

Methods of Proximal Amalgam Overhang Removal — A Comparison of Different Techniques

K C Lim,* *AM, BDS, MSc*, G H L Ong,** *AM, BDS, MSc*

Abstract

It is widely accepted that the overhanging restoration is an aggravating factor in the initiation and progression of periodontal disease, and when detected, the overhang should be removed. Some methods for removing proximal amalgam overhangs are the EVA reciprocating motor driven system, roto-pro, flame-shaped steel bur, diamond bur and sonic scaler. This article illustrates the trimmed surface after overhang removal with photographs taken at 1:1 magnification.

The smoothest surface was produced by EVA system where the overhang was removed with a diamond tip followed by polishing with prophylaxis paste using the plastic tip. The roughest surface was produced by the sonic scaler, whilst the others were intermediate. Of the single step methods, the instrument which combined speed while leaving a reasonable surface was the rotopro.

Keywords: *Dental amalgam, Dental high speed equipment, Dental restoration*

Introduction

The incidence of proximal overhangs of dental restorations is fairly high.^{1,2} Most authors consider these overhangs to be an aggravating factor in the initiation and progression of periodontal disease. This led Gilmore and Sheiham¹ to comment that "it would indeed be ironic if in the process of restoring teeth affected by dental caries, dentistry in any way contributed to the causation of periodontal disease, thereby threatening the longevity of the restored teeth".

Overhang removal can improve periodontal health by improving access for oral hygiene procedures which remove dental plaque. It is therefore recommended that overhang removal should be part of the initial phase of periodontal treatment.³

Methods of overhang removal, however, have not been extensively studied. Vale and Caffesse⁴ used the scanning electron microscope (SEM) to evaluate the surface produced by trimmers, chisels, surgical blades and EVA reciprocating motor-driven diamond tips. All four methods were found to be effective at overhang removal, however, the surgical blade and especially the EVA diamond tips remove overhangs better than chisels. Spinks et al⁵ used the SEM to evaluate the curette, sonic scaler and EVA diamond tips. Clinically, they found the EVA system was the easiest, with the curette the least. The sonic scaler produced a significantly greater number of rough surfaces, with no significant differences between the other two.

Whilst the SEM is undoubtedly useful as a research tool for studying the trimmed amalgam surface, the high magnification of the surface produced makes it difficult to relate to the actual clinical situation. This article therefore illustrates the surface produced on removal of amalgam overhangs using the EVA reciprocating motor-driven system, roto-pro, flame-shaped steel bur, diamond bur and sonic scaler with photographs taken at 1:1 magnification.

Materials and Methods

Extracted teeth exhibiting overhangs were selected, and these overhangs were removed by the following methods:

1. EVA reciprocating motor-driven diamond tips (Fig. 1) (Ka Vo, EWL VmbH, Postfach, West Germany).
2. EVA reciprocating motor-driven diamond tips followed by the plastic tips located with prophylaxis paste (Nupro, Johnson & Johnson, New Brunswick, USA).
3. Roto-pro bur (Hager & Meisinger GmbH, Dusseldorf, Federal Republic of Germany) fitted into an air-rotor handpiece (Fig. 2).
4. Flame-shaped steel finishing bur (Ash Instruments, Gloucester, England) in a conventional handpiece.
5. Diamond bur (Hi-Di ISO #197/014, Ash Instruments, Gloucester, England) in an air-rotor handpiece.

* *Private Practitioner & part-time lecturer*

** *Lecturer*

Department of Operative Dentistry, National University of Singapore.

Address for Reprints: Dr Lim Kian Chong, 19 Tanglin Road, #06-29/30, Tanglin Shopping Centre, Singapore 1024.

