

Dental Amalgam: A Restorative Dilemma

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Despite its 150 year long and successful history as a posterior restorative material, use of dental amalgam has been a topic of much debate and controversy. The twentieth century saw great concern regarding the use of dental amalgam, including the very well known 'amalgam war'.¹ Amalgam related issues like toxicity were debated and explored. The basic cause for this controversy is the presence of Mercury (Hg) as one of the components of dental amalgam. Hg occurs in three forms: inorganic, organic and elemental or metallic. Inorganic Hg occurs as salts like HgCl₂ and is highly toxic. The organic Hg, the most toxic form mostly occurs as methyl mercury. It is readily absorbed in the gut and the major route for human ingestion of this form is through fishes and sea food. Third is the elemental form, Hg⁰ which is the metal at the liquid state and is used in making mirrors, thermometers and dental amalgams. In this form it is very poorly absorbed and is thus readily excreted through the gut. But, the elemental form produces vapors which may be hazardous if present over a critical permissible concentration. Once the setting reaction is complete, only extremely minute levels of mercury can be released from amalgam, far below the health concern. Vapor exposure from amalgam restorations is estimated to be 1.7 µg/day which is far less than the WHO threshold limit value of 50 µg/m³/day for a 40 hour work week.

In 2009, FDA had given the statement that amalgam is safe as dental restorative material and in January 2015, the FDA website again clarified that there is no change in their 2009 statement regarding its use in patients.² In a review, the EU Commission's Scientific Committee in 2008 had concluded that no increased risks of adverse systemic effects exist and amalgam is not therefore considered to pose a risk of

systemic disease.³ The recent preliminary report by the Scientific Committee on Emerging and Newly Identified Health Risks in 2015 concluded "that current evidence does not preclude the use of amalgam in dental restorative treatment in the general population. Dental restorative therapy during pregnancy, as for any other therapeutic treatment, should be limited as much as possible in order to reduce the exposure of the foetus. The choice of material should be based on patient characteristics such as primary or permanent teeth, pregnancy, the already existent number of dental amalgam fillings, presence of allergies to mercury or other components of the restorative materials, and presence of decreased renal clearance".⁴ Mercury hypersensitivity has been wrongly claimed as a potential health hazard. This is a rare immune response (2% incidence), and the reaction is very mild and not life threatening.¹ *But the organisations do emphasise on proper handling and disposal of mercury in the clinics so that it may not add to the environmental burden.*

The current data suggests that dental amalgams serve for a much longer period as posterior restorations compared to other restorative options. Additionally, a significantly lower rate of secondary caries formation is associated with amalgams, thus favouring them as an economic and durable restorative material. Thus, amalgam is the judicious treatment option in situations where aesthetics is not a concern.

Nonetheless, the last decade has seen many improvements in the posterior composites, yet they cannot match the high strength and easy handling of dental amalgam. Additionally, the problem of polymerisation shrinkage makes them vulnerable to marginal leakage and a high secondary caries rate. Also, some of the components of the composite resins have also found to be cytotoxic to human dental pulp and gingiva. In the years to come, there is a need for development of newer biomimetic posterior restorative materials with a potential to remineralize enamel and encourage a minimally invasive approach towards restorative dentistry. Also, more emphasis should be on prevention, early detection of dental caries and recognition of high risk patients to reduce the dental restorative burden.



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