

# The Cast Gold Occlusal Onlay: A Conservative Technique for the Restoration of the Worn or Compromised Posterior Occlusal Table

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## INTRODUCTION

With the advent of topical and systemic fluoride and other preventative treatments in general dentistry in the mid-1900s, more patients have since entered their adult years with fewer and smaller direct posterior restorations.<sup>1-3</sup> Often, as these patients age, these fillings and the surrounding supporting tooth structure become worn and damaged, in some cases, severely. The lack of dimensional stability of the existing direct filling and parafunctional habits can contribute to the breakdown of the occlusal table.<sup>4</sup>

A common occurrence at the patient's recall examination is the failing posterior occlusal amalgam or composite restoration (Figure 1). Despite a lack of structural compromise to the proximal walls, full or partial coverage crowns are often prescribed and placed as long-term restorative solutions, owing to a perceived lack of retention. Chemically bonded porcelains have helped to

address these concerns, but their lack of long-term predictability and inertness remain as issues.<sup>5-6</sup>

The following technique offers a conservative alternative to these more extensive restorations, using the advantages of cast gold to restore and, in some cases, reestablish the occlusal table of the compromised posterior tooth.

## REVIEW OF THE TECHNIQUE FOR THE PREPARATION AND PLACEMENT OF THE POSTERIOR CAST GOLD OCCLUSAL ONLAY

### Occlusal Assessment

Carefully assessing the opposing arch for plunging or over-erupted cusps and selectively reducing their height can help to recreate a more ideal occlusal table. This can be done quickly and conveniently, while the local anesthetic is taking effect.

### Rubber Dam Placement

Placement of an extra-heavy rubber dam, extending from the distal-most tooth in the quadrant being restored to the contralateral cuspid, is important for efficiency of the treatment and protection of the patient. Water-soluble lubricant is a must, and inver-

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sion of the dam with a blunt instrument and directed air spray will create a moisture-tight seal.

### Preparation

The existing restoration, including any base material and compromised tooth structure, is completely removed with a high-speed handpiece, being careful not to remove any more tooth structure than necessary. The cutting action of many burs can create misleading internal lineangles. These can be rounded out with a #4 high-speed round bur to allow for proper assessment of potential internal cracks and fractures.

Once the toilet of the cavity is complete (Figure 2), a thin layer of calcium hydroxide is swabbed over the internal surface of the cavity with a cotton pellet. This protects the pulp<sup>7</sup> and allows for easier removal of the build-up material at the time of insertion. A self-curing, heavily-filled composite is mixed and syringed into the cavity.

Once set, the build-up allows the operator to create an internal preparation that is smooth and of ideal depth, and it minimizes the extension of the retentive portion of the preparation.<sup>8</sup> Using a new #56 or #57 straight fissure bur, an ideal occlusal inlay preparation is cut, leaving no unsupported enamel at the cavosurface margin. The buccolingual and mesiodistal extensions of the old restoration will dictate the outline of this part of the preparation. As these widths increase, so must the depth of the preparation.

An internal bevel is placed with a new #7404 finishing bur in order to shorten the walls of the cavity to the extent that the patient will only occlude on gold and the enamel is protected. It is important that the #7404 adds another plane to the internal walls without taking away retention from the gingival two-thirds of the cavity. If compromised occlusal tooth structure dictates a greater vertical reduction, more retention must be provided. This extra retention can be gained by increasing the depth of the cavity again or with the use of modifications, such as a pothole (#7404 high-speed bur), a slot (#170 high-speed bur) or pins (#6 round high-speed bur and a #170 high-speed bur) (Figure 3). Keeping the marginal ridge finish lines as far from the adjacent teeth as possible will help with finishing the gold margins at the time of insertion.

A 360-degree internal bevel is then placed using a new #7404 finishing bur, taking care to include the cusp tips and any other compromised tooth structure, finishing the margin on sound enamel (Figure 3). Keeping the marginal ridge finish line as far from the adjacent tooth as possible will help in finishing the gold margin at the time of insertion.

