

T.P.C.T.'S
DEPARTMENT OF PAEDIATRIC AND PREVENTIVE DENTISTRY

Stainless Steel Crown Procedures for Primary Molars – 1



LEARNING OBJECTIVES

- ▶ Primary teeth are relatively at a larger risk of caries than permanent teeth. They also have larger pulp with prominent pulp horns placing exacting demands on cavity design. Hence a full-coverage restoration is required. Although stainless steel crowns have an aesthetic disadvantage, they are still the treatment of choice for the following reasons:
 - ▶ Durability
 - ▶ Efficiency
 - ▶ Longevity
 - ▶ Cost-effectiveness
 - ▶ Reliability
- ▶ Even though other tooth-colored restorations are available in the market, they are either costly or require more tooth reduction, thereby increasing the chances of pulp exposure.
- ▶ This session will highlight the clinical indication, contraindication and recommendation of stainless steel crowns in pediatric dentistry



Contents...

- Introduction
- Types of SSC
- Composition
- Indications
- Recommendations
- Contraindications
- Pre-operative evaluation
- Armamentarium



Introduction

- ▶ Introduced to pediatric dentistry by Dr. William Humphrey in 1950
- ▶ By definition they are prefabricated crown forms that are adapted to individual teeth and cemented with a biocompatible luting agent

Academy of Pediatric Dentistry. Special issue. Reference Manual. 21(5): 105, 1900-00.

