

## Clinical consideration for bridge construction

### 1. Age of the patient.

The patient age must be older than 18 Y considering the large size of pulp chamber & the risk of traumatic exposure, the length of clinical crown become more stable & suitable for FPD.

### 2. Medical history

Uncontrolled Diabetic, hypertensive & other cardiovascular, pulmonary disease in which the pt cannot tolerate long term treatment.

Systemic conditions with oral manifestations of periodontitis for ex: diabetes, menopause, pregnancy, or the use of anticonvulsant drugs will affect the selection of the abutment and may change the treatment plan into R.P.D.

### 3. Chief complain of the patient

- *(pain, sensitivity, and swelling).*

Treatment plan must including RCT then FDP.

- *(difficulty in mastication or speech).*

Look for TMJ problem, post. Teeth missing or may be ortho. Problem.

- *(bad taste or odor).*
- *(fractured or unattractive teeth or restorations, discoloration).*

### 4. Extraoral examination

Temporomandibular Joints

Muscles of Mastication

Lips

TMJ pain and abnormality,-Bruxism, clenching , occupational habit,Restricted mouth opening.

Normal values to maximum opening range from 45 to 55 mm < 35mm – restricted opening (intra capsular changes).

The maximum lateral movements of the patient can be measured (normal is about 12 mm).

Next, the patient is observed during normal and exaggerated smiling to determine if he is low, normal or high lip line, This may be critical in treatment planning and particularly for margin placement of metal-ceramic crowns to the pt with high lip line, F.L must be placed subgingivally.

#### **4.evaluation of interocclusal relation**

Interocclusal space is necessary to re-establish:

- a proper occlusal plane.
- thickness of pontic&connector to give enough strength.

#### **5. dental history &Intraoral examination**

Dental history& examination must be concentrated especially on the abutment teeth.

##### **A. Abutment evaluation**

Every restoration must be able to withstand the constant occlusal forces to which it is subjected. Abutment teeth must withstand the forces normally directed to the missing teeth, in addition to those usually applied to them.

If a tooth adjacent to an edentulous space needs a crown because of damage to this tooth itself, the restoration can double as an FPD retainer (cantilever bridge) for example damaged max. Canine needs to be crowned & the adjacent lateral is missing, so we can replace the lateral & restore canine by a simple cantilever FDP.

If several abutments in one arch require crowns, there is a strong argument for the selection of a fixed partial denture rather than a removable partial denture.

### **Coronal tooth structure:**

However, the tooth must have some sound, surviving coronal tooth structure to ensure longevity. Even then, some compensation must be made for the coronal tooth structure that has been lost. This can be accomplished through the use of a dowel core, post-retained amalgam or composite core.

Teeth that have been pulp capped in the process of preparing the tooth should not be used as FPD abutments unless they are endodontically treated. There is too great risk that they will require endodontic treatment later.

### **Endodontically treated abutment tooth must be evaluated**

#### **-clinically:**

Asymptomatic (no pain, no tenderness, no sinus tract ).

#### **-radiographically:**

- The quality of root canal filling(3D obturation)
- The presence of any recurrent P.A. radioleucency & apical leakage.

### **Periodontal status of the abutment**

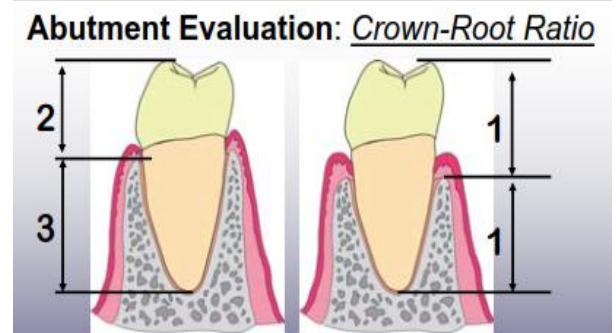
The supporting tissues surrounding the abutment teeth must be healthy, Normal thickness of P.D.L, Adequate alveolar bone level & thickness of the cortical plate.

*The roots and their supporting tissues should be evaluated for three factors*

**Crown-root ratio.**

**Root number& configuration.**

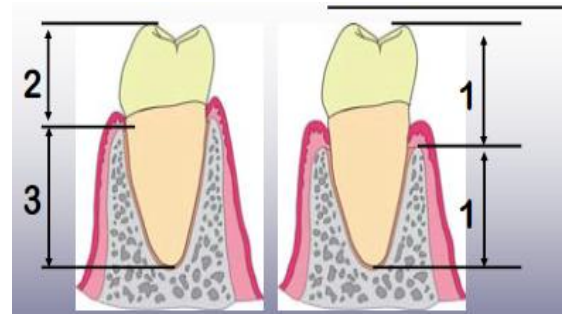
**Periodontal ligament area**



### **Crown-root ratio.**

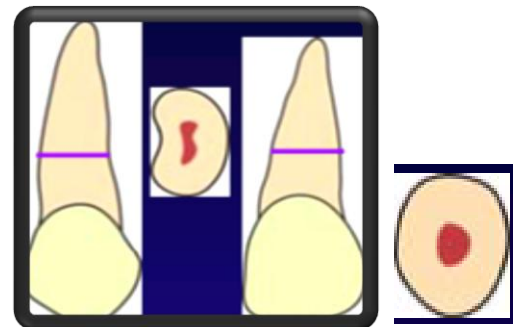
This ratio is a measure of the length of tooth occlusal to the alveolar crest of bone( crown) compared with the length of root embedded in the bone (root).

