

Restoring Class 6 Abrasion/Erosion Lesions with Direct Gold

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INTRODUCTION

The class 6 cavity, an addition to Dr G V Black's original classification system, refers to the preparation design of incisal edges of anterior teeth or the cusp tip areas of posterior teeth, and receives limited discussion in modern operative dentistry textbooks. During the formative stages of enamel maturation, an incomplete union at the cusp tips or incisal edges may result in exposed dentin and a caries-susceptible area. More frequently, these sites may present with aging as a slowly developing localized abrasion/erosion wear process. As this process continues and exposes dentin, a typical "worn-off" or "cupped-out" area develops.

The treatment-planning decision of whether or not to restore these defects often requires a careful clinical judgment. Since caries is infrequently encountered in areas where enamel is lost due to wear, the judicious use of enameloplasty to recontour and smooth any enamel roughness followed by a topical fluoride application to exposed dentin may be considered a preventive definitive treatment.

However, when wear in combination with a "cupped-out" erosion in dentin has occurred, a restoration can be justified to minimize further loss of dentin and adjacent enamel.

Composite resin, amalgam alloy, and direct gold are all possible restorative material options when a restoration is indicated for the class 6 cavity. When esthetics is not a primary concern, direct gold is a nearly ideal restorative option due to the excellent wear compatibility of enamel opposing gold. Physical types of direct gold for use in this situation may include gold foil, powdered gold, or combinations of mat/powdered gold and gold foil. The hardness of well-condensed direct golds have Knoop values ranging from 55 to 75. The acquired finished restoration hardness does not necessarily have a direct relationship to the effectiveness of a particular physical type of direct gold and may be more indicative of the quality of the clinical condensation procedures. A well-condensed and burnished direct gold restoration will have the highest hardness values. A direct gold combination using platinized gold foil over a powdered or mat gold is suggested as a desirable choice for the class 6 cavity. The surface veneer of platinized gold foil may facilitate achieving the highest hardness possible with direct gold materials. During clinical function the platinized gold will be further work hardened and will ideally provide an excellent protective restoration for the class 6 cavity.

When designing this type of restoration no attempt is made to build back lost contour or cuspid guidance. The direct gold class 6 restoration can be expected to help maintain or stabilize existing occlusal schemes. This clinical article will present

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the restorative dentist with an outline of the procedural steps for the use of direct gold when restoring a class 6 abrasion/erosion defect on a mandibular cuspid.

CLINICAL PROCEDURE

Prior to placement of the rubber dam for isolation, it is helpful to mark the maximum intercuspation and excursive occlusal contacts with Accufilm articulating paper (Parkell, Farmingdale, NY 11735) (Figure 1). Coating the teeth with a copal varnish prior to marking the teeth will help preserve the occlusal markings after placement of the rubber dam and

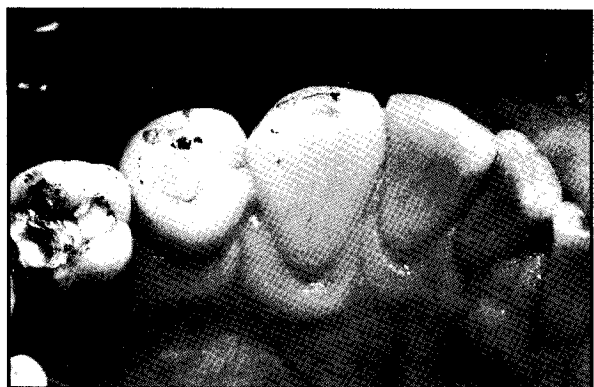


Figure 1. Abrasion/erosion lesion on incisal edge of mandibular cuspid; maximum intercuspation and excursive occlusal contacts marked

through numerous rinses during the procedures. The occlusal markings are of importance when determining the outline limitations of the cavity preparation. Whenever possible, margins should not terminate directly on areas of occlusal function. However, when this is not possible, extension of the preparation outline form to include the entire occlusal contact should be seriously considered.