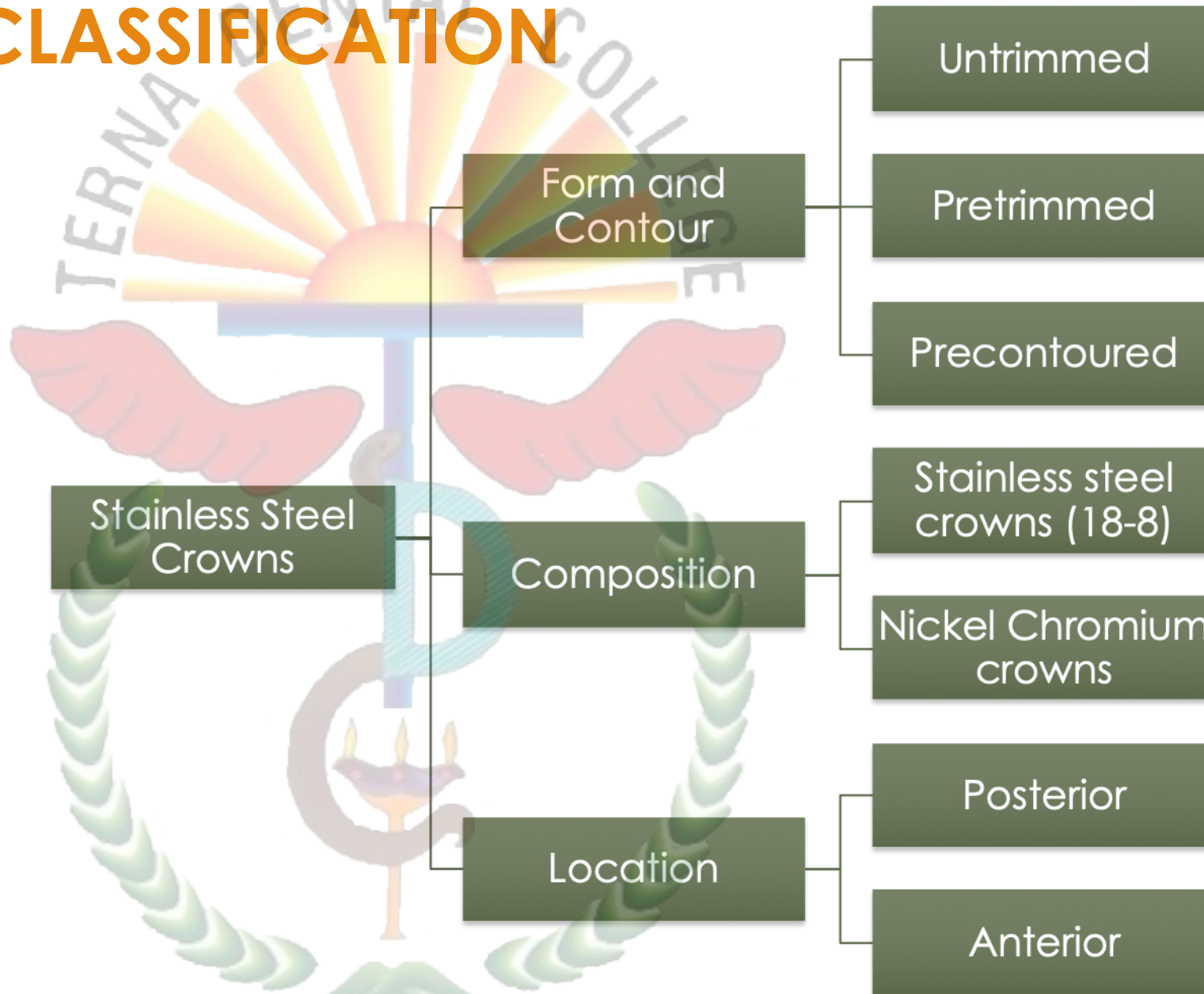


- Often referred to as Chrome-Steel crowns.
- The material used was an alloy containing 18% chromium and 8% nickel (called 18-8 alloy) with a carbon content of 0.8% to 20%.
- An alternative crown material is a Nickel-Chrome crown (Ion, 3M Dental Products). The material in this crown is an alloy of 77% nickel, 15% chromium, and 7% iron.
- Available in six sizes for each tooth and permanent first molars. Sizes 4 and 5 are the most often used. A size 7 is available for extra-large teeth.

(Mathewson et. al.)



CLASSIFICATION



ACCORDING TO FORM AND CONTOUR

- **Untrimmed Crowns (Rocky Mountain)** – Neither trimmed nor contoured, longer, require crimping and contouring, hence time consuming.
- **Pretrimmed crowns (Unitek stainless steel crowns, 3M, De novo crowns)** – the crowns are of normal length of the tooth, sides are non contoured but shorter, festooned, require contouring and trimming.



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- **Precontoured crowns (Ni-chro ion crowns and Unitek)** – festooned, precontoured & pre trimmed, minimal amount of adjustment necessary.
 - ❖ **Preveneered SSCs (Nusmile Crowns):** resin bonded composite bonded to the occlusal and buccal surfaces in a laboratory, more esthetic, expensive, require more tooth preparation and allow for only minimal crimping for crown adaptation.



➤ **ACCORDING TO COMPOSITION**

- **Stainless steel crowns** – Unitek and Rocky Mountain crowns – these alloys are made of austenitic steel – These alloys have good formability and ductility necessary for clinical adaptation – adequate hardness and wear resistance to resist opposing forces.
- **Nickel chromium crowns** – Iconel type of alloy - strain hardened during manufacturing.
- **Tin base alloys**
- **Aluminum base alloys**



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➤ ACCORDING TO LOCATION

- Crowns for anterior teeth
- Crowns for posterior teeth



➤ ACCORDING TO MANUFACTURER

- The Rocky Mountains
- Unitek
- 3M
- Iconel
- NuSmile Crowns



COMPOSITION

- ▶ There are generally 3 classes of stainless steel:
 - The *heat hardenable 400 series martensitic type*
 - The *non heat hardenable 400 series ferritic type*
 - Austenitic type consists of *chromium nickel manganese 200 series* and *chromium nickel 300 series*



AUSTENITIC SSC

- ▶ High ductility, low yield strength, and high ultimate strength.
- ▶ Readily welded and can be work hardened to high levels.
- ▶ Best corrosion resistance, especially when they have been annealed to dissolve chromium carbides and then rapidly quenched to retain carbon in solution.
- ▶ Rocky Mountain, Unitek and 3m ESPE use the austenitic types for their crowns referred to as 18-8 since they contain about 18% chromium and 8% nickel.



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COMPOSITION

Iron	67 %
Chromium	17 – 19 %
Nickel	9-13 %
Minor Elements (Carbon, Manganese)	Upto 4 %



Nickel Base Crowns

- These are ion crowns constructed of Iconel 600, a relatively new addition in preformed metal crowns, and is primarily nickel-chromium.
- The metallurgic characteristics of nickel-chromium alloy permit these crowns to be strain hardened during manufacture.
- Higher hardness renders the ion crown more difficult to contour and adapt to the prepared tooth.
- **Vickers Hardness Number:** 325-350 (Austenitic SSC's: 250-306)



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**NICKEL BASE CROWNS
(ICONEL 600 ALLOY)**

76% Nickel

15% - Chromium

8% - Iron

0.04% - Carbon

0.35% --Manganese



INDICATIONS

According to UK National Clinical Guidelines (*Int. J Ped Dent, 1999*)

- ▶ Restoration of carious primary molars where more than two surfaces are affected, or where extensive one or two surface caries is present.
- ▶ Following pulpotomy/pulpectomy procedures.
- ▶ Restoration of primary molars affected by developmental problems.
- ▶ Restoration of fractured primary molars.



