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Dental Amalgam: Still a Good Restorative Material Option for Complex Restorations in Molar Teeth

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Editorial

In the modern practice of dentistry, there are many choices available to the restorative dentist when restoring badly broken down molar teeth. For the purposes of this discussion, a complex dental restoration is defined as one that restores a relatively large portion of a molar to include at least one cusp. When restoring a complex preparation in a molar, the choice of materials includes gold, base metals, ceramics, composite resins, and amalgam. Of these materials, the ceramics and composite resins are rapidly becoming the most popular choices among practicing dentists. However, the other choices, particularly dental amalgam should be considered.

Most clinicians strive to practice "state of the art" dentistry. The term "state of the art" refers to the highest level of general development of a device, technique, or scientific field achieved at a particular time. In other words, it is the most sophisticated or advanced stage of technology, art, or science. Whereas, "standard of care" is a medical, dental, or psychological treatment guideline. Standard of care can be general or specific. It specifies appropriate treatment based on scientific evidence and collaboration between professionals involved in the treatment of a given condition. When restoring badly broken down molars or providing full cuspal coverage on an endodontically treated molar, many restorative dentists today would first consider the latest esthetic, biomimetic materials such as composite resin and all-ceramic restoratives. The latest restorative technology, including computer-aided design/computer-aided manufacturing (CAD-CAM) fabricated crowns and on lays, should be considered as state of the art choices for replacing one or more cusps on molars. Patients prefer the biomimetic options because, while the primary goals of the restorative dentist should be to restore form and function to a badly broken down molar, patients often consider the esthetic appearance of the restoration to be just as important. If given the choice between a metallic appearing restoration and one that looks like a tooth, patients will tend to choose the more esthetic restorative option. Regardless of the material chosen, the treatment should always be within the standard of care for restorative dentistry.

However, there are situations when the best choice of restorative dental material for complex cases is dental amalgam. While possibly not considered by most to be a state of the art dental restorative material, dental amalgam is still considered by most practitioners to be within standard of care. This paper will discuss two settings in the United States Navy in which amalgam is still a worthwhile and logical dental material of choice. Those scenarios are recruit basic training and operational deployments with ground forces in a combat zone. The authors recently retired from serving on active duty in the United States Navy. Both were commissioned officers in the Navy Dental Corps and both served in operational and recruit training venues.

Marine Corps basic training is conducted at the Marine Corps Recruit Depot, Parris Island, South Carolina and Marine Corps Recruit Depot, San Diego, California. The duration of this training is 78 days, and each minute of that period is carefully planned well in advance of the actual training period. The Annual Master Training Schedule is obviously heavily dedicated to basic warrior training. Most of the Recruits' waking time is involved in some aspect of training or marine life. Other recruit activities such as eating, sleeping, administrative/logistics requirements, worship, or medical/dental treatment is prearranged in the master schedule plan. It is the mission of the Parris Island Depot Dental Clinic to ensure that 95% of the graduating recruits are in a state of oral health in which no or only minor further dental treatment is expected for one year. The attainment of this level of oral health in these new Marines is necessary so that they might continue on with advanced training and be ready to deploy in a war zone in a timely fashion. Since approximately 19,000 recruits train at Parris Island in one year, the volume of required dental treatment is very large. The contact time available to the dental clinic to treat the recruits is limited by required training. The turn-around time required to produce laboratory fabricated crowns and on lays is too long to be considered a viable option in most cases. Prosthetic laboratory resources are also limited due to manning and funding requirements. Therefore, the dental restorative treatment completed at recruit training needs to be definitive, long-lasting, economical, and completed in a relatively short time period.

Posterior direct composite resin materials, particularly hybrid

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and nano-hybrid composite resins are becoming the material of choice for many dentists. In fact, at the Parris Island Dental Clinic, retrospective data showed that in 2009 approximately 78% of the molar restorations were completed with amalgam and the other 22% were restored primarily with composite resin. Very few CAD-CAM restorations were done at the clinic in 2009. By 2012 the ratio of amalgam and composite restorations was approximately 50:50. More CAD-CAM restorations were placed as this technology was incorporated into the clinic's operative dentistry practice. However, the numbers of CAD-CAM placed restorations was still low compared to amalgam and composite restorations. By 2014 the percentages of amalgams and composites were essentially reversed from the 2009 data. Sixty-eight percent of the restorations were composite and almost 32 % of the remaining restorations were amalgam. The CAD-CAM restorations at this time were being placed primarily on premolar teeth, and the numbers placed were insignificant compared to amalgam and composite. The reason for this shift from amalgam to composite is two-fold. First, there have been improvements in the physical properties of properly placed composite resin materials. While amalgam is still superior in wear and compressive strength properties, composites have improved in those categories. Secondly, the dental staff at Parris Island underwent a significant change in the average years in post-dental school practice. The number of recently graduated dentists increased at the clinic and many of the senior dentists with twenty years or more of service retired. A growing number of dental schools no longer teach amalgam as the primary material of choice when restoring a complex tooth preparation with a direct material. Emphasis is now placed on using composite resin in these cases. Some schools no longer even teach dental students amalgam restoration technique. Therefore, it was obvious that the younger generation of dentists were more comfortable placing posterior composite resin restorations, than the traditionally trained dentists. Most of those dentists at Parris Island that continued to place amalgam in the complex cases did so because of inability to properly isolate the operating field with a rubber dam, high potential occlusal forces, and the relative ease of placing large amalgam restorations in the posterior compared to placing composites.

The second Navy scenario, in which amalgam is most often used, instead of composite, is in forward deployed land war zones. There is usually minimal or no access to a prosthetic laboratory and amalgam material holds up better than composite resin in extreme and often challenging environmental conditions. Again the relative ease of placing an amalgam restoration is of utmost importance.

In all cases, dentists should make educated and practical decisions when choosing restorative materials. All materials should be within the standard of care for restorative dentistry. State of the art materials should also be considered when applicable. Dental amalgam should still be considered on the list of possible restorative material. Amalgam has a proven track record as a dental restorative for more than 100 years. Although there are concerns about the mercury component of dental amalgam, there are no scientifically based studies that would warrant the discontinuance of its use. In fact, amalgam might be a material of choice to use in patients that have true allergies to the composite resin materials. Amalgam is indicated for use as a provisional restoration in teeth that have questionable pulpal or periodontal prognoses or teeth with acute and severe caries, as definitive final restorations, and as foundations for full coverage indirect restorations. Also, amalgam preparations may conserve tooth structure when compared to full coverage fixed restorations.

The use of amalgam is contraindicated in cases where there are significant occlusal problems, the tooth cannot be restored properly with a direct restoration because of anatomic or functional considerations, the patient has major concerns for esthetics, and the patient has concerns about mercury in the amalgam.

Dental amalgam is a time proven dental material for restoring complex molar preparations for some cases. Particular instances in the Navy where amalgam is a good choice of restorative material were discussed. There are other applications in public health dentistry and community dentistry where amalgam is still a good option. As such, dental amalgam technique should continue to be taught in dental educational institutions.