Crown and Bridge

ا.د عبد الكريم جاسم العزاوي

Full metal crown

It can be used as a single unit or as a retainer for a bridge. It has better retention and resistance to displacement than other partial coverage crowns as 3/4 crown because all the axial walls are included as well as the occlusal surface, therefore this type of crown is used to cover a small abutment tooth, and in cases of long edentulous area.

Depth Orientation groove.(D.O.G.)

This is a groove that is placed on a surface of a tooth to act as a guide or reference to determine when sufficient amount of tooth structure is removed by preparation, if preparation is done without these grooves under and over preparation is possible, and more time will be wasted by repeated checking of the preparation.

Indications

1. Teeth with extensive caries, large amalgam restorations In order to protect the remaining tooth structure and amalgam from fracture.
2. Teeth where maximum retention and resistance is needed as short crowns.
3. As a bridge retainer.
4. Recontouring of the tooth.
5. Teeth receiving clasps for partial denture.

Contra-Indications

1. If high esthetic need is demanded.
2. If a more conservation crown could be used, ex: 3/4 crowns. As intact buccal surface, very short span bridge.
3. When caries index is low.

Disadvantages:

a) Poor esthetics.
b) Difficulty to test the vitality of the tooth especially the electrical pulp testing.

CRITERIA

1. Occlusal reduction

- The occlusal reduction must allow adequate space for the restorative material from which the cast crown is to be fabricated.
- Minimum recommended clearance is 1 mm on non centric cusps (non functional cusp). While 1.5 mm clearance is needed on centric cusp (functional cusp).
- The occlusal reduction should follow normal contours to remain as conservative of tooth structure as possible.

2. Axial reduction

- Axial reduction should parallel the long axis of the tooth while allowing for the recommended 6-degree taper or convergence between opposing axial surfaces.

The margin should have a chamfer configuration and should ideally be located **supragingivally**. The chamfer should be smooth and distinct and allow for approximately 0.5 mm of metal thickness at the margin.
Typically it will be an exact replica of half the rotary instrument that was used to prepare it.

SPECIAL CONSIDERATION

Functional (centric) cusp bevel

The bevel must be angled flatter than the external surface. On most teeth the functional cusp bevel will be placed at about 45 degrees to the long axis.

*****The aim of the bevel to ensure optimum restoration contour with maximum durability and conservation of tooth structure.

Nonfunctional (noncentric) cusp bevel

All complete crown preparation should be assessed for adequate reduction at the occlusoaxial line angles of the nonfunctional cusps. A minimum of 0.6 mm of clearance is needed here for adequate strength. Maxillary molars often require an additional reduction bevel in this area. Without it, an overcontoured restoration that does not follow normal configuration may result. Such additional reduction is often unnecessary for mandibular molars, because they are lingually inclined and their profile is relatively straight.

Chamfer width

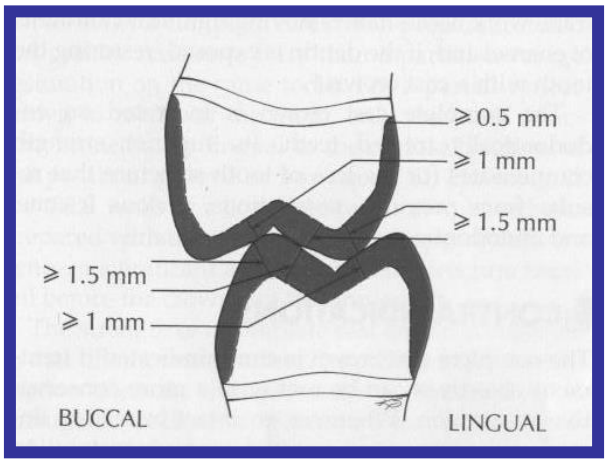
Increasing the faciolingual width of a complete crown is a common fault in practice and is a leading cause of periodontal disease associated with restoration. Adequate chamfer width (minimum 0.5 mm) is important for developing optimum axial contour.

