The use of stainless steel crowns on primary molars

Enrique Bimstein
Professor of Pediatric Dentistry
University of Florida College of Dentistry.
The use of SSC on primary molars

Goal
The participants will become familiar with the basic knowledge and procedures required for the restoration of primary molars with preformed stainless steel crowns.
Topics

1. Introduction:
   crown types, definition, rationale, indications and contraindications.

2. Characteristics, advantages and disadvantages.

3. Clinical procedures:
   tooth preparation, crown adaptation and cementation.

4. Summary and conclusions.
Crown types for primary teeth

Cast:
- Gold crowns

Stainless steel:
- Occlusal anatomy
- Trimmed
- Contoured
- Pre-veneered

Composite:
- Plastic matrix
Cast crowns - gold
Cast crowns - gold
Cast crowns - gold
Stainless steel crowns

- Preformed metal crowns or stainless steel crowns (SSC) have been in use for about 60 years.
Definition of SSC
Definition of SSC

Is a metal shell with preformed anatomy that can be adapted to the tooth.
Rationale for using a SSC

<table>
<thead>
<tr>
<th>Good</th>
<th>Good</th>
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<tbody>
<tr>
<td>Several</td>
<td>One</td>
</tr>
<tr>
<td>Hours</td>
<td>Minutes</td>
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<tr>
<td>Difficult</td>
<td>Easy</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
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<tr>
<td>Expensive</td>
<td>Cheap</td>
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<tr>
<td>“Bad”</td>
<td>“Bad”</td>
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Rationale for using a SSC

Stainless steel crowns are used to restore primary molars in which the failure of an amalgam or composite restoration is clear in your mind.
Rationale for using a SSC

The use of SSC is indicated in cases in which the prognosis for long term success of “regular” restorations is reduced by a high possibility of:

a. restoration fracture
b. recurrent caries.
Indications for using a SSC
Indications for using a SSC

Extensive caries destruction.

An adequate isthmus is difficult to obtain with a small occlusal surface and a wide contact and large pulp.
Indications for using a SSC

No gingival floor possible for a proximal – occlusal restoration
Indications for using a SSC
Early childhood caries
Indications for using a SSC

High caries incidence
Indications for using a SSC

Bruxism
( Teeth Grinding or Clenching )

Images of children and teeth.
Indications for using a SSC
After endodontic treatment

Pulpectomy
Pulpotommy
Pulpectomy
Indications for using a SSC
After endodontic treatment

always?
Indications for using a SSC

Pulpotomized primary molars can be successfully restored with one surface amalgam if their natural exfoliation is expected within not more than 2 years.

Indications for using a SSC

Developmental abnormalities

Enamel hypoplasia

Enamel hypoplasia and caries
Indications for using a SSC

Compliance and behavior?
Indications for using a SSC

Space maintainer

As an abutment for space maintainers or prosthetic appliances.
Indications for using a SSC

Fractured molars due to trauma


Dental Traumatology 2008; 24: 253–256.
Indications for using a SSC Multi-surface restorations?
Preformed metal crowns demonstrate greater longevity and reduced re-treatment need compared with (multi-surface) amalgam.

**Indications for using a SSC**
Indications for using a SSC

The literature demonstrates evidence of a more favorable outcome for SSCs than for amalgam restorations in primary molars requiring multi-surface restorations.

10 Studies, 1.6 to 10 years follow-up failure rates, ranged from 1.9 to 30.3 % for SSCs and 11.6 to 88.7 % for amalgam restorations.

### Indications for using a SSC

<table>
<thead>
<tr>
<th></th>
<th>1\textsuperscript{st} primary molar</th>
<th>2\textsuperscript{nd} primary molar</th>
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</thead>
<tbody>
<tr>
<td>One surface restorations</td>
<td>70%</td>
<td>32%</td>
</tr>
<tr>
<td>Two surface restorations</td>
<td>75%</td>
<td>71.4%</td>
</tr>
<tr>
<td>Stainless steel crowns</td>
<td>12.8%</td>
<td>11.0%</td>
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Multi-surface restorations VS SSC

1. Type of tooth (first vs second molar)
2. Dental age of patient.
3. Caries incidence.
4. Patient’s compliance (brushing etc.).
5. Water fluoridation.
7. Other (esthetics, parents compliance, etc.).
Contraindications for SSC
Contraindications for SSC

2. Extensive dental caries:
   a. there is not enough crown structure left.
   b. the caries (gingival) extent does not allow for adaptation.
   c. excessive mesial drift.
Contraindications for SSC

No restorability due to extensive crown destruction
Contraindications for SSC

No restorability due to caries gingival depth
Contraindications for SSC

No restorability due to caries gingival depth
Contraindications for SSC

No restorability due to excessive mesial drift
Contraindications for SSC

3. Esthetics.
4. Allergy to nickel

Stainless steel crowns (Unitek and Rocky Mountain) crowns composition consist of 17-19% chromium, 9-13% nickel and 0.08-0.1 carbon. Nickel based crowns (Ion Ni-chro from 3M) composition consists of 76% nickel, 8% iron, 0.04 carbon and 0.35% manganese.

