STAINLESS STEEL CROWNS

Department of Paedodontics and Preventive Dentistry, DYPDS.

INTRODUCTION & HISTORY

1947—Preformed crowns (PMC) were introduced by Rocky Mountain company

1950—Stainless steel crown (SSC) was described by Engel and popularized by Willium Humphrey to Pediatric dentistry

1950 to 1968—Various modifications in preformed crowns occurred

1964—Biologic restoration were advocated by Chosak and Eildeman

1970—Polycarbonate crowns were introduced

Babaji P. Crowns in pediatric dentistry. Jaypee Brothers Medical Publishers (P) Limited; 2015.

1971—Mink and Hill advised SSC modification for over and undersized crowns. SSC medications for deep subgingival caries and solder joint for interdental spacing. SSC modification for deep subgingival caries.

1977—McEvory advised modification of SSC technique for SSC with arch length or space loss

1980 to 1990—Various preveneered stainless steel crowns (PVSSC) were introduced

1980—Pedo Pearls crowns were introduced

1981—Nash advocated modification of SSC for adjacent crowns placement

Babaji P. Crowns in pediatric dentistry. Jaypee Brothers Medical Publishers (P) Limited; 2015.

1983—Hartman advised veneered SSC technique for esthetic anterior crown restoration

1987—Cheng crowns were introduced by Peter Cheng

1989—Kinder crowns were introduced

1990 to 1995—Hall technique was introduced by Dr Norna Hall for SSC adaptation on carious tooth without tooth preparation

1993—Beemer *et al.* advised band adaptation on SSC crown as space maintainer rather than crown and loop

1997—Pedo natural crowns were introduced to market

1997—Zirlock (Incisalock) technology was introduced for better retention of preveneered crowns

2002—Kuietzky advised split technique of rubber dam isolation technique for restoration of multiple primary anterior teeth

2010—EZ zirconia crowns were introduced by Hansen JP and Fisher JP as pediatric esthetic crowns.

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DEFINITION

STAINLESS STEEL CROWNS can be defined as prefabricated crown forms that are adapted to individual teeth and cemented with a biocompatible luting agent

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INDICATIONS

FOR PRIMARY TEETH

- Following pulp therapy
- Extensive carious lesions with three surface carious lesions
- Primary teeth with enamel or dentin defects like hypoplastic enamel, amelogenesis imperfecta, dentinogenesis imperfecta
- Fractured teeth
- Abutment for space maintainer

Mathewson RJ, Primosch RE. Fundamentals of pediatric dentistry. Quintessence Books; 1995.
Dean JA, editor. McDonald and Avery's Dentistry for the Child and Adolescent-E-book. Elsevier Health Sciences; 2015 Aug 10.
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Randall RC. Preformed metal crowns for primary and permanent molar teeth: review of the literature. Pediatric Dentistry. 2002 Sep 1;24(5):489-500.
Garg V, Panda A, Shah J, Panchal P. Crowns in pediatric dentistry: A review. Journal of Advanced Medical and Dental Sciences Research. 2016 Mar 1;4(2):41.

- Teeth with extensive wear
- Where amalgam is likely to fail (eg) proximal box extended beyond the anatomic line angles
- Hypoplastic teeth cannot be adequately restored with bonded restoration
- Attachment for habit breaking and orthodontic appliance
- As preventive restoration
- For children who require treatment under general anesthesia
- Severe bruxism

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FOR PERMANENT TEETH

- Extensive carious lesions
- Developmental defects – beneficial for restoring the occlusion and reducing sensitivity caused by enamel and dentin dysplasias in young patients
- Interim restoration of broken down or traumatized tooth or orthodontic status is established
- Tooth which require full coverage restoration but is only partially erupted

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CONTRAINDICATOINS

- Primary molars close to exfoliation
- Primary molars with more than half the roots resorbed
- Teeth that exhibit mobility
- Teeth which are not restorable
- Patients with known nickel allergy

Marwah N. Textbook of pediatric dentistry. Jaypee Brothers, Medical Publishers Pvt. Limited; 2018.

CLASSIFICATION

According to trimming	Untrimmed crowns Pretrimmed crowns Precontoured crowns
According to composition	18-8 austenitic stainless steel crown Nickel-chromium crowns
According to position	Crowns for posterior teeth Crowns for anterior teeth
According to company	The rocky mountain Unitek 3M Iconel NuSmile crowns
According to occlusal anatomy	Ion-compact occlusal anatomy Unitek-best occlusal anatomy Rocky mountains-occlusally small Ormco-smallest and least occlusally carved

Marwah N. Textbook of pediatric dentistry. Jaypee Brothers, Medical Publishers Pvt. Limited; 2018.

COMPOSITION

STAINLESS STEEL CROWN

- Made up of austenitic alloy (18-8).
- Good formability and ductility, adequate hardness and wear resistance to resist occlusal force.
- The austenitic types provide the best corrosion resistance of all the stainless steel,
- e.g. Rocky Mountain, Denovo crown and Unitek 3M.
- Low-carbon alloy steels contain atleast 11.5% chromium

- COMPOSITION:

  Iron – 67%

  chromium – 17-19%

  nickel – 10 – 13%

  minor elements – 4%

NICKEL BASE CROWNS (Ion Ni-Ch crown-3M):

- Widely used and are strain hardened during manufacturing.

- Nickel base crowns are iconel 600 types of alloys. The alloys have good formability and ductility necessary for clinical adaptation of crowns and wear resistance to resist opposing occlusal forces. The metallurgical characteristics of Ni-Chrome crown allows the crowns to be fully shaped and strain hardened without a defect during manufacture e.g. 3M crowns.

- Composition:

    Nickel – 76%

    Chromium – 15%

    Iron – 8%

    Carbon – 0.08%

    manganese – 0.35%

    Silicon – 0.2%

Tin based crown/Tin-silver alloy crowns:

- These crowns are readily adaptable but are not permanent as stainless steel or nickel based crowns.
- These crowns are made from high purity tin-silver alloy that is soft and ductile. Used for permanent molars and premolars.
- Provide a positive contact point with either natural or artificial neighbouring teeth.
- The crown margin is easy to burnish.

- Prefinished, belled and contoured
- Ductile can be stretched and burnished to fit prep margins
- Faster placement than acrylics or chemical resins for single units.
- For example, 3M™ Iso-Form™ crown
- Composition:

  Tin - 96%

  Silver alloy - 4%

Aluminium based crowns:

- They are readily adaptable with lesser clinical durability
- These are made up of aluminium alloys containing

Manganese - 1.2 %

Magnesium - 10 %

Iron - 0.7 %

silicon - 0.3 %

Copper - 0.25 %

Morphology/shape

Uncontoured and untrimmed crowns

- These crowns are untrimmed and uncontoured requires extensive trimming and contouring.
- These types are special indicated for deep proximal caries.
- They requires more chairside time for adaptation
- Eg. Unitek

Pretrimmed crown

- These are straight, noncontoured and pretrimmed crowns.
- Festooning is done to follow a line parallel to the gingival crest.
- They require additional contouring and trimming.
- Eg. Unitek-3M, Denovo crown

Precontoured and pretrimmed crowns

- These crowns are prefestooned and pre contoured types.
- They stimulate the normal appearance of the tooth.
- They require minimal trimming and contouring.
- Precontoured and pretrimmed crowns are most widely used.
- Eg. Ni-Chromium Ion crowns, Unitek-3M crowns

COMMERCIAL AVAILABILITY

Rocky mountain:

- It is made up of 18-8 steel.
- It is not prefestooned and requires trimming.
- Occlusal table is narrower buccolingually.
- It is easily dislodge with occlusal interference.

