Stainless Steel Crown: A Review Article

Harsha Agrawal

Intern, Institute of Dental Sciences, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

Abstract

The upkeep of the primary dentition is a non-pathological and sound condition which is important for the general wellbeing of the kid. Stainless steel crown was presented in 1947 by the Rocky mountain company and advanced by Humphrey in 1950. Pre-assembled stainless-steel crown can be adjusted to singular primary teeth then being cemented to give a complete restoration. It provides full coverage restoration, cost-effective, generally modest, and is durable. It is used as a restorative material in both deciduous and permanent teeth where intracoronal restoration comes up short.

Keywords: *Primary tooth, stainless steel crown, pediatric dentistry.*

Introduction

In 1950, a stainless steel crown was introduced by Humphrey to pediatric dentistry. Since then it is used for the treatment of primary teeth that are badly broken as invaluable restorative material. Superior & longer clinical life span than multi-surface amalgam restoration. Durable, relatively inexpensive, quickly & easily placed with minimal technique sensitivity. The main disadvantage is the silver metallic appearance. One of the most widely recognized issues seen in pediatric dentistry in the early childhood caries of primary dentition that influence babies and little youngsters. This early childhood caries results in basic demolition of the teeth along with the nutritional problem. The most widely recognized approach to fix and keep up the rest of the tissue of seriously harmed teeth is utilizing stainless steel crown and covering the harmed crowns of the teeth.[1]

Table 1. History of Stainless-steel crown[2]

1950	Recommended by Humphrey & Engel.
1968	Encouraged familiar treatment molality by mink & Bennett.
1960	Significantly improved crown.

Stainless Steel Crown: Stainless steel crown is a semi-permanent restoration used in a primary and young permanent molar. This crown in primary dentition is the most proficient and reliable technique for restoration. Its resistance as well as retention form offers the advantages of this restoration.[3]

Types Stainless Steel Crown:

1. **Pretrimmed crown:** These crowns have straight, noncontoured sides, however, are decorated to follow a line corresponding to gingival crest. They still require shaping & some cutting.
2. **Precontoured crown:** These crowns are decorated & are likewise pre-contoured. Some cutting and molding might be vital however for the most pre-contoured part are negligible. On the off chance that cutting off these crowns becomes necessary, the pre-contoured will be lost and the crown will fit more freely than before cutting.
3. **Preveneered crown:** These are the treated steel crowns that have gum-based composite clung to the occlusal & buccal surface to make a more aesthetic posterior crown. They are more costly than normal tempered steel crown, require more tooth reduction & take into account just negligible pleating for crown adjustment.[4]

Table 2. Composition of different metal crowns

Stainless steel crown (Rocky Mountain)	a. 17-19% chromium b. 67%iron c. 10-13%nickel d. 4% minor elements

Nickel base crown (In Conell 600 alloy)	a. 72% nickel b. 6-10% iron c. 14%chromium d. 0.04% carbon e. 0.35% manganese f. 0.2% silicon

Table 3. Factors considered for pre-operation evaluation and armamentarium used before the use of mellitic crowns

Factors considered for pre-operation evaluation:	a. The patient's dental age b. The patient's cooperation c. Medically compromised patient d. Motivation of patient
Armamentarium:	1. Burs 2. Instrument 3. Pliers 4. Polishing & isolation 5. Cementing medium

Procedure: Administration of effective local anesthesia so that it will protect from some inevitable trauma of gingival as procedure extend sub-gingivally. Placement of rubber dam provides better visibility, protect tissues around the tooth, improve efficiency. The chosen crown should re-establish the contact area and occlusal arrangement of the readied tooth. The crown determination can be done by estimating the mesiodistal width of the tooth space with the help of a divider. It also measures the components of the contralateral tooth. Tooth preparation removes caries completely and provides sufficient space for a stainless steel crown. Re-establish the tooth using a glass ionomer cement or compomer before the stainless-steel crown preparation. Decrease the occlusal surface by about 1.5 mm with no. 247 flame-shaped bur. The occlusal reduction should be done with the preservation of tooth structure, pulp exposure chance should be less with proper crown retention potential. With the help of tapered diamonds but, cut interproximal cuts mesially & distally. Little buccolingual decrease is required which should be done as less required because these surfaces are significant for retention. Contact with adjacent teeth must be broken gingivally and buccolingually.[5] A suitable size of the pre-contoured crown is picked by estimating the mesiodistal width. For multiple crown placement in the same quadrant, the adjacent proximal tooth surface should be reduced more than usual. Try it should be done before the procedure of cementation. Crown ought to sit close to 1mm sub-gingivally. Crown should be cemented with glass ionomer cement or polycarboxylate cement. Remove the excess cement from the margins. The absence of release of excess amounts of cement reveals inadequate cement. The interproximal surface is cleaned, the region beneath the contact area is cleaned with dental floss. At last, the crown is checked for occlusion. The patient ought to be prompted that there might be some transitory gingival uneasiness when the local anesthesia's wear off.[6]

