

Crown and bridge Prosthodontics

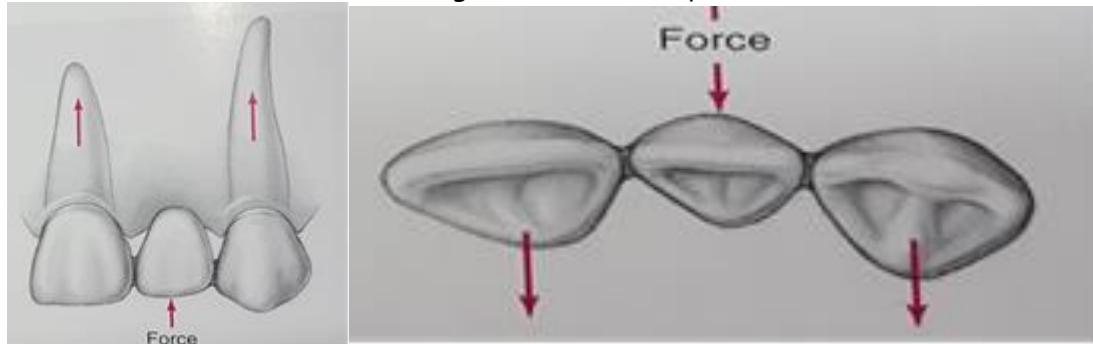
Lecture: 3

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Evaluation Abutment tooth:

Abutment in fixed prosthodontic terminology is a tooth or portion of a tooth that used for the support and/or retain of a fixed bridge or part of the bridge, to which retainer is connected (cemented).

All the forces that would normally be absorbed by the missing tooth are transmitted, through the pontic, connectors, & retainers to abutment teeth. Abutment teeth must withstand forces normally directed to the missing teeth, in addition to those usually applied to the abutments, therefore, **the choice of abutment is important** because it has to withstand both the forces acting on it and on the pontic.



So the clinician have to evaluate the abutment teeth carefully

EVALUATION AIDS

- CLINICAL EXAMINATION USING EXAM.TOOLS
- VITALITY TEST
- RADIOGRAPHS
- DIAGNOSTIC CASTS
- PERIODONTAL PROBE

Requirements;

- 1) *Abutment must withstand the forces normally directed to the missing teeth; whenever possible the abutment should be vital tooth.*
- 2) *A tooth that has been endodontically treated & symptomatic with radiographic evidence of good seal & complete obturation of the canal can serve as abutment (Post & core for retention & strength).*
- 3) *The supporting tissue surrounding the abutment teeth must be healthy & free of inflammation.*
- 4) *The abutment teeth should not exhibit any mobility, since they will be carrying an extra load. Sever uncorrectable, periodontal disease is contraindicated For F.P.D*



Abutment evaluation (selection):

FACTORS RELATED TO TOOTH (ABUTMENT)

1. Health of abutment (caries or pulpal):

- *A sound abutment tooth permits ideal type of preparation. Caries tooth may be used as abutment provide that caries is removed the pulp protected (lining) and the tooth is restored to its original form by suitable filling material.*
- *If the caries far away from margin and small and the retainer design will extend beyond the caries area, cement or resin can't be used in state of metal.*
- *Extensive caries need extraordinary filling technique and preparation to conserve and support remaining tooth structure.*
- *Pulpless teeth can be used only after endodontic treatment.*

2. SHAPE;

Some teeth have conical, peg, bulbous or tapered crown form that interferes with the preparation parallelism, necessitating full coverage crowns to improve aesthetics and retention. • Examples:

- *Peg laterals*
- *Anterior teeth with poorly developed cingula and short proximal walls*
- *Mandibular premolars with poorly developed lingual cusps and short proximal surface*
- *Thin incisors.*

3. CROWN LENGTH

- *The abutment teeth must have adequate occlusocervical crown length to achieve sufficient retention.*
- *Full coverage restorations and crown lengthening are considered with short clinical crowns to ensure adequate retention.*

3. Size of the crown:

- ***It determines the type of retainer to be used. For example: short, thin, conical, tapered teeth are poor indication for partial veneer crown.***
- ***The height of the clinical crown is closely related to retention.***

4. Axial relationship:

- a) *Rotation, tilting, over lapping, mal-position might lead to decision of precluding of such a tooth to be used as abutment (because rotation or torque can damage supporting structure or cause retainer to become loose).*
- b) *Also it may indicate the use of specific retainer (over reduction lead to weaken the tooth & endanger pulp health).*
- c) *Rotation lead to either increase or decrease of space available for pontic (size of pontic planned).*

FACTORS RELATED TO ROOT & GINGIVO PERIODONTAL COMPLEX

5. Condition of supporting tissue;

- *The supporting tissue surrounding the abutment teeth must be healthy & free of inflammation ,the abutment teeth should not exhibit any mobility, since they will be carrying an extra load. Intra oral radiograph should be used to evaluate bone architecture*
- *The alveolar bone support is one of most important factors that aid to evaluate an abutment*

- The supporting alveolar bone should be healthy
- It should have good trabecular architecture and show no sign of bone defect or bone loss