Ormco company:

- It is prefestooned crown with broader occlusal table and long gingivo-occlusal height.
- Require gingival trimming.
- It has prominent marginal ridge and can dislodge with occlusal interference.
- It can provide excellent restoration after proper beveling and trimming.

Unitek:

- It is variant of rocky mountain and Ormco company.
- It is made up of 18-8 steel.
- It is prefestooned with rounded cusps, shallow cuspal angles, preventing lateral excursion.
- It has broader occlusal table buccolingually, thus requires less tooth reduction.
- It causes minimum occlusal interference.

3M company:

- It is nickel based crown.
- These are pretrimmed and precontoured crowns.
- It is easy to fit and require least amount of additional crimping, trimming and contouring.
- ***3M Iso-form crowns***: These are tin-based crowns.

Denovo crown:

- These are pretrimmed crowns, requires additional contouring

SIZE

Crown shape	Number of sizes available	Width range (mm)
Upper 1st primary molar	6 (2–7)	7.2–9.2
Upper 2nd primary molar	6 (2–7)	9.2–11.2
Lower 1st primary molar	6 (2–7)	7.4–9.4
Lower 2nd primary molar	6 (2–7)	9.4–11.4
Upper 1st permanent molar	6 (2–7)	10.7–12.8
Lower 1st permanent molar	6 (2–7)	10.8–12.8
Upper 1st primary molar	7	6.6–9.0
Upper 2nd primary molar	7	8.5–11.0
Lower 1st primary molar	7	6.9–9.3
Lower 2nd primary molar	7	8.5–11.5

HALL TECHNIQUE

Based on biologic or minimal cutting approach and named after DR NORNA HALL, a general dental practitioner from Scotland.

Advantages

- Quick and noninvasive
- No tooth preparation is needed
- No need for caries removal
- No need for local anesthesia and rubber dam
- Acceptable to dentist, parent and child

Disadvantages

- Untreated caries may cause pulp pathology
- Difficulty in retreatment
- It is a supplement to conventional technique but not a substitute

INDICATIONS

- Class I – non-cavitated lesion where in the child is unable to accept fissure sealant
- Class I – cavitated lesion where in the child is unable to accept caries removal or conventional restoration
- Class II – cavitated or non-cavitated lesions

CONTRA-INDICATIONS

- Signs or symptoms of irreversible pulpitis
- Clinical or radiographic signs of pulp exposure
- Unrestorable crowns
- Patient at risk for bacterial endocarditis

TECHNIQUE

Placement of separators is mandatory

1. Size – smallest crown that covers all the surfaces is selected

2. Fill – dry and fill with GIC

3. Locate and Seat – Seat using finger pressure and ask the child to bite on it

4. Wipe – excess cement wiped off

5. Seat further – ask the child to bite on crown for 2 to 3 minutes

6. Clean – remove excess cement by scalar and floss the contacts

ARMAMENTARIUM

- Local anesthesia
- Rubber dam
- Wooden wedge
- Scalar or any sharp instrument
- Crown seater and remover
- Stone and finishing burs for crown finishing
- For cementation – luting cement, glass slab, spatula
- Miscellaneous – articulating paper, wax sheet, glass marking pencil

- Other crown cutting burs – pear shaped, tapering fissure, needle shaped, smoothening burs
- No. 69L bur for proximal surfaces

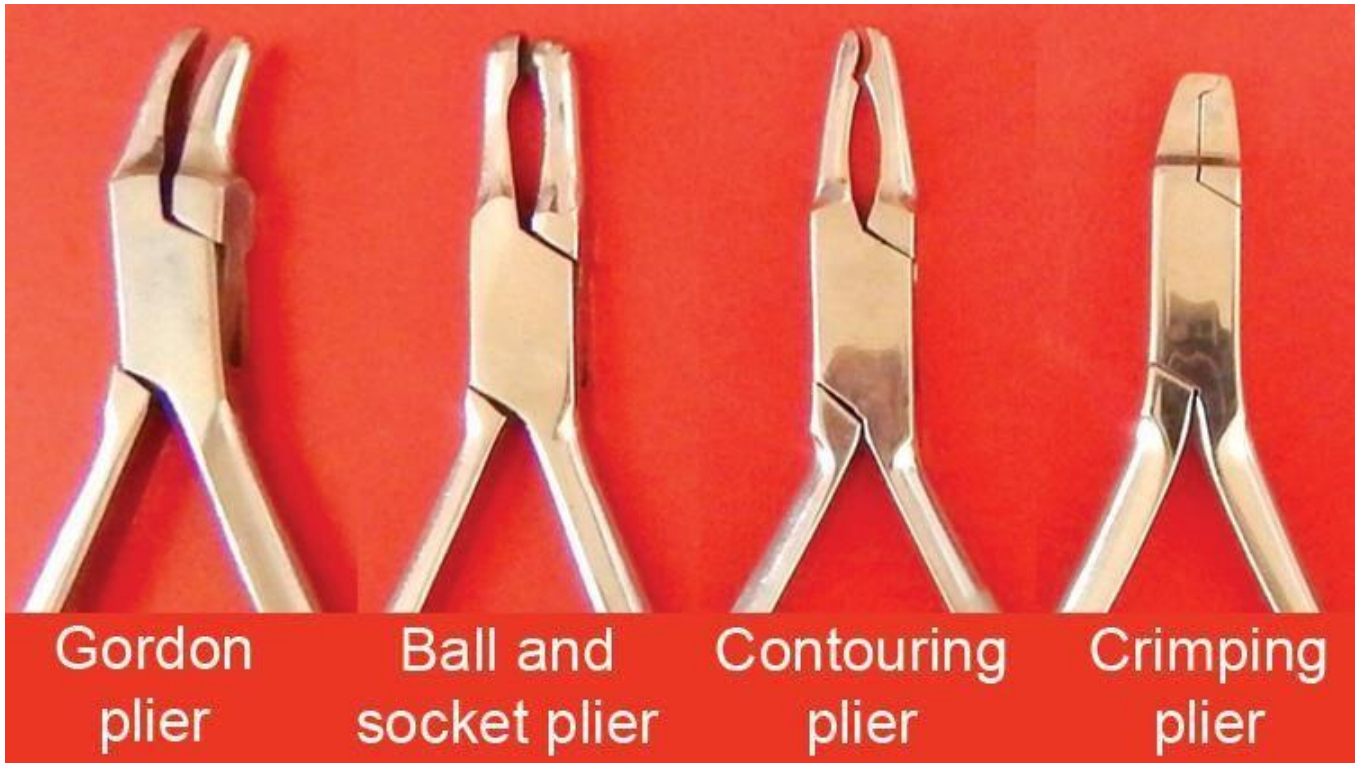
- Pliers –

  Hoe pliers,

  No. 114 Johnson contouring pliers,

  No. 417 crimping pliers,

  No. 112 Ball and Socket pliers



- Crown and bridge scissors

Crown cutting scissors (Festooning, curved, starignt and all purpose scissors: (A) Festooning scissor; (B) Straight crown cut scissor; (C) Curved scissor; (D) All purpose scissor; (E) Crown cutting scissor; (F and G) Crown cutting scissors: (i) Curved festooning; (ii) Straight smooth; (iii) Curved **A E F G B C D** 02.