4. **Allergy to nickel**

Nickel is one of the most common causes of allergic contact dermatitis and produces more allergic reactions than all other metals combined. There may be a risk of sensitizing patients to nickel with long-term exposure to nickel-containing appliances as in orthodontic therapy.

Contraindications for SSC

http://www.hugginsappliedhealing.com/story5.php
Contraindications for SSC

4. Allergy to nickel (???)
Nickel, has its problems with human biochemistry.
Children have to start wearing glasses within a few months of receiving the crowns.

http://www.hugginsappliedhealing.com/story5.php
Contraindications for SSC

4. **Allergy to nickel (???)**

If your child becomes cranky and misbehaves after the crowns were placed while previously he had a pleasing personality, check it out.

http://www.hugginsappliedhealing.com/story5.php
Characteristics of SSC

Stainless steel crowns may be with:

- Occlusal anatomy
- Trimmed
- Contoured
- Crimped?
- Pre-veneered
Characteristics of SSC

Occlusal anatomy only (Unitek)

They require trimming, contouring and crimping.
Characteristics of SSC

Oclussal and pre-trimmed (Unitek)

- Festooned to allow a line parallel to the gingival crest.
Characteristics of SSC

Oclussal and pre-trimmed (Unitek)

• Festooned to allow a line parallel to the gingival crest.

• They require contouring and crimping.
Characteristics of SSC

Occlusal, pre-trimmed and pre-contoured: (Ion-Nichro)

- Some trimming, contouring and crimping may be necessary.
- When trimmed, re-contouring, crimping and polish are required.
Characteristics of SSC

3M Stainless steel    ION Ni-Chro

Shape

Length

Cervical constriction
Characteristics of SSC

Pre-veneered: metal with esthetic facing (NuSmile).

- Have a resin-composed facing bonded to Occ. and B. surfaces.
- Expensive, require more tooth reduction, and allow only for minimal crimping.
SSC in primary teeth: topics

1. Introduction: crown types, definition, rationale, indications and contraindications.

2. Characteristics, advantages and disadvantages.


4. Summary and conclusions.
Clinical procedures for SSC

• Rationale

• Tooth preparation.

• Crown selection

• Crown adaptation.

• Complications.

• Cementation.

• Cleaning
The tooth preparation and crown adaptation of SSC in primary (and permanent) molars is based (among other) on the crown’s:

**Flexibility**: easily bent or shaped.

**Elasticity**: the tendency of a body to return to its original shape after it has been stretched.
Rationale for SSC tooth preparation and adaptation

- Preformed metal crowns are flexible and elastic.
- The tooth cervical bulge is “surrounded” by the crown.
Rationale for SSC tooth preparation and adaptation
Rationale for SSC tooth preparation and adaptation

a. do not require the retention features that are incorporated in cavity design of cast crowns.

b. obtain their retention from the flexibility and elasticity of the thin, contoured and crimped crown margins, and cementation.
Rationale for SSC tooth preparation and adaptation

Subgingival depth

\[ \approx 1.5 \text{ mm} \]

C. E. J.
Clinical procedures for SSC

• Rationale

• **Tooth preparation.**

• Crown selection

• Crown adaptation.

• Complications.

• Cementation.

• Cleaning
Check Occlusion before starting tooth reduction.
Armamentarium - Burs
Armamentarium for adaptation

114 plier
Crimping plier
Sharp scaler
Round scissors
Tooth preparation for SSC

• General considerations
  Extent.
  Caries removal.
  Pulp treatment.

• Occlusal surface
  (1-1.5 mm reduction)

• Buccal and lingual surfaces

• Proximal surfaces

• Finish
Occlusal preparation (a)
Create a “channel” 1.25 mm deep between the cusps.
Occlusal preparation (a)

Reduce the cusps to the depth of the channel.
Occlusal preparation (b)
Occlusal preparation (b)
Occlusal preparation (b)
Tooth preparation for SSC

• General considerations
  Depth and extent.
  Caries removal.
  Pulp treatment.

• Occlusal surface

• Buccal and lingual surfaces

• Proximal surfaces

• Finish
Buccal and lingual reduction.
Prepare a slight bevel, at the occlusal 1/3 portion of the surface.
Tooth preparation for SSC

- Buccal and lingual surfaces
  a) Limited to occlusal 1/3 of the B & L surfaces at a 45° bevel.
  b) Round off all line angles.
  c) A large mesio-buccal or cervical bulge may require more buccal and lingual reduction.
Buccal and lingual reduction.
Prepare a slight bevel, at the occlusal 1/3 portion of the surface.
Buccal and lingual reduction.
Prepare a slight bevel, at the occlusal 1/3 portion of the surface.
What's next?