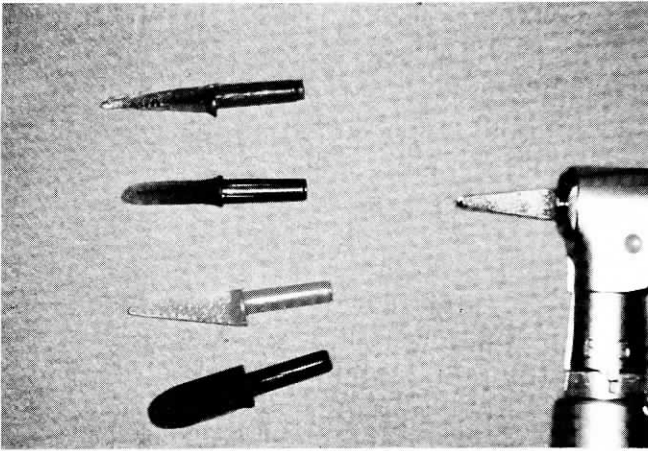


Fig. 1. EVA reciprocating handpiece with diamond tip (right) with assortment of plastic tips (left) for carrying prophylaxis paste to polish the trimmed proximal surface.

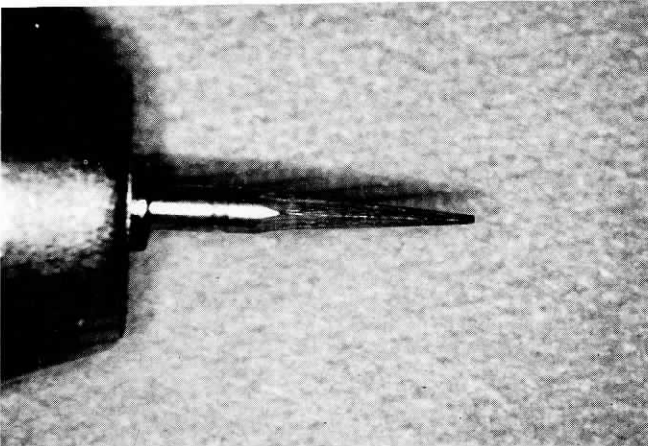


Fig. 2. Roto-pro.

6. Sonic scaler (Soniflex, Ka Vo EWL YmBh, Postfach/Riss, West Germany).

The overhangs were removed with each of the above methods, using a sickle explorer to determine if the overhang was removed. In addition, a proximal restoration was polished with brownie and greenie polishing points (Shofu Inc, Kyoto, Japan) for comparison. The teeth were then photographed at 1:1 (life-size) magnification.

Results

Typical surfaces after overhang removal by the different methods are illustrated in Figures 3-9.

Subjective evaluation of the photographs indicate that the smoothest surfaces were those produced by the EVA system where the diamond tips were followed by polishing with prophylaxis paste using the plastic tips. This was followed by the roto-pro, flame-shaped finishing steel bur, diamond bur with the surface produced by the sonic scaler being the roughest.

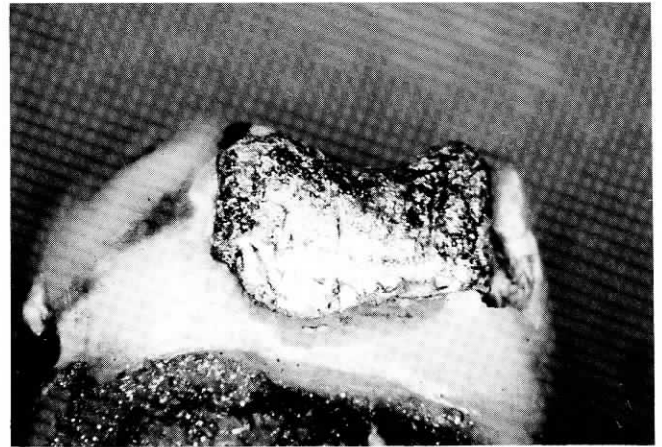


Fig. 3. Overhang removal with the sonic scaler produces a very rough surface. The adjacent tooth surface however, is not usually damaged by the sonic scaler.