Labial and lingual walls are established with a #170 tapered fissure bur or a #56 straight fissure bur. These walls should basically be parallel and may have a slight occlusal divergence with increasing width of the preparation. The preparation should only include dentin removal and not removal of adjacent enamel. The depth of the preparation should allow an approximate 1.5 mm thickness of direct gold. The pulpal floor line angles are prepared with a #33 1/2 inverted cone bur. Slight undercuts can be placed at the mesial and distal areas, which is usually where the greatest bulk of remaining dentin is found. If desired, these internal features may be refined with hand instrumentation such as a (6 1/2 - 2 1/2 - 9) monangle chisel (Thompson Dental Mfg, Co,

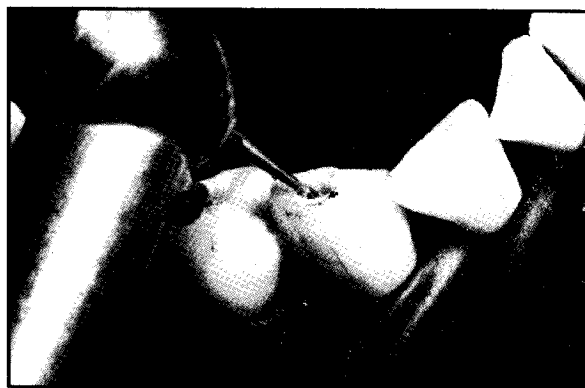


Figure 2. Preparation walls have been prepared with a #170 tapered fissure bur. Pulpal floor line angles and mesial/distal retentive areas are prepared with a #33 1/2 inverted cone bur. Internal features may be refined with a monangle chisel such as the (6 1/2 - 2 1/2 - 9).

Missoula, MT 59806). Care must be taken not to undermine remaining tooth structure (Figure 2). The entire cavosurface angle is then beveled with a Wedelstaedt chisel. A cavosurface bevel is appropriate in this area in order to produce a structurally supported enamel margin consistent with the orientation of occlusally divergent enamel rod patterns. This bevel should be less than 0.5 mm to avoid producing a thin edge of gold, which may fracture during function.

Powdered gold such as E-Z Gold (1/10 oz, Product code #1100471, Ivoclar-Williams North America, Inc, Amherst, NY 14228) may be used for building up the bulk of the restoration to slightly less than the desired contour. The use of E-Z Gold as a build-up material significantly shortens the chairside time required to complete the restoration. When starting the build-up, using larger-sized E-Z Gold pellets will facilitate engaging opposing retentive areas in the cavity preparation and will quickly establish a stable base of material. Powdered gold can be used to build up approximately 75%-80% of the restoration. Platinized gold foil (1/10 oz No 4, Product code #1101401, Ivoclar-Williams North America) is then placed over the bulk powdered gold and will ultimately serve as the exposed surface of the restoration. The platinized gold is manufactured by placing a sheet of machined platinum foil between two sheets of #4 (4" x 4") regular cohesive gold foil that are bonded together by welding, rolling, and manually beating ("cladding"). An alloy with a platinum content of approximately 15-30% is produced. The platinized gold foil is then manually prepared into 1/64-sized (1/2" x 1/2") and 1/128-sized (1/2" x 1/4") cohesive pellets. In larger preparations, 1/64-sized pellets will be used to build the restoration to within 95% of the desired contour. The final veneer and the desired surface contour of the gold will then

be developed with 1/128-sized pellets, with attention devoted during the condensation procedures to banking the gold over the cavosurface margins in order to avoid chipping fragile enamel edges (Figure 3).

