**cons**

**Sheet no. : 8**

**Refer to slide no. : no need**

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#Last lecture we talked about grossly caries teeth, and using amalgam for grossly caries lesion, we covered the pin retained restoration and we will complete the rest in this lecture.

* **Amalgam Treatment options:**

1. Pin retained amalgam

2. Slot retained amalgam

3. Amalgam foundations

4. Bonded Amalgam

**2.Slot retained amalgam:**

* **A slot is a retention groove placed in dentine in a horizontal plane.**

If the groove placed in vertical position, it called lock.

If the groove placed in horizontal position, it called slot.

* **It may be used in conjunction with pin retention or as an alternative to it.**

Therefore, you can use slot alone, or you can use slot and pin together.

* **Slots are particularly indicated in short clinical crowns and in cusps that have been reduced 2-3 mm for amalgam.**

So, if the crown of posterior teeth very short, it’s preferable to use slot.

* **More tooth structure is removed in making slots than pins.**
* **Slots are less likely to create micro fractures, to perforate the tooth or penetrate the pulp**

Slot is **not conservative** treatment compare to the pin, but if we compare between slot and pin from aspect of “**complication**”; during use of pin you can penetrate the pulp or you can have a perforation. Therefore, slot is easier to use without complication.

You should rely on clinical scenario and your clinical skills to determine what supposed to use, slot or pin.

#to summarize:

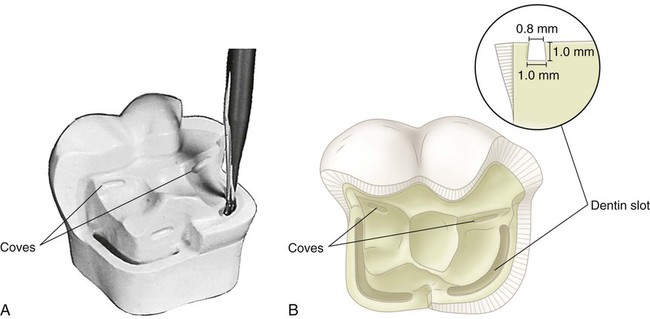
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| --- | --- | --- |
|  | conservation | complication |
| slot | Less conservative | Less perforation and penetration the pulp. |
| pin | More conservative | More Perforation and penetration the pulp. |

* They are usually placed **on any aspects of the preparation on the gingival floor** **0.5mm axial to the DEJ.**

The position of slot could at any aspect of the cavity (facial, lingual, mesial, distal) depending on the caries .After removing the caries you determine the proper position of slot.

#remember that:

Slot is a horizontal groove .therefore, the only way to make slot horizontal is placed slot in the **gingival floor** of the cavity.



In this picture, slot placed in mesio-lingual , horizontally on the gingival floor of the cavity.

* It may be **continuous or segmented** depending on the amount of tooth structure missing and whether pins are to be used or not.
* It should be **at least 0.5mm in depth and 1mm long.**

**Now in the previous picture, if you take a cross section for the slot you will find:**

-The depth from the occlusal plane: at least 0.5 mm. (NOTE in picture the depth is 1mm but **at least the depth is 0.5mm.)**

-the width at occlusal part: 0.8mm.

-the width at gingival part: 1mm.

The width of occlusal part is **SMALLER** than the width of gingival part; **CONVERSION** walls (same as the walls of amalgam cavity preparation).

You should use inverted bur to get these two conversion walls.

***3- Amalgam foundations***

* **It is the initial restoration of a severely involved tooth.**
* **The tooth is restored so that the restorative material used will serve in place of the missing tooth structure to provide retention and resistance forms for the placement of the definitive indirect restoration.**

If you not able to use pin or slot, you can use indirect restoration to restore the tooth. However, the problem here is the large amount of the tooth is missing, so we apply the foundation before the indirect restoration.

Foundation: restoration that replace part of the missing tooth.

After applying the foundation, you can restore the tooth by indirect restoration.

* **It should provide resistance against forces that might fracture the remaining tooth structure.**

**There’s** a large amount of tooth structure is missing , therefore we apply amalgam as a foundation. Functions of amalgam foundation:

1.resist fracture of remaining tooth structure.

2.replace part of the tooth structure at will cover by indirect restoration later on.

***Tooth preparation for amalgam foundations***

* **The technique for tooth preparation depends on the type of retentive mean to be used: pins, slots or chamber retention.**

Keep in mind that

-pin and slot that we talked about previously (first two points of Amalgam Treatment options) use as **DEFENETIVE TREATMENT** ;which means that these pin and slot are alternative treatment for patient ,will not cover by indirect restoration.

Pin and slot (in amalgam foundation) used for retention, and use under the indirect restoration, it’s **NOT THE DEFENETIVE TREATMENT**, it’s the first step in treatment.