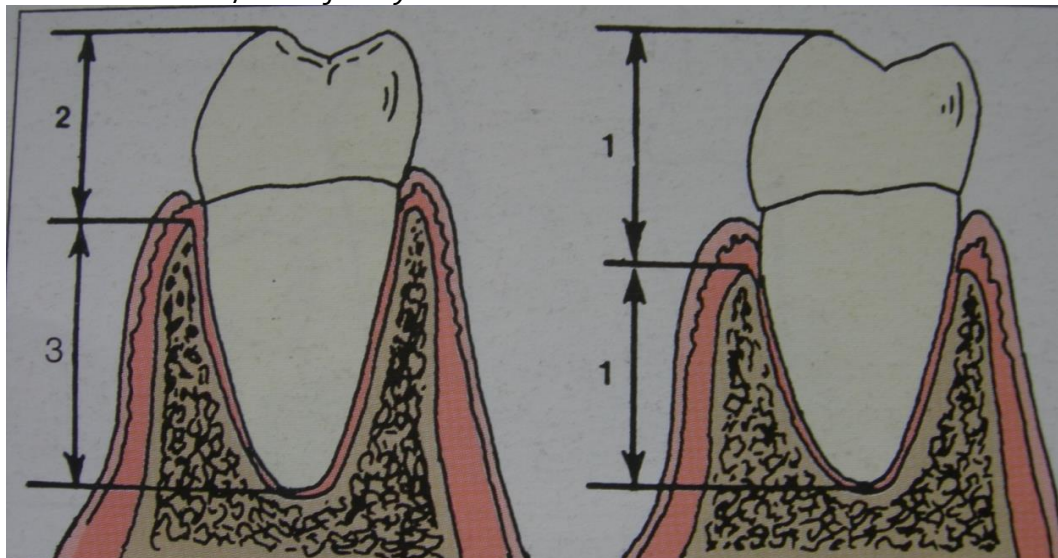
The roots & supporting tissue should be evaluated for the following:

- CROWN - ROOT RATIO
- ROOT CONFIGURATION
- PERIODONTAL AREA

A. Crown –root ratio:

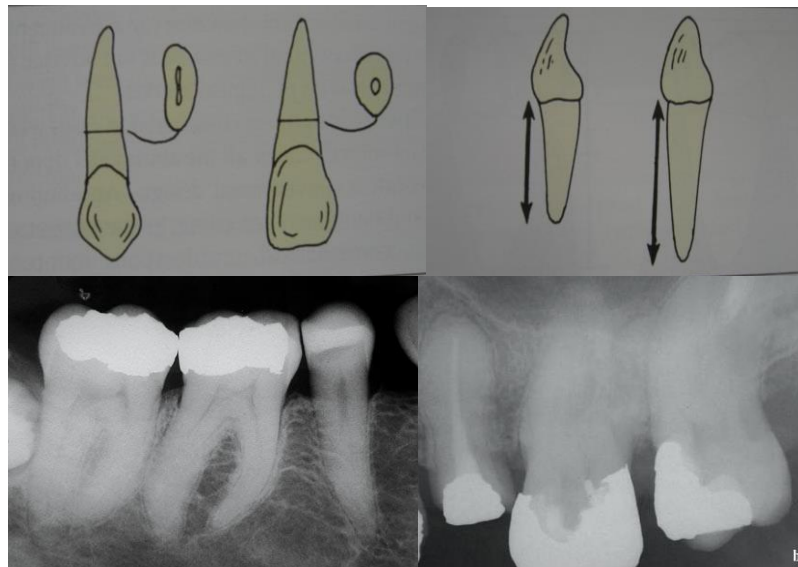
It is a linear measurement of the length of the crown (tooth) occlusal to the crest of alveolar bone.

- $2/3$ crown/root ratio is the optimum for a tooth to be used as abutment for F.P.D.
- Minimum acceptable ratio is 1:1 crown/root ratio
- Greater than 1:1 might be considered adequate in some cases such as periodontally involved mobile teeth (opposing) or if the opposing occlusion is composed of artificial teeth, which reduce occlusal forces that acting on abutment, this defiantly lead to less stress on abutment .



B. Root configuration; (Root shape , angulation& length)

- Roots that are broad labio-lingually than they are mesio-distally are preferable roots that have round or circular in cross section.
- Tooth with conical root can be used as abutment for short span bridge. A single rooted tooth with irregular configuration or with some curvature in the apical third of the root is preferable to the tooth that have perfect taper.
- Multirooted teeth generally provide greater stability than single-rooted teeth .
- A multi rooted posterior teeth with widely separated (divergent) roots will offer better periodontal support than root that convergence, fuse, or have conical configuration.



