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Clinical Technique/Case Report

Management of Idiopathic Subgingival Amalgam Hypertrophy– The Common Amalgam Overhang

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SUMMARY

An amalgam overhang is defined as an extension of amalgam restorative material beyond the confines of a cavity preparation. The pseudo pathology term "idiopathic subgingival amalgam hypertrophy" is used in the title for shock effect and as a scare tactic to catch the attention of our readers. From various studies, it is apparent that such overhangs are alarmingly common. The overhang is largely iatrogenic, caused by poor operator skill exacerbated by unusual dental morphology. Creep may also play a role in the gingival overhang of large amalgam restorations. Maybe we, as clinicians, are becoming complacent and lax in our techniques and matrixing while restoring such a routine restoration. This article revisits the pros and cons of different methods of amalgam overhang management with clinical cases for illustration.

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INTRODUCTION

Although amalgam use has been declining in the USA, the number of amalgam procedures performed is still very high. The 1993 USPHS report on amalgam indicated that, "in 1990, over 200 million restorative procedures were provided in the United States; of these, dental amalgam accounted for roughly 96 million."[1] This corresponds to 48% of direct restorations.

A similar utilization pattern is found in other countries. General practitioners in the United Kingdom reported that amalgam was used in 45% of direct restorations.[2] In a study of Norwegian dentists, amalgam was used in about 32% of all direct restorations in permanent teeth.[3] In the Taiwan National Health Insurance Research database, amalgam was used in 53.3% of the 25,293 direct restorations of posterior teeth.[4]

From 1979 to 1990, there was a 38% reduction in the number of amalgam restorations provided in the USA.[1] This trend is expected to continue. As of 2005, amalgam use had declined to one-third of the 1979 level (52.5 million amalgam restorations [31.6% of all restorations] compared to 157 million amalgam restorations performed in 1979).[5] The rate of decline appears to be stabilizing. Reported use of mercury in dental amalgam sold in the USA in 2001 was approximately 30.8 tons, decreasing slightly to 30.4 tons in 2004, or by about 1%.[6] Based on the numbers presented, it is reasonable to assume that, currently, close to 50 million amalgam restorations per year are still provided in the USA.

Several studies have shown that overhangs are alarmingly common and can be as high as 71%.[7-9] In a recent study that evaluated overhanging amalgam restorations in young adults attending a periodontal department, 57% of the patients investigated had at least one amalgam overhang and 27% had three or more overhangs visible on the radiographs. Overall, 178 (25%) of the restored approximal surfaces had detectable amalgam overhangs.[10] A similar study evaluated the intraoral radiographs of 235 individuals. From a total of 1,787 proximal amalgam restorations, 293 (16%) of the restorations exhibited detectable overhangs.[11] The range 16% to 71% of overhangs detected in previous studies—may be due to the definition of overhangs and the methods of assessment. Using the lowest number gleaned from these studies and applying it to the estimated 50 million amalgam restorations performed today, we may be looking at eight million detectable amalgam overhangs produced yearly.

Once overhangs are diagnosed, either from clinical evaluation or radiographic assessment, they should not be ignored. It has been shown that a marginal overhang is the most common cause of amalgam restoration failure.[12-13] Overhangs have been strongly implicated as an etiologic factor in the progression of periodontal disease. There is good documentation that bleeding, gingivitis and bone loss increases in tissues adjacent to overhangs.[14-15]

Generally, if the amalgam restoration with an overhang is grossly defective (that is, it involves new caries or is inaccessible for repair), replacement of the defective restoration is the best approach. However, if the overall amalgam restoration is basically adequate (no new caries is involved and the overhang is minimal and accessible), less expensive alternatives, such as smoothing out of the overhang or marginal repairs, may be acceptable options. In a two-year clinical evaluation of 45 patients with 113 defective amalgam restorations, the authors found that the repair and the replacement groups remained statistically similar and provided equal restoration longevity.[16]

Small overhangs are more easily removed than large ones, and the latter may necessitate replacement of the restoration. A variety of instruments may be used to remove overhanging margins, but such instruments need to be used carefully to avoid damaging adjacent dental tissues. This article describes various techniques and instrumentations used to remove overhanging amalgam.

