



# PRINCIPLES OF TOOTH PREPARATION

**Dr.Maria mayhoube**

# INTRODUCTION

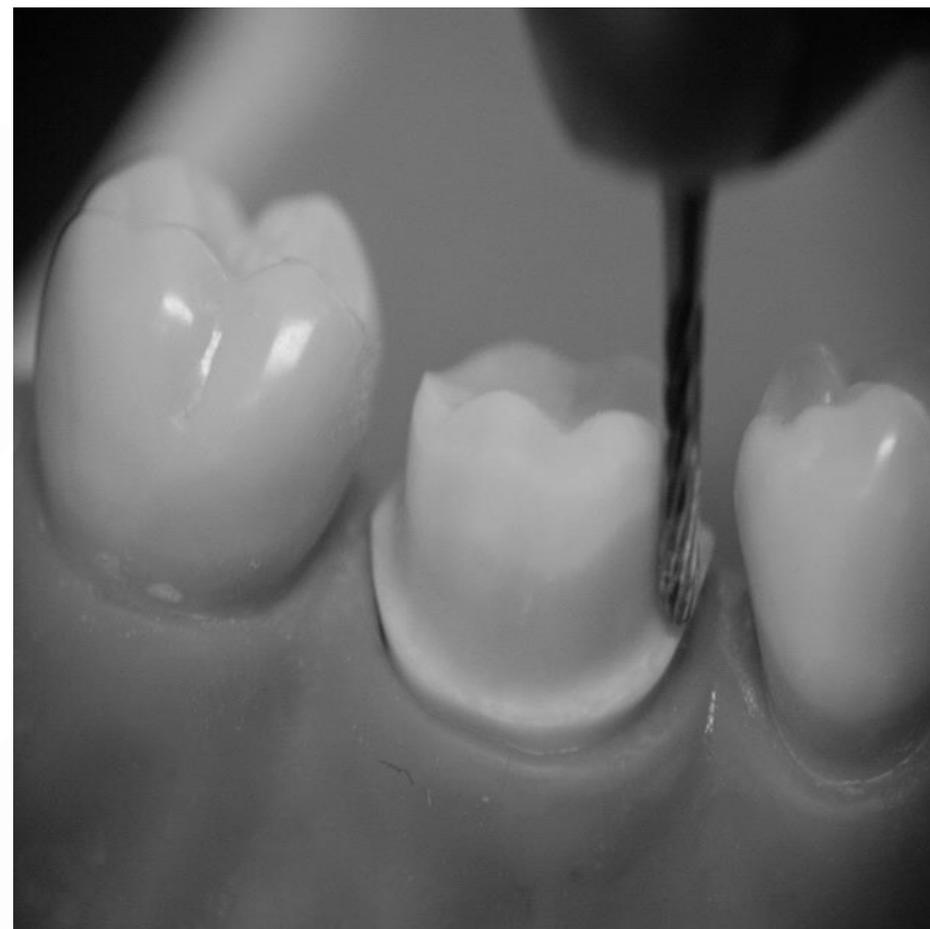
- **Tooth Preparation**

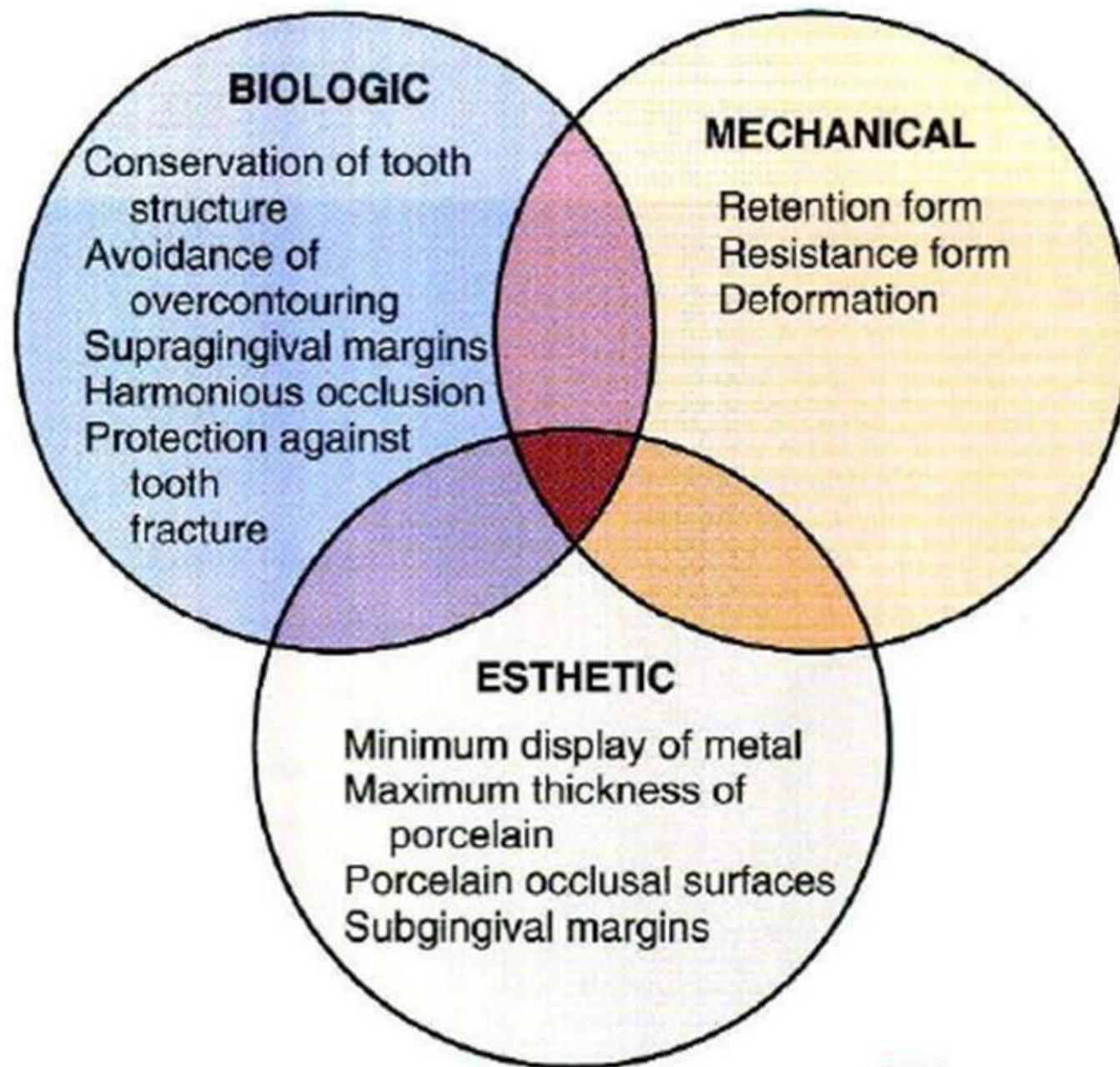
A clinical procedure consisting of removal of tooth structures and / or shaping of the tooth to accommodate a fixed restoration

Problems in Fixed Restoration

Can be avoided by

Correct Tooth Preparation





# Five Principles that govern tooth preparation for restoration

- 1. preservation of tooth structure**
- 2. retention and resistance**
- 3. structural durability**
- 4. marginal integrity**
- 5. preservation of the periodontium**

# **FIVE** Principles of tooth preparation

**PRESERVATION  
OF TOOTH  
STRUCTURE.**

**RETENTION AND  
RESISTANCE  
FORM.**

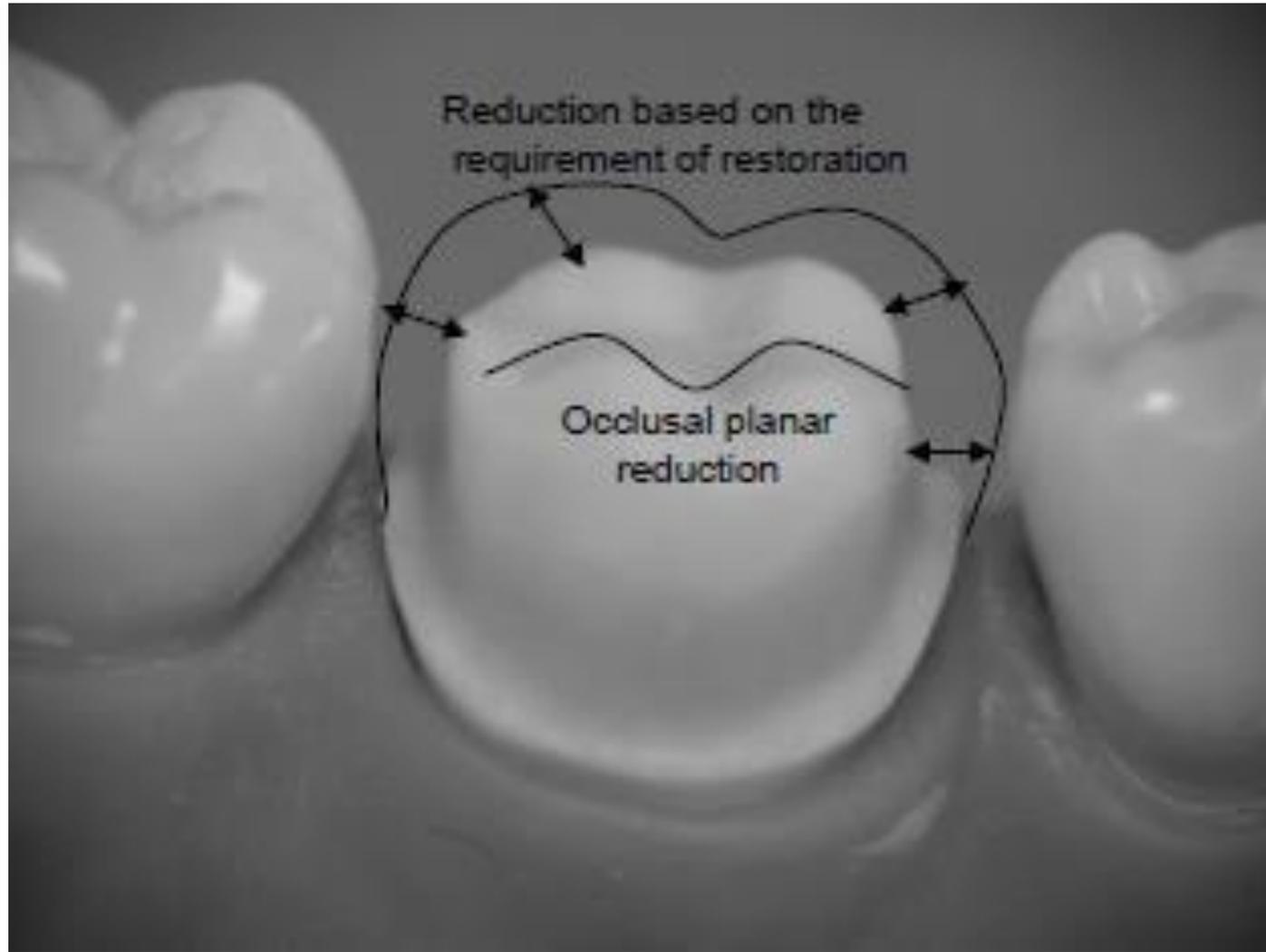
**STRUCTURAL  
DURABILITY OF  
THE  
RESTORATION.**