PREPARATION

The clinical procedure to prepare a tooth for a complete cast crown consists of the following steps:

- Occlusal guiding grooves
- Occlusal reduction
- Axial alignment grooves
- Axial reduction
- Finishing and evaluation

Dimension recommended for complete cast crown



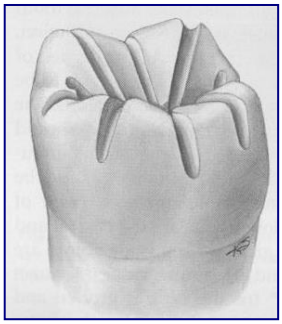
Step-by-step procedure

The steps have been illustrated for a mandibular second molar.

Guiding Grooves for Occlusal Reduction.

Tapered carbide or a narrow, tapered diamond is used.

1. Place depth holes approximately 1 mm deep in the central, mesial, and distal fosse and connect them so that a channel runs the length of the central groove and extends into the mesial and distal marginal ridge.
2. Place guiding grooves in the buccal and lingual developmental grooves and in each triangular ridge extending from the cusp tip to the center of its base.
3. Because the functional cusp is to be protected by an adequate thickness of metal, place a functional cusp bevel to ensure this in the area of contact with the opposing tooth. The depth of this guiding groove should be slightly less than 1.5 mm (to allow for smoothing) in the area of centric stop and should gradually diminish in a cervical direction



<u>The criteria and aim of using guiding grooves:-</u>

A. Ensure that the occlusal reduction follows anatomic configuration and thus minimizes the loss of tooth structure while ensuring adequate reduction, which depend on the mechanical properties of the alloy used.

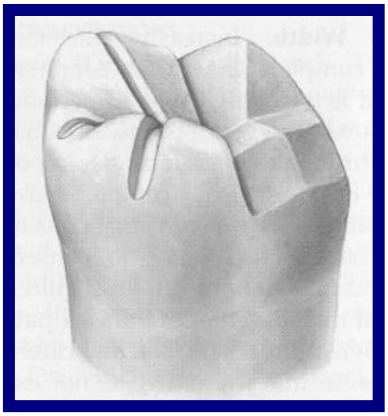
B. The guiding grooves must be placed with accuracy; the dentist should concentrate on the position, depth, and angulation of each groove. A groove should be placed in the low point and high point of each cusp. The low points are the central and developmental grooves; the high points are the cusp tips and triangular ridges. Correct depth (0.8 mm for the central groove and nonfunctional cusps, 1.3 mm for the functional cusps) allowing 0.2 mm for smoothing the preparation.

C. The dentist should memorize the diameters of the instruments; this will facilitate assessing the adequacy of the reduction in progress.

D. On the nonfunctional cusp, the groove should parallel the intended cuspal inclination; on the functional cusp, it should be angled slightly flatter to ensure the additional reduction of the functional cusp.

Occlusal Reduction

The tooth structure that remains between the grooves is removed with the carbide or the narrow, round-end, tapered diamond.



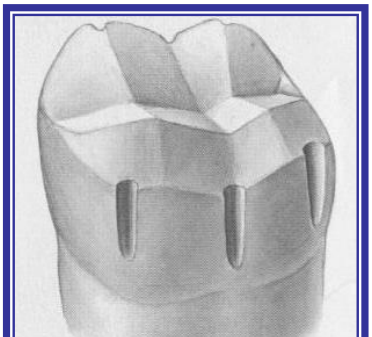
4. Complete the occlusal reduction in two steps. Half the occlusal surface is reduced first so that the other half can be maintained as a reference. When the necessary reduction of the first half has been accomplished, reduction of the remaining half can be completed.

5. On completion, check that a minimum clearance of 1.5 mm has been established on functional cusps and at least 1.0 mm on nonfunctional cusps.

This clearance must be verified in all excursive movements that the patient can make, by using dark-utility wax as follows:-

- The patient should close into several layers of the wax in maximum intercuspation.
- Remove the wax from the mouth and evaluate it for thin spots, which can be measured with a wax caliper.
- Place the wax back in the patient's mouth and have the patient move the mandible into protrusive and excursive positions.