C. Surface area of the roots:

- The area of periodontal ligament attachment of the root to the bone.
- It can be used as a measurement scale to determine the potency of abutment
- Tylman stated that ,two abutment teeth could support two pontics.
- Johnston et al improvised Tylman statement and proposed the famous Antes law

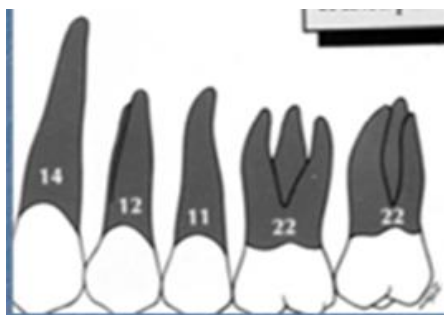


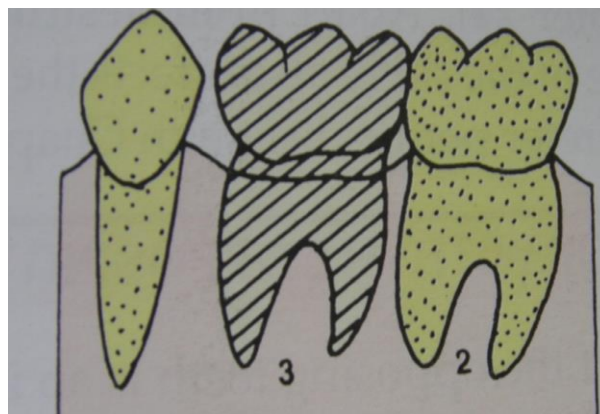
Table 3-1 ROOT SURFACE AREA OF ABUTMENT

	Root Surface Area (mm ²)	Percentage Root Surface Area in Quadrant
MAXILLARY		
Central	204	10
Lateral	179	9
Canine	271	14
First premolar	234	12
Second premolar	220	11
First molar	433	22
Second molar	411	22
MANDIBULAR		
Central	154	8
Lateral	168	9
Canine	268	15
First premolar	180	10
Second premolar	207	11
First molar	411	24
Second molar	426	23

Data from Jensen A: Root surface measurement and a method for a rapid determination of root surface area. Acta Odontol Scand. 23:15, 1963.

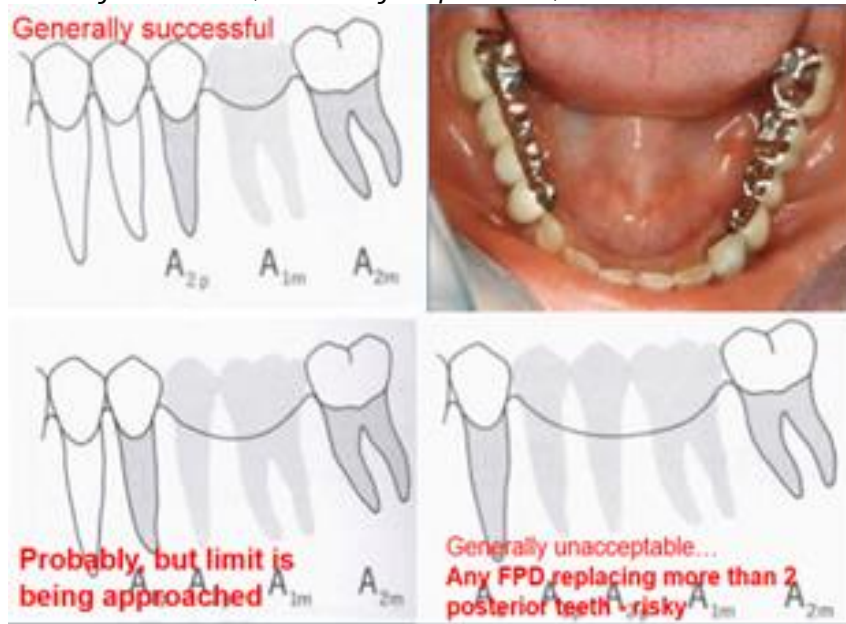
ANTE'S LAW:

The root surface area of the abutment teeth (*embedded in bone*) (*periodontal ligament area/pericemental area*) must be equal or more than root surface area of teeth being replaced.



Example:

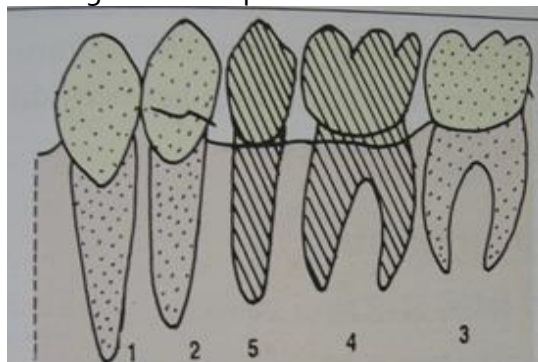
missing first molar alone or with second premolar, the root surface areas of both are equal to the root surface area of abutment (second & first premolar).



according to this premise :

One missing tooth can be successfully replaced if abutment teeth are healthy .

If two teeth are missing, a FPD can probably replace the missing teeth but the limit is being approached. In selected case and in order to increase the capability of the bridge to withstand the loading force first premolar can be used as a secondary abutment



If three missing posterior teeth (first molar and the two premolars) *OR* When the root surface area of the teeth to be replaced by pontics surpass that of the abutment teeth, then a high risk or an unacceptable situation for FPD exists.