**MARGINAL  
INTEGRITY.**

**PRESERVATION  
OF THE  
PERIODONTIUM.**

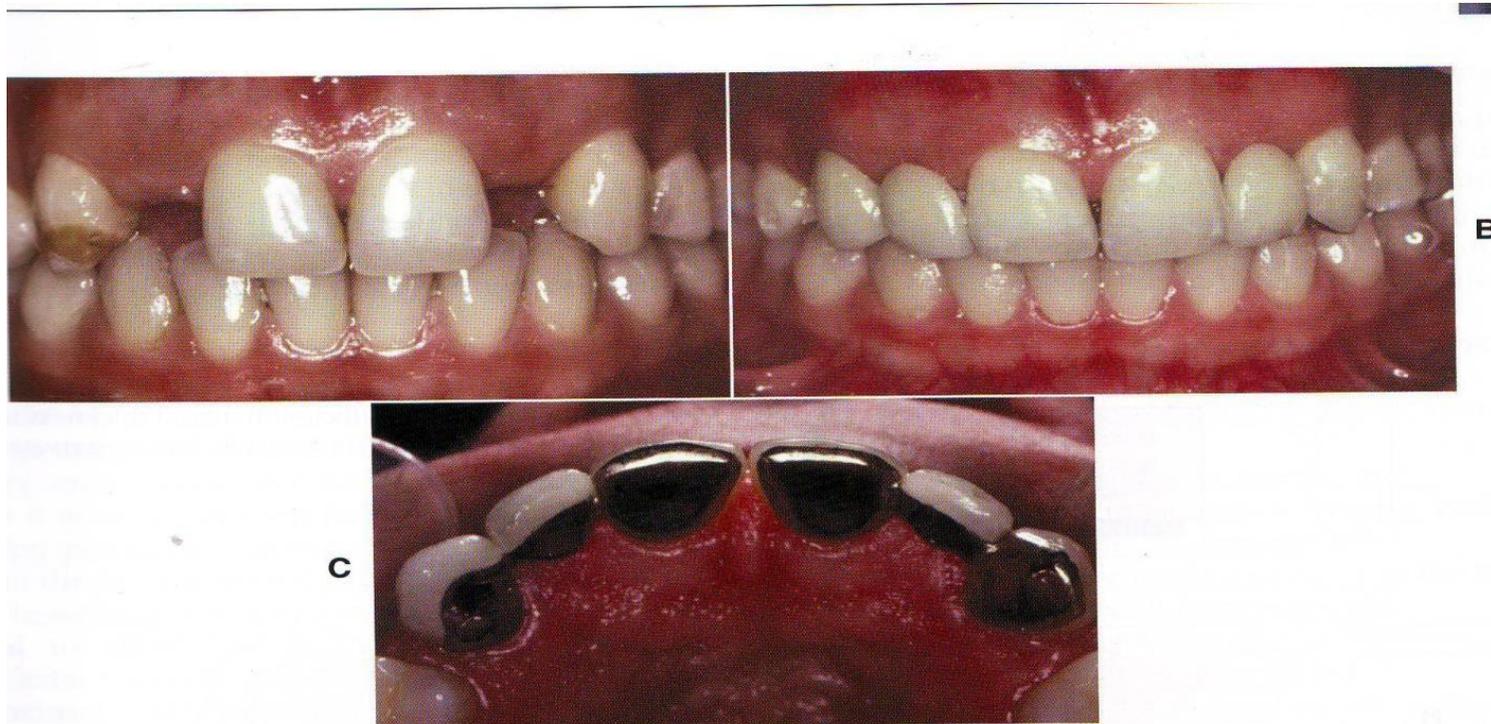
# 1. Preservation of Tooth Structure

- Avoid over reduction of all surfaces of the tooth
- Avoid excessive occlusal reduction
- Achieve correct occlusal planar reduction
- Avoid flat occlusal surface
- Excessive Reduction:
  - Thermal hypersensitivity
  - Pulpal inflammation and necrosis

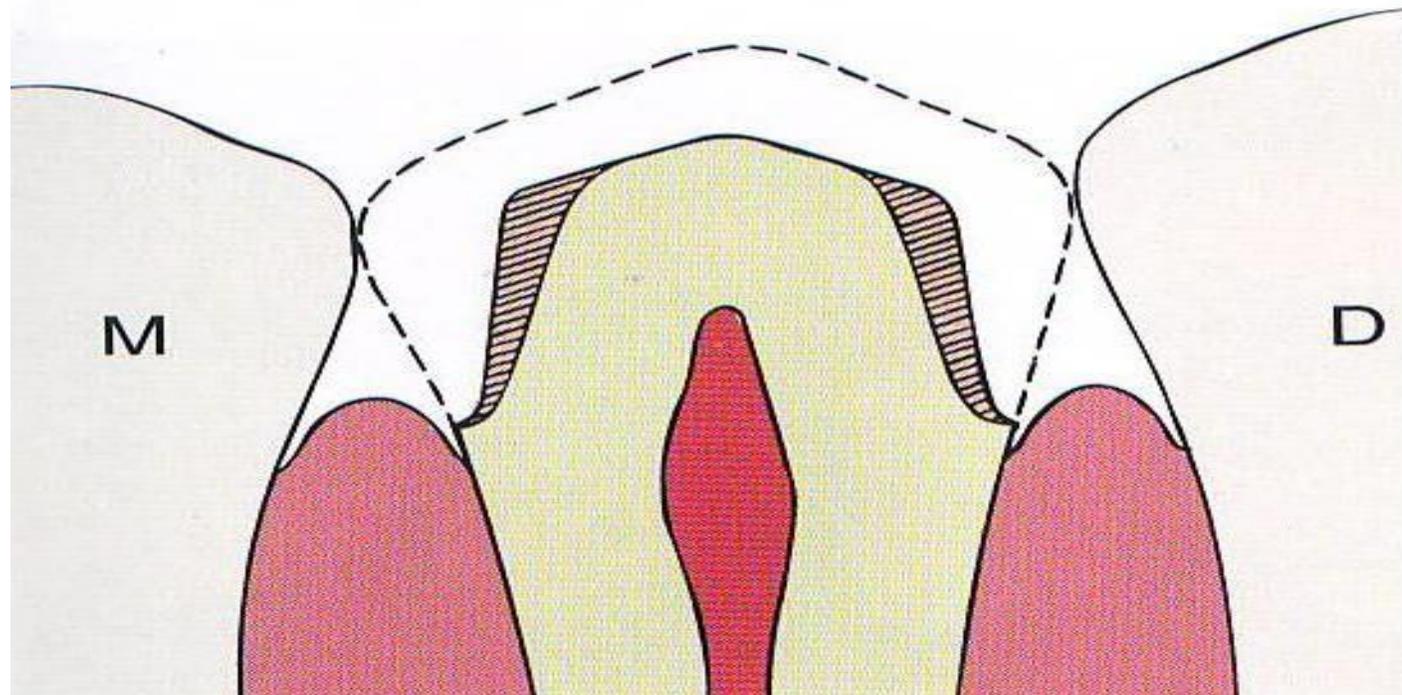


# Tooth structure is conserved through adherence to the following guide lines:

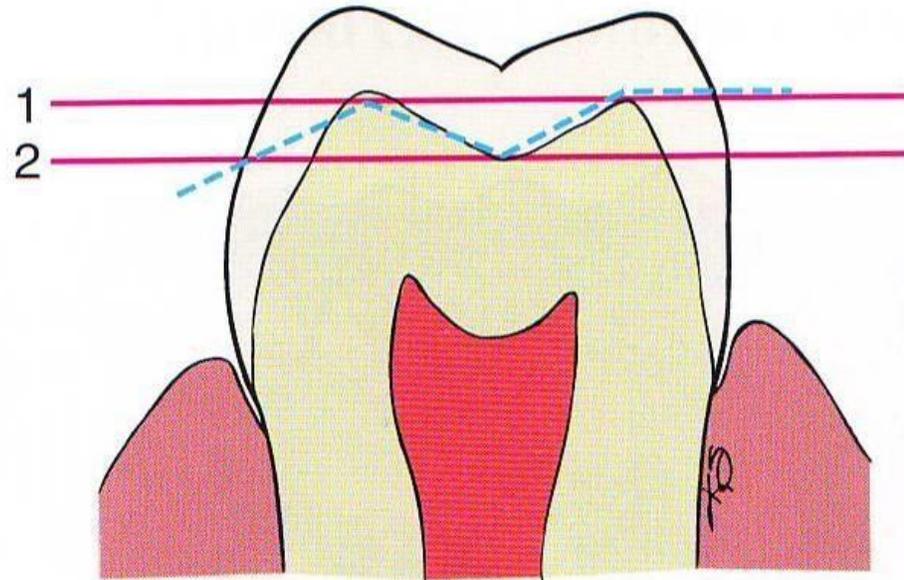
1-Use of partial –coverage rather than complete coverage restoration.



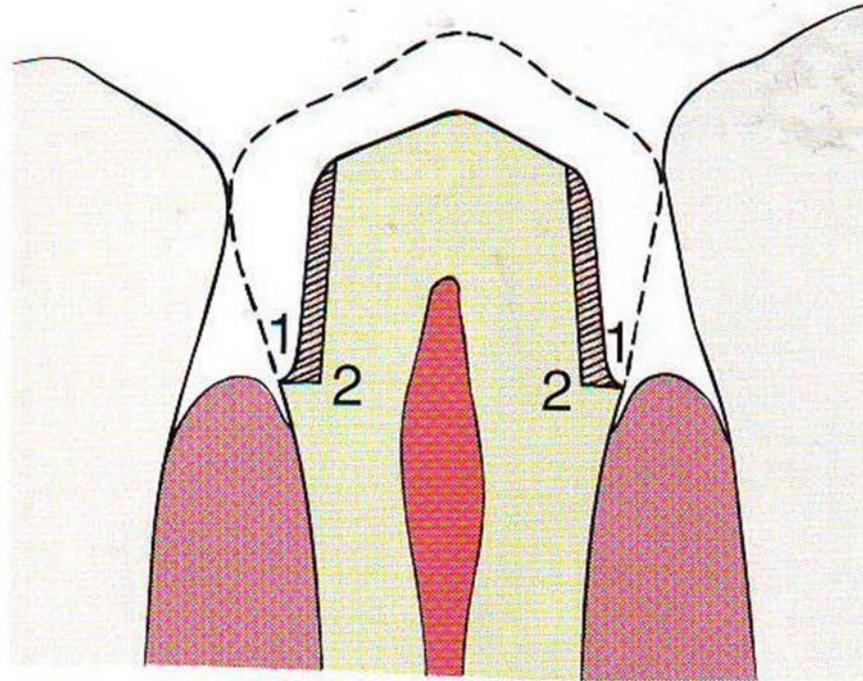
## 2-Preparation of teeth with minimum practical convergence angle ( Taper) between axial walls.



3-Preparation of the occlusal surface so that reduction follows the anatomic planes to give uniform thickness in the restoration.

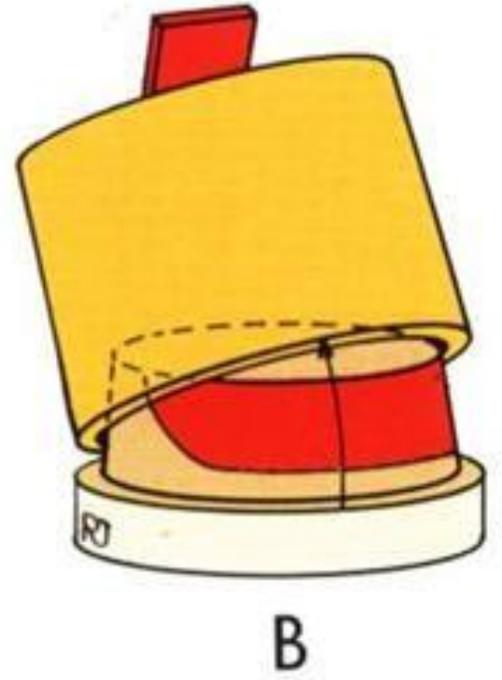
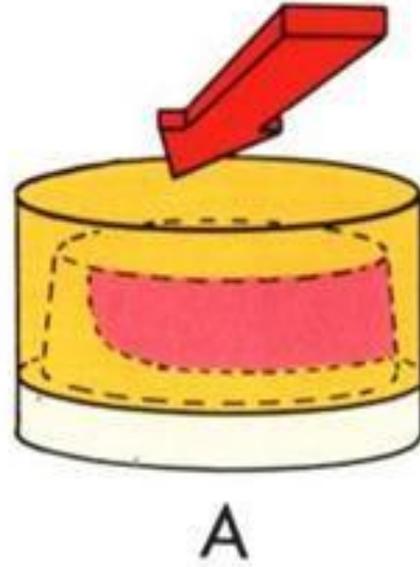
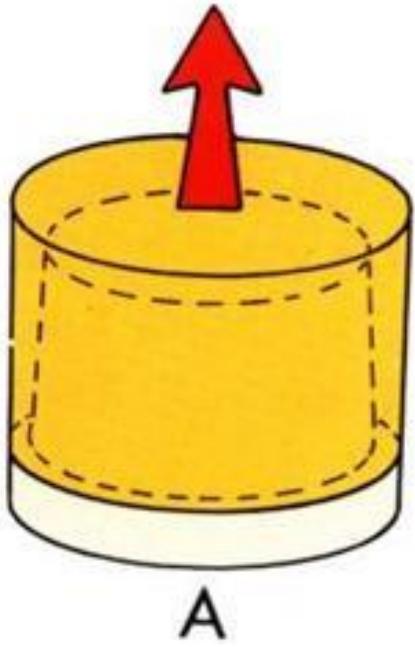


