

STAINLESS STEEL CROWN

It is another commonly used pediatric restorative material. It is used extensively for full coronal coverage restorations of primary teeth. Stainless steel crowns have undoubtedly preserved the function of many primary teeth that otherwise would have been unrestorable. They were originally developed to provide a 'restoration of last resort' for those teeth that were not salvageable by any other means.

In addition, stainless steel crowns are often used to restore all posterior teeth in young patients with high risk for caries who exhibit multiple proximal lesions that could otherwise be restored with silver amalgam or esthetic materials. Crowns are used instead simply because they better protect all posterior tooth surfaces from developing additional caries and because the posterior crown restoration has proven to be the most durable and cost-effective in the primary dentition. Anterior and posterior stainless steel crowns may have labial and/or occlusal resin or porcelain veneers to enhance aesthetics.

Indications

- 1. Extensive decay in primary teeth: Steel crown is indicated wherever one or more cusps are destroyed or weakened by caries. This commonly occurs in the first primary molars when the distal interproximal carious lesion is untreated.*
- 2. After pulp therapy: In both primary and permanent teeth, after pulp therapy tooth become more brittle. So, it is recommended to prevent post-operative tooth fracture by placing a stainless steel crown.*
- 3. As an alternative restoration of amalgam: Stainless steel crown is a preventive restoration because it helps to avoid amalgam failure or tooth fracture and to prevent caries from developing in other areas of the tooth. This application can be used in handicapped child who lack oral hygiene. Most of the practitioners no longer place MOD restorations in the first primary molars of preschool children rather they prefer to place a stainless steel crown.*
- 4. To mask the developmental defects of tooth: Linear hypoplastic defects can undermine the occlusal surface of primary molars if the systemic disturbances occur at natal and prenatal stage. Similarly, amelogenesis and dentinogenesis imperfects can alter tooth morphology and predispose the dentition to excessive wear and loss of cervico occlusal length.*

5. The stainless steel crown on the first permanent molar is frequently used as a semi-permanent restoration for certain period in adolescent patient. When adequate secondary dentine has formed then it is replaced by more permanent restoration like, porcelain.

6. Stainless steel crown can be used for space maintainer. For example, crown and loop space maintainer.

7. Multiple rampant caries cases.

8. Fracture of permanent and primary incisors: It is useful restoration in cases where the fracture is close to the gingival margin and likely to be subjected to occlusal stresses the strength of the stainless steel crown is a great advantage.

9. Severe bruxism cases.

The advantages:

1. Single visit for placement.
2. Relatively quick and simple procedure.
3. Usually reduce sensitivity totally, because they cover the whole tooth.
4. Inexpensive compared with cast restorations.
5. Good retention rate.

The disadvantages:

1. Require more tooth preparation.
2. Once a tooth has been prepared for a stainless-steel crown, it will need a full coverage restoration eventually.
3. Sub-gingival margins.

Operative technique

1. Obtain adequate anesthesia.
2. Isolate the tooth to be crowned.
3. Select the crown size.
4. Remove any carious dentine and enamel.
5. Replace tooth bulk with glass ionomer.
6. Reduce the occlusion minimally.
7. Reduce the mesial and distal surfaces; slicing with a fine tapered bur. Depending on the natural anatomy of the tooth it may be necessary to create a peripheral chamfer on the buccal and lingual surfaces.
8. Try the selected crown; adjust the shape cervically, such that the margins extend ~1 mm below the gingival crest evenly around the whole of the perimeter of the crown. Sharp Beebee scissors usually achieve this most easily, followed by crimping pliers to contour the edge.
9. After the contouring, smooth and polish the crown to ensure that it does not attract excessive amounts of plaque.

10. After test fitting of the crown remove the rubber dam to check the occlusion then re-apply for cementation.
11. Cement the crown usually with a glass ionomer based cement.
12. Remove excess cement carefully with an explorer and knotted floss.
13. Finally recheck the occlusion.

Anterior teeth

Most of the labial metal may be cut away, leaving a labial “window” that is then restored with resin-based composite. This restoration is called an open-face stainless steel crown.

Several brands of stainless steel crowns with esthetic facings veneered to the labial surfaces are also available to restore primary anterior teeth. Such crowns are available for direct adaptation to the prepared teeth and have had a significant amount of success.

Stainless steel crown modifications

1. For the Undersized Tooth or the Oversized Stainless Steel Crown: Make a cut with the help of curved scissor on the buccal surface of the oversized crown from cervical margin to the occlusal table. The one free crown margins insert under the other free margins to achieve correct size then spot welded, soldered and polished and cemented to the reduced abutment.
2. For the Oversized Tooth or the Undersized Crown: A vertical cut is made on the buccal surface of the crown. The margins are pulled apart and an additional piece of stainless steel band material is spot welded to the buccal surface to increase the dimensions of the crown. After contouring the crown, the cut surface is spot welded, soldered to fill any microscopic deficiency in seal. The crown is polished and cemented.
3. For Deep Subgingival Caries: Use untrimmed rocky mountain crown to encompass the preparation along with deep carious part.
4. For the Open Contact Problem: Select a larger crown or exaggerated interproximal contour can be obtained with 112 (ball and socket) pliers to establish a closed contact. Localized addition of solder can also build out the interproximal contour.

