

Dental Amalgam

Introduction

- Dental amalgam is an alloy made by mixing mercury with a silver tin alloy. Dental amalgam alloy is a silver tin alloy to which varying amount of copper and small amount of zinc has been added.
- According to **Skinner's**, amalgam is a special type of alloy in which one of its constituent is mercury. In dentistry, it is common to use the term amalgam to mean dental amalgam.

Advantages

- Ease of use, Easy to manipulate
- Relatively inexpensive
- Excellent wear resistance
- Restoration is completed within one sitting without requiring much chair side time.
- Well condensed and triturated amalgam has good compressive strength.

Advantages

- Sealing ability improves with age by formation of corrosion products at tooth amalgam interface.
- Relatively not technique sensitive.
- Bonded amalgams have “bonding benefits”.
 - Less microleakage
 - Slightly increased strength of remaining tooth structure.
 - Minimal postoperative sensitivity.

Disadvantages

- Unnatural appearance (non esthetic)
- Tarnish and corrosion
- Metallic taste and galvanic shock
- Discoloration of tooth structure
- Lack of chemical or mechanical adhesion to the tooth structure.
- Mercury toxicity
- Promotes plaque adhesion
- Delayed expansion
- Weakens tooth structure (unless bonded).

Composition of dental amalgam

Powder: the alloy powder composed of : ►

1- **silver** : 40-70% ►

Gives strength ►

High expansion of the restoration ►

2- **Tin** 20-30% ►

Increase affinity for mercury ►

speed of amalgamation ►

Increase the flow of the amalgam ►

3- COPPER : 15-30% high copper ►

5% or less low copper alloys.....lead to ►

Reduce corrosion of the restoration ►

Minimize the flow ►

Increase setting expansion ►

4- Zinc : 1-2% ►

Acts as a scavenger for oxides formed during manufacturing ►

Help the process of amalgamation ►

Alloy particles

Irregular shape of particles called **lath-cut** alloy ▶

Spherical shape called **spherical alloy** ▶

Lath cut and spherical called **Admixed** ▶

amalgamation

It is the process of reaction between the mercury and amalgam alloy ▶

The amalgamation reaction consists of two phenomena which include solution and crystallization ▶

The amalgam alloy is intimately mixed with liquid Hg to wet the surface of the particles and this crystallization growth leading to hard amalgam . ▶

Properties of dental amalgam

1- compressive strength ►

Highly compressive strength for high copper alloy and low for low copper alloys...because amalgam is brittle material therefore sudden application or excessive force tend to fracture . ►

2- **tensile strength** : strong in compressive but weaker in tensile and shear strength ►

3- **Creep** : is permanent deformation under static loads... ►

Highly copper alloys have low creep ►



4- Dimensional changes : the amalgam undergo shrinkage at the first time after setting (first 20 mins) and after this period the expansion occur and the dimension become constant with in 24 hours ▶

5- corrosion : it is progressive destruction of the metal by chemical or electrochemical reaction with its environments, ▶

Excessive corrosion can lead to increase porosity and reduce the marginal integrity. ▶

Amalgam capsules



Amalgam mixing or triturating



Old design



New design

1- under-mixed : appear dull and crumbly which are lower strength and poorer corrosion ►

2- normal mixing: appear shiny and separated in one mass from the capsule ►

3- overmixed : appear soupy and tend to stick to inside the capsule which result low compressive strength and high creep. ►