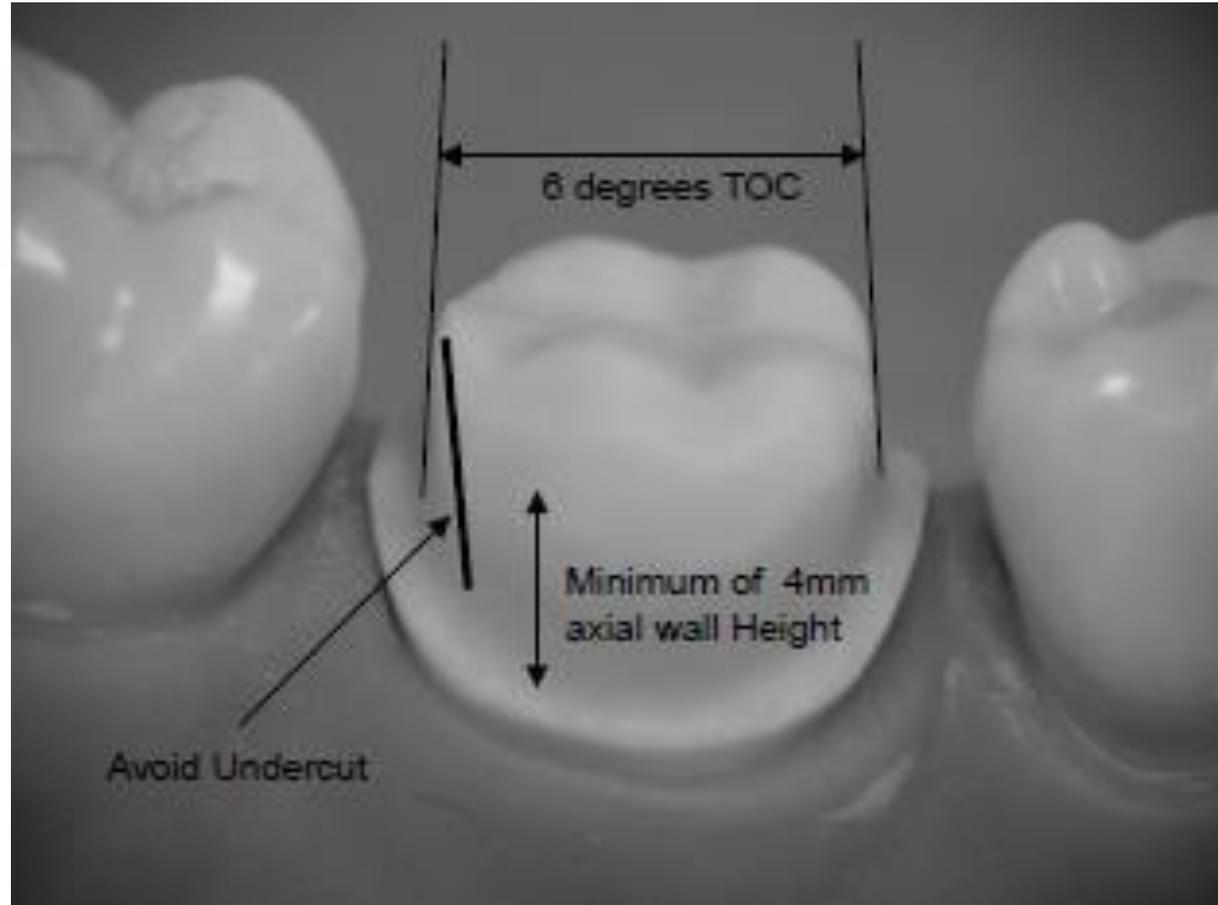
4-Selection of a margin geometry that is conservative and yet compatible with the other principles of tooth preparation.



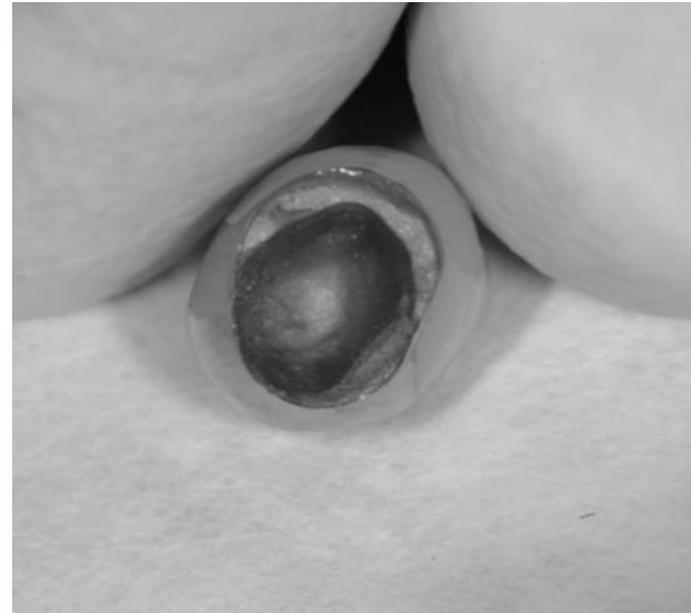
## 2. Retention and Resistance

- **Retention** is the ability of the preparation to resist the crown restoration removal by force director along its path of insertion (like a sticky food) .
- **Resistance** is the ability of the preparation to resist the dislodgment of the restoration by forces directed obliquely or horizontally to the restoration.



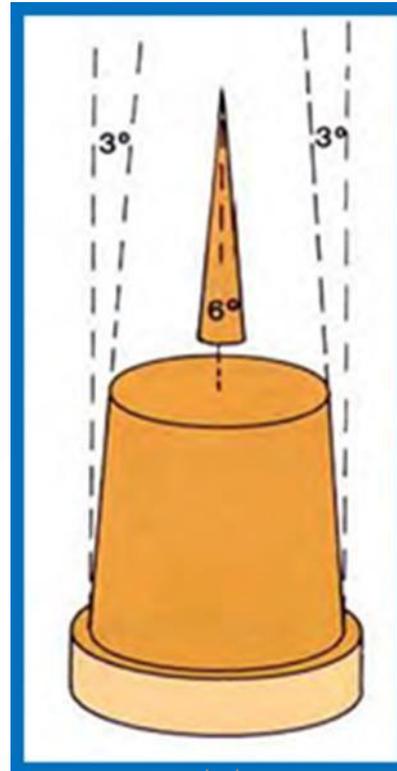


- Preparation – primary source of retention and resistance
- Cementation – secondary source of retention and resistance

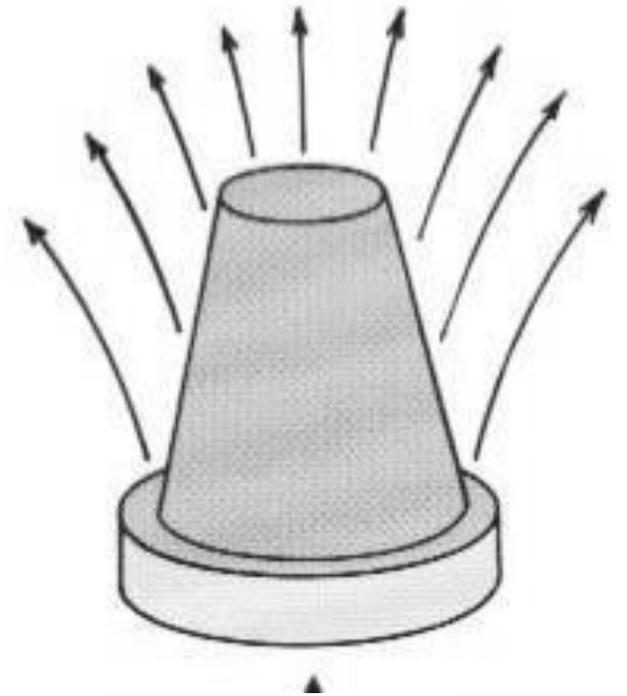
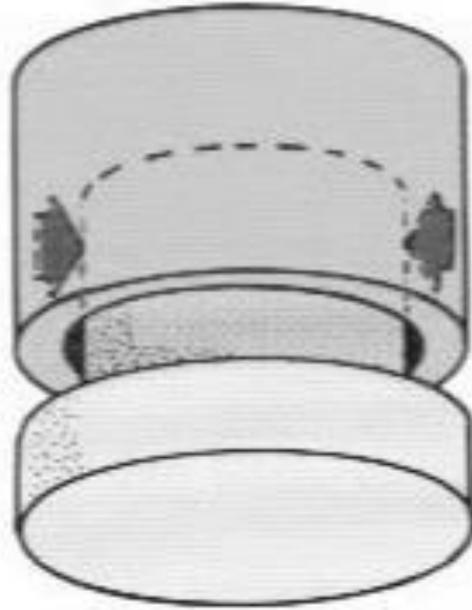
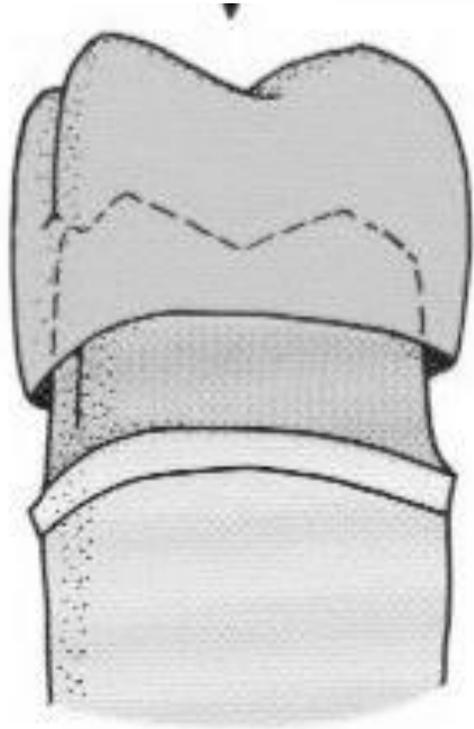


