Crown and Bridge

Lecture 1

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Jacket crown

It is a type of crown that is formed by a tooth colored material. It is mainly used as a single unit in the anterior quadrant of the mouth. It is the weakest type of crown because the tooth colored materials are weaker and more brittle than metal. It can be divided into 2 types according to the material from which it is formed:

1. Porcelain jacket crown
2. Acrylic jacket crown

It isn't a conservative type of crown because a butt shoulder finishing line is done all around and excessive tooth structure is removed to provide enough space for the acrylic or porcelain material in order to get a proper shape of the crown, to increase the rigidity of material and to resist the fracture by increasing the thickness of the material.

The acrylic jacket crown may be used as a temporary crown or for crowning a tooth of a patient under 18 years of age, until full eruption finishes to the tooth, and then a final crown (full veneer crown or porcelain jacket crown)

All ceramic crowns are some of the most esthetically pleasing prosthodontic restorations. Because there is no metal to block light transmission, they can resemble better in terms of color, translucency than any other restorative option can natural tooth structure.

There chief disadvantage is their susceptibility to fracture, although this is lessened by use of A resin – bonded technique.

Advantage:

1. superior esthetic
2. excellent translucency (similar to that of natural tooth structure)
3. good tissue response
4. Lack of reinforcement by a metal sub structure permit slightly more conservative reduction of facial surface
Disadvantages:

1- reduced strength of the restoration because of the absence of reinforcing metal substructure.

2- Significant tooth reduction is necessary on the proximal and lingual aspects due to the need for a shoulder-type margin circumferentially. (less conservation).

3- Porcelain brittleness

4- Difficulties may be associated with obtaining a well-fitting margin, which can result in fracture because of the nature of Porcelain.

5- Proper preparation design is critical to ensuring mechanical success (90’degree Cavo surface angle) thus a severely damaged tooth should not be restored with ceramic crown.

6- All ceramic restoration do not tend themselves well to use as retainers for a fixed partial denture.

7- Wear has been observed on the functional surface of natural teeth that oppose Porcelain restoration.

Indications:

1- a high esthetic requirement exists

2- proximal or facial caries that can not longer be effectively restored with composite resin.

3- Because of the relative weakness of the restoration, the occlusal load should be favorably distributed. Generally, this means that the centric contact must be in an area where the Porcelain is supported by tooth structure (i.e in a middle third of a lingual wall)
Contra indications:

1- when a more conservation restorative can be used.
2- Rarely are they recommended for molar teeth. (Increased occlusal load and the reduced esthetic demand).
3- It is not possible to provide adequate support or an even shoulder width of at least 1 mm circumferentially

Procedure of preparation

1. A uniform 1 mm reduction is done all around the crown (labial lingual and proximal surfaces).
2. A butt (90°) shoulder finishing line is done all around the tooth.
Dental Ceramic and Porcelain

The word ceramic is derived from the Greek word *Keramos* which means "burnt stuff" meaning a material produced by burning or firing.

It consists mainly of kaolin which blends with other minerals such as silica, and feldspar to produce the translucency and extra strength required for dental restoration.

A material containing these additional important ingredients was given the name *porcelain*.

Composition of traditional dental porcelain

The composition of the various types of porcelain is summarized in the table below. There are considerable differences in the composition between the dental porcelains and decorative porcelain ex. dental porcelain contains little or no clay.

Kaolin is a hydrated aluminosilicate. The decorative porcelain is a mixture of this material with silica, bound together by a binder (flux) such as feldspar (a mixture of potassium and sodium aluminosilicates). Feldspar is the lowest fusing component which melts and flows during firing uniting the other components in a solid mass. The fusion temperature of feldspar may be further reduced by adding to it other low-fusing fluxes such as borax.

Dental porcelain is mainly divided (according to fusing temperature) to high fusing porcelain which fuses in the range of 1300-1400 C, and low-fusing porcelain which fuses in the range of 850-1100 C.

<table>
<thead>
<tr>
<th>Components</th>
<th>Type of porcelain</th>
<th>Kaolin (Clay)</th>
<th>Silica</th>
<th>Feldspar (Binder)</th>
<th>Glasses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decorative</td>
<td></td>
<td>50</td>
<td>25</td>
<td>25</td>
<td>0</td>
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<tr>
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<td>0</td>
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<td>60</td>
<td>15</td>
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</tbody>
</table>

Properties of porcelain

1- Esthetics. Porcelain is an almost perfect material for the replacement of missing tooth substance. It is available in a range of shades and at various levels of translucency giving an almost natural appearance. The inner layer of the porcelain crown is constructed from a fairly opaque core material. This is covered with a more translucent dentine material with a final coating of translucent enamel porcelain forming the outermost layer.

2- Rigidity and Brittleness. Porcelain is a very rigid, hard, and brittle material whose strength is reduced by the presence of surface irregularities or internal voids and porosity.

3- Thermal conductivity. Porcelain is an excellent thermal insulator. This is very important when a gross amount of tooth structure is prepared and the
residual layer of dentin may be of minimum thickness to act as an insulator.

4- **Resistance to chemicals.** Porcelain is very resistant to any chemical and it is unaffected by any variation in the pH in the oral cavity.

5- **Biocompatibility.** The outer layer of porcelain in coated by an oxide layer (glazed porcelain) which is very smooth therefore it does not allow food adhesion on it more than the normal tooth structure.

**Types of Porcelain**

1- **Opaque porcelain:** It is applied as a first ceramic coat and performs two major functions:
   a) It masks the colour of the alloy (in metal fused to porcelain crown).
   b) It is responsible for the metal – ceramic bond.

2- **Body porcelain:** This porcelain is placed and fired on the opaque layer. It provides some translucency and contains oxides that aid in shade matching.

3- **Incisal porcelain:** This type of porcelain is more translucent than the above types of porcelain. It is placed mostly in the incisal third to give the crown a translucent incisal third and the thickness of this porcelain decreases as we go cervically therefore decreasing the translucency.