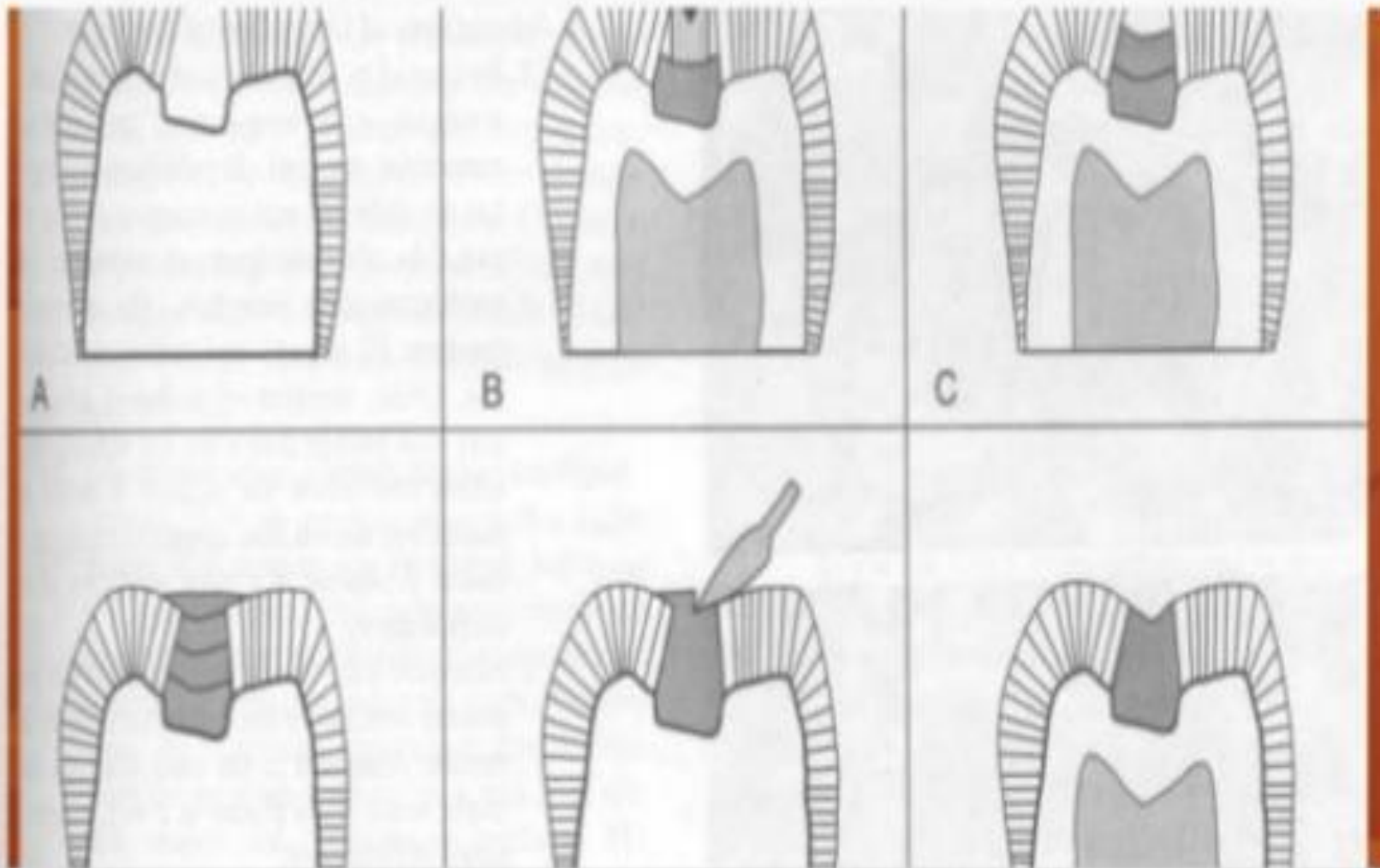
Hand condensation

- Once the increment of amalgam is inserted into the cavity preparation it should be condensed with pressure to avoid voids and to adapt the material to the walls, the condenser point is forced into the amalgam mass under hand pressure.
- Condensation is started at the center and then condenser point is stepped little by little towards the cavity wall.
- After condensation of the each increment excess mercury should left over the first increment so that it can bond with the next increment.
- The procedure of adding an increment,condensing it,adding another increment and so forth is continued until the cavity is overfilled.
- In case the cavity is large well condensed amalgam restoration can be achieved when the mix has proper consistency.



Hand condenser





Condensation of amalgam



Start with the smallest condenser



Step condenser over mass



Continue adding increment

Carving and finishing

- After amalgam is condensed in cavity it is carved to reproduce the proper tooth anatomy. It should be started when the amalgam is hard enough to offer resistance to the carving.
- Burnishing of the occlusal anatomy can be accomplished with the help of the ball burnisher. A rigid flat-bladed instrument is best used on the smooth surfaces. Final smoothing can be done with the help of moist cotton or with the help of prophylaxis paste. While polishing temp should not raise beyond 60-degree.
- Final finish should be done after the amalgam is fully set, it should be delayed for at least 24 hr. and a wet prophylaxis paste should be used .



