An Introduction to Fixed Prosthodontics

Fixed Prosthodontics (Crown and Bridge Prosthodontics); It is a branch of dental science that deals with restoration of damaged teeth with artificial crown and replacing the missing natural teeth by a dental prosthesis permanently cemented in place [Fixed partial denture].

Fixed Prosthodontics includes:

1. Inlays
2. Onlays
3. Veneers
4. Crowns
5. Fixed partial dentures

Crown: It is a fixed extra-coronal artificial restoration of the coronal portion of a natural tooth. It must restore the morphology, contour and function of the tooth and should protect the remaining tooth structure from further damage.

Types of crowns (Classification of crowns):

I. According to coverage area

1. Complete crown: It is the crown that covers all the coronal portion of the tooth such as full metal crown, porcelain fused to metal crown and All Ceramic crown.
2. Partial crown: It is a crown that covers part of the coronal portion of the tooth such as 3/4 crown, 7/8Crown.
3. Complete replacement: It replaces the natural crown entirely. This type of crown retains itself by means of a dowel (post) extended inside the root canal space of the tooth such as a post crown.

Three-quarter crown which is a partial crown covering all tooth surfaces except the buccal surface.

Post crown which replaces the natural crown entirely and retains itself by means of a dowel (post) extended inside the root canal space.

II. According to the materials used in the fabrication of the crown

1. Metal crown: made from gold alloy and its alternatives such as full metal crown and 3/4 crown.
2. Non- metal crown: made from acrylic resin, zirconium or porcelain as in jacket crown.
3. A combination of metal and plastic materials such as porcelain fused to metal crown.

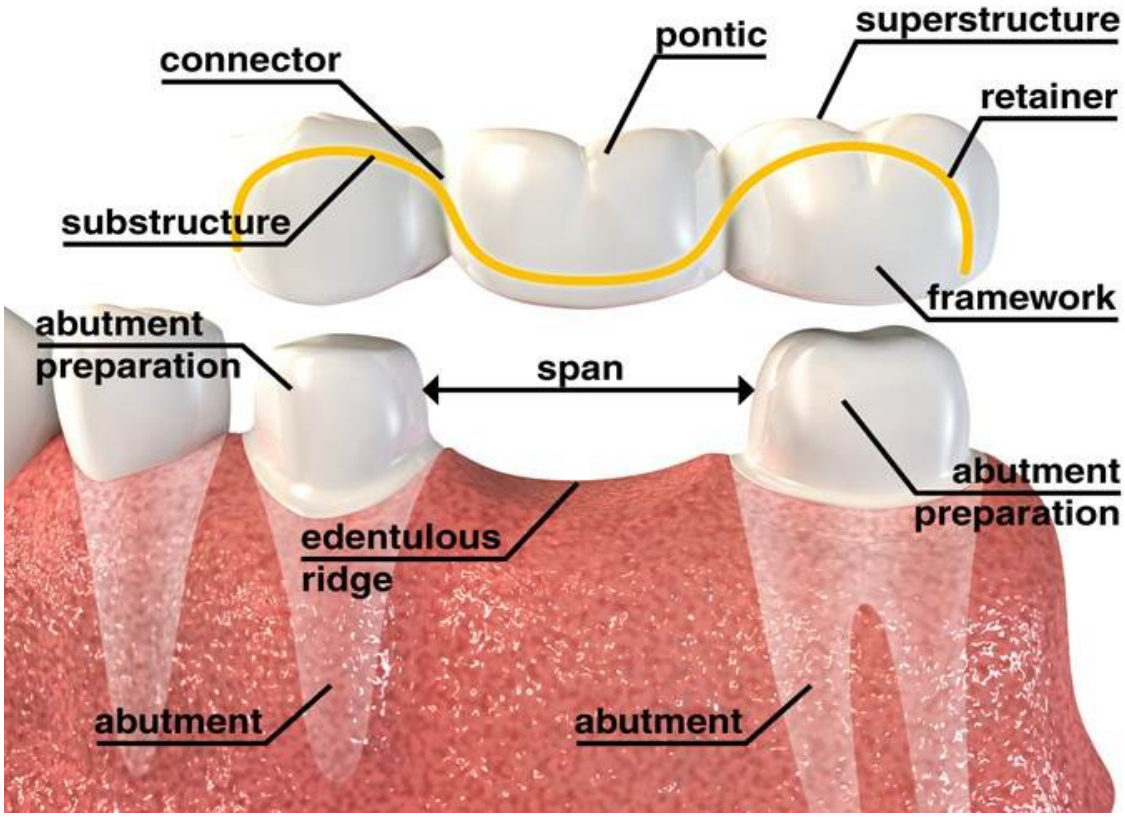
Bridge: It is a fixed dental prosthesis which replaces and restores the function and esthetic of one or more missing natural teeth and can't be removed from the mouth by the patient. It is primarily supported by natural teeth or root. The tooth that gives support to the bridge is called "abutment tooth".