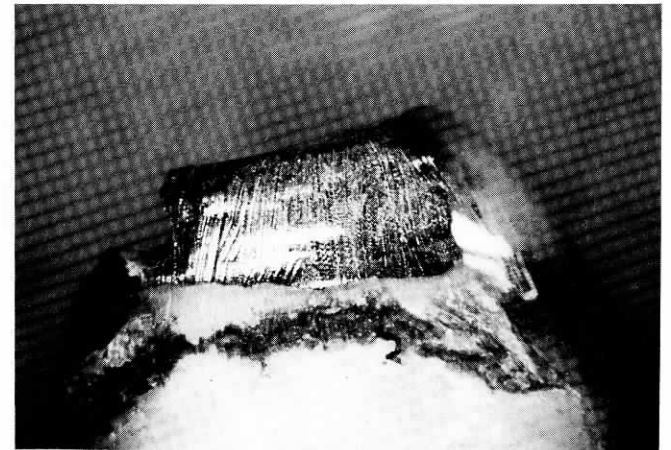


Fig. 4. The surface shows the vertical grooves in the amalgam surface caused by the rotating diamond surface.

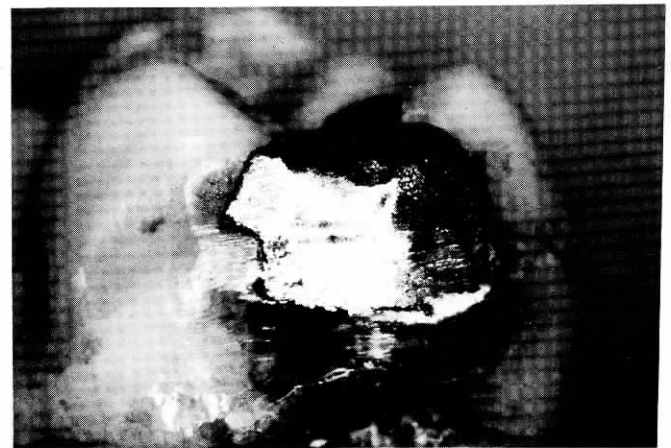


Fig. 5. The surface produced by the EVA fitted with the diamond coated tip is essentially similar to that produced by a diamond bur except the reciprocating action of the handpiece produces horizontal grooves on the trimmed amalgam surface. There is also some damage to tooth structure. Removal of the overhang revealed lining cement which extended right to the cavity margin (arrow).



Fig. 6. After overhang removal with the EVA diamond-tip, the surface was polished with prophylaxis paste placed onto the plastic tip. This produced a relatively smooth surface. Under the overhang as recurrent caries.



Fig. 7. The flame-shaped steel finishing bur produces horizontal grooves on the trimmed surface. This tooth had recurrent caries at the two line angles of the proximal box. There is slight damage to the tooth below the overhang.

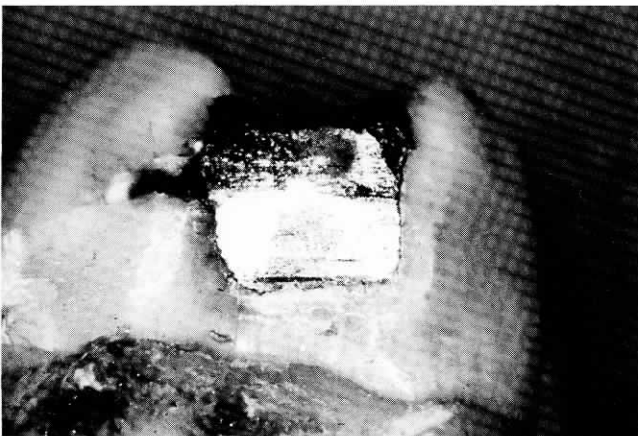


Fig 8. The roto-pro also produces horizontal grooves on the trimmed amalgam surface. There is damage to adjacent tooth structure.



Fig. 9. The surface was produced by polishing with brownie and greenie points. The polished amalgam surface makes the voids and poorly adapted margins of the amalgam obvious.

Defective margins were noted in some amalgam restorations after overhang removal. The amalgam surface also sometimes revealed voids. Damage to the tooth surface in the process of removing the overhang was common.