### Impression

The rubber dam is removed and a double-bite impression tray is tried-in for comfort of fit, allowing the



Figure 1. The lower left first and second molars restored with occlusal amalgam restorations placed more than 30 years ago.



Figure 2. Toilet of cavities complete. Note the asymptomatic fracture in the first molar.



Figure 3. Finished preparations, including conventional occlusal inlay preparation on the second molar and occlusal onlay preparation on the first molar.

patient to practice closing into a centric bite. The quadrant is washed, dried and isolated, and a single-phase



Figure 4. The final impression includes a mesial slot to increase retention of the occlusal onlay.



Figure 6. Medium garnet, fine sand and fine cuttle paper-backed discs and mandrels used to finish gold and tooth to the same plane.



Figure 8. Lateral view of the finished castings showing restored occlusal form.

polyvinyl impression material is syringed into the internal lineangles of the preparation, taking care not to lose contact between the syringe tip and the tooth.



Figure 5. Castings on dies showing ideal contour of the occlusal table of the first molar.



Figure 7. Pumice and optical powders to remove fine scratches and finish the gold to a high luster.



Figure 9. Occlusal view of the finished castings.

The impression material is continuously ejected, while the operator moves the tip up over the occlusal table. The loaded tray is brought to the mouth and the





Figure 10. Lateral view of the finished castings.

patient closes into his or her natural bite. For the duration of the set, the mandible is stabilized by the operator or assistant.

### Temporization

Once it has been established that the impression is accurate and free of air bubbles (Figure 4), the tooth is temporized with a flowable methylmethacrylate. The temporary material is flowed into the cavity preparation and over the cavosurface margins for protection and is allowed to set. The occlusion is checked and the patient is dismissed.

### Laboratory

A die spacer is placed on the internal floor of the poured model and a wax pattern is generated. If a pot-hole or a slot has been used to aid in retention, it can be waxed directly with the pattern. If a pin or pins have been added, a #700 tapered plastic burnout pin can be used to cast the pin. The countersink will provide a bulk of gold at the junction of the pin and the casting and aids in seating the final restoration.

It is critical that the technician be directed to create a bulk of gold at the external finish line (Figure 5). This will help to protect the enamel margin and allow the casting to recreate the proper cuspal and marginal ridge contour.

### Insertion

After anesthesia and rubber dam placement, the temporary seal is removed and the casting tried in. Once the operator is assured of an accurate fit, the buildup is removed. This will allow for a more ideal seating of the casting and increase effectiveness of the cement by allowing it to lock into any existing undercuts in the preparation that the buildup had blocked out. It also has an added esthetic benefit (particularly in maxillary teeth) of allowing the white-colored cement to mask the shine through of the casting and enhance the color of the supporting enamel.



Figure 11. Occlusal view of the finished castings.

The zinc-phosphate luting cement is mixed slowly and incrementally on a cool glass slab in order to slow the set and place it into the preparation and on the internal surface of the casting. The casting is brought into place and firmly seated with a combination of hand and mallet pressure, long enough to counter the hydrostatic pressure of the cement. The margin should be continually cleared of cement, and seating pressure should be applied until no more cement extrudes at the finish line. For this procedure, zinc-phosphate cement is preferred to glass-ionomer and composite cements due to its film thickness, ability of the operator to control the setting time and its imperviousness to the heat generated at finishing.

The gold and tooth are then reduced to the same plane through the use of slow-speed paper-backed discs, moving from coarse to fine as the cement sets (Figure 6). The rotation of the discs should always be moving from the tooth to the gold to prevent opening the gold margin. It is critical that the assistant maintain a steady stream of air to cool the casting as it is being finished. A slurry of flour of pumice, followed by dry optical powders in rubber cups, can be used to create a high shine (Figures 7-9). The dam is removed and the occlusion checked (Figures 10-11).

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