# Factors Affecting R R رافقسالو تبتلا بلع قرئوملا لماو علا

1. Taper
2. Length
3. Substitution of internal features
4. Path of insertion
5. Surface Roughness

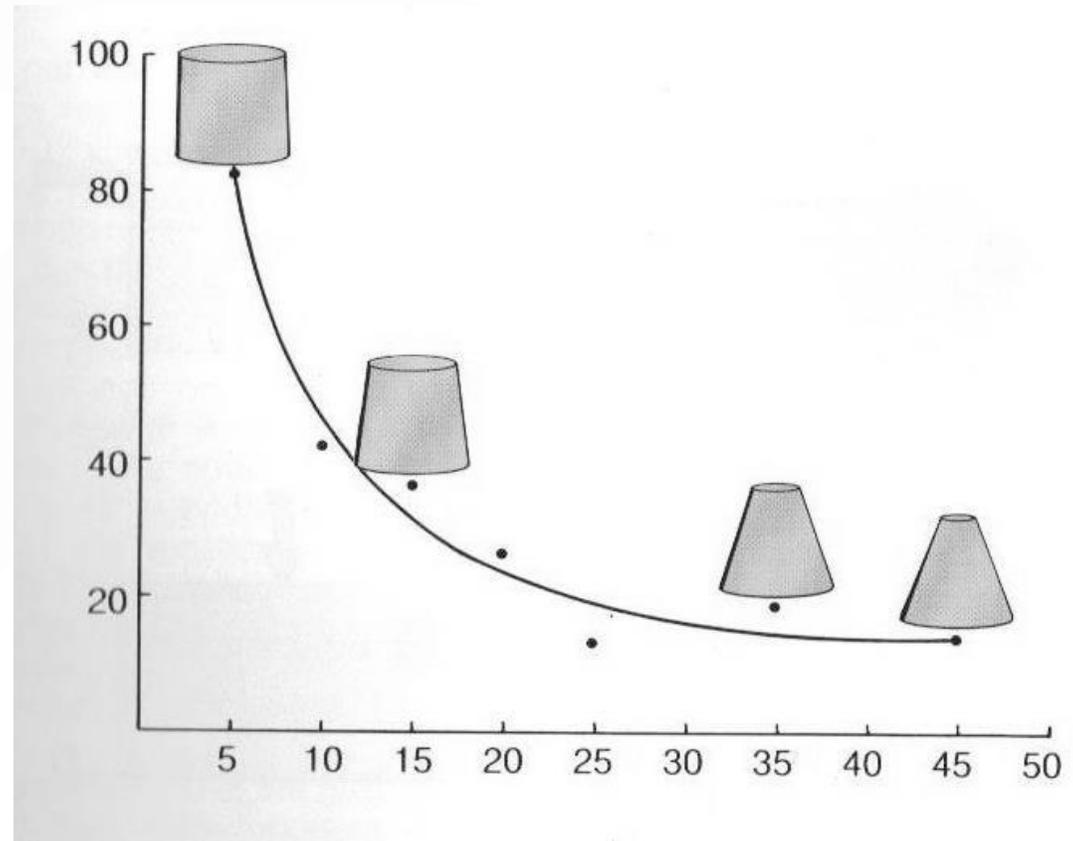
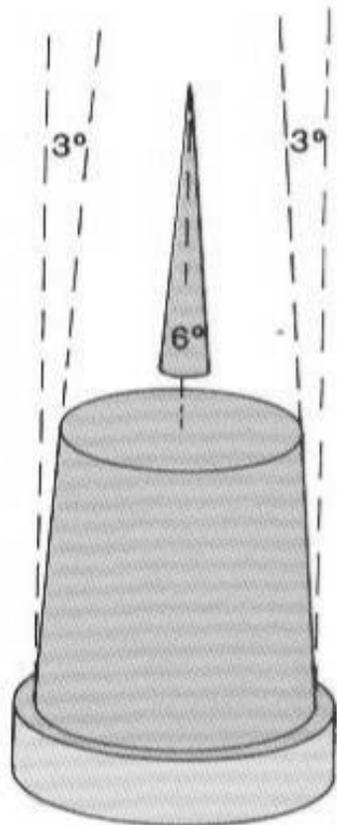


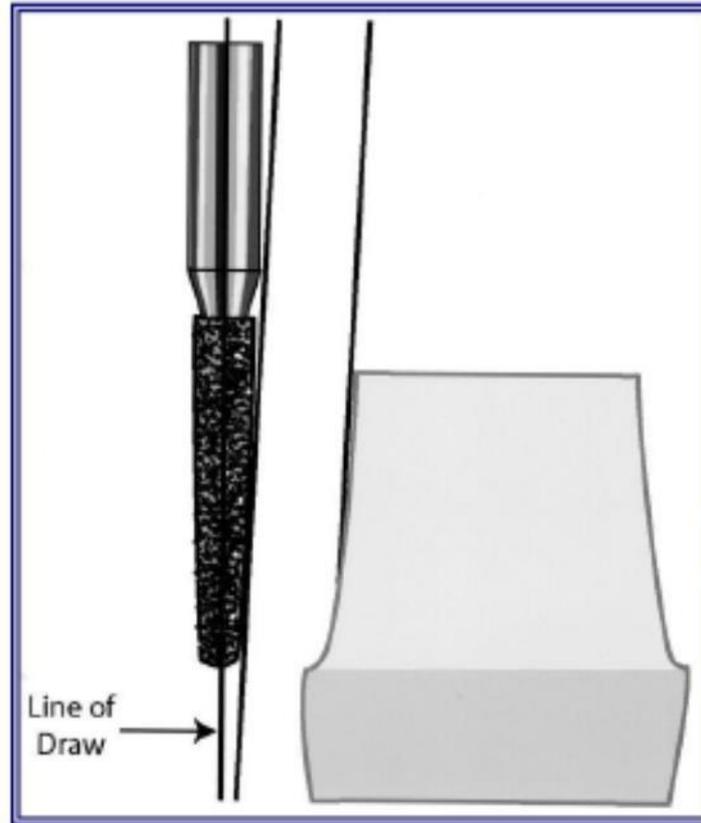
# TAPER



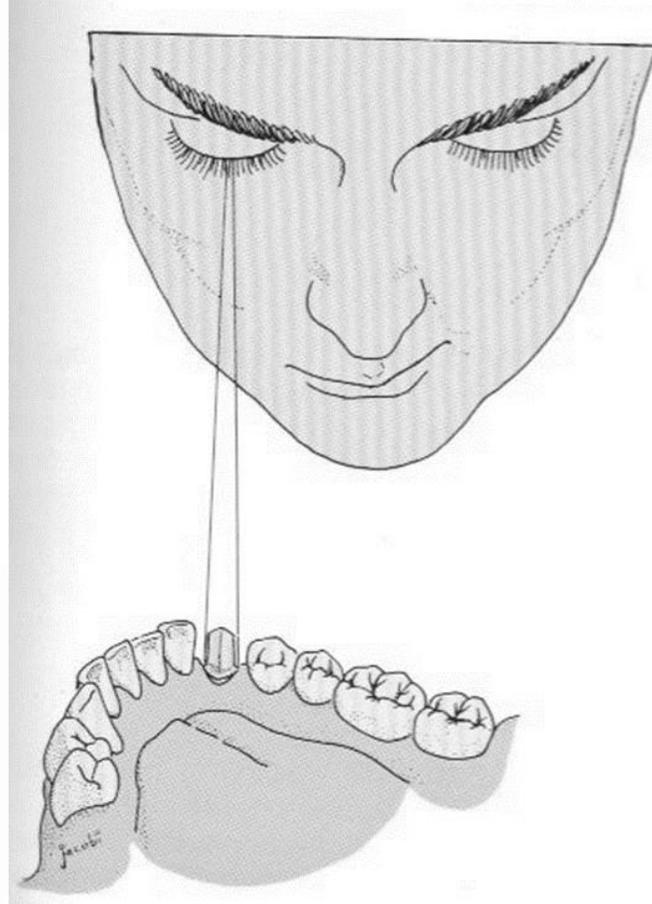
# TAPER

- As the degree of taper of the preparation increases, Its ability to retain a restoration decreases

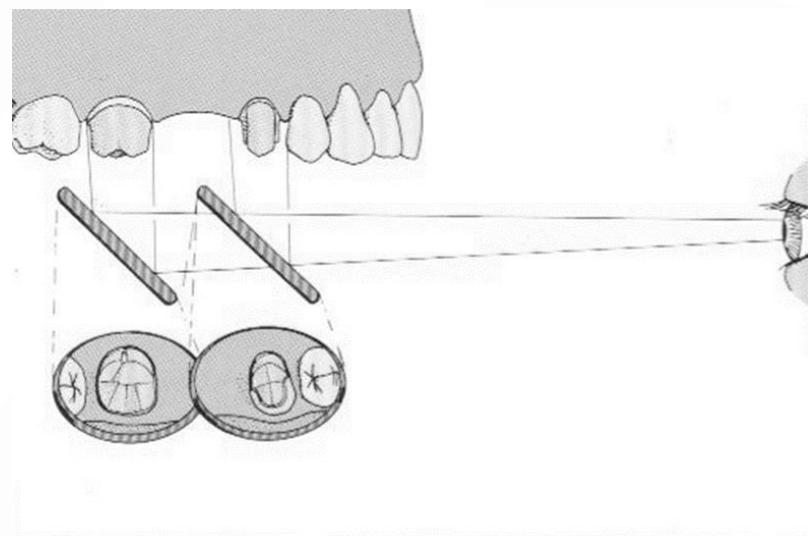
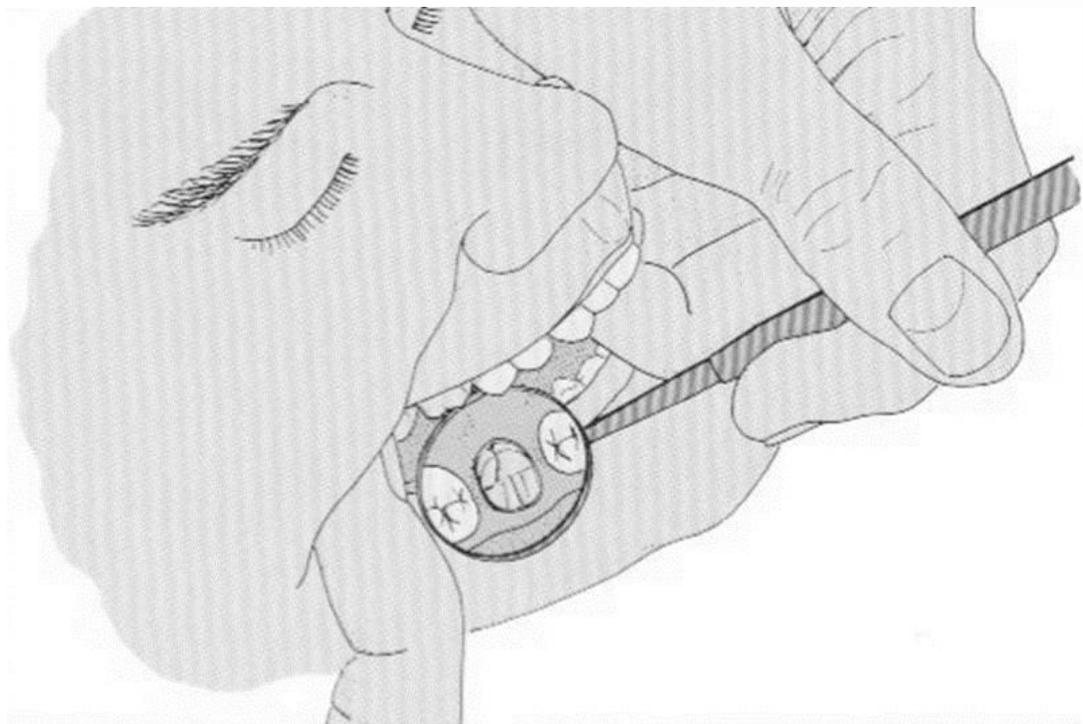




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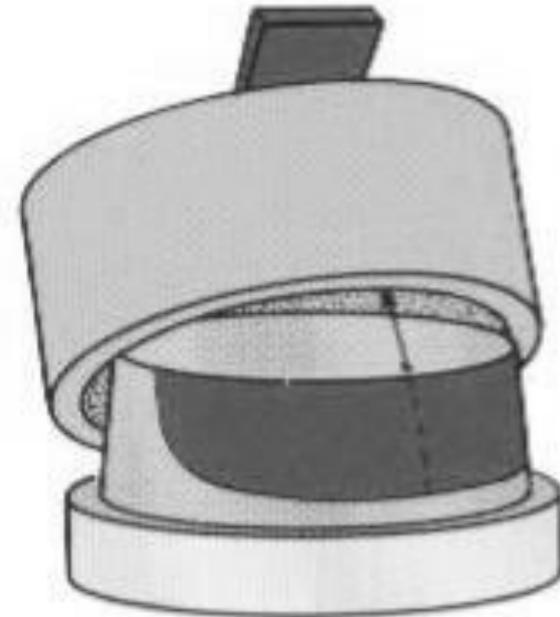
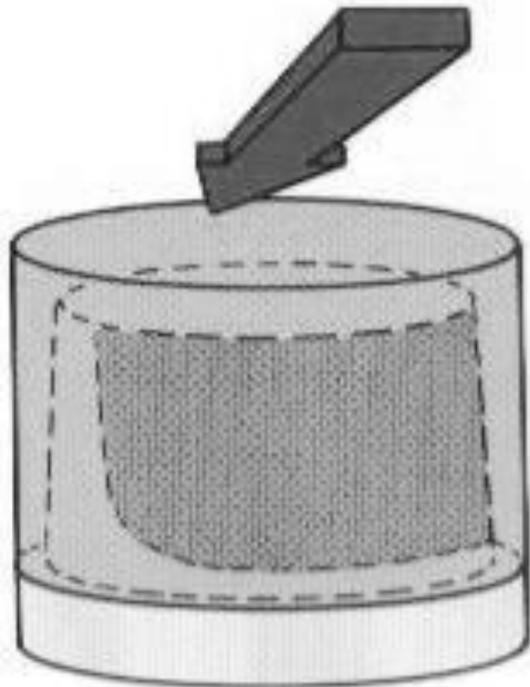


