Amalgam restoration of posterior proximal cavities with deep and concave gingival outlines

M. Darveniza, MDSc, FRACDS*

Abstract

A technique for making a matrix and wedges for amalgam restoration of deep and concave gingival outlined proximal cavities is described. Two clinical situations involving concave surfaces of the maxillary first molar and premolar are illustrated.

(Received for publication November 1984.)

Introduction

The difficulty of restoring deep proximal cavities in posterior teeth which may also have concave gingival outlines is exemplified by the number of amalgam restorations with overhanging margins seen in radiographs.[1,2] The G.V. Black tie-matrix and copper-band matrix has been advocated for deep cavities and a compound[2] wedging technique and modelled plastic[3] wedge technique for concave gingival outlines.

A deep proximal Class II cavity can be considered as one where a common matrix band† 6.5 mm in an occluso-gingival dimension will not adequately reach gingivally for wedging and occlusally for amalgam condensation. Such a deep cavity requires selection, fitting and wedging of a larger matrix to prevent an overhang. Class II cavities with concave gingival outlines are commonly associated with the root furrow on the mesial surface of the maxillary first premolar, furcation entrance on the distal surface of maxillary molars, particularly the first molar, and overcut gingival floors.

The purpose of this paper is to describe techniques and instruments effective in restoration, without amalgam overhangs, of deep and concave gingival outlines for Class II cavities.

The first maxillary molar

An overhang is commonly found with the restoration of a deep distal cavity in the maxillary first molar and an associated concave gingival outline (Fig. 1). As access is restricted, the usual treatment is to replace the restoration. However, failure to use a deep matrix with stable wedging often results in a similar overhang. The technique described will prevent the repetition of such a major overhang.

The sectional wedging technique

In such cases it is prudent first to select, contour, place and then verify adaptation of the wedge to the gingival outline of the cavity prior to placing the matrix (Fig. 2). Two different wedges are used and, when combined, movement of the wedge is restricted because of a reciprocal locking effect. The preferred primary wedge‡ is contoured with a scalpel or diamond bur§, so that it is convex and adapts to the distal concave gingival outline (Fig. 3). As well, the distal aspect, including the head of the wedge, should be vertical to allow its rotation apical to the gingival outline and into the furcation entrance on placement of the secondary wedge with a wedge holder‖ (Fig. 3). The secondary wedge¶ should be triangular in cross-section with a base wide enough to rotate and press the primary wedge into the concavity at the gingival outline (Fig. 4).

*Lecturer in Operative Dentistry, University of Queensland.

†**Siqveland,** broad. Ash Co., Weybridge, U.K.

‡**Sycamore,** large. Hawe-Neos Dental, Gentilino, Switzerland.

§**Horico Bullet,** 2.5 mm diam. Hopf Ringleb & Co., GmbH & Cie, Langenhagen, West Germany.

‖Teledyne Dental Products, Illinois, USA.

¶**Wizard,** wide base. Teledyne Dental Products, Illinois, USA.