Hall Technique: Introduction of Hall techniques causes a drastic change in the use of stainless steel crown over the last 10 years. In Scotland, the hall technique was reported and during the audit of dental care, it was identified. Hall's technique is a novel method, for managing carious deciduous molars by cementing preformed metal crown over them. This technique is performed without local anesthesia, caries removal and tooth preparation are not required. To improve consistency in children and decrease nervousness related to dental treatment, apply techniques of behavioral management, stainless steel used should be increased by clinicians. Circumvent expenses of relish treatment and avoid negative child health impact. Reduce tooth extraction and broad treatment.[7]

Procedure:

1. The child should be upright.
2. Choose the smallest size crown to place.
3. All the cusp should be covered with a spring-back effect.
4. During try in the attempt of seating crown should not be done.

Advantages:

1. Clinically acceptable by dentists and patients.
2. Because of its resistance, retention, replacement, and life span stainless-steel crown is preferred over amalgam restoration.
3. Inexpensive and are durable.
4. They adjust to the tooth appropriately and do not bring about any spillage.
5. They offer full inclusion for the tooth, ensuring that it remains secure.
6. They can be set effectively on the tooth.
7. The best treatment of choice for children who need general anesthesia.

8. When contrasted with different materials utilized for restoration, a stainless steel crown has a 6% rate of success.
9. A tooth can be restored even if there is a significant loss in crown structure.

Disadvantages:

1. Unaesthetic because of metal exposure.
2. In partially erupted tooth it cannot be used.

Post-treatment instructions:

1. Precautions should be taken that child does not bite their tongue, cheek, or lip due to the effect of the anesthesia.
2. A mild pain killer can be given to the child by the dentist as to when the numbness has worn off, some discomfort may be experienced.
3. Stay away from sticky food for 3-4 days after crown insertion so that cement under it gets time to get harden.
4. Brushing and flushing should be done.

Alternatives: Silver amalgam, Composite

Stainless steel crown modifications:

Undersized tooth or the oversized crown: This normally occurs when long-standing interproximal caries cause space loss. To decrease the crown perimeter a cut is made on the buccal surface to the occlusal surface. The slice edges are re approximates to cover each other creation the crown periphery smaller. The crown is taken a stab at the tooth and the measure of disregarding fundamental is set apart on the crown. The covered edges are then spot welded. The crown is polished with a rubber wheel and fine abrasive.[8]

Oversized tooth or undersized crown: Isolate the edges varying and weld a bit of 0.004-inch orthopedic band material over the cut surface. After forming apply the bind to fill any infinitesimal insufficiency in the seal. Polish the soldered crown.

Deep subgingival caries: One methodology is to finish the indicated pulp treatment and afterward reestablish the pit planning with silver amalgam is considered as the substitute for the tooth structure. The proximal territory is cut as in standard crown preparation. The stainless steel crown is adjusted with the amalgam substitute for tooth structure at the interproximal finish line. If subgingival caries happens interproximal the unfestooned rocky mountain crown will be sufficiently profound to cover the arrangement.

Complications:

Crown tilt: Due to caries or inadequate use of instruments there may be the destruction of the lingual or buccal wall which may bring about completed crown tilting toward the inadequate side. Before crowning, restoration should be placed which offers to prevent tilting of the crown.