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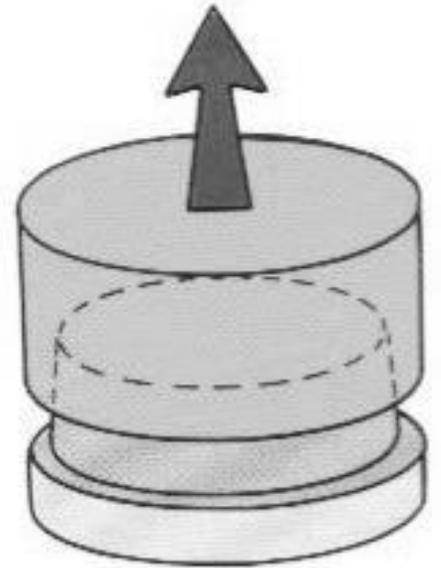
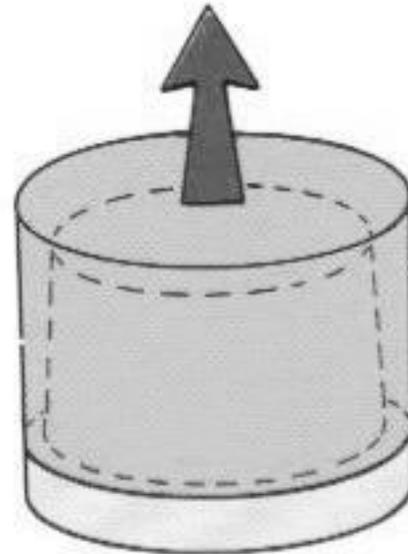
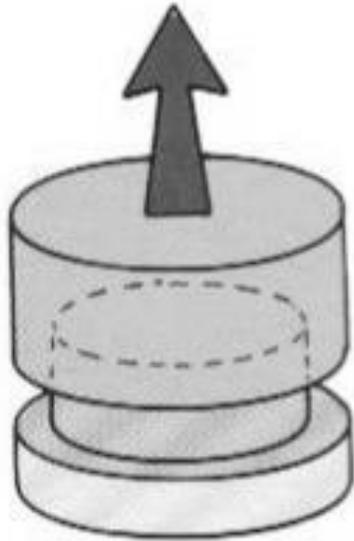
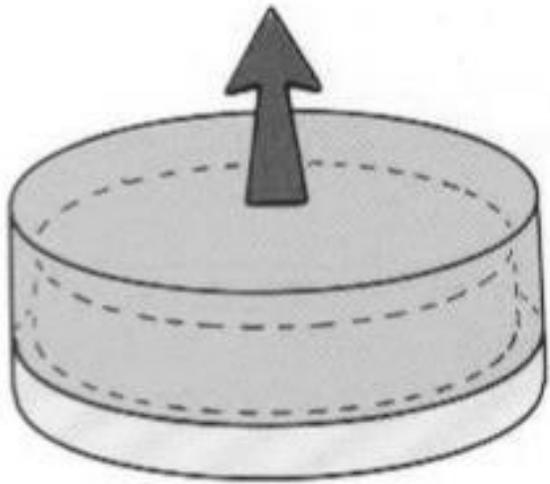
# Length of the preparation and height

Increasing the length increase retention and resistance



# Surface area of the preparation

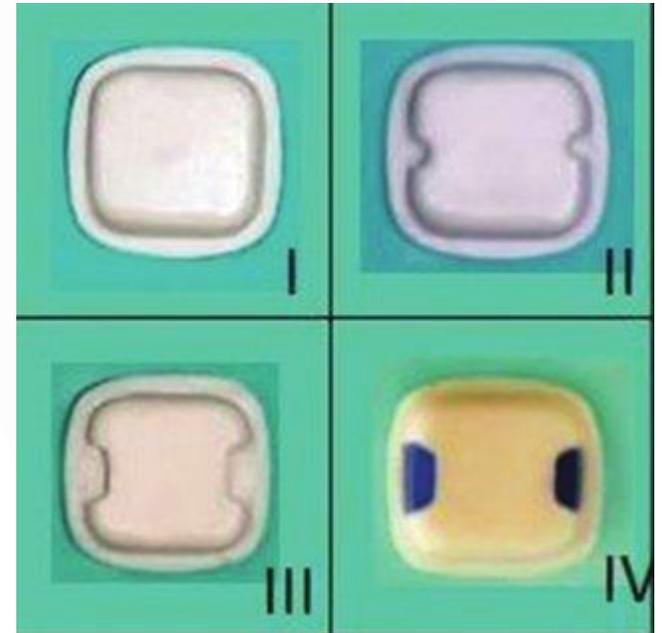
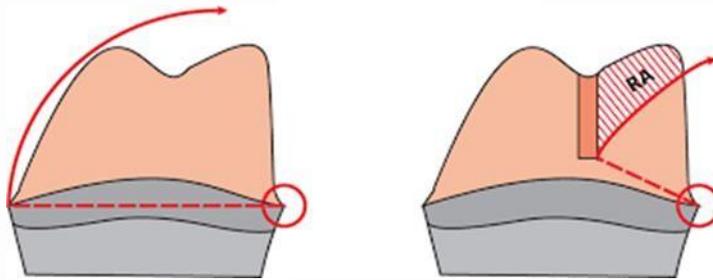
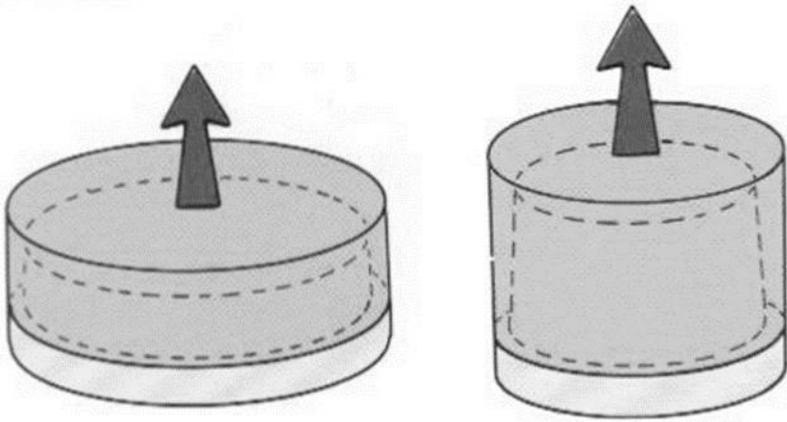
increasing the surface increase retention and resistance



# Surface area of the preparation

،size of the tooth:

- ،extend of coverage by restoration features such as grooves and boxes that are placed on the preparation



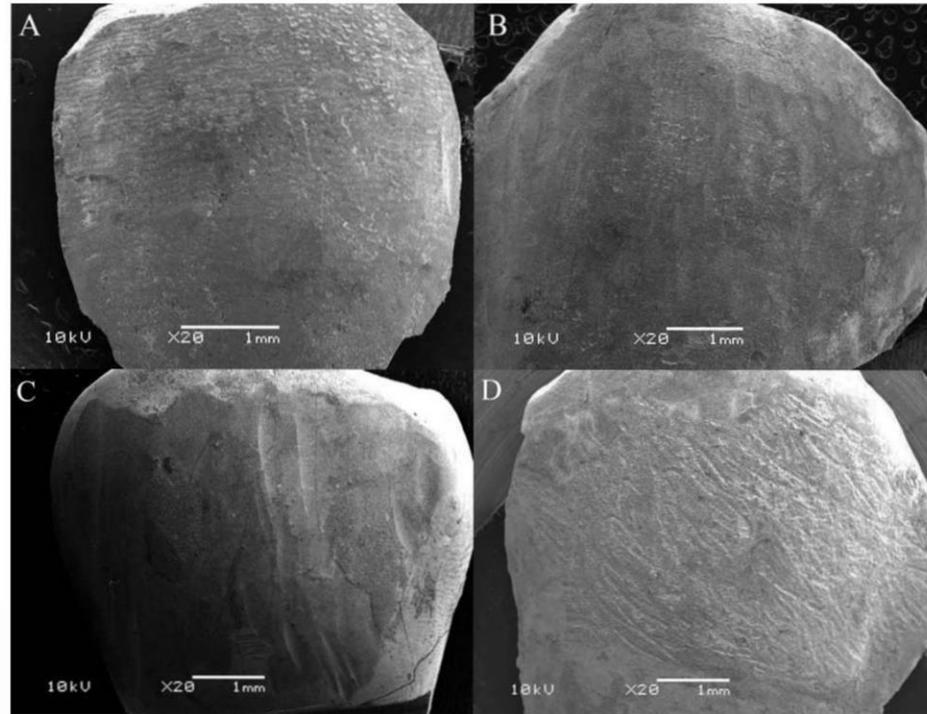
# *Surface area of the preparation*

- molar has greater surface area than premolar so retention on molar is more than premolar.
- Another example is the full metal crown is more retentive than 3/4 crown because 3/4 crown doesn't cover all the crown resulting in less retention and resistance .

# Buccal groove Proximal box



# Smooth surface less retentive than the rough surface

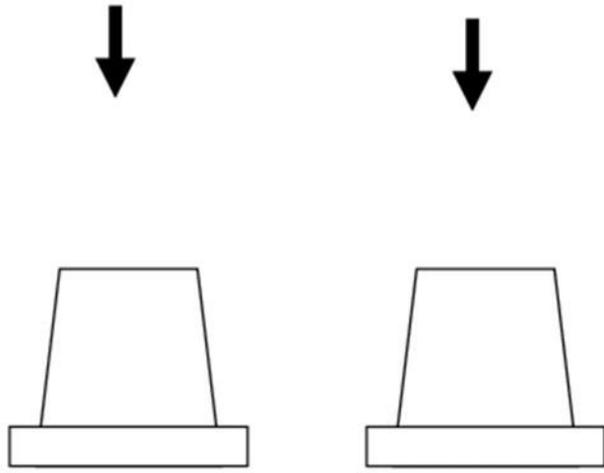


# Path of Insertion

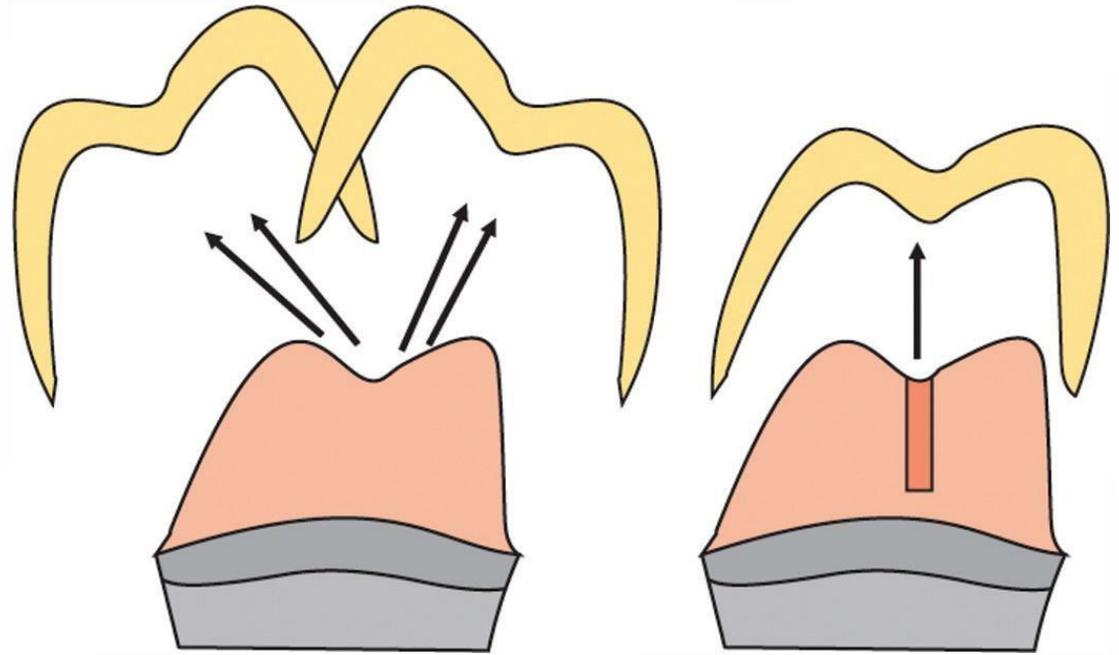
Path of insertion: An imaginary line along which the restoration can be inserted and removed without causing lateral force on the abutment.