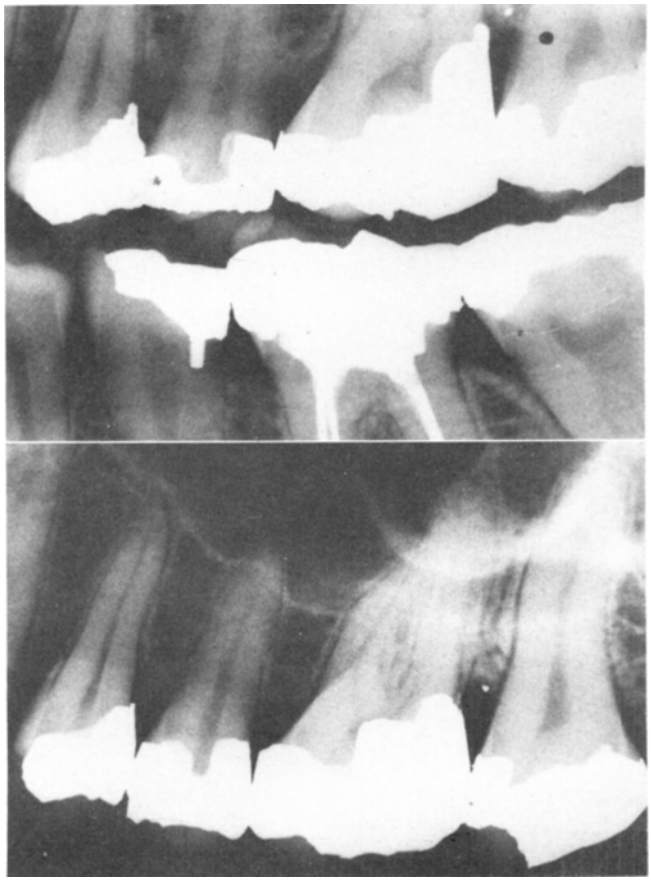


Fig. 1. – a, Bite-wing radiograph reveals a mesio-occluso-distal amalgam of 26 illustrating a deep distal section with an overhang subsequently found to be at the entrance of the furcation. The gingival cavity outline was concave. b, Periapical radiograph of completed restoration of 26 free of detectable overhang. A contoured matrix and sectional wedging was employed for restoration.

Adaptation of the primary wedge is verified by probing with a straight probe. Gaps occur if the wedges are at a steep angle to the gingival outline of the cavity. Usually in this situation the gingival papilla is too large and restricts the placing of the wedges and a gingivoplasty is required to obtain optimal adaptation.

Matrix retainer and restoration

Prior to fitting a matrix for a deep cavity the depth from the gingival floor to the marginal ridge of the adjacent tooth is measured with a periodontal probe. Matrix height should be at least 1 mm greater than the cavity depth to allow 0.5 mm for wedging gingivally and 0.5 mm for amalgam condensation occlusal to the marginal ridge.

It has frequently been observed that carious lesions on the distal surface of the first maxillary molar require deeper restorations than the mesial surface; they vary in height from 6 to 10 millimetres. A suitable matrix** for such cavities is one which is approximately 11 mm in height and therefore requires contouring. Scissors are used to contour the matrix so that the gingival lobes are flattened and the heights of the mesial and distal sections are at least 1 mm greater than the depth determined with the periodontal probe (Fig. 5).

The preferred retainer†† can be easily placed from the lingual because of the contra-angle head design, small shank length and its release mechanism which allows disconnection for easy removal of the deep matrix. After fitting the matrix

Meba, No. 10 Molar Band. Martin Halas Dental Co., Pty Ltd, Sydney, Australia.

††**Tofflemire, Junior.** Teledyne Dental Products, Illinois, USA.

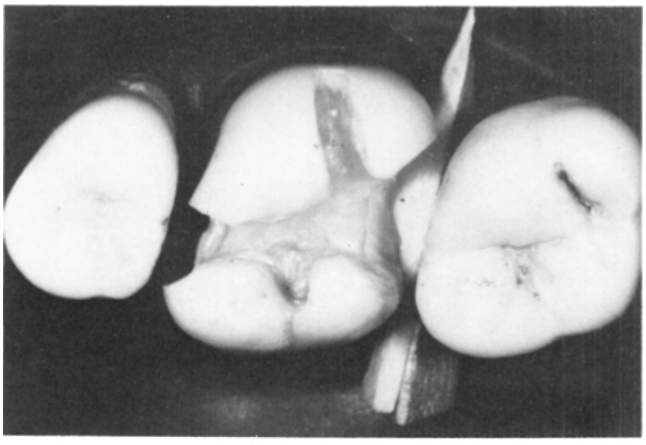


Fig. 2.–Occlusal view of an extracted tooth model before placing the matrix. The sectional wedges obliterate the concave gingival outline of 16, fit apical to the gingival outline and mesially into the furcation entrance, and are in stable contact.

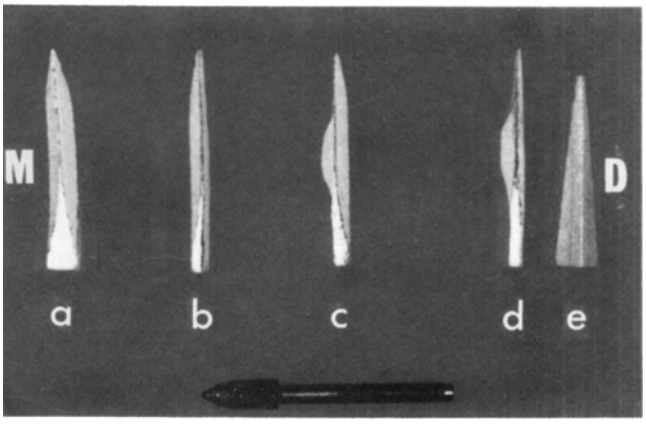
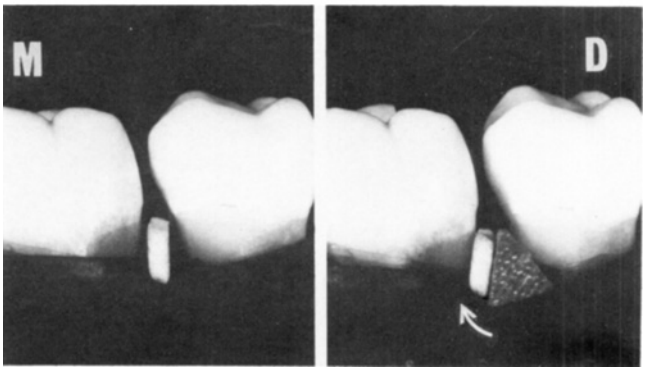


