

# CLINICAL techniques

## Increasing Occlusal Surface Thickness of Stainless Steel Crowns: A Clinical Technique

Theodore P. Croll, D.D.S.\*

### Abstract

*Patients with tooth grinding habits may tend to wear through the occlusal surfaces of stainless steel crowns. A technique is described which prevents this problem by increasing metal occlusal surface thickness of the crown.*

### Introduction

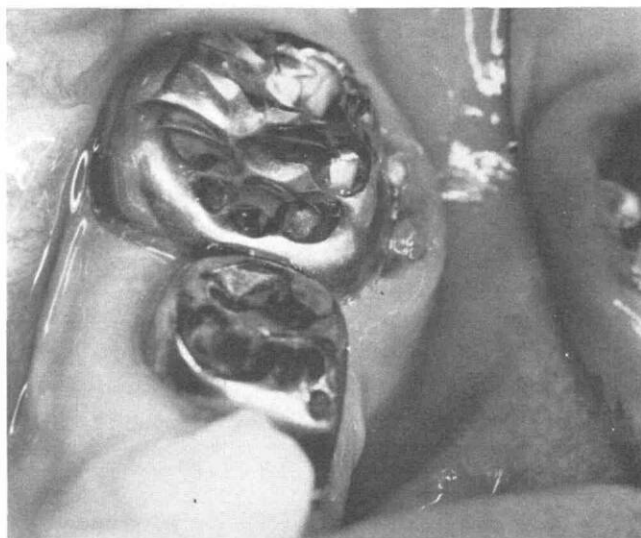
Since the 1950's, stainless steel crowns have become widely used for restoration of primary teeth.<sup>1-5</sup> The crown provides a means of restoring a primary molar with reasonable assurance that the tooth will require no additional treatment before exfoliation.

Recently, stainless steel crowns have been advocated for restoration of permanent posterior teeth in certain cases.<sup>6,7</sup> When the crowns are carefully adapted and precise fit is assured, they can serve as fine interim restorations for young permanent teeth with special problems.

Some disadvantages of stainless steel crowns are; difficulty in performing ideal adaptation,<sup>6,7,8</sup> cement dissolution, recurrent marginal caries, predisposition for gingival inflammation,<sup>6,9,10</sup> and wear of the occlusal surface of the crown completely through the metal.<sup>6</sup>

The author has treated a number of children who have active tooth grinding habits and have also required stainless steel crowns for restoration of carious teeth. In several cases the bruxism habit was so severe, that within one year of crown placement, the occlusal surfaces were worn through. This led to salivary leakage and cement dissolution (Figure 1).

The purpose of this paper is to describe a clinical technique which increases the occlusal surface thick-



**Figure 1.** Eight months after placement, a stainless steel crown is seen with wear through the occlusal surface. Salivary leakage has led to cement dissolution, loosening of the crown, and buccal gingival inflammatory changes.

ness of stainless steel crowns in order to prevent occlusal wear through the metal. It is recognized that careful attention to occlusal relationships during crown placement is very important to prevent premature functional contacts after cementation,<sup>6,7</sup> but abnormal wear can occur even if a stainless steel crown is ideally adapted and positioned.

### Technique

A child at risk of grinding through a stainless steel crown may be identified by history of bruxism as reported by the parents, and by careful observation of wear patterns in the mouth. Study models are also

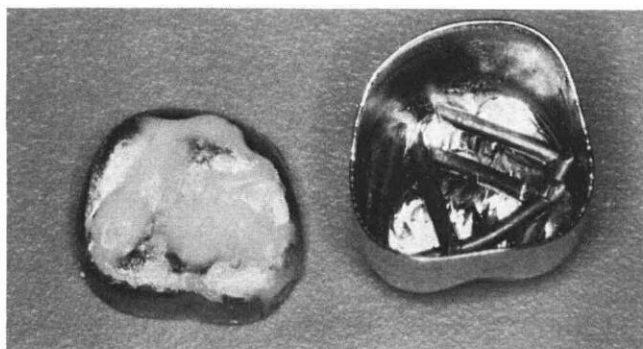
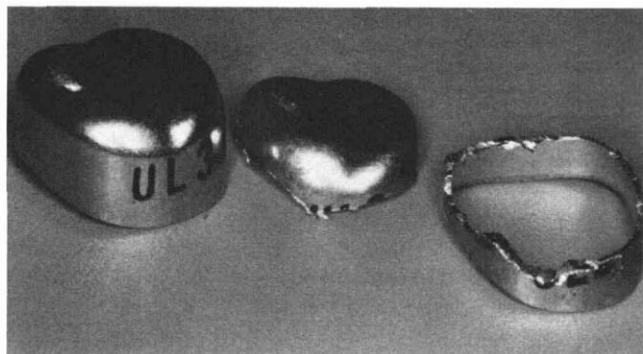
quite helpful in revealing areas of abnormal enamel abrasion from bruxism. Although difficult to diagnose, hypertrophy of the masseter muscles may also suggest a chronic tooth grinding habit.

When it is expected that a patient may wear through a crown, the following technique is advocated:

1) Perform the recommended procedures for stainless steel crown preparation.<sup>1-7</sup> Select a non-precrimped Unitek brand\* preformed crown which would normally be suitable for proper restoration of the tooth.