EVALUATION OF PREOPERATIVE OCCLUSION

- OBJECTIVE: To replicate the existing occlusion
- To assess: Midline and Cusp-fossa relationship bilaterally
- Transfer the occlusion on to a wax sheet
- Also evaluate the dental age of the patient, cooperation of the patient and medically compromised /developmentally disabled children

Mathewson RJ, Primosch RE. Fundamentals of pediatric dentistry. Quintessence Books; 1995.

CROWN SELECTION

- Smallest crown that completely covers the preparation
- Spedding – 2 factors

    1. Operator must establish the correct occlusogingival crown length

    2. The crown margins should be shaped circumferentially to follow the natural contours of the tooth’s marginal gingivae

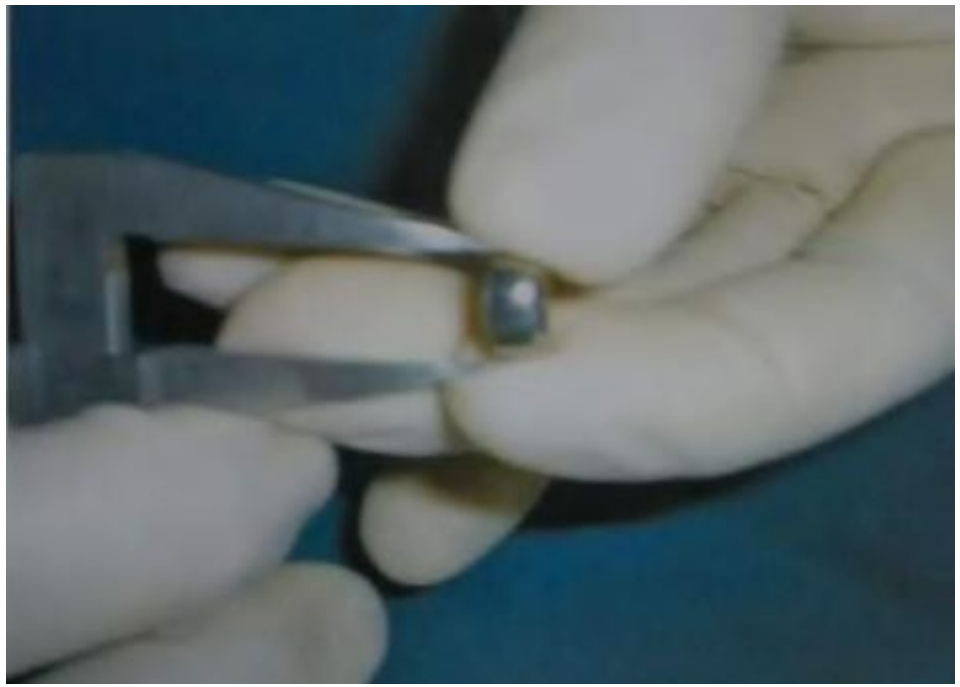
- Considerations for crown selection

Adequate mesiodistal diameter, light resistance to seating and proper occlusal height

Mathewson RJ, Primosch RE. Fundamentals of pediatric dentistry. Quintessence Books; 1995.

2 methods

Measuring the internal mesiodistal dimension by using boley gauge or Vernier caliper before tooth preparation



Crown selection after tooth preparation

TOOTH PREPARATION

- Occlusal reduction
- Proximal reduction
- Buccal/lingual reduction
- Finishing
- Evaluation

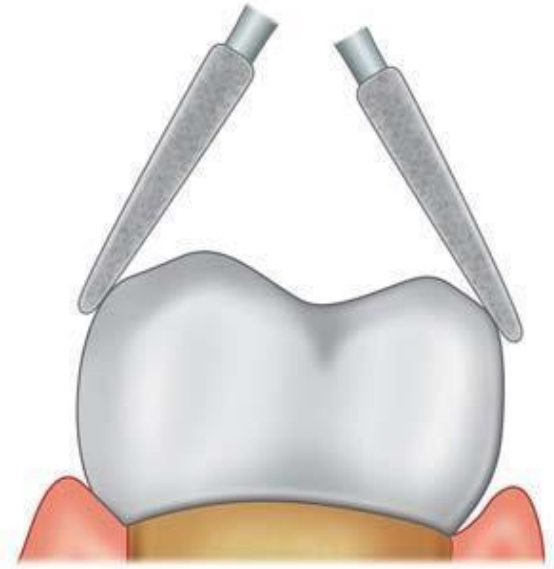
OCCLUSAL REDUCTION

- Occlusal reduction to be done prior to proximal to avoid invisibility of preparation areas due to blood contamination

- **Full *et al.* (1974)** considered that occlusal preparation should be done first to allow better access to the proximal areas of the tooth. While other authors suggest the proximal reduction before the occlusal surface

- **Mink and Bennett (1968)** recommended initial placement of 1 mm deep grooves in the occlusal surfaces, which helps to establish the correct amount of occlusal surface reduction.
- Use carbide fissure bur or flame-shaped bur to reduce the occlusal surface by 1.5 to 2 mm, following the cuspal outline and maintaining the original contour of the cusps.
- Reduction is determined by comparing the marginal ridges of adjacent teeth

S no	Researchers	Year	Occlusal reduction in mm
1	Humphrey	1950	Cusps should be reduced if necessary
2	Mink and Bennet	1968	1-1.5mm uniform reduction
3	Mathewson et al	1974	1-1.5mm
4	Troutman and Kennedy	1976	1.5-2mm
5	Rapp	1966	Preparation height 4mm from gingival margin



PROXIMAL REDUCTION

- The proximal contact needs to be cleared for two reasons:

    1. Caries starts at or beneath the contact area

2. If there is no clearance then the metal is unable to slide past the contact area and into residual undercut.

- Use no. 69L tapering fissure or needle burs with a main objective of breaking the contact

- Slice the mesial and distal surfaces with needle bur
- Break the contact with tapering fissure bur
- Hold the bur slightly along the long axis of the tooth and extend the slice to the buccal and lingual line angles giving 2 to 5^{o} taper
- To obtain retention, the crown must seat at the depth of 1 mm subgingivally and there should be no gingival blanching

- **Objective**: near vertical reduction with gingival margin for feather edge without any shoulder or ledge
- Excessive taper – poor retention
- Shoulder or ledge – difficulty in seating the crown
- Note: Avoid damage to adjacent teeth by placing a separator or a wedge