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- ▶ Restoration and protection of teeth exhibiting extensive tooth surface loss due to attrition, abrasion or erosion.
 - ▶ In patients with high caries susceptibility.
 - ▶ As an abutment for certain appliances, such as space maintainers.
 - ▶ In patients where routine oral hygiene measures are impaired and breakdown of intracoronal restorations is likely.



American Academy of Pediatric Dentistry (J Ped Dent, Refer manual, 2004-2005)

► Recommendations:

1. Children at high risk exhibiting anterior tooth caries and/or molar caries may be treated with SSC to protect the remaining at-risk surfaces.
2. Children with extensive decay, large lesions, or multiple surface lesions in primary molars should be treated with SSC.
3. Strong considerations should be given to the use of SSC in children who require general anesthesia.

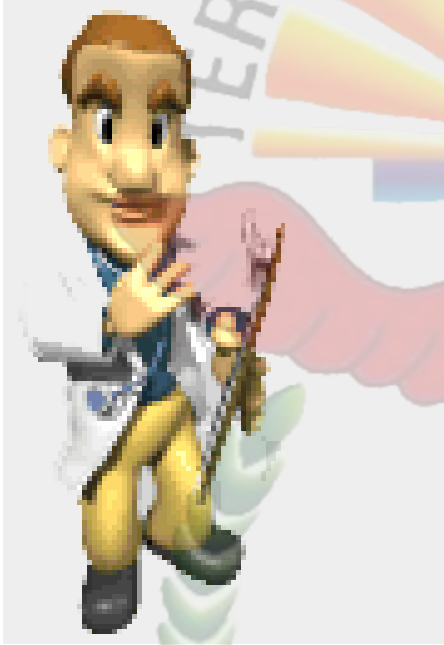


Contraindications

- ▶ Esthetics
- ▶ Teeth that are nearing exfoliation
- ▶ Mechanical problems
 - ▶ space loss
 - ▶ caries beneath the level of the bone
- ▶ Permanent restoration in the permanent dentition



Pre-Operative Evaluation



- ▶ Dental age of the patient
- ▶ Cooperation of the patient
- ▶ Motivation of the parents
- ▶ Medically compromised children



Armamentarium

- ▶ Burs and stones
 - ▶ 169 L
 - ▶ Green/heatless stone
- ▶ Pliers & Scissors
 - ▶ Contouring plier
 - ▶ Crimping plier
- ▶ Cementing instruments
- ▶ Polishing instruments