DESCRIPTION OF MATERIALS AND TECHNIQUES

I. Small Overhang

Small and supragingival overhangs can be easily removed (Figures 1a and 1b; Figures 2a and 2b) using a variety of instruments. Periodontal scalers, curets and files can be used to remove the bulk of amalgam overhangs by force via crushing and fragmentation. An instrument, such as a Gracey 204S, is appropriate because of its durable heavy design, which allows for increased leverage. The remaining overhang material can be removed by upward cutting strokes with an amalgam or gold knife and Bard-Parker #12 surgical blade. Manual dexterity and the control of force is of utmost importance in using these instruments, as

Figure 1a. *Preoperative radiographic image on tooth #19 DO.*

Figure 1b. *Radiographic image of the corrected restoration.*

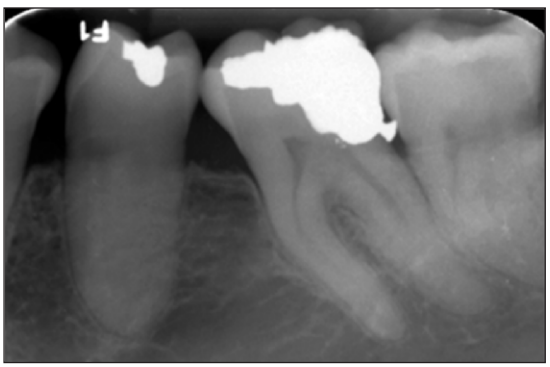

Figure 2a. *Preoperative radiographic image of tooth #30 DO.*

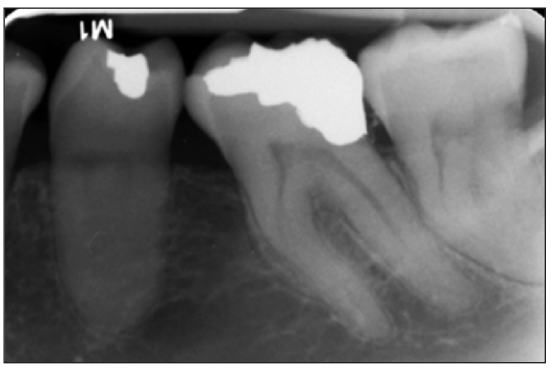

Figure 2b. *Radiographic image of the corrected restoration.*

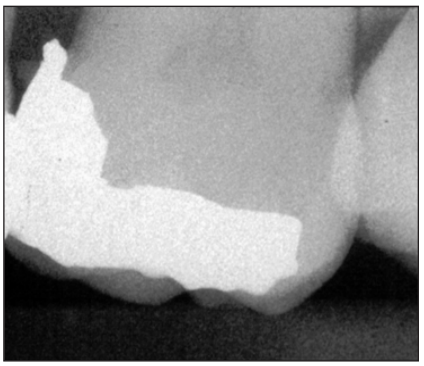

Figure 3a. *Preoperative radiographic image of tooth #3 MO.*

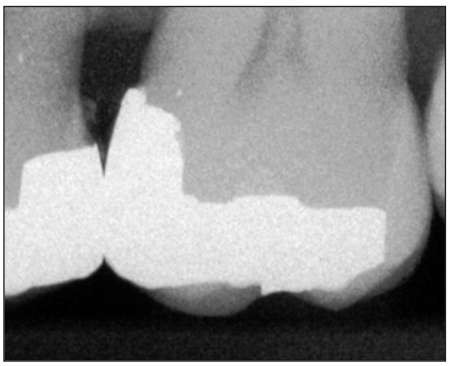

Figure 3b. *Radiographic image of the corrected restoration. Note the truncated appearance of the restoration.*