BUCCAL/LINGUAL REDUCTION

- Buccal and lingual reduction is optional
- **Duggal and Curzon** suggested trying selected crown for size before carrying out lingual or buccal reduction.
- **Mink and Bennet (1968)** suggested that buccolingual reduction is not done for retention, which is undertaken only if the buccal or lingual bulges obstruct crown placement such as for primary mandibular first molar tooth which has bulky buccal surface **(Mathewson *et al.* 1974, Andlaw and Rock, 1984).**

- No more than **0.5 to 1 mm** tooth structure should be removed buccolingually.
- Knife edge finish line should be achieved **0.5 to 1 mm** below gingival sulcus.
- Some authors suggest, **0.5mm** of reduction confining to the occlusal one-third only by mesiodistal strokes using tapered fissure bur at **30 to 45^{o} angle** to occlusal surface
- Natural undercuts are maintained that aids in retention

FINISHING

- Reduce and round off all the line angles and sharp corners using No. 69L bur to prevent stress concentration avoiding further reduction

- Occlusal clearance of 1 to 1.5mm gap is verified by asking the patient to bite on a wax sheet and no marking of the prepared tooth should be observed

- Proximal surfaces verified by passing a thin probe and felt for ledges

- Bevelling:

  Line angles bevelled at an angle of 30 to 45 degrees

  Round occlusobuccal and lingual surfaces

  Remove sharp cusp tips

  There should be unobstructed crown placement.

EVALUATION CRITERIA FOR CORRECT TOOTH PREPARATION

- The occlusal clearance should be **1.5 to 2 mm.**
- Proximal slices converge toward the occlusal and lingual, following the normal proximal contour.
- An explorer can be passed between the prepared tooth and the proximal tooth at the gingival margin of preparation.
- Optional buccal and lingual surface are reduced at least **0.5 mm** with reduction ending in a **feather edge 0.5 to 1 mm into the gingival sulcus**.

- The buccal and lingual surfaces converge slightly towards the occlusal.
- All the line angles in the preparation are rounded and smoothened.
- The occlusal third of buccal and lingual surfaces are gently rounded.
- Gingival finish line of preparation should be feather edge without ledge.

CROWN ATTACHMENT

- To prevent ingestion or inhalation,
- Solder a hook on lingual aspect of crown and attach floss to it
- Solder a lingual attachment to tie a floss
- Attachment of floss to buccal surface using special glue. A best method as it doesn’t interfere with crown manipulation

CROWN ADAPTATION

- Remove rubber dam if its been used
- **Festooning** of proximal surfaces before trying to limit the false blanching
- Place the crown **from lingual** and rotate it towards the buccal side
- Loose fit with **2 or 3mm** excess gingivally . Mark with scalar or glass marking pencil where the scratch line indicates the gingival line
- Remove and cut the crown **1mm** below the scratch line

- Smoothen the edges with finishing burs
- Retry the crown and trim only in the areas blanching is visible
- Gingival extent checked with probe; not more than 1mm on buccal and 0.5mm on lingual
- The subgingival placement of crown around the tooth is justified since for primary teeth, the buccal, lingual and proximal contours are just above the gingival crest and the objective is to engage the crown in natural undercuts

CONTOURING

- Contour to reciprocate the original contour of tooth
- Minimal contouring aids in better anatomy and hence better retention
- **No. 114 Johnson contouring** pliers is used.
- A Ball and Socket pliers is used to contour the buccal and lingual surfaces by holding the pliers and force is exerted from the opposite side of the crown to bend the gingival 1/3rd of the crown inward
- Advantage: crown gets work hardened by manipulation and becomes more retentive

CRIMPING

- Necessary for gingival health
- **No. 117 crimping pliers** is used to crimp the gingival 1/3rd of the crown
- The pliers must be walked through the entire crown continuously without lifting.
- Advantage: protection of soft tissues, prevention of leakage of cements, prevention of contamination and adequate retention

CHECKING THE FINAL FIT

- Retry the crown and check all the margin for proper adaptation with an explorer
- Seat the crown from lingual to buccal and snap into position under finger pressure
- Quality of retention is dependent on its snug fit onto the tooth
- Evaluate occlusal harmony and compare with preoperative occlusion
- Check for destabilization or rocking of crown by pressing an explorer on occlusal aspect to apply load
- Critically evaluate for blanching and pre-cementation radiograph to be taken

CROWN FINISHING

- Margins finished with green stone burs
- Slow speed handpiece will produce a sharp featheredge margin
- Crown is finished with finishing burs
- Polished with rubber wheel or rouge

CROWN CEMENTATION

- Remove, clean and dry the tooth and the crown. Isolate.
- According to **Myers in 1983**, advocated application of **varnish** before cementing crown to **prevent postoperative sensitivity** due to exposed tubules in case of a vital tooth
- Mix and load the cement. At least 2/3rd of the crown must be filled
- Seat the crown from lingual to buccal side.
- Remove excess cement

CEMENTSUSED FOR CROWN CEMENTATION

CLASSIFICATION

CHIEF INGREDIENTS (Craig) :

- Zinc phosphate
- Zinc oxide eugenol
- Zinc polyacrelate
- Glass ionomer
- Resin

BONDING MECHANISM (O'Brien):

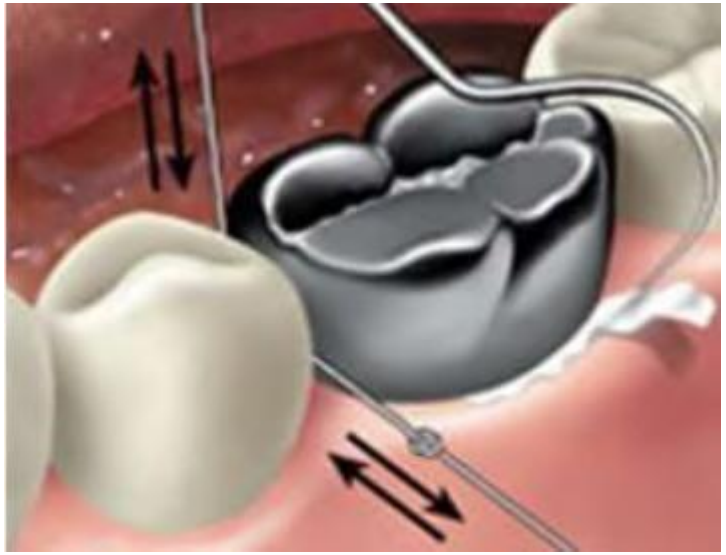
- Phosphate based
- Phenolate based
- Polycarboxylate based
- Methacrylate based

PRINCIPLE SETTING REACTION (Wilson):

- Acid base cement
- Polymerization cement

FINISHING OF CROWN

- Re-evaluate **occlusion**
- Advisable to move a waxed **floss in the inter-proximal** aspect to check for excess cement that might cause irritation and inflammation
- Remove excess using **scalar or explorer** from the buccal and lingual aspect
- Finished crown is shown to the child for positive reinforcement



MODIFICATIONS

1. Adjacent SSC – (Nash 1981)

- According to **Nash (1981),** additional reduction of adjacent proximal surfaces of teeth when adjacent teeth are to be restored with SSC simultaneously
- One at a time ! Otherwise, it can cause encroachment of space for either one of them
- To restore carious adjacent teeth with SSC both the preparations should be modified to allow the teeth to be fitted with smaller sized crowns than normal and further reduction of the buccal and lingual tooth walls is carried out rather than more proximal reduction.