Alignment grooves for axial reduction.

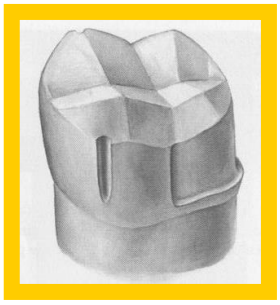


Three alignment grooves are placed in each buccal and lingual wall with a narrow, round –end, tapered diamond. One is placed in the center of the wall, and one in each mesial and distal transitional line angle.

The shank of the diamond used to place the grooves, should be parallel to the long axis of the tooth. This will produces a convergence between the axial walls that is identical to the taper of the diamond.

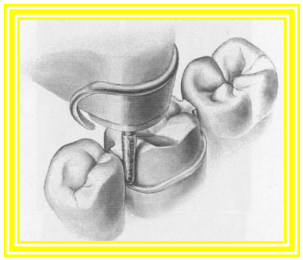
The depth of the groove should not exceed half the width of the bur. Other wise, a lip of unsupported tooth enamel will be created, unsupported enamel cannot be tolerated because it is likely to fracture when the restoration is try-in or cemented. Occlusocervically, the placement of the tip of the diamond will determine the location of the margin.

Use a periodontal probe to assess the relative parallelism of the alignment grooves with one another or with the proposed path of withdrawal of a secondary retainer, if the prepared tooth is to serve as a fixed partial denture abutment. When uncertainty exists regarding the correct placement of alignment grooves (as is likely on long-span fixed partial denture abutments), making an impression with irreversible Hydrocolloid (Alginate). This can be poured in rapid-setting stone, and the resulting cast can be analyzed with a dental surveyor. At this time, corrections may still be easily made before unnecessary tooth reduction has occurred.



Axial Reduction.

Using narrow, round –end diamond bur. Perform the axial reduction for half the tooth at a time, maintaining the other half as a reference for assessing adequacy of the preparation.



Pay special attention to the interproximal areas to prevent unintentional damage to the adjacent teeth. This often results if the practitioner is impatient and attempts to force the diamond into the area. Sufficient time must be allowed for the cutting instrument to create its own space.

If the proper cervical placement of the margin has been selected with proper axial alignment of the bur, a lip of tooth enamel will be maintained between the diamond and the adjacent tooth that protects it from any damage.

If desired, protect the adjacent teeth by placing a metal matrix band.

The most difficult interproximal areas to reduce are those with significant buccolingual dimension and those with root proximity.

Cut into the proximal area from both sides until only a few millimeters of interproximal island remain.
This area can then is removed and contact broken by using thinner, tapered diamond.
If the adjacent proximal surface is damaged, it must be polished with white stones, silicone points, and prophylaxis paste before impression making.
Ideally a fluoride application should be given for improved resistance and to prevent demineralization of the surface enamel.
Place the cervical chamfer concurrently with axial reduction.
Its width should approximately 0.5mm, and should have adequate clearance (>0.6mm) exists between the external surface of the proximal chamfer and the adjacent tooth.

Finishing: A smooth surface finish and continuity of all prepared surfaces will aid most phases of fabrication of the restoration. Smooth transitions from occlusal to axial surfaces facilitate impression making, waxing, investing, and casting because bubble formation is reduced.

1-Use a fine-grit diamond or carbide bur of slightly greater diameter for finishing the chamfer margin. This should be done a smoothly as possible, with the hand piece operating at reduced speed. The wider diamond is recommended because it will smooth out any unwanted ripples that may have been created during axial reducing and will eliminate any unsupported enamel at the margin.
2-Finish all prepared surfaced and slightly round all line angles. Place a nonfunctional cusp bevel at this time.
3-place additional retentive as needed (e.g., grooves or boxes) with the tapered carbide bur.

Evaluation: upon completion, the preparation is evaluated to assess whether all the criteria have been fulfilled.

Sometimes a seating grooves placed at the buccal surface of the lower molar and the palatal surface of the upper molar where the axial wall with great bulk .This groove help in seating the cast crown in place & prevent rotation tendency of crown during cementation.