Fig. 3.–Occlusal view of the wedges illustrating the step-by-step wood-carving techniques using the bullet shape diamond bur to achieve a primary convex wedge. a, Manufactured wedge; b, distal side (D) is flattened and vertical; c, mesial side (M) is flattened at the tip and head until the middle section is convex; d, completed primary wedge with an unaltered secondary wedge e.



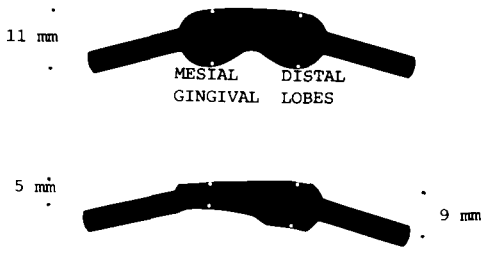


Fig. 5. – Lateral view of an 11 mm matrix before and after contouring for a mesio-occluso-distal cavity, being 4 mm deep mesially and 8 mm distally.

retainer, wedges are placed in the larger and more accessible entrance of the gingival embrasure. This is often the buccal entrance on the opposite side to the matrix retainer. The desired shape and position of contact area is burnished into the matrix while on the tooth with the small ball end of a double-ended burnisher,‡‡ the amalgam condensed and following matrix removal an interproximal carver§§ is used to remove any minor overhangs.

The first maxillary premolar

An amalgam overhang is commonly found resulting from restoration of a deep mesial Class II cavity which may also have an associated concave gingival outline. The amalgam constituting the overhang is usually found in the root furrow and as it traverses distally can also be found in the entrance of the bifurcation. The usual treatment is to replace the restoration. However, failure to place a matrix with marginal adaption and with stable wedging often results in a similar overhang.

Wedging retainer and restoration

Sectional wedging for a deep cavity, as outlined for the maxillary first molar, can be used or for a 4.0 to 5.5 mm deep cavity a single contoured wedge can be effective. For the latter a single wedge is contoured with a scalpel or diamond bur so that it is convex and adapts to the mesial concave gingival outline (Fig. 6). To produce a stable wedge, the tip is carved away until it lodges in the buccal embrasure beween the maxillary canine and the first premolar. If a root furrow is present a more pronounced convex wedge is shaped to extend distally under the cavity outline. If the convex shape

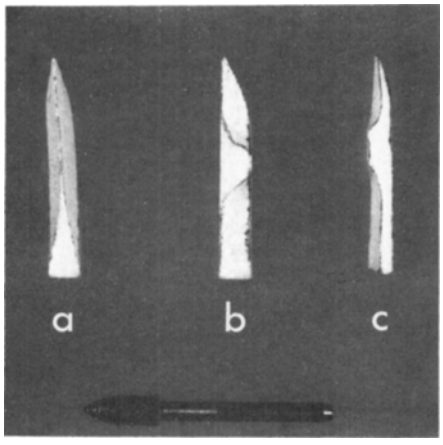


Fig. 6. – a, Manufactured wedge; b, mesial view of the carved wedge with desired convex shape; c, gingival view with thinned tip and head and convex middle section and the bullet shape diamond used for carving.

is carved too close to the tip of the wedge it results in good adaptation but poor stability. A new wedge should be selected and the convex shape carved further away from the tip until it is centred lengthwise as shown in Fig. 6. If this fails, a sectional wedging technique is indicated to improve stability.

For a deep cavity, the preferred matrix¶¶ for a premolar is approximately 8.5 mm in height and can be used for contouring following the methodology outlined for the maxillary first molar. For a 4.0-5.5 mm cavity depth the preferred matrix† is approximately 6.5 mm in height. The wedge is usually placed in the larger entrance to the gingival embrasure, often the lingual, and the retainer approaches from the opposite side (Fig. 7,8). After placing the matrix, retainer and wedging, matrix adaptation to the gingival cavo-surface margin is checked. Restoration is performed as already described for the maxillary first molar.