- Howe No. 110 pliers can be used to flatten the contact to adjust proximal contour of SSCs.

- **Posterior most crown is cemented first** and final check for proper broad contacts between crowns is done

2. SSC with adjacent restoration – (Nash 1981)

- When SSC and amalgam restoration are planned in single appointment, **SSC is done first followed by amalgam**
- To allow for proper contour of the SSC crown's marginal ridge with indicated amalgam restoration.
- The stainless steel crown is used as a guide in reproducing the anatomy and morphology of the amalgam restoration.

3. Adjacent SSC with arch length loss/space loss - (Mc Evoy 1977)

- Extensive and **long-standing carious lesion** can cause shift of primary teeth into interproximal contact areas leading to **arch length loss**
- Usually crowns will adjust to tooth preparation individually but cannot be placed at the same time because of the mesial drift. Crown preparations are reduced further and contacts of the crowns are flattened with hoe pliers

- According to **Myers**, **more tooth reduction** can be done to enable the crown to fit into the available mesiodistal space

- According **to Nash in 1981**, additional reduction of adjacent proximal surfaces of the teeth when adjacent teeth are being restored

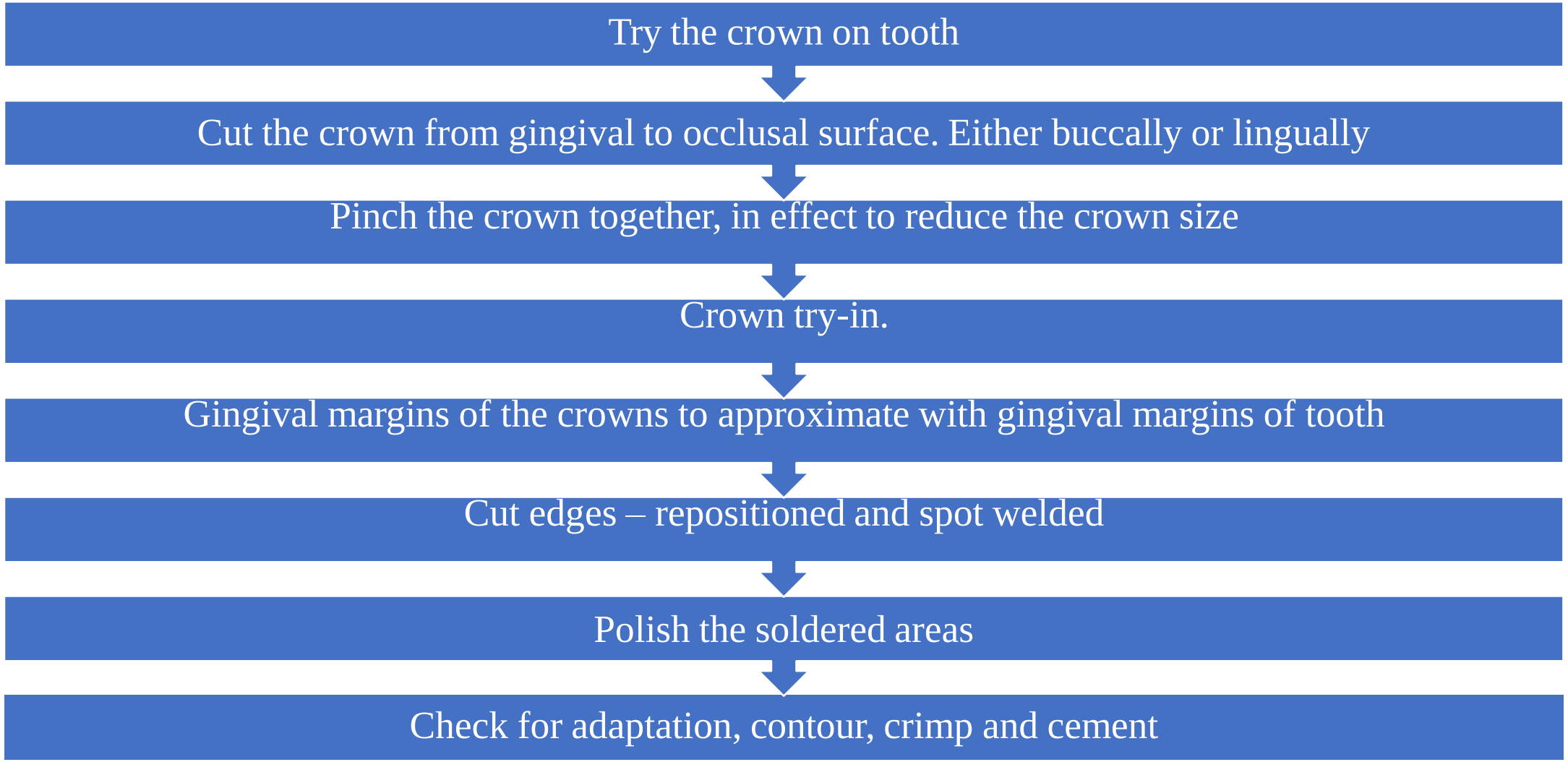
4. Contralateral 1st primary molar – (McEvoy 1977)

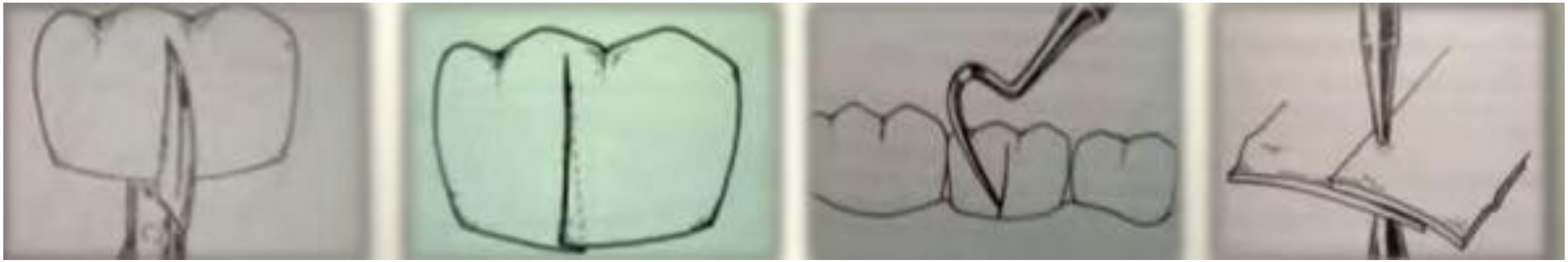
- Primary maxillary first molar crown can be used to restore the morphologically altered primary mandibular first molar of the opposite side

5. Modification in crown size – (Mink and Hill, 1971)

- A larger crown can be altered by cutting the edges, overlapping and welding them to reduce the crown circumference to fit a smaller tooth
- A smaller crown can be altered by cutting the edges and welding an additional piece of band material to increase the crown circumference to fit a larger tooth

Modification in crown size - OVERSIZED CROWN





6. Modification in crown size - UNDERSIZED CROWN

Cut a V shaped groove in the crown on buccal or lingual side and Try the crown for fit