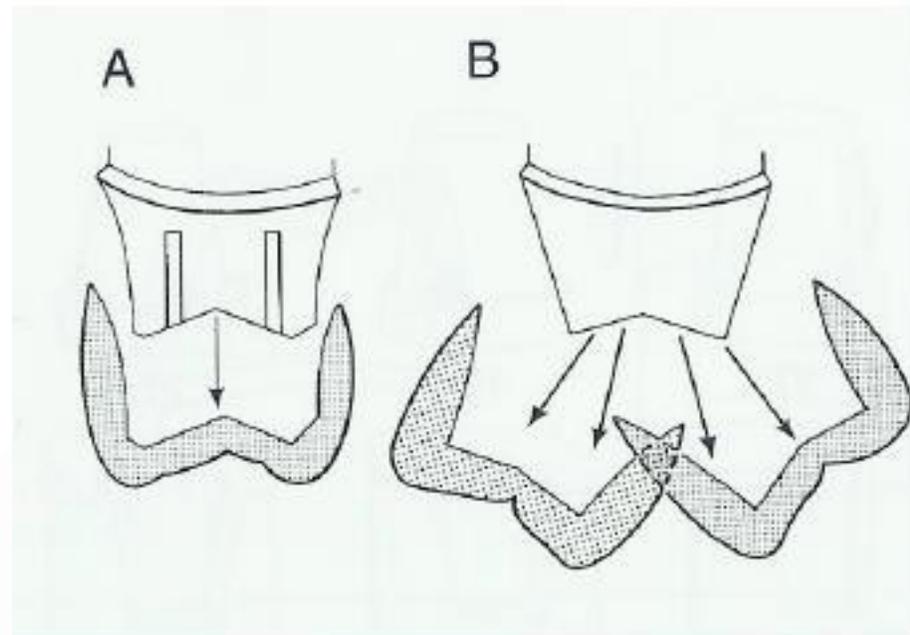
The crown restoration should have a single path of insertion to be retentive.

Most of the time the path of insertion is parallel to the long axis of the  
Tooth



Common path of insertion





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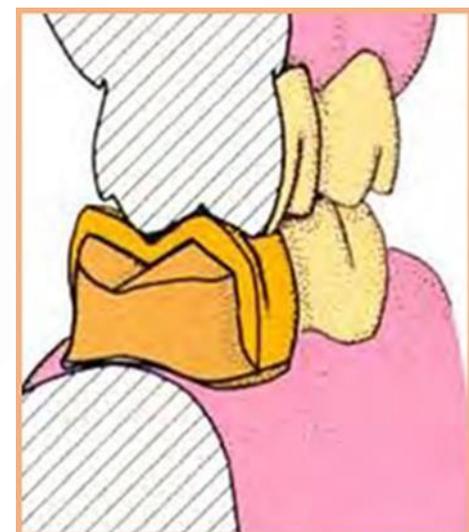
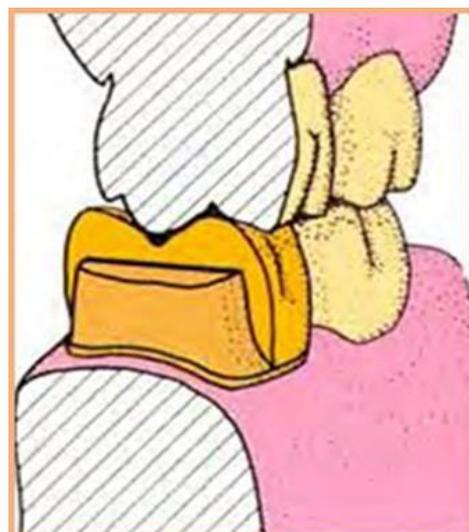
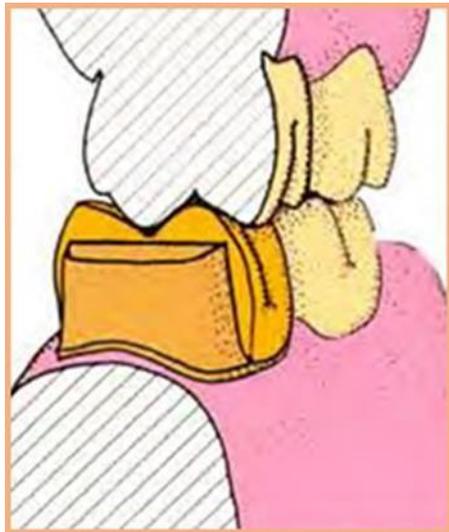
# 3.STRUCTURAL DURABILITY

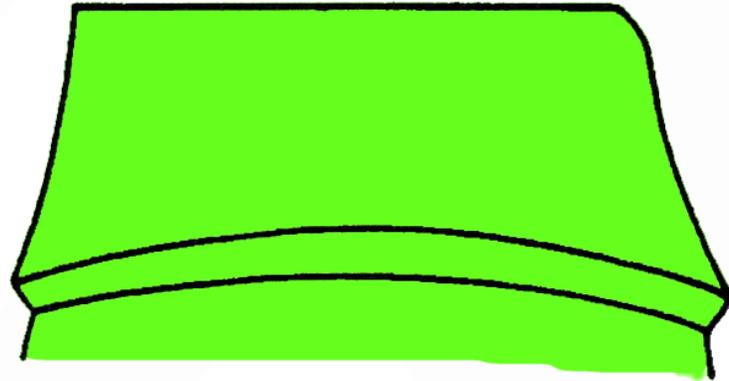
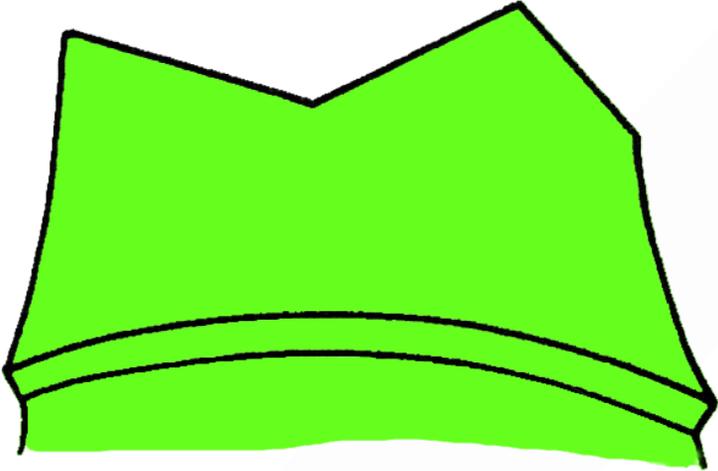
- The preparation must be designed so that will be possible to have an adequate bulk of metal to allow the restoration to withstand the force of occlusion.
- Artificial crown must be rigid enough (not to flex or perforate).

# 3.STRUCTURAL DURABILITY

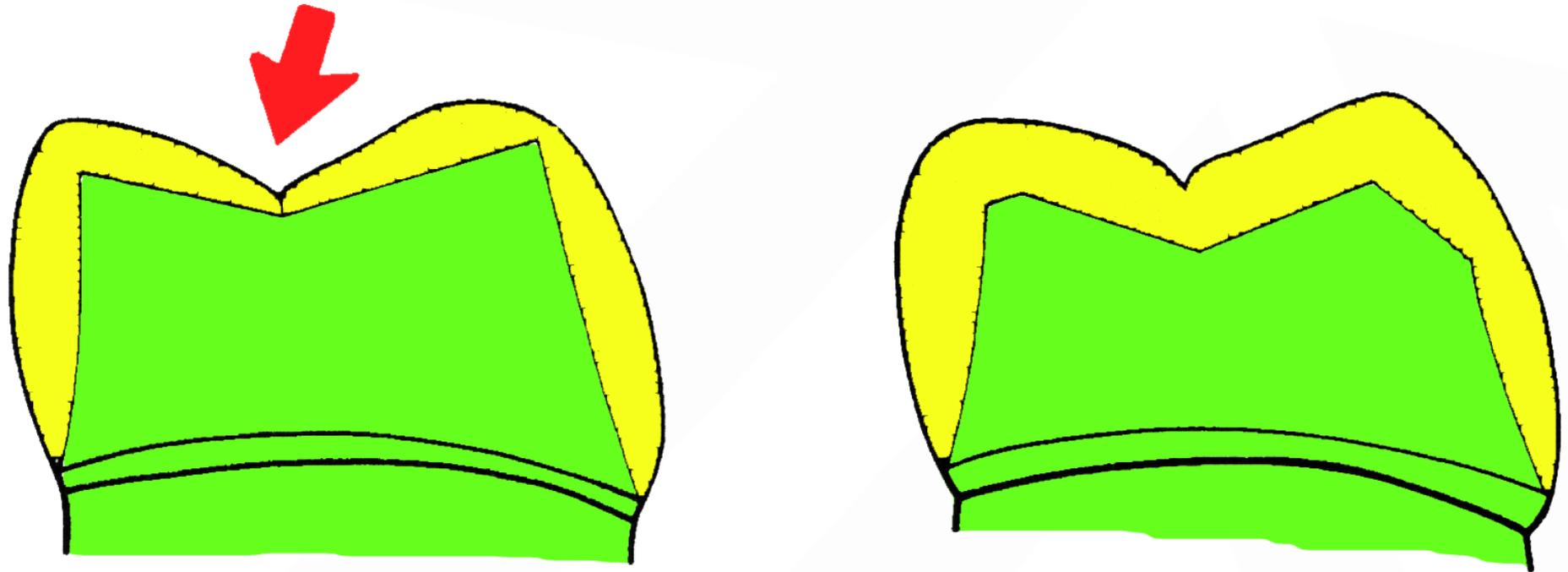
1. **Occlusal reduction.**
2. **Functional cusp bevel.**
3. **Axial reduction.**

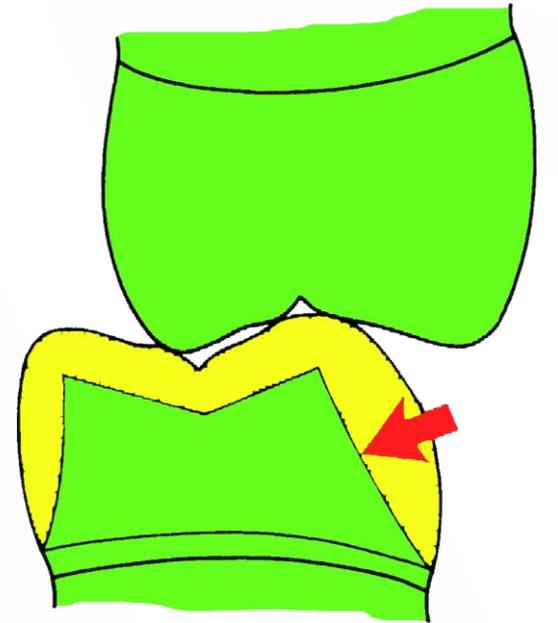
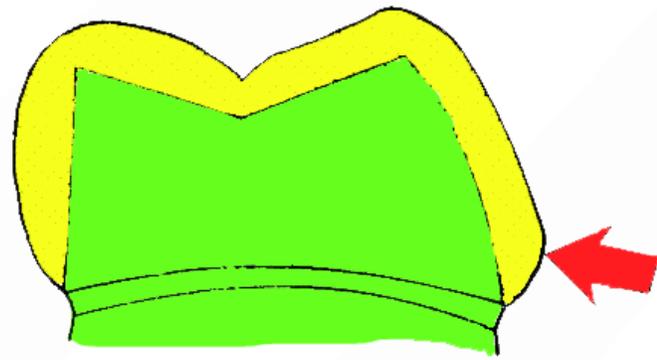
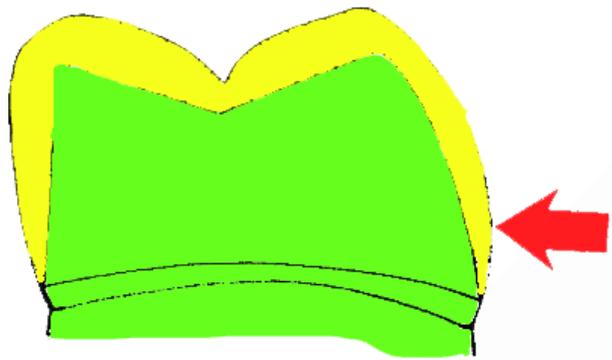
must follow the anatomical features