2) Prior to crown adaptation select a Unitek brand crown of the next smallest size. Using a high speed carbide bur, cut the occlusal table from the smaller crown (Figure 2a). The periphery of the metal should be smoothed with a rotary wheel. Since Unitek brand crowns are machined so that any one size fits perfectly within the next larger size, the cut occlusal surface adapts well to the internal aspect of the selected crown.

3) After roughening the inside surface of the larger crown and the occlusal surface of the smaller crown segment with a diamond stone, place pieces of silver solder inside the larger crown and soldering flux on the smaller segment (Figure 2b). Place the cut occlusal



**Figure 2.** a) The occlusal table is cut from the smaller crown. (b) Silver solder pieces are placed within the larger crown, and soldering flux is spread on the occlusal surface of the smaller crown segment.

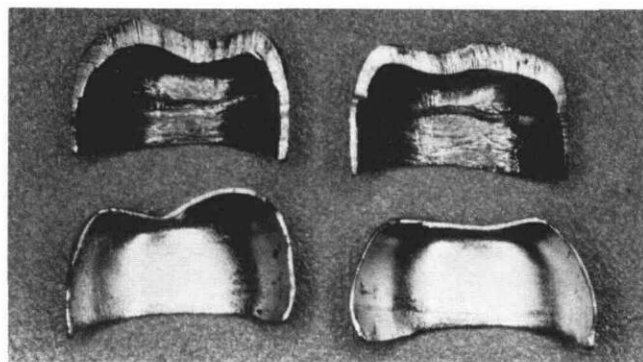
\*Unitek Corporation, 2724 and South Peck Road, Monrovia, California 91016

segment over the solder within the crown. A high-heat, fine-flame torch is then used to melt the solder, attaching the two stainless steel surfaces. Excess solder expressed around the internal margins suggests even solder flow. A metal instrument or graphite pencil point may be used to gently push the stainless steel surfaces together while the solder is flowing to eliminate void spaces.

4) The internal aspect of the crown is then roughened with an abrasive stone or diamond bur, and excess solder is removed.

5) Crown finishing then proceeds as usual.<sup>1-7</sup>

Cross sections of the unprepared crown can be compared to the crown as supplied by the manufacturer (Figure 3). It is apparent that surface thickness is greatly increased. The only modification in tooth preparation which may be necessitated by this technique is that occlusal reduction may need to be somewhat increased. Careful attention in rounding of occlusoaxial line angles also aids in proper crown seating.<sup>2,6,7</sup> Increased occlusal surface thickness has not proven to be problematic in adapting or cementing the crown.



**Figure 3.** Cross sections of a crown as supplied by the manufacturer above are compared with a crown after occlusal surface thickness has been increased.

It is recognized that the heat applied for soldering may alter metallurgical properties of the stainless steel. Although such changes have not been seen to be of clinical importance, it would be interesting to test the physical properties of the treated crown for comparison with those of a crown as supplied by the manufacturer.

The author has used the technique in a number of cases over a two year period and to this date (March, 1980) no crown has been observed to be worn through and no other unusual clinical problems have arisen.

## Summary

A clinical technique for increasing the thickness of the occlusal surfaces of stainless steel crowns is described. The technique has been successful in cases with children who have tooth grinding habits.

---

**References**

1. Humphrey, W. P.: "Uses of chrome steel in children's dentistry," *Dent Survey*, 26:945, July 1950.
2. Castaldi, C. R.: "Operative dentistry," In Goldman, H. M. and others (eds.): *Current therapy in dentistry*, St. Louis, C.V. Mosby, 1966 Vol. 2 Pp. 621-655.
3. Full, C. A., Walker, J. D., and Pinkham, J. R.: "Stainless steel crowns for deciduous molars," *JADA*, 89:360, August 1974.
4. Mink, J. R. and Bennett, I. C.: "The stainless steel crown," *J Dent Child*, 35:186, May 1968.
5. Law, D. B., Lewis, T. M., and Davis, J. M.: *An atlas of pedodontics*, Philadelphia, W. B. Saunders, 1969, Pp. 181-186.
6. Croll, T. P., Castaldi, C. R.: "The preformed stainless steel crown for restoration of permanent posterior teeth in special case," *JADA*, 97:644-649, Oct. 1978.
7. Castaldi, C. R., Brass, G. A.: *Dentistry for the adolescent*, Philadelphia, W. B. Saunders Company, 1980, Pp. 375-384.
8. Croll, T. P., McKay, M. S., and Castaldi, C. R.: "Impaction of Permanent Posterior Teeth By Overextended Stainless Steel Crown Margins: Report of a Case," *JADA* (In review).
9. Webber, D. L.: "Gingival health following placement of stainless steel crowns," *J Dent Child*, 41:186, May-June 1974.
10. Myers, D. R.: "A clinical study of the response of the gingival tissue surrounding stainless steel crowns," *J Dent Child*, 42:33-36, July-August 1975.

---

Dr. Croll has a private practice in pediatric dentistry, and is clinical associate, orthodontics/pedodontics, University of Pennsylvania School of Dental Medicine. Requests for reprints should be sent to Dr. Croll at Pediatric Dentistry, East Street Center, East Street and N. Main Street, Doylestown, Pennsylvania, 18901.