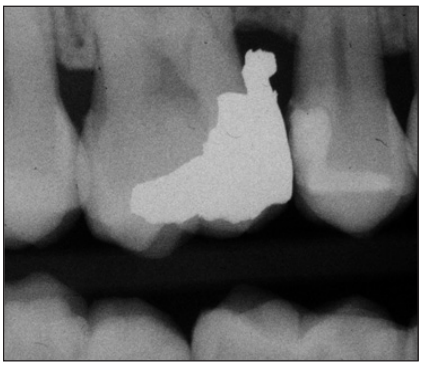

Figure 4a. *Preoperative radiographic image of tooth #14.*

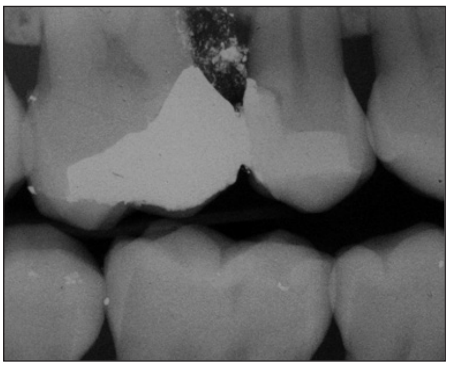

Figure 4b. *Radiographic image of the corrected restoration. Note the presence of amalgam debris even after copious rinsing.*

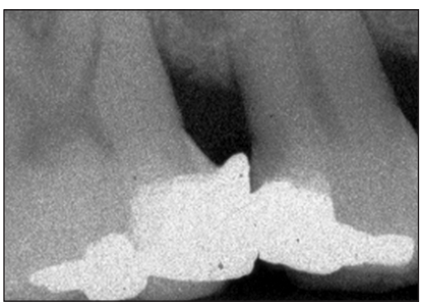

Figure 5a. *Preoperative radiographic image of tooth #14 with with mesial overhang.*

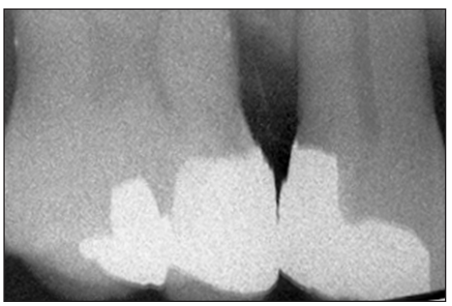

Figure 5b. *Radiographic image of the corrected restoration. Note minor damage to the adjacent restoration.*

damage to adjacent restorative/tooth structure and the laceration of soft tissue can occur with dire consequences.

Following periodontal instrumentation, diamond files and polishing strips (Vision Flex Diamond Strips, Brasseler, Savannah, GA, USA) of varying grits can then be used to fine polish the margins. The strip is made of stainless steel with perforated holes. The perforations perform well, carrying metal debris away from the area. The flexibility of the files and strips makes contouring of the proximal restoration surfaces possible with minimal adjacent tooth damage. However, diamond files and strips are difficult to engage in a posterior quadrant and may be uncomfortable for patients without local anesthesia. Since a series of grits may be employed, polishing is time consuming. After completing the filing and polishing strips procedures on the overhangs, polishing with a rubber cup and pumice should be performed to minimize roughness and prevent plaque accumulation. Floss and polishing compounds may be used in difficult access areas.

II. Medium Overhang

Medium size overhangs, which may be supragingival or subgingival, can best be removed by ultrasonic instrumentation and rotary instrumentation with diamond finishing burs. An ultrasonic scaler (Cavitron Ultrasonic Scaling Systems, Dentsply, York, PA, USA) can be used to remove amalgam overhang with tactile sense similar to removing recalcitrant calculus. A major risk with bulky amalgam overhangs is that they may fracture unpredictably and create irregular projections or voids in the restorations (Figures 3a and 3b). A recent study found that ultrasonic scaling resulted in rough surfaces, such as chips, nicks and scratches on the amalgam.[17]

A better methodology would be to use a special diamond-coated ultrasonic insert that has a similar shape to scaler systems clinicians may already use.[18] With its familiar shape, the learning curve required to handle this unique insert may be minimized (Figures 4a and 4b).