Discussion

The problem of restoring deep proximal cavities with amalgam has not been widely investigated with the result that overhanging margins in this situation are common. The technique described has been taught and used by dentists at two participating continuing education courses at this Dental School and found to be sound and effective.

The problem of wedging concave outlines and associated furrows or furcation entrances remains a tedious procedure because shaping of a convex wedge is required. This could be overcome if such a wedge was manufactured and its final shaping left

‡‡**P.F.I. 18.** Ash Co., Gloucester, UK.
§§**IPC-C1.** American Dental Manuf., Missoula, USA.
¶¶**Meba, No. 13, Bicuspid,** broad. Martin Halas Dental Co. Pty Ltd, Sydney, Australia.

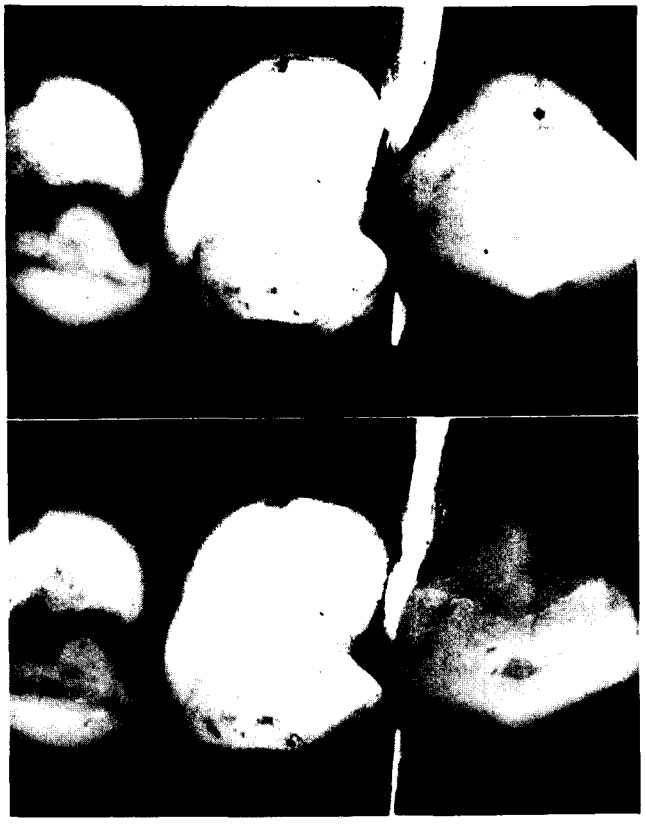


Fig. 7, 8.—Occlusal view of an extracted tooth model illustrating the before and after wedge placement. Note, gingival outline of 24 has been obliterated and part of the convex shape is hidden in the furrow below the outline.

to the dentist. If convex wedges in different mesio-distal widths were available the sectional twin wedge technique might not be necessary as a large single wedge might suffice as is the case for many premolar cavities.

The recommended instrument for interproximal furrow and furcation entrance carving for minor overhangs only proved effective when a slow setting amalgam was chosen. The use of extended carving time amalgam alloys is recommended so that the amalgam is still abradable in those regions where access and the application of force is limited.

The requirement of stable wedging is necessary to prevent matrix movement during the packing of amalgam. If a wedge is not stable when an apically directed force is used, an overhanging margin can be expected. As a matrix is not stable to apically directed forces during amalgam condensation the routine use of a wedge is mandatory.

Conclusion

The clinical case and extracted tooth models discussed illustrate the technique of contouring a matrix and wedges for the successful restoration of deep and/or concave gingival outlines in Class II cavities without amalgam overhangs. The techniques illustrated are simple to perform and require the use and modification of standard dental instrumentation.

Acknowledgement

I wish to thank Mr D. Lund for the photographic illustrations and his advice.

References

1. Highfield JE, Powell RN. Effects of removal of posterior overhanging metallic margins of restorations upon the periodontal tissues. J Periodontol 1978;5:169-81.
2. Markley MR. Silver amalgam. Oper Dent 1984;9:10-25.
3. Weiss EL. An anatomic wedge for posterior tooth restoration. Quintessence Int 1983;12:1217-22.

Requests for reprints:
Dental School,
University of Queensland,
Turbot Street,
Brisbane, Qld, 4000.