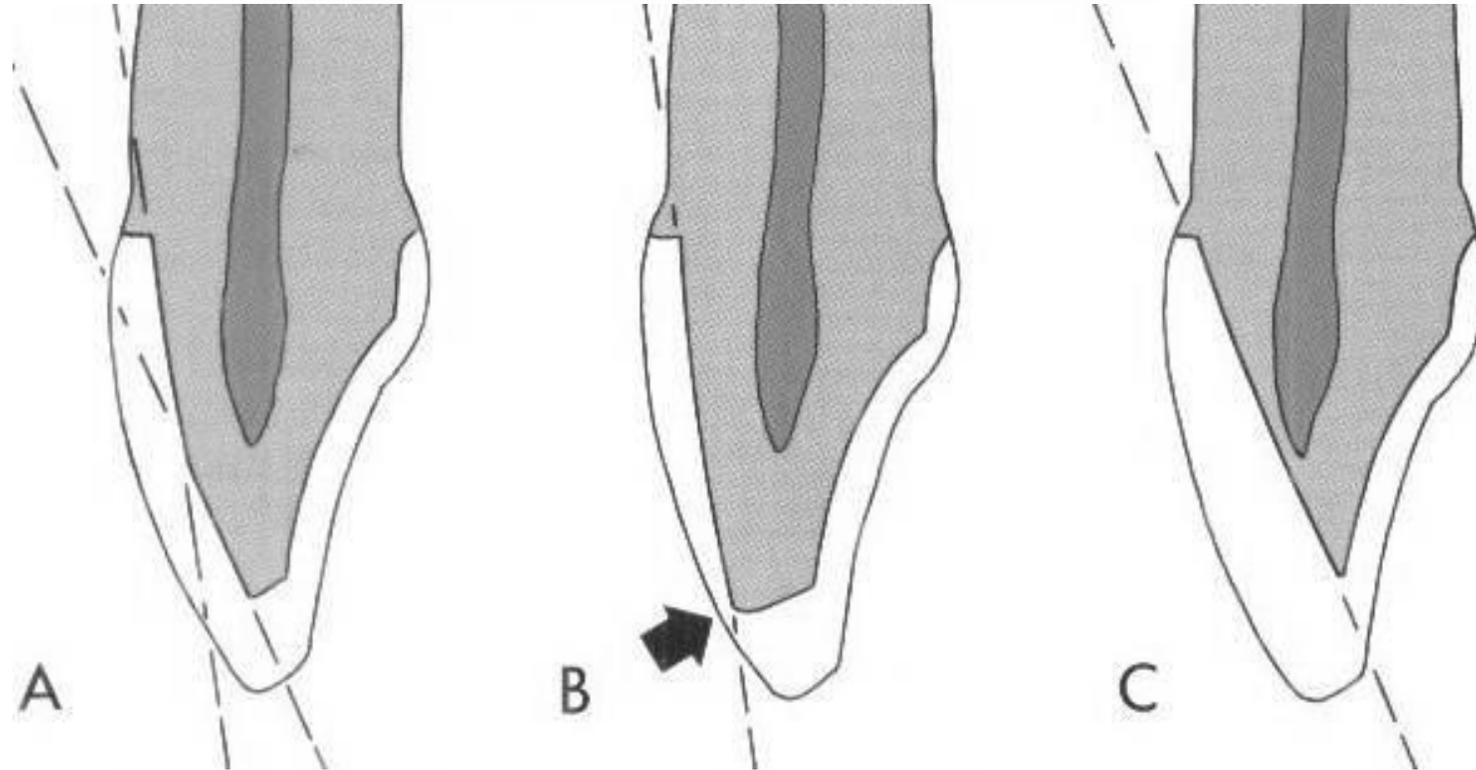


# Decreasing the restoration thickness

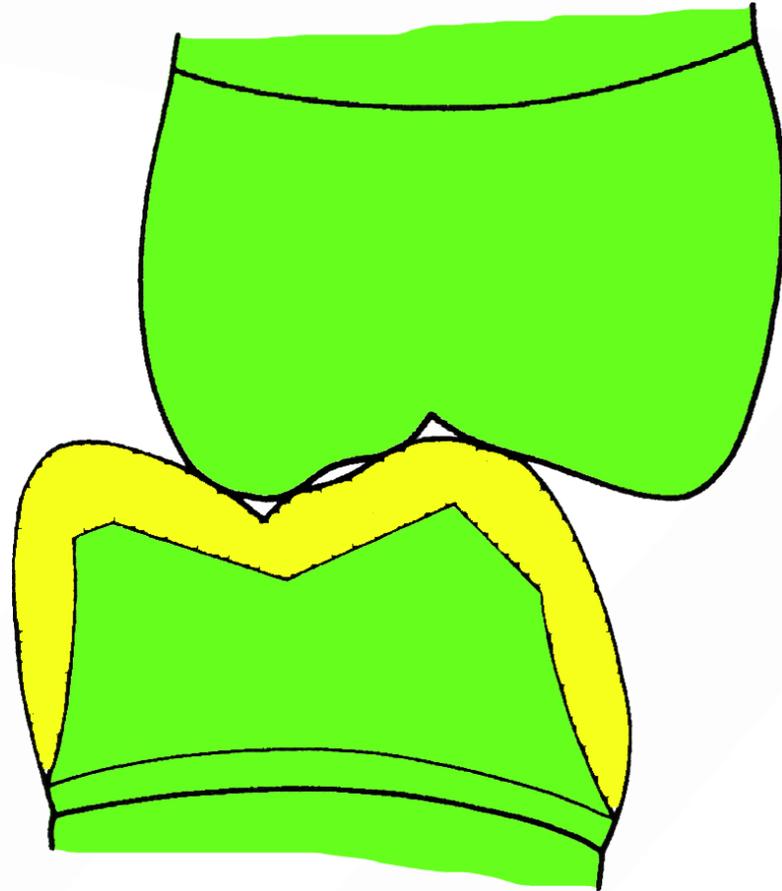




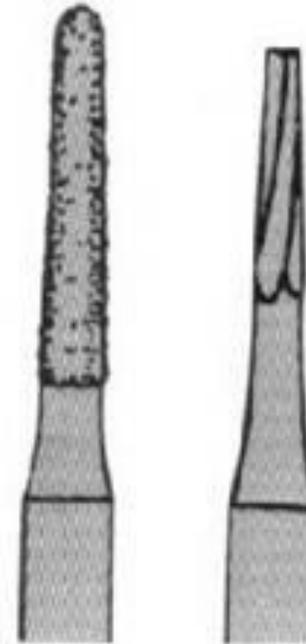
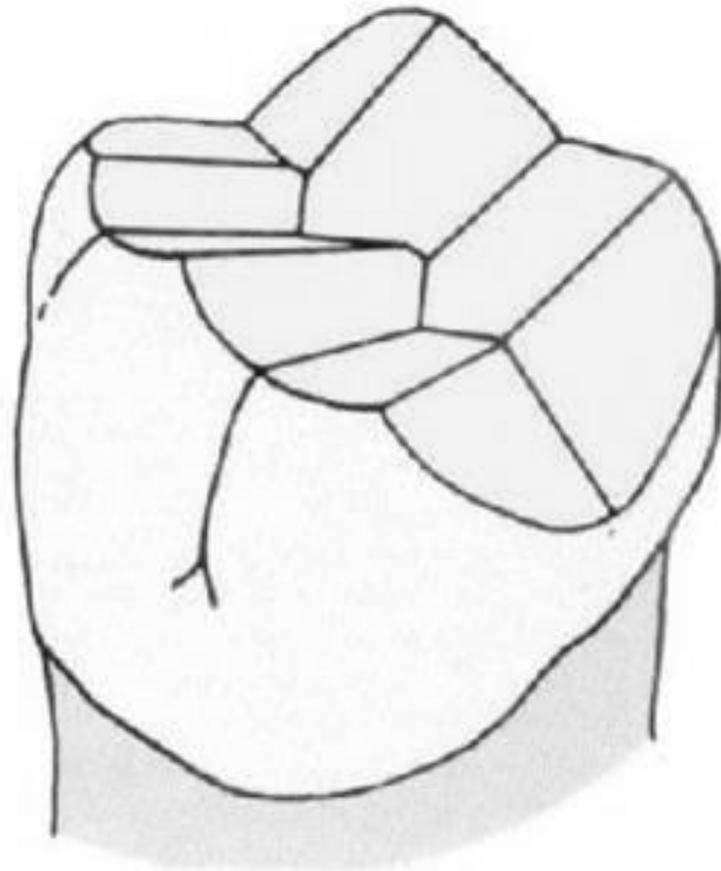
# Preparation of the labial surface is divided into 2 steps



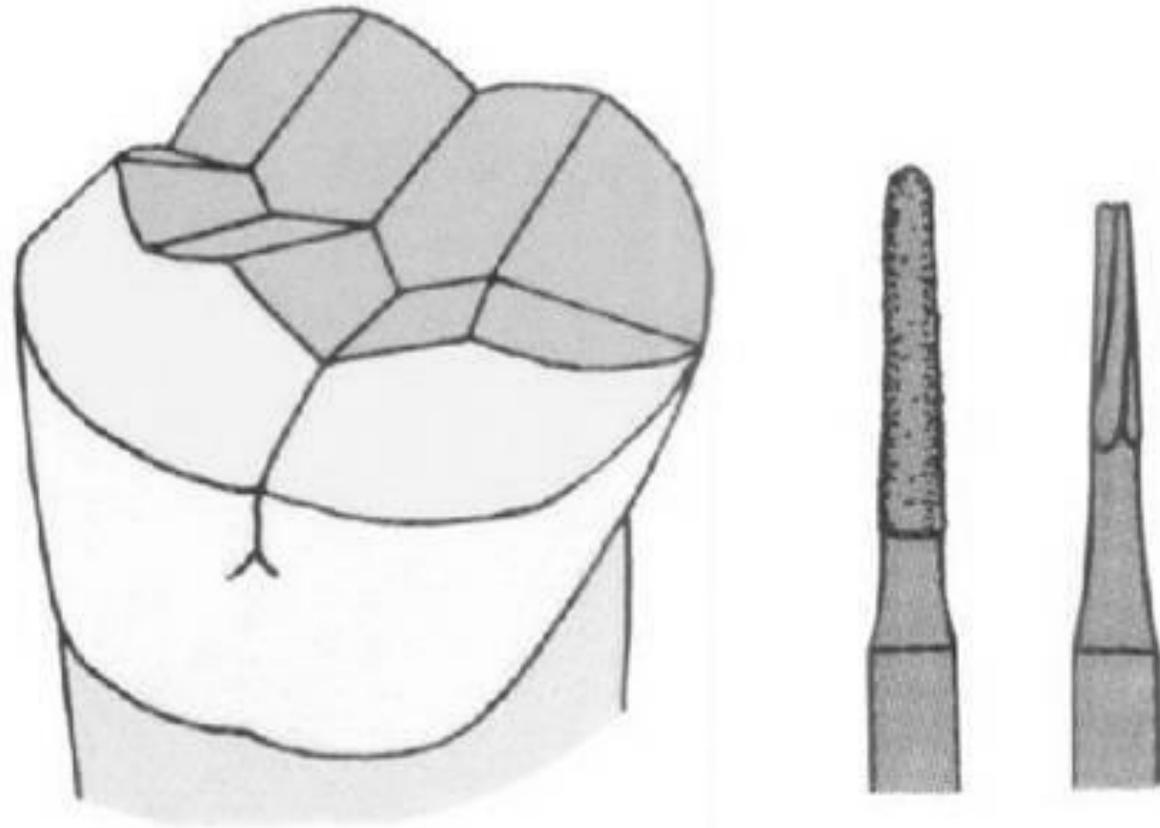
bevel to supported cusps!



