Furthermore, when it is difficult to achieve ideal conditions for placement of a direct composite restoration, clinicians should weigh the potential reduction in long-term success seen with glass ionomer restorations against the possible ease of placement and fluoride-releasing properties these restorative materials can provide.

In the discussed clinical scenario where the patient is uncooperative, and the guardian does not want amalgam restorations, we would suggest using a high viscosity glass-ionomer restorative cement, knowing that the long-term success of the restoration is not as high as that of a composite restoration. Our choice was made because the patient's cooperation would make completing a well-done direct composite with less-than-ideal isolation challenging. It is ultimately the clinician's responsibility to use an evidence-based approach that incorporates the patient and caregiver's

wishes to achieve the best outcome for each patient.

In contrast to composite resins, further research is needed to determine the impact of fluoride release from glass ionomer restorative materials in reducing the risk or severity of recurrent decay with failed restorations. ●

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