

Review Article

Technique for Adapting Margins of Preformed Stainless Steel Crowns

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Abstract:

Stainless Steel Crowns have been indicated for the restoration of primary and permanent teeth with caries, cervical decalcification, and/or developmental defects (eg, hypoplasia, hypocalcification), when failure of other available restorative materials is likely (eg, interproximal caries extending beyond line angles, patients with bruxism), following pulpotomy or pulpectomy, for re-storing a primary tooth that is to be used as an abutment for a space maintainer, or for the intermediate restoration of fractured teeth. Marginal adaptation of SSCs involves appropriate crown size selection, trimming the crown form to achieve proper length, crimping crown edges to approximate the prepared tooth, and finishing and polishing the crown form. This article about stainless steel crown restoration focuses on the procedure of adapting, finishing, and polishing crown margins.

Keywords: Stainless steel crowns, Dental caries, crown restorations.

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Introduction

Dental caries (also known as tooth decay) is a disease where bacterial processes cause damage to the hard tooth structure, characterised by acid demineralisation of the tooth enamel. Restoration of primary teeth differs from restoration of permanent teeth, due in part to the differences in tooth morphology. The mesiodistal diameter of a primary molar crown is greater than the cervicoocclusal dimension. The buccal and lingual surfaces converge toward the occlusal. The enamel and dentin are thinner. The cervical enamel rods slope occlusally, ending abruptly at the cervix rather than being oriented gingivally and gradually becoming thinner as in permanent teeth.² The pulp chambers of primary teeth are proportionately larger and closer to the

surface. Primary teeth contact areas are broad and flattened rather than being a small distinct circular contact point, as in permanent teeth. Shorter clinical crown heights of primary teeth also affect the ability of these teeth to adequately support and retain intracoronal restorations. Young permanent teeth also exhibit characteristics that need to be considered in restorative procedures, such as broad contact areas that are proximal to primary teeth.^{2,3}

Tooth preparation should include the removal of caries or improperly developed or unsound tooth structure to establish appropriate outline, resistance, retention, and convenience form compatible with the restorative material to be utilized. Rubber-dam isolation should be utilized when possible during the preparation and

placement of restorative materials. Stainless steel crowns are usually recommended for teeth having received pulp therapy.⁴

Stainless steel crown restorations

Stainless steel crowns are prefabricated crown forms that are adapted to individual teeth and cemented with a biocompatible luting agent. "The SSC is extremely durable, relatively inexpensive, subject to minimal technique sensitivity during placement, and offers the advantage of full coronal coverage."⁵

The use of SSCs also should be considered in patients with increased caries risk whose cooperation is affected by age, behavior, or medical history. These patients often receive treatment under sedation or general anesthesia. For patients whose developmental or medical problems will not improve with age, SSCs are likely to last longer and possibly decrease the frequency for sedation or general anesthesia with its increased costs and its inherent risks.⁶

SSCs have been indicated for the restoration of primary and permanent teeth with caries, cervical decalcification, and/or developmental defects (eg, hypoplasia, hypocalcification), when failure of other available restorative materials is likely (eg, interproximal caries extending beyond line angles, patients with bruxism), following pulpotomy or pulpectomy, for re-storing a primary tooth that is to be used as an abutment for a space maintainer, or for the intermediate restoration of fractured teeth.

In high caries-risk children, definitive treatment of primary teeth with SSCs is better over time than multisurface intra-coronal restorations. Review of the literature comparing SSCs and Class II amalgams concluded that, for multisurface re-restorations in primary teeth, SSCs are superior to amalgams.⁷ SSCs have a success rate greater than that of amalgams in children under age four.⁸ SSCs can be indicated to restore anterior teeth in cases where multiple surfaces are carious, where there is incisal edge involvement, following

pulp therapy, when hypoplasia is present, and when there is poor moisture control.⁶

The edges of stainless steel crown forms cannot be machined to curve sufficiently inward to precisely abut the tooth around its entire periphery. That final adaptation phase must be achieved by the dentist, customizing marginal fit to the individual tooth preparation.

Technique

After the proper size crown form has been selected, marginal adaptation can be accomplished as follows:

- With a large abrasive wheel ("heatless stone") or diamond wheel on a straight slow speed angle, crown length is custom cut. The aim is to recreate marginal ridge heights in relationship to adjacent teeth and have sufficient marginal extension to overlap the cervical bulge of the crown. Ideally, the crown margins for a primary molar can approximate the anatomical location of the cements-enamel junction, or slightly occlusal to it, around the full periphery of the crown. For permanent posterior teeth, the contoured crown margins should be more coronal, so that ultimate preparation for a precision cast crown in adulthood is not compromised in any way. During selection of a suitable crown form size, one should remember that if a selected crown does not fit a prepared tooth, either the tooth is insufficiently prepared, the chosen crown form too small, or both.
- With crimping pliers, the edge of the crown form (0.5- 1 mm) is bent slightly inward around the crown periphery.
- The abrasive wheel is then applied to the edges, rotating toward the margins from the occlusal direction. Such action thins the marginal stainless steel material and curves it slightly more toward the axial walls of the tooth.
- The crown surfaces are then smoothed and polished with a rubber wheel, applied in the same direction.
- For final finishing, the crown form can be smoothed and polished with a cloth or

chamois wheel on the dental lathe, using Tripoli polishing agent and jeweler's rouge (iron oxide). Debris from the finishing process, accumulated inside the crown, can be removed with a wet cotton swab.⁹⁻¹³

Discussion

Over the last decade, the authors have found that SSCs are best bonded into place with resin modified glass ionomer luting cement.¹⁴ It is important to remember that the methods described are used with both primary and permanent molar SSC forms that often are expected to remain in place for 5 to 15 years. Just like other overcontoured metallic restorations, resin-based composite restorations, or those made with any of the glass ionomer systems, there are biological consequences to every dental, surgical, and restorative treatment. SSCs are no exception, and periodontal considerations of such restorations have to be considered.^{15,16,17}

Where esthetics are a concern, the facing of SSCs can be removed and replaced with a resin-based composite (open-faced technique). Another option when esthetic concerns predominate is primary SSCs with preformed tooth-colored veneers. Although these veneered crowns can be more difficult to adapt (due to their limited crimping area) and are subject to fracture or loss of the facing, in some cases veneered SSCs possess a major advantage over conventional SSCs due to their superior esthetics and high parental satisfaction.^{18,19,20}

Recommendations

- Children at high risk exhibiting anterior tooth caries and/or molar caries may be treated with SSCs to protect the remaining at-risk tooth surfaces.
- Children with extensive decay, large lesions, or multiple-surface lesions in primary molars should be treated with SSCs.

- Strong consideration should be given to the use of SSCs in children who require general anesthesia.⁵

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