ATRAUMATIC RESTORATIVE TREATMENT (ART)

The Atraumatic Restorative Treatment (ART) is a procedure based on removing carious tooth tissues using hand instruments alone and restoring the cavity with an adhesive restorative material. Another terminology used for ART is Alternate Restorative Treatment. Usually carious lesions are left untreated in children of underprivileged communities of developing and underdeveloped countries mainly because

of financial problems and lack of awareness. The treatment requires qualified personnel and expensive equipment. The absence of clean and pressurized water and irregular supply of electricity make it impossible for oral healthcare personnel to work efficiently. This method was presented for treating dental caries, which involved neither drill or water nor electricity at the headquarters of the WHO, Geneva, on World Health Day (April 7th, 1994).

Advantages of ART

- Easily available inexpensive hand instruments are used rather than the expensive electrically driven dental equipment.
- As it is almost a painless procedure the need for local anesthesia is eliminated or minimized.
- ART involves the removal of only decalcified tooth tissues, which results in relatively small cavities and conserves sound tooth tissue as much as possible.
- Sound tooth tissue need not be cut for retention of filling material. The retention is obtained by the chemical adhesion of glass ionomer restorative material with cavity walls.
- A practice of straightforward and simple infection control is used without the need to use autoclaved hand pieces.
- The leaching of fluoride from glass ionomer probably remineralizes the demineralized dentin and prevents development of secondary caries.
- The combined preventive and curative treatment can be done in one appointment.
- Repairing of defects in the restoration can be easily done.
- It enables the oral health workers to reach people who otherwise never would have received any oral health service.

Disadvantages of ART

- ART restorations are not long lasting. The average life is two years depending upon the rate of caries activity of the individual oral cavity.
- As fundamental principles of cavity preparation are not followed all oral health workers may not accept it.
- Because of the low wear resistance and low strength of the existing glass ionomer materials their use is limited to small and medium sized one surface cavity only.
- The continuous use of hand instruments over long period of time may result in hand fatigue

Other Applications of ART

- *ART procedure helps in reducing dental anxiety: In patient especially popular in children and young dental patient.*
- *Early childhood caries in toddlers.*
- *Patient with contraindications for local anesthesia.*
- *Those Patients who are with mentally or physical handicapped.*
- *Children who present with behavior management problems, e.g. those who under normal situations cannot be treated except under sedation or general anesthetic agent. They have been found manageable with the use of ART.*

PATIENT PREPARATION AND ARMAMENTARIUM FOR ART

The operator's work posture and positions

- *The work posture and position of the operator should provide the best view of the patient's mouth and both patient and operator should be comfortable.*
- *The operator sits firmly on the stool, with straight back, thighs parallel to the floor and both feet flat on the floor. The height of the stool must then be adjusted so that the operator can see the patient's teeth clearly.*
- *The head and neck should be still, the line between the eyes horizontal and the head bent slightly forward to look at the patient's mouth.*
- *The distance from the operator's eye to patient's tooth is usually between 30 and 35 cm. The operator should be positioned behind the head of the patient. The exact position will depend on the area of the patient's mouth to be treated.*

Assistance

- *When treating patients, particularly children using ART, it is a great advantage if another person can mix the glassionomer.*
- *The assistant works at the left side of a right-handed operator and does not change position and should sit as close to the patient support as possible, facing the patient's mouth.*
- *The assistant's head should be 10 to 15 cm higher than the operator, so that the assistant can also see the operating field and can pass the correct instruments when needed.*

Patient Position

A patient lying on the back on a flat surface will provide safe and secure body support and comfortable and stable position for lengthy periods of time.

Operating Light

• *The light source can be the sun (natural) or artificial. The latter is more reliable and constant than natural light and can also be focused on a particular spot. Therefore, a portable light source is recommended, e.g. a headlamp or a light attached to the mouth mirror.*

Essential Instruments and Materials for ART Procedure

The success of ART depends on the operator knowing the functions of the various instruments and using them properly and correctly. They must also be maintained in a good condition. The following instruments can be used in ART.

- 1. Mouth mirror, tweezers and explorer.*
- 2. Spoon excavator: used for removing soft carious dentine.*
- 3. Dental hatchet: used for widening the entrance of the carious lesions and for slicing away thin unsupported enamel.*
- 4. Carver: it has two functions; the blunt end is used for inserting the mixed GIC into the cavity as well as into pits and fissures. The sharp end is designed to remove excess restorative material and to shape the GIC restorations.*
- 7. Mixing pad and spatula: These are necessary for mixing GIC (disposable paper pad and the plastic spatula which is called agate spatula).*

Other Materials used in ART

- 1. Cotton rolls and pellets: for isolation and cleaning and drying cavities.*
- 2. Petroleum jelly: used to keep moisture away from the glass ionomer restoration during setting.*
- 3. Plastic strip and dental floss: used for contouring the proximal surface and removal of excess material of multiple surface restorations.*
- 4. Wedges: used to hold the plastic strip close to the shape of the proximal surface of the tooth.*
- 5. Restorative material: GIC is the choice of filling material in ART.*

Technique

Tooth isolation → tooth cleaning → widening the entrance → remove the carious lesion → if necessary pulp protection by $\text{Ca}(\text{OH})_2$ → cleaning the cavity → acid etching → GIC is mixed according to manufacturer → fill the cavity → a gloved finger smeared with petroleum jelly is pressed on the occlusal surface with slight pressure → bite is checked → carving → cover the filling with petroleum jelly again or with varnish → instruct the patient not to bite on the tooth at least 30 min.