Discussion

The overhanging amalgam restoration would enhance accumulation of dental plaque below the ledge caused by the overhang, resulting in caries (Figs. 6 & 7) and periodontal disease. Further, plaque also accumulates on the surface of the restoration itself. Hence the objective of overhang removal should be to remove the overhang and leave a surface that is sufficiently smooth to allow efficient plaque removal by the patient.

The smoothest surface after overhang removal is undoubtedly produced by the EVA system where the diamond tip trimmed surface is polished with prophylaxis paste using the plastic tip of the EVA system. However,

the EVA diamond tip which is powered by a conventional motor does not remove amalgam overhangs as quickly as the roto-pro or diamond bur, both of which are fitted into a high speed air-rotor. Of the different methods used, the EVA system requires the greatest access to the overhanging margin to accommodate the width of its tips.

The trimmed surface produced by the two faster methods of overhang removal, the roto-pro and diamond bur, or other methods for that matter, could probably be smoothed by polishing using the EVA plastic tip coated with prophylaxis paste.

The roto-pro, was actually designed to fit into the air-rotor handpiece to remove calculus. It removed the overhang quickly and produced a reasonably 'smooth' surface. Its narrow tip also makes it accessible to all but the narrowest of interproximal areas.

The sonic scaler produced the roughest surface. Unlike the other methods which cut the excess amalgam, the

sonic scaler works by using vibration to break off the overhang at its narrowest and consequently weakest portion, which is usually at the cavity margin. This uncontrolled fracture of the overhang could also result in the reverse situation, a deficit.

The standard diamond bur produced the roughest surface, but diamond burs come in a variety of diamond grit sizes and also very narrow tip designs so that where the interproximal space is narrow and inaccessible to other instruments, there will probably be a diamond bur which could get in to do the job. The flame shaped steel bur gives a reasonable surface, although being fitted to a conventional motor, will take longer to remove the overhang than the other methods driven in a air-motor handpiece.

A feature in all groups, although not in all teeth, were the defective margins, such as voids and gaps which were often associated with proximal amalgam overhangs. These defects were also observed in other studies.⁴⁻⁵ The gaps and voids are probably the result of incorrect choice or placement of the matrix band and/or absence or incorrect placement of the interproximal wedge, which could also result in insufficient condensation pressure. Besides these defects in the marginal adaptation and quality of the proximal amalgam restoration, in the process of removing the overhang, the surrounding tooth tissue is likely to be damaged or roughened. Further, these overhangs are often subgingival, and have to be

removed 'blind'. The practitioner may find that it takes just as long if not longer to remove the overhang as to replace the whole restoration. He would therefore have to evaluate the access for overhang removal and the quality of the restoration then decide if it would be better to replace rather than recontour the existing restoration.

Conclusion

Of the methods of overhang removal evaluated, the smoothest surface was produced by EVA system where the overhang was removed with a diamond tip followed by polishing with prophylaxis paste using the plastic tip. Of the single step methods, the instrument which combines speed with a reasonable trimmed surface is the roto-pro.

REFERENCES

1. Gilmore N, Sheiham A: Overhanging dental restorations and periodontal disease. *J Periodontol* 1971; 42:8-12.
2. Bjorn A L, Bjorn H, Grkovic B: Marginal fit of restorations and its relation to periodontal bone level. Part 1: Metal fillings. *Odontologisk Revy* 1969; 20:311-21.
3. Rodriguez-Ferrer H J, Strahan J D, Newman H N: Effect of gingival health on removing overhanging margins of interproximal subgingival amalgam restorations. *J Clin Periodontol* 1980; 7:457-62.
4. Vale J D F, Caffesse R G: Removal of amalgam overhangs. A profilometric and scanning electron microscopic evaluation. *J Periodontol* 1979; 50:245-9.
5. Spinks G C, Carson R E, Hancock E B, Pelleu G B Jr: An SEM study of overhang removal methods. *J Periodontol* 1986; 57:632-6.