Diamond burs and finishing burs can be used to remove overhangs if the area is accessible (Figures 5a and 5b). Damage to adjacent tooth structure and soft tissue often occurs (Figure 5b). For subgingival and interproximal overhangs, visibility and soft tissue could be an obstacle. Since burs are inherently rigid instruments and have a finite thickness, Chamfer Burs (#850/868, Brasseler, Savannah, GA, USA) that are tapered, have medium coarseness, are 8 to 10 mm in length and are less than 1.2 mm in size, can access both the gingival and interproximal area. Rigidity and size make the process of

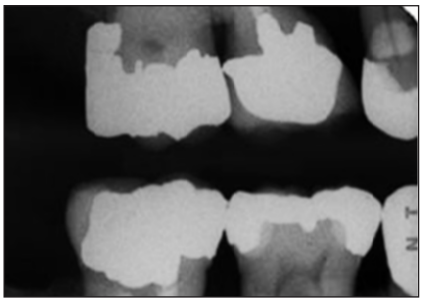

Figure 6a. *Preoperative radiographic image of tooth #2 with bulky distal overhang.*

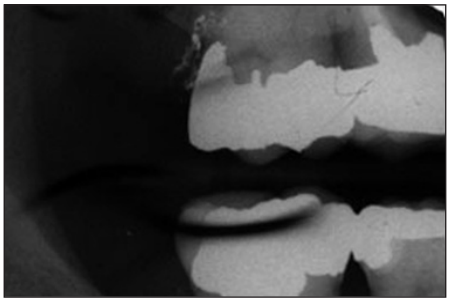

Figure 6b. *Radiographic image of the corrected restorations with long diamond and finishing burs.*

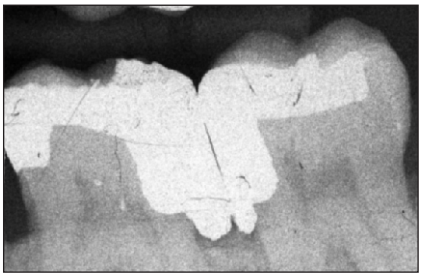

Figure 7a. *Preoperative radiographic image of teeth #30 and #31. Deep gingival overhang existed in both the distal portion of #30 and the mesial portion of #31.*

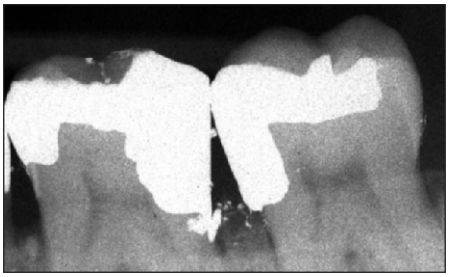

Figure 7b. *Radiographic image of the corrected restorations.*

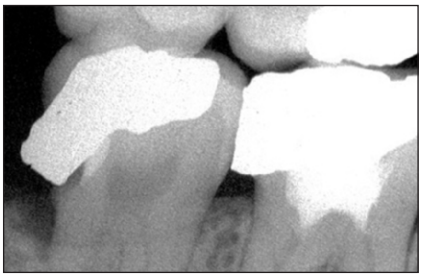

Figure 8a. *Preoperative radiographic image of teeth #18 and #19. Extensive overhang existed in both the distal portion of the restorations.*

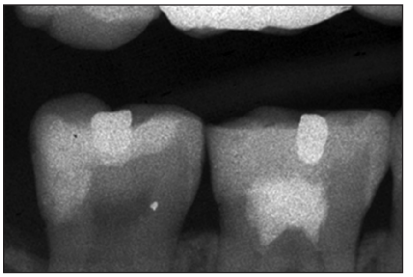

Figure 8b. *Radiographic image of the replaced composite restorations.*

Figure 9. *Discoloration of mucosal tissue presented as an amalgam tattoo at the mesio-lingual area of the complex amalgam restoration of tooth #30.*

reduction far more difficult to achieve. However, in situations where there is no adjacent tooth, the burs can reach more gingival locations and may be more amenable (Figures 6a and 6b). The production of flat proximal anatomy and excessive reduction is common because of limited visibility and difficulty in controlling the speed. Again, multiple burs from medium coarseness to fine grit may be required to achieve reduction and desired finishing.