# Occlusal surface preparation



# bevel to supported cusps



- Full metal restoration:
  - 1.5 mm – functional cusp
  - 1mm – non functional cusp
- Metal-ceramic crowns :
  - 1.5 to 2mm – functional cusp
  - 1 to 1.5mm – non functional cusp
- All ceramic crowns :
  - 2mm over all

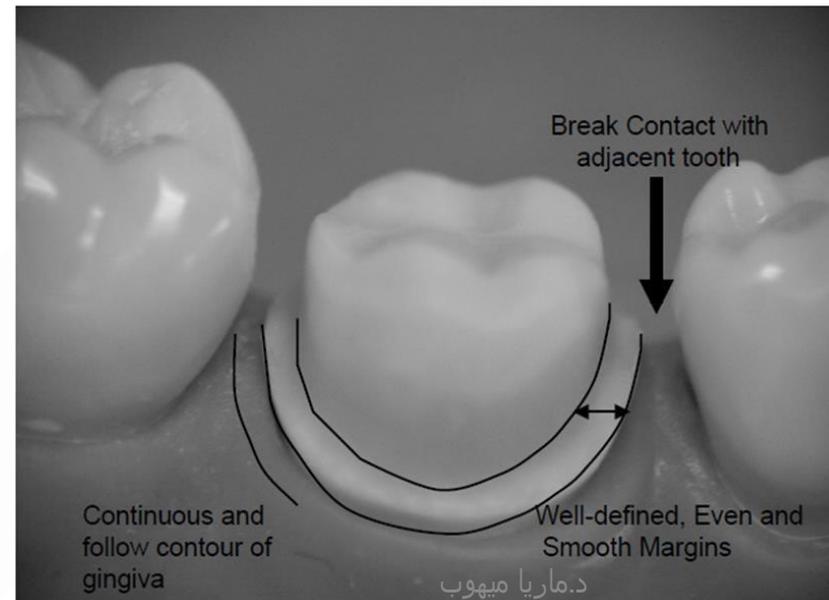
Axial walls	Unsupported cusp	Supported cusp	Crown
1mm	1mm	1.5mm	Full metal
1.2-1.3mm	1.5mm	2mm	PFM
1.5mm	2mm	2mm	All ceramic

## 4.MARGINAL INTEGRITY

- The restoration margin should closely adapt to the cavosurface finish line of the preparation to survive in the oral cavity.



- Well-defined margins
- Continuous margins
- Even and smooth margins
- Located at appropriate level
- Follow contour of the gingival margin
- Break contact with adjacent tooth



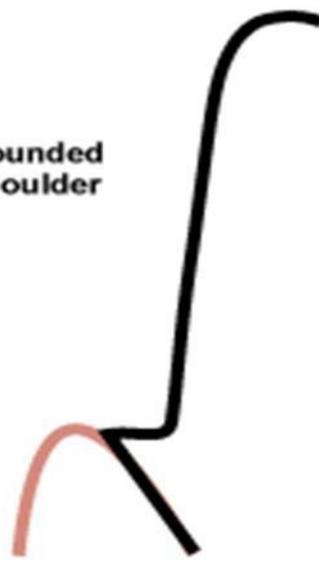
Knife edge



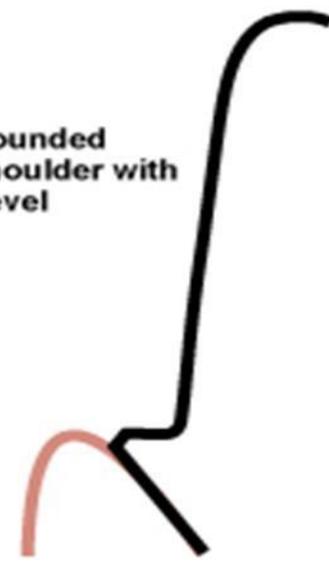
Chamfer



Rounded shoulder



Rounded shoulder with bevel



**Table 7-2 ADVANTAGES AND DISADVANTAGES OF DIFFERENT MARGIN DESIGNS**

Margin design	Advantages	Disadvantages	Indications
Feather edge	Conservative of tooth structure	Does not provide sufficient bulk	Not recommended
Chisel edge	Conservative of tooth structure	Location of margin difficult to control	Occasionally on tilted teeth
Bevel	Removes unsupported enamel, allows finishing of metal	Extends preparation into sulcus if used on apical margin	Facial margin of maxillary partial-coverage restorations and inlay/onlay margins
Chamfer	Distinct margin, adequate bulk, easier to control	Care needed to avoid unsupported lip of enamel	Cast metal restorations, lingual margin of metal-ceramic crowns
Shoulder	Bulk of restorative material	Less conservative of tooth structure	Facial margin of metal-ceramic crowns, complete ceramic crowns
Sloped shoulder	Bulk of material, advantages of bevel	Less conservative of tooth structure	Facial margins of metal-ceramic crowns
Shoulder with bevel	Bulk of material, advantages of bevel	Less conservative, extends preparation apically	Facial margin of posterior metal-ceramic crowns with supragingival margins

## جدول بأشكال خطوط الإنهاء المختلفة



شكل خط الإنهاء	محاسنه	سيئاته	استطبائاته
حد السكين Featheredge	الحفاظ على بنية السن	من الصعوبة التحكم بموقع الحواف	لا ينصح به عادة
حد الإزميل Chisel edge	الحفاظ على بنية السن	من الصعوبة التحكم بموقع الحواف	يستخدم بالأسدان المائلة
خط إنهاء مع شطب Bevel	يزيل الميناء غير المدعوم ويسمح بإنهاء المعدن	سيئمت التحضير فيه ضمن الميزاب اللتوي	إنهاء الحواف الدهليزية في الترميمات الجزئية بالفك العلوي وحواف ال onlay\inlay
شبه الكتف Chamfer	حواف واضحة, حجم كاف, سهولة بالتحكم	يجب الحذر عند تحضيره لتجنب حدوث درجة مينائية غير مدعومة	الترميمات معدنية, الحواف اللسانية لترميمات الخزف - معدن
كتف Shoulder	حجم كاف للمعدن + محاسن الشطب	حفاظ أقل على النسيج السنية	حواف دهليزية لتيجان الخزف - معدن, تيجان خزفية كاملة
كتف مائل Sloped shoulder	حجم كاف للمعدن + محاسن الشطب	حفاظ أقل على النسيج السنية	الحواف الدهليزية لتيجان الخزف - معدن
كتف مشطوب Shoulder with bevel	حجم كاف للمعدن + محاسن الشطب	حفاظ أقل على النسيج السنية يسد بالتحضير أكثر تاشنل	الحواف الدهليزية لتيجان الخزف - معدن المتكيفة مع حواف تونق ثتوية

FINISH LINE	CROWN
<p style="text-align: center;">0.5 مم CHAMPHER</p>	<p style="text-align: center;">FULL METAL</p>
<p style="text-align: center;">SHOULDER</p> <p style="text-align: right;">1 مم</p>	<p style="text-align: center;">PFM</p>
<p style="text-align: center;">1 مم ROUNDED SHOULDER</p>	<p style="text-align: center;">ALL CERAMIC</p>

# 5.Preservation of the periodontium



- **Supragingival margins**
  - Less potential for soft tissue damage
  - Easily prepared and finished
  - More easily kept clean
  - Impressions are more easily made
  - Restorations easily evaluated at recall appointments

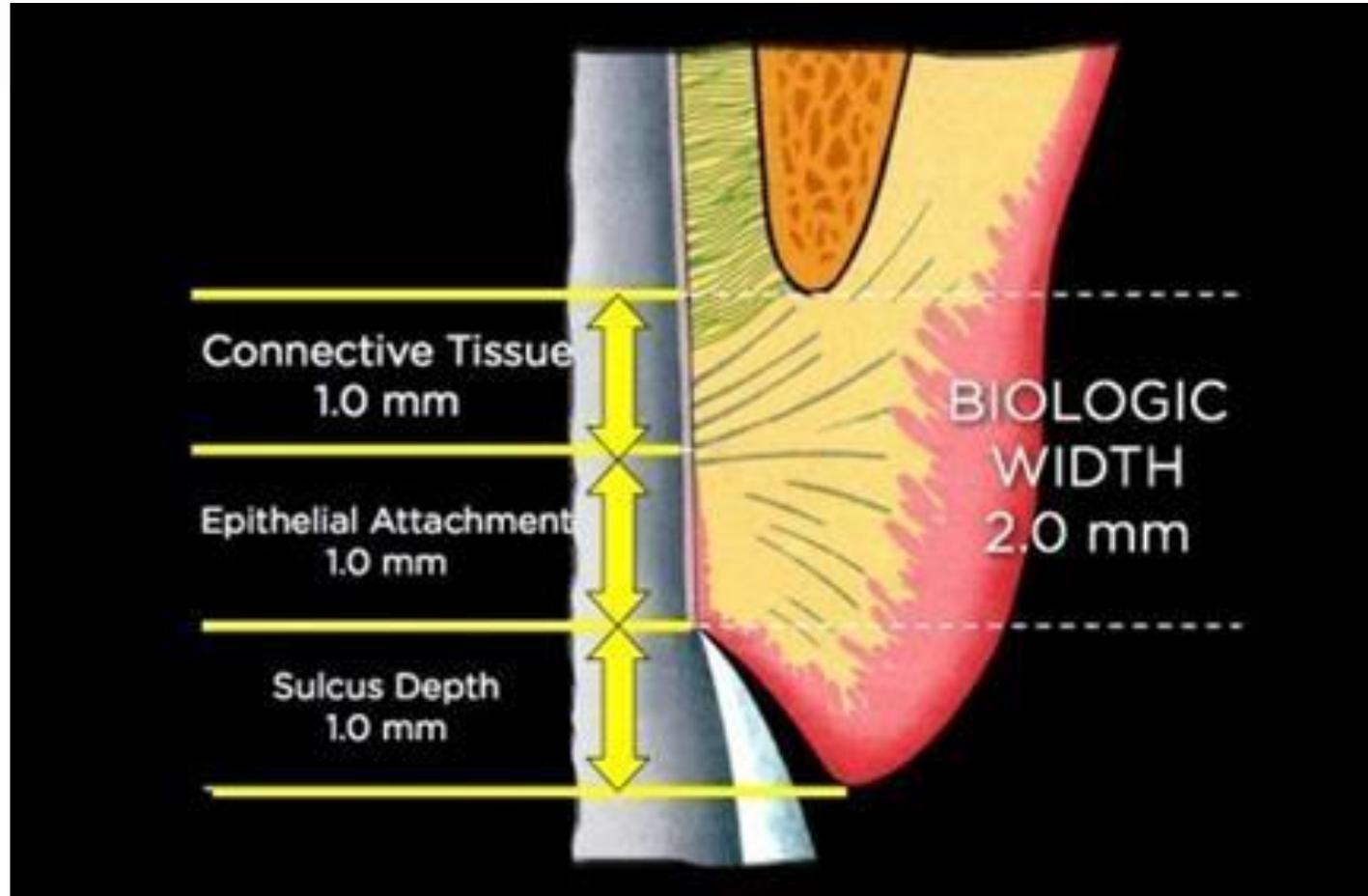
# SUBGINGIVAL MARGINS

## *SPECIFIC DEMANDS FOR SUBGINGIVAL MARGINS:*

- Aesthetic demands
- Caries removal
- To cover existing subgingival restorations
- To gain needed crown length
- To provide more favourable crown contour

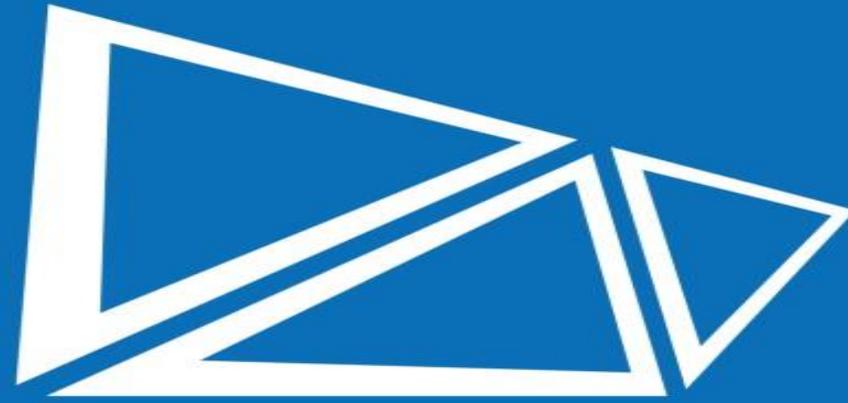
## *DISADVANTAGES:*

- Difficult for preparation
- Gingival management should be perfect
- Prone for soft tissue trauma
- More prone for gingival and periodontal pathosis
- Difficult to maintain oral hygiene
- Metal margins can be seen thru the gingiva



# COMMON ERRORS

1. Over Reduced / Under Reduced
2. Over Tapered / Under Tapered
3. Sharp Angles / Corners
4. Undefined Margin
5. Irregular Margin
6. Margin Position
7. Marred Adjacent Tooth
8. Contact Unbroken
9. Functional Cusp Bevel location



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