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Opinion Article

Evolution in Dental Materials: A Comprehensive Review of Amalgam Fillings

Safi Madini*

Department of Prosthetic Dentistry, University of Sulaimani, Sulaimani, Iraq

DESCRIPTION

Dental materials play a vital role in modern dentistry, where the focus is not only on durability but also on biocompatibility and aesthetics. Among the various materials used in dentistry, amalgam fillings have been a foundation for many years. However, with developing technologies and increasing concerns regarding mercury content, researchers have been exploring alternative materials and improving the properties of traditional ones. It provides a comprehensive review of the development of dental materials, focusing particularly on advancements in amalgam fillings. Amalgam, a mixture of metals including mercury, silver, tin, and copper, has been utilized in dentistry for over 150 years. Its popularity stemmed from its affordability, ease of use, and durability. However, concerns regarding the mercury content in dental amalgam have led to a change in focus towards alternative materials in recent years. Dental amalgam is still frequently utilized in dentistry, particularly for posterior restorations. However, significant efforts have been made to enhance its properties and mitigate potential risks. One advancement is the introduction of high-copper amalgam, which exhibits improved strength, corrosion resistance, and decreased creep compared to conventional amalgams. High-copper amalgams also have a reduced mercury content, addressing concerns regarding toxicity. Furthermore, research has focused on developing amalgam alloys with enhanced handling characteristics, such as improved compressive strength and resistance to stain and rust. These advancements aim to extend the lifespan of amalgam restorations while ensuring patient safety.

Researchers have looked into alternatives to standard dental amalgam in response to worries about mercury poisoning and growing patient requests for cosmetic restorations. Composite resins, glass ionomers, and resin-modified glass ionomers have gained popularity due to their tooth-colored appearance and adhesive properties. These materials offer excellent aesthetics and biocompatibility, making them suitable for use in both anterior and posterior restorations. These restorations provide superior aesthetics and biocompatibility compared to traditional amalgam fillings, although they often require more extensive preparation. One of the primary concerns regarding dental amalgam is its mercury content and potential toxicity. While numerous studies have demonstrated the safety of dental amalgam restorations, particularly when used appropriately in healthy individuals, researchers continue to investigate alternative materials with lower or no mercury content.

It has been made to improve the biocompatibility of dental materials to minimize adverse reactions and help tissue healing. The field of dental materials continues to develop rapidly, driven by advancements in materials science, technology, and patient preferences. Future research may focus on developing novel materials with improved mechanical properties, biocompatibility, and aesthetics. Nanotechnology holds potential for enhancing the properties of dental materials, such as improving wear resistance and antibacterial properties. Personalized dentistry may become more prevalent, with materials personalized to individual patient needs based on factors such as genetics, oral microbiome, and lifestyle habits. Digital dentistry, including Computer-Aided Design and Manufacturing (CAD/CAM) technologies, will likely play a significant role in fabricating custom restorations with precise fit and optimal aesthetics. The development of dental materials, particularly in the context of amalgam fillings, has undergone significant advancements in recent years. While dental amalgam remains as a widely used material for posterior restorations, alternative materials with improved aesthetics and biocompatibility have gained popularity.

Correspondence to: Safi Madini, Department of Prosthetic Dentistry, University of Sulaimani, Sulaimani, Iraq, E-mail: madini@gmail.com

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