Interproximal ledge: If bur's angulation is not given correctly, then a ledge will be delivered rather than a shoulder free interproximal cut. Failure to expel this ledge brings about trouble in seating the crown.[9]

Inhalation or ingestion of crown: Till cementation proper isolation i.e. rubber dam should be placed because of cough reflex present in a child there will be more chances of crown ingestion. If this happens, the child should be held upside down as quickly. This results in the removal of the crown. If this is ineffective, clinical referral ought to be accomplished for a quick chest radiograph. If the crown remains in lung or bronchi, then it can be expelled by bronchoscopy.

Poor margin: Marginal integrity is decreased if the crown is ineffectively adjusted. Results in recurrent caries. An increase in gingivitis and plaque retention may occur. Stainless steel crown can be used as a restoring material where more than two surfaces are affected in a primary molar. Used in a child who is less than 6 years. In pulp therapy procedures. In the case of fractured primary molars. Excessive loss of tooth surface .eg Abrasion, erosion, bruxism. Children having high caries susceptibility. Used as an abutment. In the case of crossbite. Used in case of repetitive caries around the existing restoration. In the case where restoration is expected to last more prominent than 2 years.[10]

Contraindications: If a primary molar is about to exfoliate where the radiograph shows more than half the primary tooth resorbed.

1. Uncooperative patient.
2. Patient allergic to nickel.
3. In the case of grade 3 mobility.

Conclusion

A conclusion has arrived from clinical investigations that stainless steel crown may last longer than fillings for carious essential teeth, stainless steel crown outperform plastic reclamations when used to re-establish multisurface carious sores in deciduous molar teeth. Besides, it is the most cost-effective, extremely durable, and has minimum technique sensitivity material. All accessible evidence recommends that stainless steel crown should be used as a restorative material in deciduous primary molar tooth.

Funding: Nil.

Conflict of Interest: None

Ethical Approval: Not required.

References

1. Santamaría RM, Pawlowitz L, Schmoeckel J, Alkilzy M, Splieth CH. Use of stainless steel crowns to restore primary molars in Germany: Questionnaire-based cross-sectional analysis. Int J Paediatr Dent. 2018;28(6):587-594.
2. Yilmaz Y, Kara NB, Yilmaz A, Sahin H. Wear and repair of stainless steel crowns. Eur J Paediatr Dent. 2011;12(1):25-30.
3. Afshar H, Kamali Sabeti A, Shahrabi M. Comparison of Primary Molar Crown Dimensions with Stainless Steel Crowns in a Sample of Iranian Children. J Dent Res Dent Clin Dent Prospects. 2015;9(2):86-91.
4. Uston KA, Estrella MR. The stainless steel crown debate: friend or foe?. J Mich Dent Assoc. 2011;93(1):42-46.
5. Ludwig KH, Fontana M, Vinson LA, Platt JA, Dean JA. The success of stainless steel crowns placed with the Hall technique: a retrospective study. J Am Dent Assoc. 2014;145(12):1248-1253.
6. Bamdadian Z, Pasdar N, Alhavaz A, Ghasemi S, Bijani A. Comparative Evaluation of Physical and Mechanical Properties of Different Brands of Primary Molar Stainless-Steel Crowns: An In Vitro Study. Open Access Maced J Med Sci. 2019;7(23):4120-4126.
7. Atieh M. Stainless steel crown versus modified open-sandwich restorations for primary molars: a 2-year randomized clinical trial. Int J Paediatr Dent. 2008;18(5):325-332. Atieh M. Stainless steel crown versus modified open-sandwich restorations for primary molars: a 2-year randomized clinical trial. Int J Paediatr Dent. 2008;18(5):325-332.
8. Spedding RH. Two principles for improving the adaptation of stainless steel crowns to primary molars. Dent Clin North Am. 1984;28(1):157-175.
9. Threlfall AG, Pilkington L, Milsom KM, Blinkhorn AS, Tickle M. General dental practitioners' views on the use of stainless steel crowns to restore primary molars. Br Dent J. 2005;199(7):453-441.
10. Discepolo K, Sultan M. Investigation of adult stainless steel crown longevity as an interim restoration in pediatric patients. Int J Paediatr Dent. 2017;27(4):247-254.