**A-Pin retained foundation**

* **Used in severely broken teeth with few or no vertical walls where an indirect restoration is indicated.**
* **The main difference from using pins for definitive restorations is the distance of pin holes from the external surface of the tooth, and more bending of the pins may be necessary.**

When you apply indirect restoration, you must prepare the tooth from all sides (preparation by remove 2mm from all sides of the tooth; in order to be able to apply the indirect restoration) so, if you use slot/pin for retention in amalgam foundation you should place the pin/slot **MORE AXIAL** compared to pin/slot that used as definitive treatment.

If you place the slot/pin (in amalgam foundation) close to the outside wall,you will lose the pin/slot when you prepare the tooth for indirect restoration(when you remove 2mm from all sides) that’s why the pin/slot should placed more axial in amalgam foundation.

**B- Slot retained foundation**

* Foundation slots are **placed slightly more axial.**
* They are usually **0.5-1mm in depth and width, and 2-4mm in length.**

**C- Chamber retention**

* **Used in multi-rooted endodontically treated teeth.**

Chamber for non vital tooth.

* **Should only be used when the dimension of the pulp chamber is adequate to provide retention, and the thickness of dentine in the area is enough.**

molars and premolars have very good amount of pulp chamber, so if you want to do restoration for a tooth has access cavity or access cavity with one missing wall, with good amount of pulp chamber (long chamber, **you can rely on chamber for retention** and condensate the amalgam inside access cavity.

Condensation the amalgam inside the access cavity will not break the tooth, if this tooth has enough tooth structure.

**#Root** **trunk**: part of pulp chamber inside the root.

The root trunk of pulp chamber+ the pulp chamber in crown will give the retention.

* **If the height of the pulp chamber is less than 2mm extension into the root canal (2-4mm), the use of prefabricated post, cast post & core, pins and slots should be considered**.

**4- Bonded Amalgam**

* **Reduce the need for mechanical retention** features and resistance form which conserves sound tooth structure.
* Assist in the **improvement of the marginal seal** with potentially less sensitivity.
* **Self or dual cured bonding agent or resin cement** placed on conditioned tooth structure, then Amalgam is condensed immediately.
* **micromechanical bond.**

**#To summarize the bonded amalgam:**

-Applying bonding agent for all the walls of the cavity, then self or dual cure (self is better than dual cure), we can’t use light cure for amalgam.

-Acid etching should apply before the dentin bonding agent.

-when dentine bounding agent setting will achieve the retention(**MICROMECHANICHAL RETENTION).**

**#**Why we don’t use bounded amalgam in our general practice in amalgam restoration?

1.becouse bounded amalgam is sensitive technique (**NEED A GOOD ISOLATION**).

2.you increase the materials that used in treatment ,leading to **INCREASE THE COAST**.

#can we consider the dentine bonding agent varnish for amalgam? YES

Varnish used for marginal seal (seal the space between amalgam and cavity walls)

Dentin bounding agent also provide marginal seal(dentin bounding agent provide better seal than varnish, but not commonly use).

* **Restorative technique**

Restorative technique same as any restorative technique for amalgam, but we should attention to the matrix, we can use:

1.Universal matrix:

We should insure that the universal matrix can replace the contour of the tooth.

2. Automatrix:

Retainer of the automatrixs bounded to the matrix itself. So, it small in size, can surround the tooth from all sides, also you can modulate its size by using special instrument.

3. Compound supported copper band:

A. place the matrix around the tooth.

b. Heat compound martial.

C. Inject the compound around the matrix in order to fix the matrix during

Procedure.

* **The use of Complex composite restorations**

**Indications for the use of composite:**

We can use the composite for grossly caries lesions because; the mechanical properties of the composite are good enough.

* Wear resistance and polymerization shrinkage are the main problems of the composite, but in general It has the **1.** **Ability to strengthen weakened tooth structure (**composite can bound to the tooth structure so, it can strengthened tooth structure**).**
* **2.An interim restoration (control restoration) while waiting to determine pulpal response**

#control restoration: restoration that used for short period of time (to make sure there’s no sign and symptom for the patient),you can use control restoration as definitive treatment if no sign and symptom for patient and if it was good quality and good carving. But if the control restoration was bad you must replace it.

* **3.As a foundation for indirect restorations**

**#**TheIndications for the use of composite **SAME as** Indications for the use of amalgam in grossly caries lesion.

* For very large composite restorations **secondary retention is usually required** because of

1. The increased amount of missing tooth structure
2. The decreased amount of tooth structure available for bonding

We prefair enamel surface for bounding(bound strength for enamel better than dentine)but in case of grossly caries lesion ,most of the tooth structure is lost therefore ,most of the bounding will be to the dentine.

1. The increased concern for retaining the composite in the tooth

Since most of the bounding to the dentine surface( which is not enough if the cavity is large) we need extra retention .

* **Retentive means include**

1. Grooves
2. Slots
3. Locks
4. Pins (not as esthetic as previous options).
5. Wider bevels in or flares on accessible enamel margins(on the non stress area) to increase the surface available for bonding
6. Using the root canals.