↓

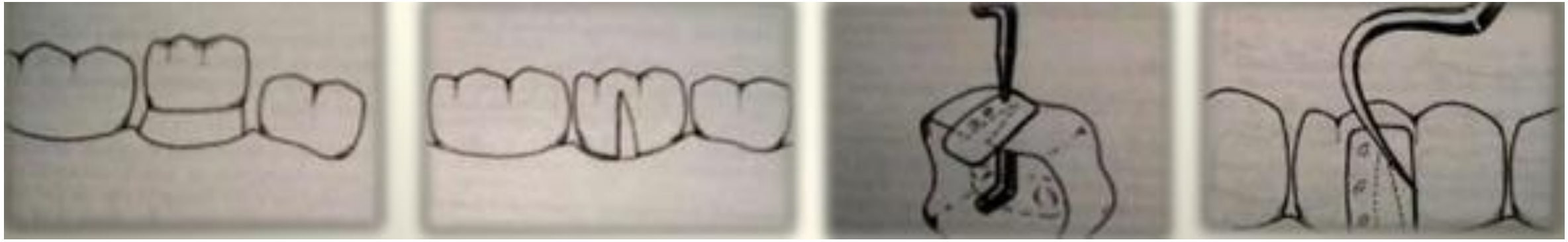
Spot weld a strip of orthodontic band material over the V shaped groove and Retry the crown

↓

Solder, adapt, contour and crimp the crown

↓

Polish the soldered area and cement



7. Crown extension for deep proximal lesions

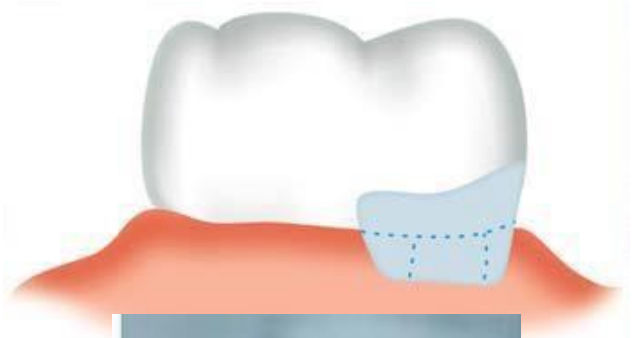
Prepare the crown

Cut a piece of orthodontic band conforming to the lesion

Spot weld the piece to crown and check the adaptation and extent

Solder and polish the area

Cement the crown



Crown extension for deep subgingival caries - (Mink And Hill 1971)

- For deep proximal caries, crown margin are over extended to protect the proximal surface.
- Use metal piece to crown with an extension on the interproximal area of the crown, which can be welded or soldered to crown
- Trim the excess & contour the crown with No. 114 pliers. Polish with wheel before cementation.

8. For space loss

- The crown can be rotated mesiobuccally – **MS Duggal**
- Flattening of proximal contour – **Nash 1981**

9. OPEN FACED SSC

- Esthetic modification of SSC by cutting away the labial metal, leaving a labial window that is restored with composite resin Called as open-face SSC **– (Hartman, 1983)**

- In Posteriors, SSC modified with the buccal surface trimmed away to leave a crown perimeter, which is then restored with a resin veneering with composite

10. For open contacts

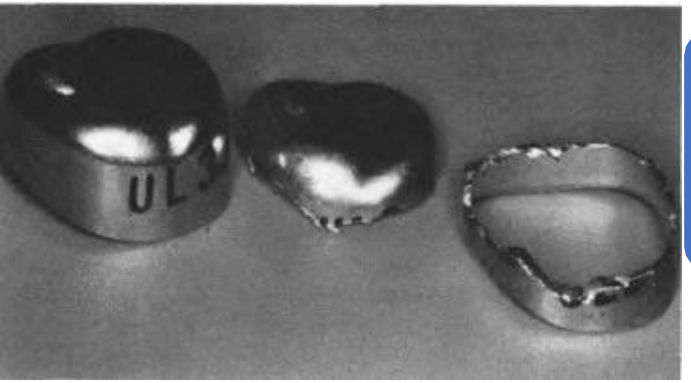
- Use Abel Ball and socket (no.112) and create the Belling effect

11.Restoration of bruxism/hypoplastic teeth – (Croll's technique, 1980)

- Greater occlusal wear results into decreased vertical height
- Occlusion can be increased by the addition of a layer of solder from the impression surface of crown **(croll's technique).**
- In other way avoid or minimize the occlusal reduction. Rest part of the tooth preparation and crown adaptation is similar to normal other than occlusal reduction.

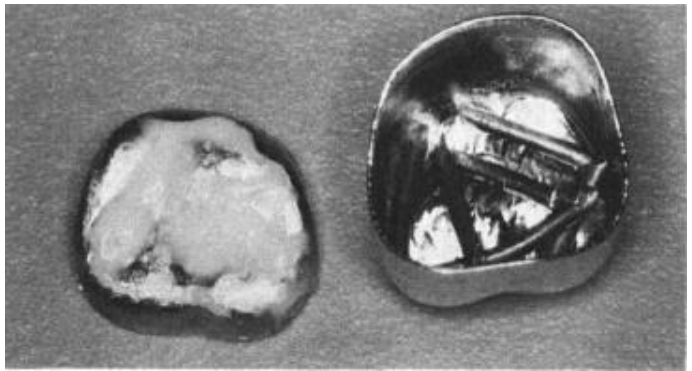
Unitek (Preformed, non-crimped) – Take the crown of correct size

To take the crown of next smallest size



Cut the occlusal surface of smaller size crown using carbide bur. This will fit into the crown selected of correct size.

Roughen the internal surface of larger crown and occlusal surface of smaller crown using diamond bur

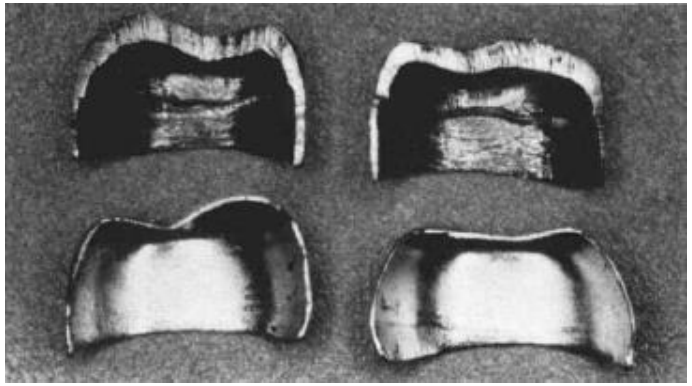


Place pieces of silver solder inside larger crown and flux on smaller crown

Fine flame → Solder

Use graphite pencil/metal instrument to hold the pieces together, to avoid void spaces.