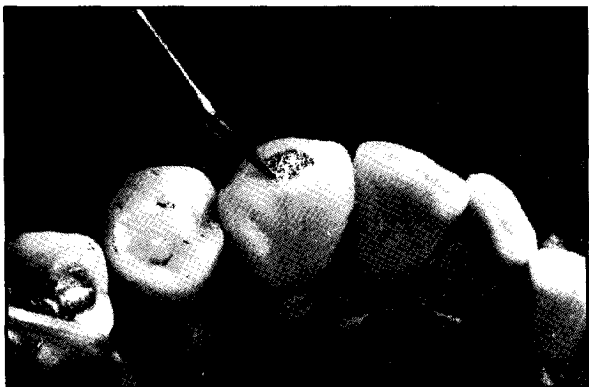


Figure 3. After the build-up is completed using E-Z Gold, a veneer of platinized gold is placed, banking the material to the beveled cavosurface margin

The restoration is subsequently burnished with firm hand pressure, which is integral to the process of work hardening the direct gold restoration and eliminating all surface porosities (Figure 4). After burnishing completely, the restoration can be smoothed and appropriately contoured with a garnet-grit disk (E C Moore Co, Inc, Dearborn, MI 48126)



Figure 4. Burnishing the restoration with firm hand pressure to work harden the gold

followed by a fine cuttle disk. A large volume of air should be directed at the restoration during disking procedures to avoid overheating the tooth. Some additional burnishing will be beneficial after disking. Flour of pumice (Moyco Industries, Inc, Philadelphia, PA 19132) and tin oxide powder (Sultan Chemists, Inc, Englewood, NJ 07631) may be used to produce a high surface gloss (Figure 5). This polishing step is not as important, however, as

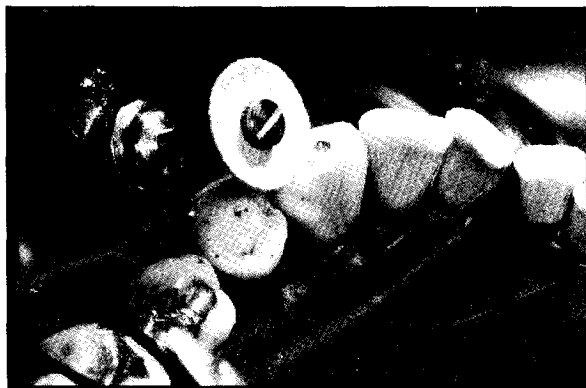


Figure 5. The restoration is finished with garnet-grit disks followed by fine cuttle disks. Final polishing may be done with fine flour of pumice followed by tin oxide.

burnishing is to achieve the hardest surface possible on the platinized gold foil.

The completed restoration (Figure 6) should duplicate existing tooth contours and should preserve the patient's pre-existing occlusal scheme (Figure 7). If the restoration includes occlusal contact, care should be taken to harmonize this contact area with adjacent teeth.



Figure 6. Completed class 6 direct gold restoration

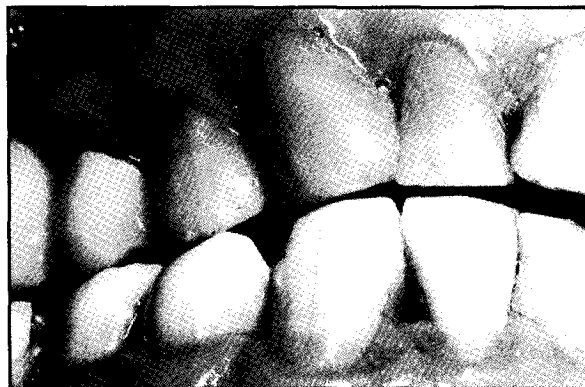


Figure 7. Lateral excursive movements indicate preservation of pre-existing group function occlusal scheme.

CONCLUSIONS

A clinical technique for the restoration of the class 6 cavity using direct gold has been described. While these areas are usually the result of multifactorial wear processes, active caries is not usually present. However, a restorative procedure may be selected to minimize further loss of dentin that may compromise the support of adjacent enamel. When a decision has been made to restore this lesion with direct gold, the use of platinized gold foil as a surface veneer should be considered because of its enhanced hardness. The outline form of the cavity preparation design should only involve exposed dentin and not undermine remaining tooth structure. Adequate burnishing, which work hardens the gold, is critical

to the success of this procedure. Existing occlusal function in excursions should be preserved and original tooth contours replicated in the final restoration.

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