**#**SAME clinical technique that used for class3,4and5 composite restoration.(please refer to slide 64)

**#** We will talked about indirect restoration in details next year.

* **Cavity preparation for Posterior Composite**

Please refer to slide#68, 69,70,71,72 (the Dr read them without any extra notes).

1. **Conventional class I preparation:**

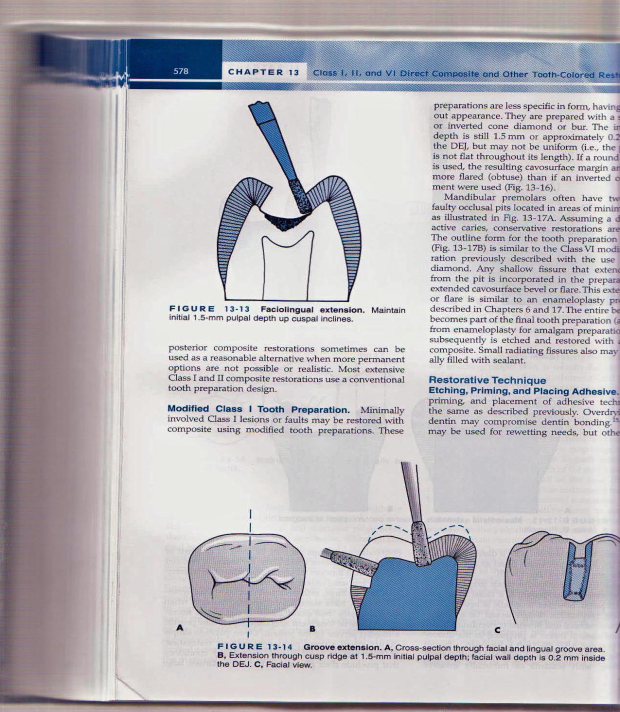
* Indication: large preparations of restorations subjected to heavy occlusal forces(no root)
* Design: box like amalgam and some flat walls ┴ occlusal forces.
* Uniform depth.
* pulpal floor is usually flat and follows the DEJ.

**#**don’t place bevel on the occlusal surface of class 1 (conventional); [thin layer of composite on the occlusal surface will broken].

* Preserve the strength of the cuspal and marginal ridge areas as much as possible.
* extensions into marginal ridges should result in 1.6mm thickness of remaining tooth structure in premolars and 2mm in molars.

If extension is required toward the cusp tips, the same approximate 1.5mm thickness is maintained.

* **No attempt is made to place bevels** on the occlusal margin because it may result in thin composite in areas with heavy occlusal forces, and because the enamel rod are exposed to aced etch(as shown in the figure) therefore no need for bev el.



**2- Beveled Conventional class I preparation**

* Indication: large Class I with groove extension.

Beveled Conventional class I preparation rarely used, except in the case of GROOVE EXTENTION (buckle extension, lingual extension), groove extension is the only indication for use Beveled Conventional class I preparation.

You should take the occlusal load in consideration:

Functional cusps are palatal cusp in the upper teeth, buccle cusps of the lower teeth (if you prepare lingual extension for upper tooth, you should check the occlusion; if the occlusion on the occlusal part of groove extension, don’t place bevel on the occlusal part, place the bevel in the gingival part only.

* Design: box like form and beveled walls on the groove extension walls.
* Uniform depth.
* pulpal floor is usually flat and follows the DEJ.

**3- Modified class I tooth preparation**

* Indications: minimally involved class I or faults.
* Design: less specific in form/ scooped out appearance.
* The initial depth is 1.5mm or .0.2 mm inside dentine, but the pulpal floor may not be uniform.

Modified: there’s no specific shape for the cavity, just remove the caries and place the composite. However, the posterior teeth have a heavy occlusion so the THICKNESS of the cavity at least should be 2.5mm or .2mm in the dentin.

* **Proximal composite restorations**

You can either preserve the marginal ridge or remove it:

* Access through the marginal ridge (remove it, as class2 amalgam cavity preparation. (MO, DO, box only(on the proximal surface), MOD)
* Marginal ridge is preserved.
* **Access through the marginal ridge**
* Access to carious dentine is by removal of enamel over the marginal ridge(remove the cares from occlusal part or buccal part and use the marginal ridge for seal)
* Cleaning of the dentino-enamel junction using a low speed round bur
* Excavation of caries over the pulp
  + - Unsupported enamel is left in the cavity.(unsupported enamel should remove in case of heavy occlusion, if there’s no heavy occlusion unsupported enamel left)
* Bevel or not? No need to place bevel(except in case of buccal or lingual extension you can place bevel).
* **Marginal ridge is preserved**

1.Occlusal approach.

2.Buccal approach (suitable for teeth that are tilted lingually).Bur perpendicular to the long axis of the tooth.

Please refer to slid 83 the Dr read it without any extra notes.

* **Placing the matrix and restoration**

Matrix band should use especially with class2.

The best choice is SECTINAL MATRIX BAND.

You can use universal matrix band but the problem is this matrix band is thick so, it lead to overcontact.

You can use mylar strip and fix it by wedges.

Good luck ☺