Metal flows into the internal aspect



Internal aspect of the crown is roughened with abrasive stone or diamond bur

Cement the crown

12. Abutment to space maintainer

- Stainless Steel crowns used as a Abutment to space maintainer

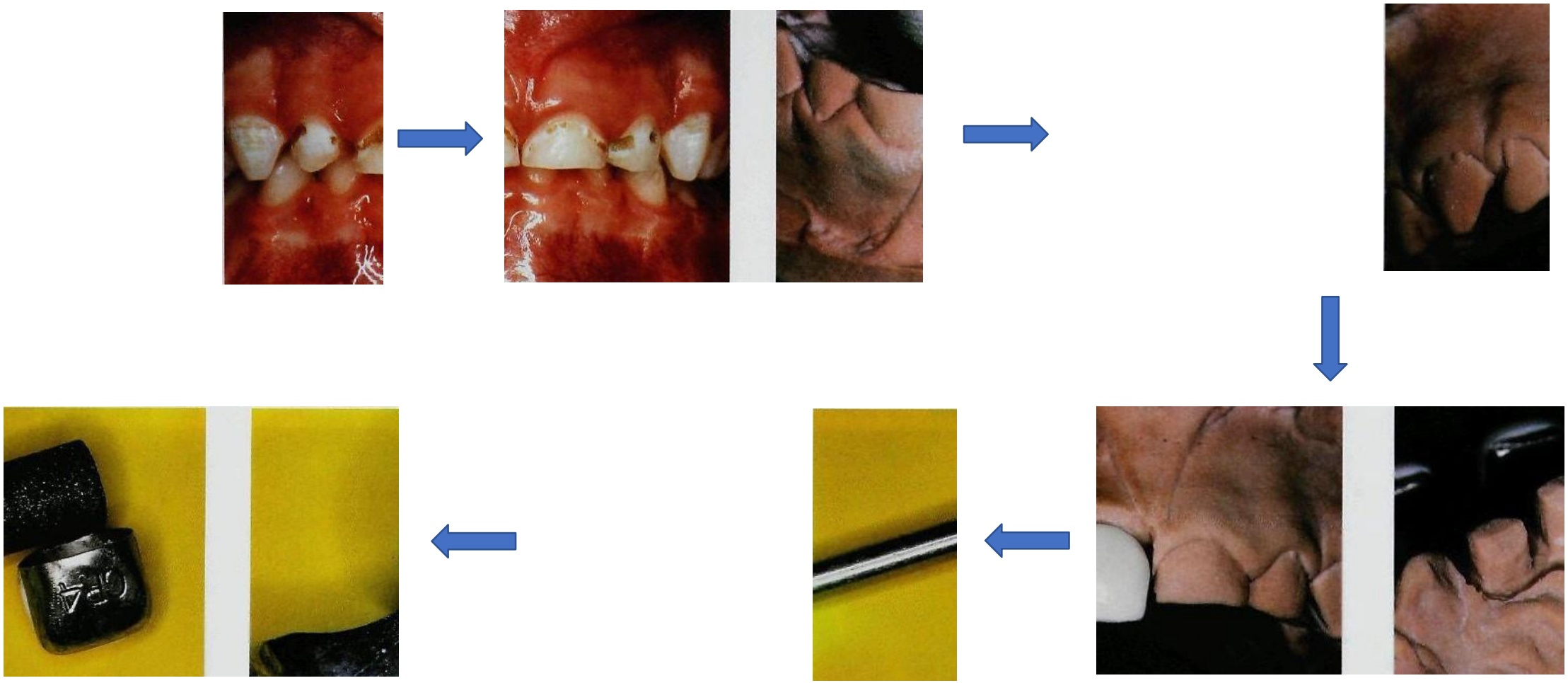
13. Other modifications by Hall

1. Pronounced curvature in the proximal side using contouring plier .
2. Mandibular 2nd primary molar crown is used on the contralateral Maxillary 1st primary molar. – (Hall technique manual, 1999)

14. Permanent molar – (Murray and Maden, 1997)

- Silver restoration on to SSC
- Increase occlusal thickness
- Marginal ridge retained before cementation
- Remaining occlusal surface removed
- Silver amalgam given

15. Pre-veneered SSC– (Fuks, 1999)



16.Modifications in extruded opposing tooth

- The extruded tooth may be recontoured to re-establish the occlusal plane and create interocclusal space for a stainless steel crown before beginning for crown adaptation.
- More of occlusal reduction is required

To consider…

Before eruption of mandibular first molar:

- When fitting a crown for a second primary molar, where the first permanent molar has not yet erupted, care must be taken when measuring the available mesiodistal dimension for the crown.
- If the stainless steel crown encroaches on the space needed for eruption of the permanent molar, its eruption path may be distorted.

ADVANTAGES AND DISADVANTAGES OF SSC

ADVANTAGES

- Completed in single appointment
- Less time consuming than case restoration
- No lab procedures required
- Less sensitive to moisture
- Less prone to fracture
- Longevity
- Durable as compared to multisurface restorations
- Cost effective
- Premature contacts are well tolerate by the child
- Patient comfort

DISADVANTAGES

- Significant amount of tooth structure is removed
- Unesthetic
- Poor marginal adaptation may cause gingivitis
- Gingival inflammation due to excess unremoved cement
- Overhanging distal margins may cause impaction of permanent 1st molars

ANTERIOR STAINLESS STEEL CROWNS

- The major attribute of the stainless steel crown is its ability to prevent space closure and over eruption of the opposing tooth.
- When the fracture is horizontal and restoration is likely to be subjected to severe occlusal forces, a stainless steel crown will be more durable than a composite resin. The stainless steel crown is only an interim method of treatment and should eventually be replaced by a composite resin restoration or a porcelain crown.

According to AAPD

Full coronal restoration of carious primary incisors may be indicated when:

(1) Caries is present on multiple surfaces,

(2) The incisal edge is involved,

(3) There is extensive cervical decal-cification,

(4) Pulpal therapy is indicated,

(5) Caries may be minor, but oral hygiene is very poor, or

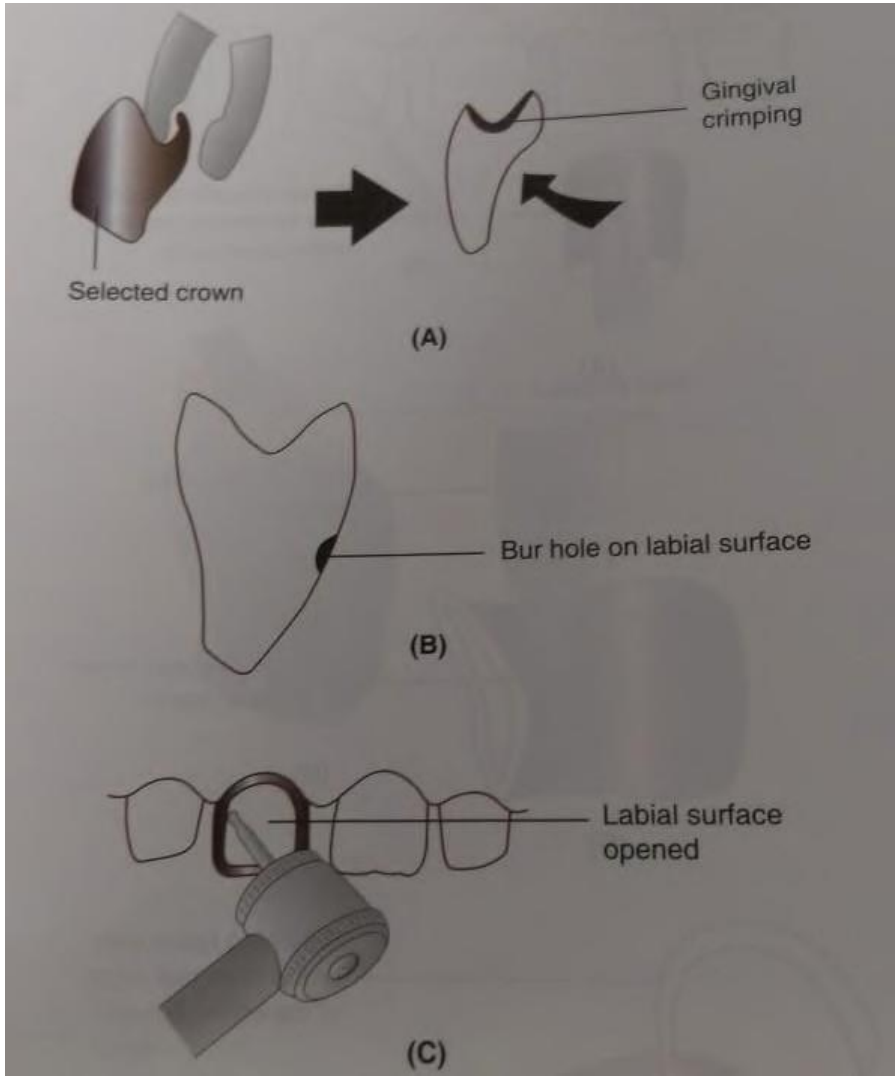
(6) The child’s behavior makes moisture control very difficult.

