

Beware of mercury toxicity a health hazard –a review



Medical Science

KEYWORDS :

Dr. Sheetal Ghivari

Senior Lecturer, Department of Conservative Dentistry and Endodontics, KLE VK Institute of dental sciences, Nehru Nagar, Belgaun, State-Karnataka, INDIA

ABSTRACT

Amalgam popularly, known as silver filling served as a restoration of choice since 160 years as it is long lasting and very economical. There can be no doubt that silver amalgam has saved more teeth than any other restorative material. Mercury present in amalgam is a concern to the patient as well as dental surgeon. Proper measures should be taken to minimize the sources of mercury toxicity in dental office. Various gadgets and methods are utilized for measuring the blood and urinary levels of mercury. Dental office should follow the dental mercury hygiene recommendations and use alternatives to amalgam like gold, platinum and gallium based alloys to avoid mercury toxicity.

Introduction:

For many years amalgam was considered as a Cinderella of dental material. Silver amalgam has been in use as restorative material since the beginning of nineteenth century. Unlike any other plastic dental filling material, it has been continuous clinical use for more than 160 years. Yet the safety of dental amalgam for both the dental patient and dental personnel has been questioned intermittently since the inception of the use of this material. The controversy relates to the important component of dental amalgam, that is, mercury.²

Mercury in the environment and food chain: mercury is a naturally occurring element with 30,000 to 1,50,000 tons being released in to atmosphere by degassing the earth's crust and oceans.

Mercury enters the food chain by inadequate and improper disposal of wastes into the oceans, lakes and stream where micro-organisms methylate inorganic mercury to the more toxic methyl mercury. Methyl mercury is then rapidly taken by plankton algae and concentrated in fish via consumption of these organisms.³

Absorption efficiency for different forms of mercury

Mercury	Skin	Lungs	GIT
Elemental	-	80%	0.01%
Inorganic	-	80%	7%
Organic	-	-	95-98%

Ingested elemental mercury vapor readily crosses cell membranes because of its high diffusibility and lipid solubility. About 80% of inhaled mercury is absorbed across alveolar membrane in to blood stream and transported in to other tissues. Accumulation of mercury occurs in spleen, muscle, glands such as thyroid gland, salivary gland and testis. The accumulation of mercury, after exposure is dependent on the dose, frequency and duration of exposure as well as number of metabolic factors. On an average biologic half life of inorganic mercury is 50-60 days.⁴

Elimination of mercury from the body occurs primarily by the excretion of Hg⁺⁺ via the 1)Urine 2)Feces 3) Exhalation 4)Perspiration may also have a role under certain conditions.

Sources of mercury in dental office

1) Mercury spills 2) Expression of excess mercury from amal-

gam 3) Leakage from dispensers 4) leakage from amalgam capsules during trituration 5) Mercury vaporization from contaminated instruments placed in sterilizers 6) grinding of amalgam during removal of restoration.⁵

Monitoring mercury level:

Biologic monitoring for mercury exposure: because of high individual variations and daily fluctuations, serial monitoring is recommended to increase the reliability of blood and urinary concentrations as a measure of exposure to individuals.

Signs and Symptoms of mercury toxicity: Chronic exposure leads to neurological effects, the characteristic mercurial tremor. Psychological and behavioral changes.

Oral symptoms: gingivitis, excessive salivation, metallic taste and loosening of teeth.⁶

Dental mercury hygiene recommendation

- 1) Ventilation- provide proper ventilation in work place
- 2) Monitor the mercury vapor level in the office periodically using badges.
- 3) Monitor personnel –office personnel by periodic analysis
- 4) Office design: Proper Work area design to facilitate spill contaminant
- 5) Precapsulated alloys- to avoid bulk mercury spill
- 6) Amalgamator fitted with cover
- 7) Handling care – avoid skin contact with mercury, avoid dry polishing.
- 8) Evacuation systems: Use high volume evacuation when finishing
- 9) Change mask as necessary.
- 10) Store amalgam scrap under radiographic fixer.
- 11) Spills: Clean up spilled mercury by using bottles, tapes or fresh mixes of amalgam or commercial clean up kits.

Possible alternatives to amalgam restorations can be used such as

1) Gold 2)Composites 3)Gallium based alloys 4) Glass ionomer to prevent mercury toxicity in dental office.⁷

Conclusion: Dental amalgam is the oldest restorative material in dentistry but it is surrounded with controversies. Amalgam should be handled carefully to prevent health hazard associated with mercury.

REFERENCE

- 1.Rathore M, Singh A, Pant VA. The dental amalgam toxicity fear- a myth or actuality. Toxicol Int. 2012 ;19(2):81-8. | 2. Brownawell AM, Berent S, Brent RL et al. The potential adverse health effects of amalgam. Toxicol Rev.2005;24(1):1-10. | 3. Roberts HW, Charlton DG. Release of mercury from amalgam restorations and it's health effects: a review. Oper dent.2009; 34(5):604-15. | 4. McComb D. Occupational exposure of mercury in dentistry and dentist mortality. J can dent assoc. 1997;63(5):372-6. | 5.Mjor IA. Safe and effective use of dental amalgam. Int dent j.1987; 37(3):147-51. | 6. Makert JR, Berglund A. Mercury exposure from dental amalgam fillings: absorbed dose and potential for adverse health effects. Crit Rev Oral Biol Med. 1997 ;8(4):410-36. | 7. Mccullogh MJ, Tyas MJ. Local adverse effects of amalgam restorations. Int dent j.2008 Feb; 58(1):3-9.