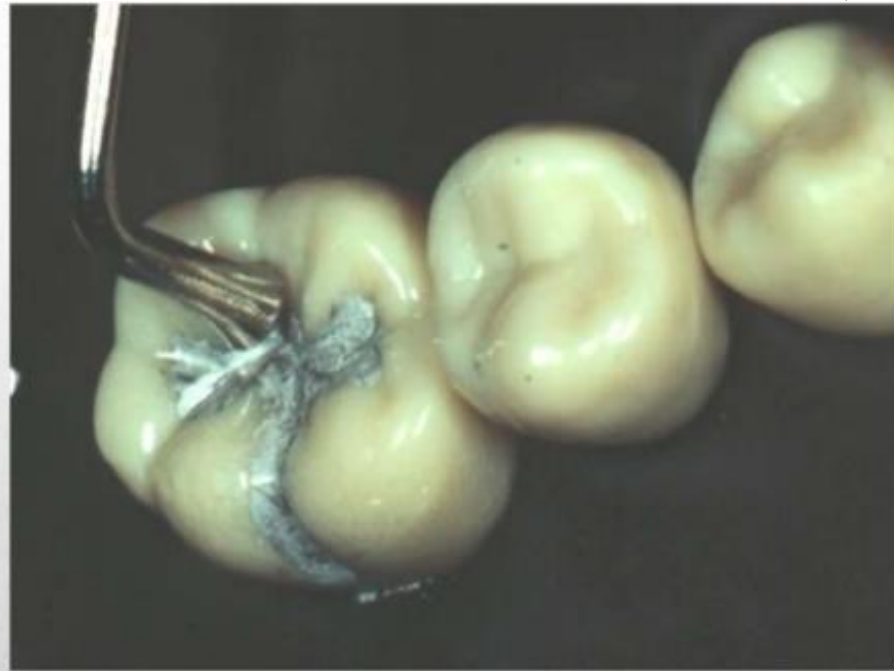
Create initial grooves



Carve to margin

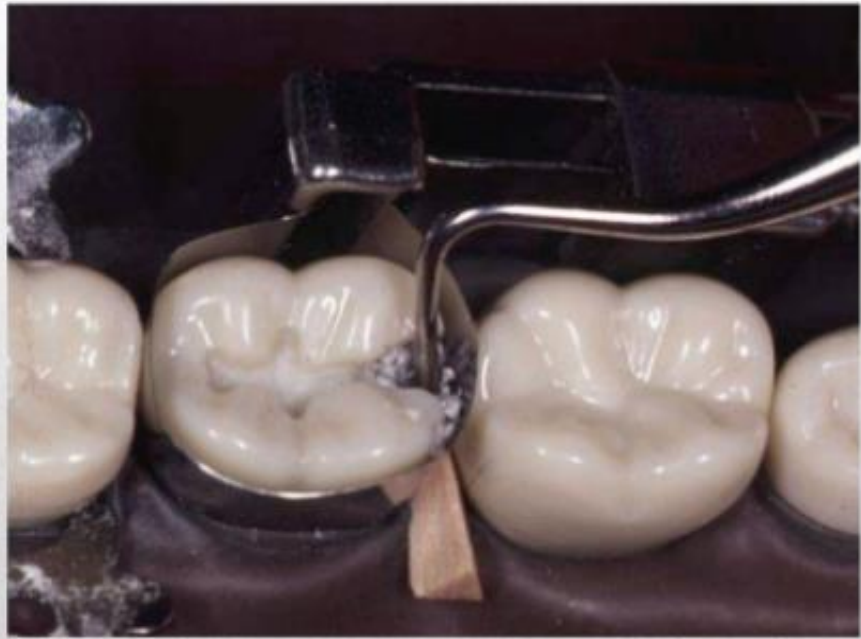


Remove flash



Final shape and burnishing

Class II restoration



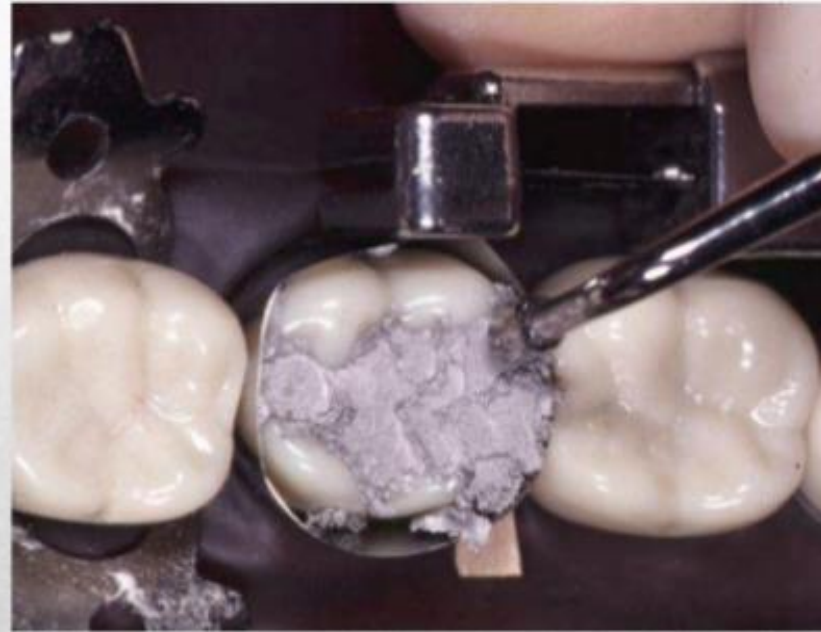
Initial Condensation



Completed restoration



Overpacking



Marginal Ridge Condensation

Matrix ?

A matrix is defined as a properly contoured piece of metal or other material used to support and give form to the restoration during its placement and hardening.

Why do we need matrices ?



- Gingival floor of a class II cavity is the most vulnerable area where overhang of restorative material can take place.
- There is no method to control the placement and contour of restoration without a matrix wall.

MATRIX RETAINER

Ivory matrix no.

- *Consist of stainless steel band which encircle one proximal surface of a posterior tooth.
- *This is attached to the retainer via a wedge shaped projection on the retainer.
- *An adjustment screw at the end of the retainer adapts the band to the proximal contour of the prepared tooth.

Indication: For restoration of class II cavity especially when the contact on the unprepared side is very tight.