As the level of the alveolar bone moves apically, the lever arm of that portion out of bone increases, and the chance for harmful lateral forces is increased. The optimum crown-root ratio for a tooth to be utilized as a fixed partial denture abutment is **2:3**. A ratio of **1:1** is the minimum ratio that is acceptable for a prospective abutment under normal circumstances.



### **Root numbers & configuration**

This is an important point in the assessment of abutments suitability from a periodontal standpoint. Roots that are broader labiolingually than they are mesiodistally are preferable to roots that are round in cross section.



Multirouted posterior teeth with widely separated roots will offer better periodontal support than roots that converge, fuse, or generally present a conical configuration.



The tooth with straight conical roots can be used as an abutment for a short-span fixed partial denture if all other factors are optimal. A single-rooted tooth with evidence of irregular configuration or with some curvature in the apical third of the root is preferable to the tooth that has a nearly straight conical root.

### **3.Periodontal Ligament Area**

Another consideration in the evaluation of prospective abutment teeth is the root surface area, or the area of periodontal ligament attachment of the root to the bone. Larger teeth have a greater surface area and are better to bear added stress.

In a statement designated as "**Ante's Law**" \_\_\_\_\_

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When the root surface area of the teeth to be replaced by pontics surpasses that of the abutment teeth, a generally unacceptable situation exists.

It is possible for fixed partial dentures to replace more than two teeth, the most common examples being anterior fixed partial dentures replacing the four incisors.



**Max.Canine to max. second molar** fixed partial dentures also are possible (if all other conditions are ideal) (in the maxillary arch), but not as often in the mandibular arch. However, any fixed prosthesis replacing more than two teeth should be considered a high risk.

**Note: maxillary teeth have longer clinical crown & less crown inclination.**



## Biomechanical considerations

The major biomechanical factors which affect the design of FPD are:

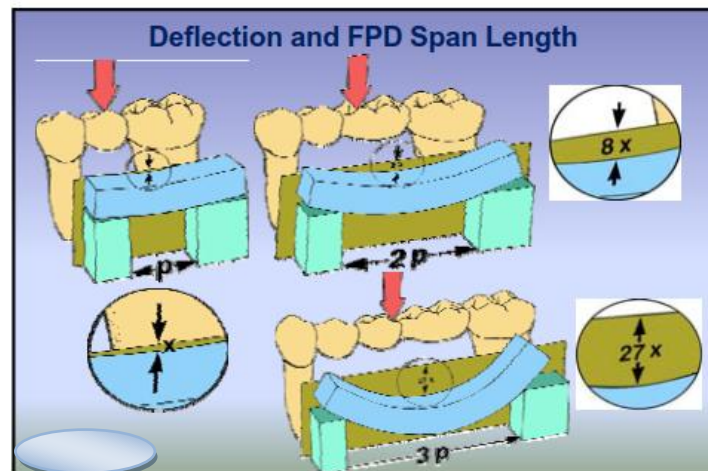
1. Length of the edentulous span.
2. Occlusogingival height of the pontics.
3. Arch curvature.
4. Direction of force acting on FPD.

### 1. Length of the edentulous span.

Length of the edentulous span increased load placed on the periodontal ligament of abutment teeth. a long-span bridge cause **Bending or deflection (flexion)** of FPD.

$$\text{Flexion} = \frac{(\text{length of FPD})^3}{(\text{Occlusogingival height of the pontic})^3}$$

Flexion or deflection is directly related with the cube of the bridge length and inversely with the cube of the occlusogingival thickness of the pontic. For example a span of two pontics will flex 8 times more than single pontic FPD compared with a fixed partial denture having a single tooth pontic span. Hence the flexion decreases by increasing the height of pontic or by using high strength alloy like Ni/Cr.