III. Large Overhang

For large amalgam overhangs, a reciprocating handpiece (KaVo 2061 CHC with a 61LG Head, KaVo America Corporation, Lake Zurich, IL, USA), in conjunction with appropriate diamond files (Proxoshapes, KaVo America Corporation), can achieve the best results (Figures 7a and 7b). However, damage to the adjacent tooth structure and soft tissue can still occur. The clinician must operate the reciprocating files with light pressure and without jamming the interdental space. A sweeping, continuous motion with generous water spray following the contour of the tooth should be used. After removal of the gross overhang, the previous procedures described for medium and small overhangs may have to be repeated to achieve acceptable results. Sometimes, the overhang is too large or inaccessible for all the techniques described and replacement is the only option (Figures 8a and 8b). A list of instruments and their application is summarized in Table 1.

IV. Amalgam Tattoo

One of the common side effects of amalgam overhang removal is the occurrence of amalgam tattoos (Figure 9). They are due to deposits of metal dusts and debris in the oral soft tissue, which are components of an amalgam filling (Figures 4b, 5b and 7b). One way to minimize the metal dust and debris collection is to use generous water spray during and after the overhang removal procedure. The amalgam tattoo is relatively inert and usually causes no tissue damage.[19] Unfortunately, the discoloration is permanent and the patient has to be informed prior to the overhang removal procedure.

DISCUSSION

Amalgam overhangs are mostly iatrogenic and alarmingly common. It is evident that inadequate planning,

Table 1: *List of Instruments and Their Application*

	Small Overhang	Medium Overhang	Large Overhang
Hand instruments Periodontal scaler Periodontal curet Periodontal files Amalgam/Gold knife Bard-Parker #12 blade Diamond files Diamond polishing strips	✔	✔	✔
Ultrasonic instrumentation Ultrasonic scaler Diamond coated insert		✔	✔
Rotary instrumentation Diamond burs Finishing burs		✔	✔
Reciprocal instrumentation Diamond files			✔
Replacement			✔

poor techniques and improper matrixing are the major causes of overhangs. To reduce the number of overhangs, clinical skills and judgment of the operator may need to be refreshed.

The morphological features of the dentition and visibility may also play a role. It is well known clinically that mesial concavity exists in either maxillary premolar or maxillary first molars. This finding is confirmed by a recent study that found overhangs to be more common in the maxilla than in the mandible and molars exhibited more overhangs than pre-molars. The study also concluded that proximal amalgam overhangs are associated with an increased risk of secondary caries.[11] Overhangs have been strongly implicated as an etiologic factor in the progression of periodontal disease. Clinicians must perform a thorough examination for overhangs, using both clinical and radiographic assessments. Once diagnosed, appropriate treatments, such as described above, can be used to remedy the situation. To catch the potential overhang, the authors recommend routine post-operative radiographic assessment for large restorations that involve deep gingival extension.

The use of amalgam as restoration material has decreased in favor of composites. Restorative procedures for composite restoration are very similar to that of amalgam and are even more technique-sensitive. One study observed that the detection of overhangs in Class II resin composite restorations by radiography is difficult, because most overhangs are related to bonding agents and they are radiolucent.[20] Given the fact that composite restorations are done in higher numbers, are more technique-sensitive and are harder to detect, knowledge about overhanging restoration margins is of utmost interest.

CONCLUSIONS

Clinicians must be vigilant in diagnosing amalgam overhangs and not become complacent and lax in their restorative techniques and matrixing. All of the different methods of amalgam overhang management have advantages and limitations, and one must be careful when carrying them out to avoid soft tissue injury, tooth and restoration damage or amalgam tattoos.

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