Components of bridge:

1. Retainer: It's the part that seats over (on or in) the abutment tooth. It could be major or minor (will be explained later).

2. Pontic: It is the suspended member of fixed partial denture that replaces the missing tooth or teeth.

3. Connector: It is that part of fixed partial denture that joins the individual components of the bridge together (the retainer and the pontic). It could be fixed (rigid) or movable (flexible) connector. When the retainer is attached to a fixed connector, it is called "major retainer", but when it is attached to a flexible (movable) connector it is called "minor retainer".



Components of bridge.

Purposes of crown construction:

1. To restore the grossly damaged tooth, fractured tooth or a tooth with a heavy filling (amalgam or composite).
2. To restore the masticatory function and speech.
3. To restore the esthetic (hypoplastic condition whether heredity defect or acquired defect).
4. To maintain the periodontal health by recontouring the occlusion and prevents food impaction.
5. To alter the occlusion (occlusal relationship) as a part of occlusal reconstruction to solve occlusal problems or to improve function.
6. As a retainer for the bridge.

Steps in the construction of cast restorations

1. Diagnosis.
2. Tooth preparation.
3. Final impression.
4. Temporary restoration (Provisional restoration).
5. Construction of working model.
6. Waxing.
7. Investing.
8. Burn-out (Wax elimination).
9. Casting.
10. Cleaning and finishing.
11. Try-in and cementation.

Note: Steps (1-4, and 11) are clinical steps, while steps (5-10) are laboratory steps carried out in the lab by the laboratory technician.

Diagnosis

The first step should be the diagnosis of the case whether it is indicated for crown and bridge work or not. This is decided after a thorough examination of the tooth and surrounding structures, which includes:

(a) Periodontal Examination: The patient should have proper oral hygiene to ensure that no plaque accumulation would occur on the crown margins which might lead, if left, to caries.

(b) Dental examination: which includes:

-*Visual examination:* we should examine the occlusion of the patient, the presence of crowding, spacing, rotation of teeth, tilting (drifting) and supra-eruption of the abutment tooth (or teeth). Meanwhile, the condition of the remaining tooth structure, the presence of caries and the quality of existing old fillings in the abutment tooth (or teeth) all should be checked.

-*Radiographic examination:* The radiograph reveals the shape and number of the roots, the condition of the surrounding structures, and the bone support of the tooth (crown/root ratio). The ideal crown/root ratio of a tooth to be used as an abutment for fixed partial denture is 1:2.

The radiograph also reveals the presence of a lesion in the bone, root canal treatment, fracture in the tooth or root, bone loss, unerupted teeth, etc. This information will affect the prognosis of the treatment.

Tooth Preparation

It is the cutting or instrumentation procedure that is carried out on the tooth during crown construction procedure.

The prepared tooth is the final form or shape of the tooth after the cutting (preparation) procedure. Rotary instruments are used to reduce the height and contour of the tooth. The tooth is prepared so that the crown restoration can slide into place and be able to withstand the forces of occlusion.

Finishing line of the preparation is a line that separates between the prepared

and the unprepared tooth portions. It represents the end margin of our preparation. It should be smoothly continuous from one surface to the other; otherwise, it will interfere with seating of the crown if it is poorly done.

Objectives of tooth preparation

The main objectives of tooth preparation in fixed prosthodontics includes:

1-To eliminate undercuts from the axial surfaces of the tooth.

Note: The axial surfaces are the facial (labial or buccal), proximal (mesial and distal), and palatal (lingual).

2-To provide enough space for the crown restoration to withstand the force of mastication. This space depends on the material used; metal needs little space while plastic materials need more space.

3-To provide good esthetic.

Disadvantages of crowns

1. Heat generation during the cutting procedure of the teeth might affect the health of the pulp; therefore, water coolant must be used during the preparation procedure.

2. Over preparation can cause pulp irritation or even pulp exposure which might lead to death of the pulp. Excessive tooth preparation can also weaken the tooth structure.

3. Periodontal problems: food impaction with subsequent gingivitis and periodontal pocket formation and secondary caries might develop.