Ivory matrix no. 1 Retainer & Bands



01-918
For Molars



Fig. 1



Fig. 2



Fig. 3

01-919
For Premolars



Fig. 4



Fig. 5



Fig. 6

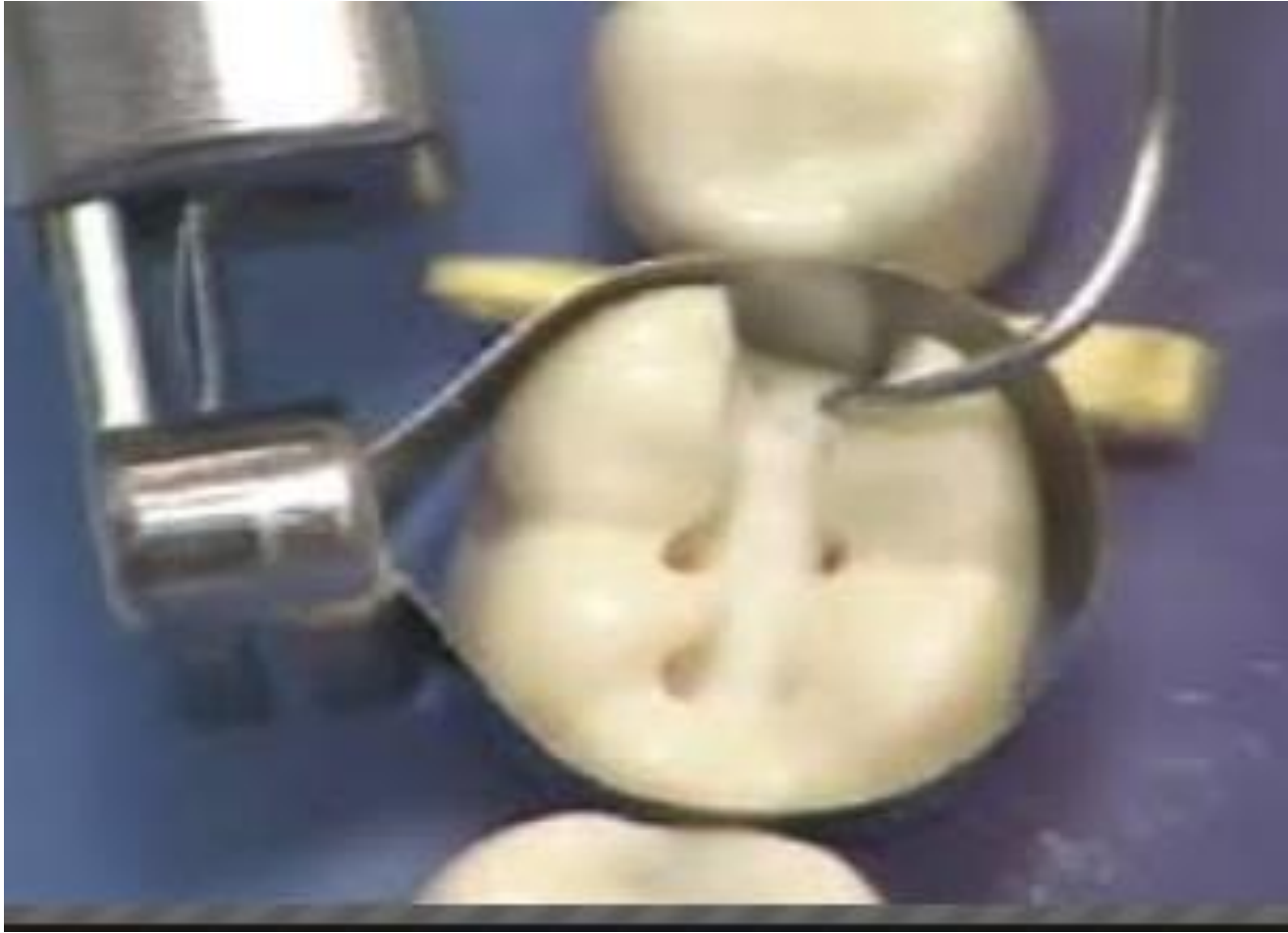


Ivory No. 8 matrix

- *Consist of a stainless steel band the encircles the entire crown of the tooth.
- *The circumference of the band can be adjusted by the adjusting screw present in the retainer.
- **Indication:** for the restoration of the class II cavities on one or both proximal surface of the posterior tooth.

Ivory matrix No. 8





WEDGES

- Wedges are devices that create rapid separation during tooth preparation and restoration

Functions of wedges

- Help in rapid separation of teeth
- Prevent gingival overhang of restoration
- Provide space for compensate thickness of matrix band
- Help in stabilization of retainer and matrix during restorative procedures
- Help in retracting and depressing interproximal gingival area thus help in minimizing trauma to soft tissue.
- Help in depressing rubber dam in interproximal area



- Wedges made of two materials

Wood or plastic

1. Wooden wedges

- Soft wood like pine or hardwood like oak
- They may be medicated

- They are preferred because-

1. *Easy to trim*
2. *Adapt well*
3. *Absorb moisture and swells to provide adequate stabilization to matrix band*
4. *They are used along with metal matrices*



- Wooden wedges can be of two shapes
- Triangular or round
- **Triangular** wedges are commercially available
- Preferred for cavities with deep gingival margin
- It has got an apex and a base
- Apex usually lies in the gingival portion of contact area.
- Base lies in contact with gingiva ,this helps in stabilization and retraction of gingiva
- Used in tooth preparation with deep gingival margin.

Round wedge

- Made from wooden tooth picks by trimming the apical portion
- It has a uniform shape
- Used in class11 tooth preparation



PLACEMENT AND LOCATION OF WEDGES

- Correct location of the wedge is in the gingival embrasure below the contact area,
- Select the appropriate wedge depending on the clinical situation
- Wooden wedges can be trimmed with a knife or scalpel to produce a custom fit
- Wedge is usually placed from the lingual embrasure which is normally larger in size
- If it interferes with tongue it can be placed from buccal side.
- Length of the wedge should be only 0.5inch or 1.3cm so that it does not irritate tongue or the cheek.
- After placement wedge should be firm and stable.

Thank you ▶