A – Contouring Plier

B – Crimping Plier

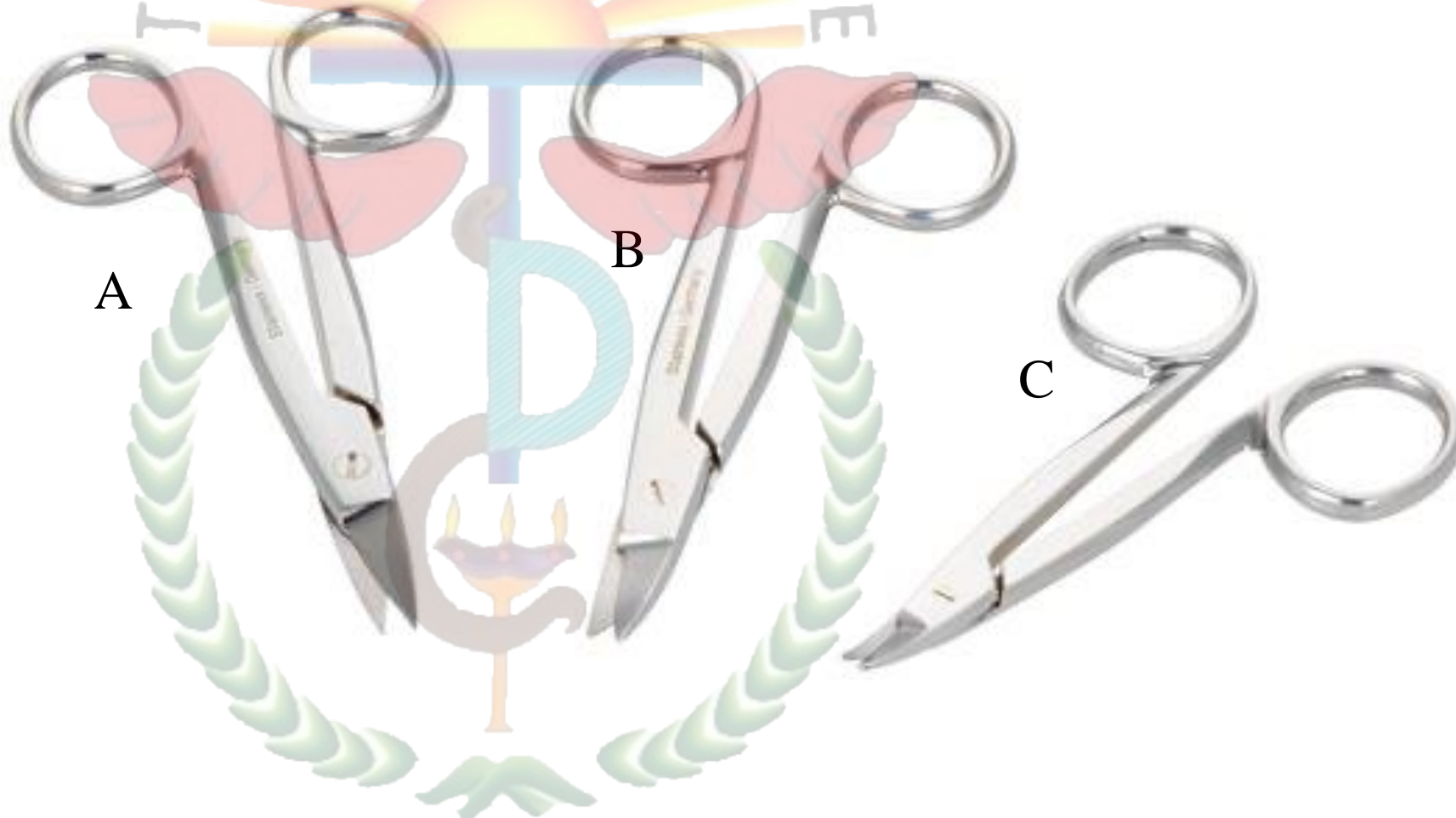
C – Small Crimping Plier



A - Straight Scissor **801201**

B - Curved Scissor **801202**

C - Festooning Scissor **801203**



3M™ ESPE™ Stainless Steel Crowns

Primary Molars

There are 48 crown sizes available in the 3M ESPE stainless steel primary molar crown range.

<i>Crown Shape</i>	<i>Number of sizes available</i>	<i>Width range mm</i>
Upper 1st primary molars	6	7.2 to 9.2
Upper 2nd primary molars	6	9.2 to 11.2
Lower 1st primary molars	6	7.3 to 9.3
Lower 2nd primary molars	6	9.4 to 11.4

Permanent Molars

There are 24 crown sizes available in the 3M ESPE stainless steel permanent molar crown range.

<i>Crown Shape</i>	<i>Number of sizes available</i>	<i>Width range mm</i>
Upper 1st and 2nd permanent molars	6	10.7 to 12.8
Lower 1st permanent molars	6	10.8 to 12.8

Conclusion

- ▶ The stainless steel crown (SSC) is an extremely durable restoration with several clear-cut indications for use in primary teeth including: following a pulpotomy/pulpectomy; for teeth with developmental defects or large carious lesions involving multiple surfaces where an amalgam is likely to fail; and for fractured teeth.
- ▶ In other situations, its use is less clear cut, and carries risk factors, restoration longevity and cost effectiveness are considerations in decisions to use the SSC.



Take Home Message

- ▶ It would be very difficult to justify restoring a primary molar requiring a large multisurface restoration with an alternative material or leaving it untreated to be compared with longevity of primary molars restored with SSCs.
- ▶ To have a thorough knowledge of armamentarium used for stainless steel crowns is very important for clinicians which will help them to follow the same in clinical steps of stainless steel crown in children.



Probable SAQ's

1. Indications and Contraindications of stainless steel crown in children
2. Advantages and Disadvantages of stainless steel crown
3. Enumerate modifications of stainless steel crown
4. Composition of of stainless steel crown
5. Classification of of stainless steel crown



Probable LAQ's

1. Write in detail about the indications, contraindications, advantages and disadvantages of Stainless Steel Crown.



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Thank u