Caries removal
Pulp therapy (if required)
Proximal surfaces

Proximal surfaces
Caries removal
Pulp therapy (if required)
Caries removal
Apply a liner or perform pulp therapy
Tooth preparation for SSC

• General considerations
  Depth and extent.
  Caries removal.
  Pulp treatment.
• Occlusal surface
• Buccal and lingual surfaces
• **Proximal surfaces**
• Finish
Tooth preparation for SSC

Proximal surfaces

a) 169L tapered fissure or thin tapered diamond bur.

b) Break proximal contacts at appropriate depth in single sweeping motion (or gradually).

c) Vertical proximal walls with slight convergence in an occlusal and lingual/palatal direction.

d) Feather-edge finish line; common error: ledge formation.
Proximal surfaces
Proximal reduction: “open” the proximal contacts, flat surfaces.
Proximal reduction: “open” the proximal contacts, flat surfaces.
Proximal surfaces
Proximal surfaces
Proximal surfaces
Rounding angles.
Rounding angles.
Clinical procedures for SSC

• Rationale
• Tooth preparation.
• **Crown selection**
• Crown adaptation.
• Complications.
• Cementation.
• Cleaning.
SSC selection

General considerations

a) Place or “seat crown” from lingual to buccal.

b) Push crown over the buccal buldge for a snap fit.

c) Check margins for close cervical adaptation extending 1-1.5 mm subgingivally (blanching).
1. Choose the crown that fits MD.

Select the smallest crown that restores the pre-existing contacts (if present).

The most common used crowns are size # 4
SSC selection

Too small M-D
SSC selection

Too big M-D
Radiograph in which crown adaptation is adequate in tooth 64 and inadequate in 65 and 74.
Crowns which are too big M-D may prevent the adequate eruption of adjacent permanent tooth.
Crown adaptation
Crown adaptation

114 Contouring Pliers
Crown adaptation

Buccal and lingual
Crown adaptation

Proximal
Crown adaptation

“Extra” countour
Crown adaptation
Crown adaptation
Crown adaptation

Crimping Pliers
Crown adaptation

Crimping Pliers
Crown adaptation

Crimping Pliers (extra crimping)
Crown adaptation

Examine the crown for sharp angles or irregularities. Re-contour and/or re-crimp were necessary.
Examine the occlusion.

The occlusion should be the same before starting the procedure.
SSC Cementation and cleaning
SSC Cementation and cleaning
Complications
Additional crown adaptation

To crown is too long

- over the gingiva.
Additional crown adaptation

Sharp scaler
Additional crown adaptation

- Crown and Bridge Scissors
Additional crown adaptation

- Crown and Bridge Scissors
Polish the crown with a heath less stone.
Additional crown adaptation

• Buccal and lingual surfaces

Due to carious proximal contact loss, the crown that fits M-D may be too small B-L; this may be solved with more buccal or lingual reduction.
Additional crown adaptation

- Buccal and lingual surfaces

Due to carious proximal contact loss, the crown that fits M-D may be too small B-L; this may be solved with more buccal or lingual reduction.
Due to carious proximal contact loss, the crown that fits M-D may be too small B-L; this may be solved with more buccal or lingual reduction.
Additional crown adaptation

Too high

Fits MD but does not cover the buccal surface: modify a larger crown.
Additional crown adaptation

Too high
Over the gingiva (or loose).

Additional contour and/or crimping are required.
Additional crown adaptation

Howe Plier: to rotate crowns
Complications

Aspiration
Complications

Aspiration

Figure 1. Lateral chest view with the stainless steel crown in place.

Figure 2. Posterior-anterior view with the stainless steel crown in place.

Figure 3. The stainless steel crown is lodged in the right main bronchus.

Complications

Gingival and periodontal diseases
Complications: Allergy

The nickel content in the formulation of nickel chromium crowns is around 70% greater than that of contemporary stainless steel crowns that contain 9-12% nickel similar to that of many orthodontic band and wires.

http://www.slideshare.net/dentistryinfo/stainless-steel-crown
Complications: Allergy


Kolokitha OE, Chatzistavrou E. A severe reaction to nickel-containing orthodontic appliances. Exposure to nickel-containing orthodontic appliances may cause intra- or extraoral allergic reactions. Nickel is the most typical antigen implicated in causing allergic contact dermatitis, which is a Type IV delayed hypersensitivity immune response. Angle Orthod. 2009 Jan;79(1):186-92

Bruce GJ, Hall WB. Nickel hypersensitivity-related periodontitis. Compend Contin Educ Dent. 1995 Feb;16(2):178, 180-4; quiz 186

Pre-veneered: metal with esthetic facing

- have a resin-composed facing bonded to O and B surfaces.
- expensive, require more tooth reduction, and allow only for minimal crimping.
Ram D et al. Long-term clinical performance of esthetic primary molar crowns. At the 4 year evaluation all the esthetic crowns (n=10) showed chipping of the esthetic facing, with poor esthetic appearance.

Composite crowns
Composite crowns
SSC in primary teeth: topics

1. Introduction: crown types, definition, rationale, indications and contraindications.

2. Characteristics, advantages and disadvantages.


4. Summary and conclusions.
**Summary and conclusions**

✓ SSCs represent a long term, easy one appointment full coverage restorations of primary molars.

✓ The tooth preparation and adaptation are relatively easy, in most cases.

✓ Durable and cost effective ($34 for 5).
THANK YOU