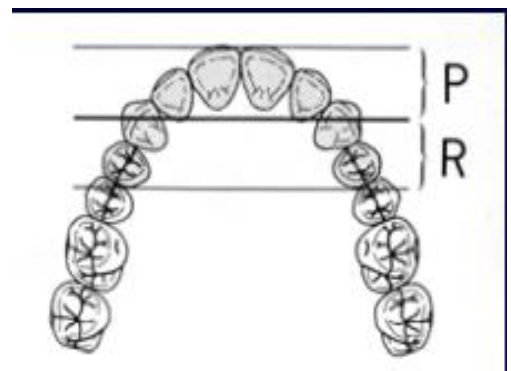


**2. Occlusogingival height of pontic:** increasing the height or using strong alloy material will decrease flexion

### 3. Arch curvature.

#### Effect of Arch Curvature on FPD Deflection

- Pontics lying outside the inter-abutment axis act as a lever arm →torquing movement.
- Additional resistance to this torque can be overcome by adding secondary abutment (2° abutments)



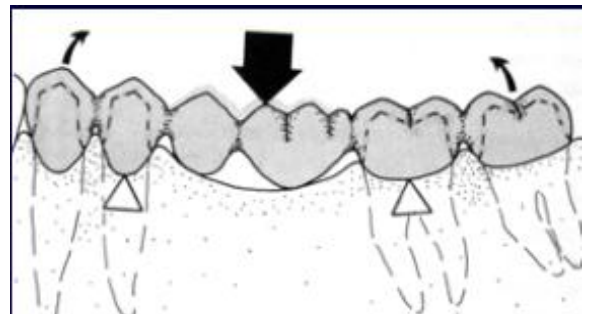
This is a common problem in replacing all four maxillary incisors with a fixed partial denture (primary abutment are canines, secondary are 1<sup>st</sup> premolars)



**-Double abutments (secondary abutment)(splinted abutment)** are sometimes used as a means of overcoming problems created by unfavorable crown-root ratios and long spans. Double abutments help in stabilizing the prosthesis by distributing forces over more teeth.

**Criteria for (splinted) secondary abutments:**

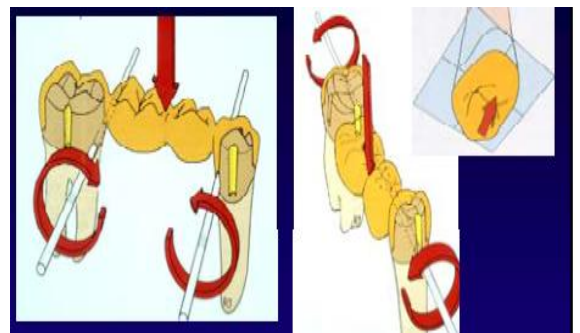
- Root surface area and C: R must equal to the primary abutments.
- Secondary retainers must have more or equal retention of the primary retainers.
- Long clinical crown and adequate interproximal space for the connectors.



#### **4.Direction of force acting on**

**FPD(Dislodging forces on an FPD)**

- Occlusal force on pontics can cause M-D torque.
- Forces at an oblique angle or outside the center of the restoration cause Facio-Lingual





torque (around M-D axis of rotation).

### Abutment inclination

A common problem that occurs with some frequency is the mandibular second molar abutment that has tilted mesially into the space formerly occupied by the first molar. It is impossible to prepare the abutment teeth for a fixed partial denture along the long axes of the respective teeth and achieve a common path of insertion

The solutions for this case are:

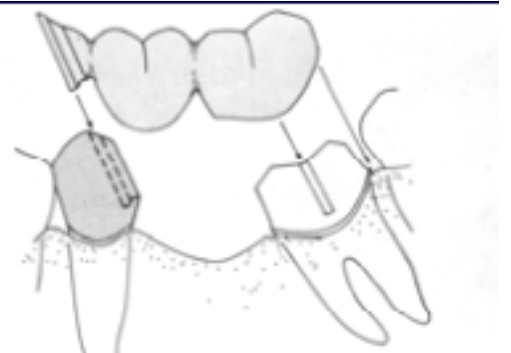
Uprighting of molar is best accomplished by the use of a fixed appliance. Both premolars and the canine are banded and tied to a passive stabilizing wire.



A proximal half crown sometimes can be used as a retainer on the distal abutment. This preparation design is simply a three-quarter crown that has been rotated 90 degrees so that the distal surface is uncovered. & full coverage mesial retainer.



The nonrigid connector is another solution to the problem of the tilted fixed partial denture abutment. A full crown preparation is done on the molar with its path of insertion parallel with the long axis of that tilted tooth. A box form is placed in the distal surface of the telescopic crown premolar to accommodate a keyway in the distal of the premolar crown.





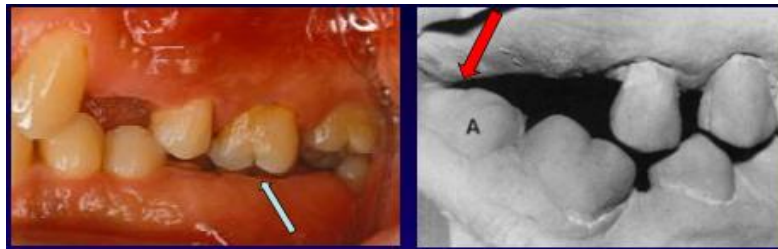
## 6. evaluation of diagnostic cast

-the edentulous ridge shape&span length.

-curvature of the arch.

-inclination of the abutment teeth, M-Ddrifting,rotation,.occlusocervical  
dimention.

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interocclusal  
relationship.