MANUFACTURERS OF ANTERIOR STAINLESS STEEL CROWNS

- 3M Espe-Unitek Crowns,
- St Paul,
- MN and Acero Crowns,
- Seattle,
- WA., Rocky Mountain crown.

TOOTH PREPARATION - STAGE 1:

- Measurement of the tooth's mesiodistal dimension to facilitate selection of the crown of the correct size
- If there is no space between the fractured teeth, a small proximal slice is required to allow the fitting of the crown
- Marking the gingival margin and trimming it
- Process repeated until the correct cervical contour is achieved




B
C
E
F

STAGE 2:

- Shape the cingulum with No. 112 pliers to avoid occlusal interference
- Retention in the form of a “snap fit” is achieved using the No. 117 crimping pliers or the smaller No. 421 pliers (Unitek Corp.)
- Before cementing the crown, cover the fractured surface of the dentin with a calcium hydroxide lining material. A composite resin may then be used to replace the missing tooth substance.
- This crown can remain in place for several months, during which time vitality testing can be performed and any color changes will be easily detected.

ESTHETICS

- Reasonable esthetics can be achieved followed by cutting a labial window in the stainless steel crown.
- This can be done using a diamond bur in an air turbine to cut away the excess and finally a green stone to finish the margins.
- Some material must be left to lap around on the labial surface of the tooth, or the crown will be easily displaced.

Indications:

- Following pulp therapy
- Multisurface caries
- Fractured incisor.

Advantages

- Good retention
- Long lasting

Disadvantages

- Unesthetic look

Availability

Anterior Crown Kit, 72 crowns—these crowns are identical to the Unitek.

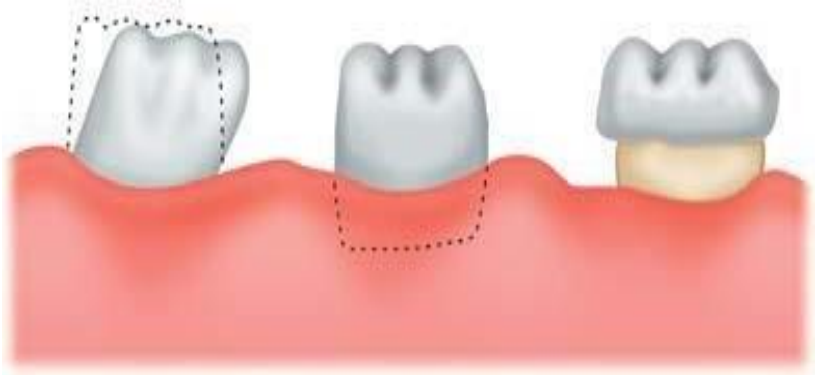
Available for primary incisors, canines and permanent incisors

Manufactures: Rocky Mountain and Unitek Corp.

MANAGEMENT OF COMPLICATIONS

CROWN TILT

- **Reason:** Destruction of buccal or lingual wall by caries or over instrumentation
- **Result:** Tilting occurs towards the deficient side
- **Rectify:** placement of amalgam alloy or GIC prior to crowning
- **Clinical significance:** Minimal unless on young permanent molars where supraeruption of opponent tooth may occur



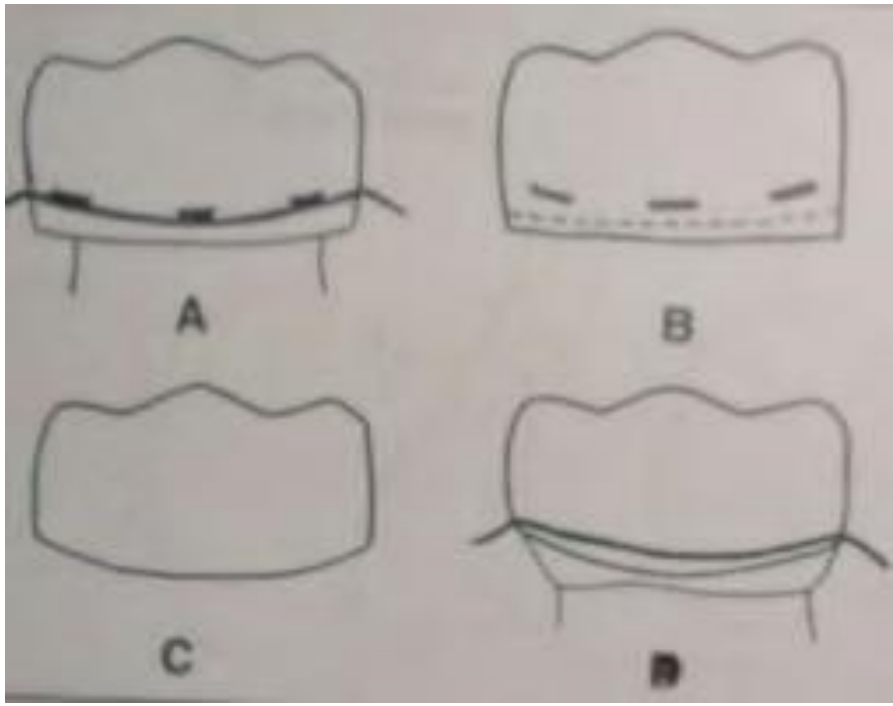
Improper crown adaptation with poor margin (left to right—crown tilt) (A); Overextent of crown (B); Under extent of crown (C).

INTERPROXIMAL LEDGE

- **Reason**: Occurs if the angle of the tapered fissure bur is incorrect
- **Result**: Failure to remove the ledge causes difficulty in seating the crown
- **Note:** Interproximal slice is difficult when the adjacent tooth is partly erupted and in poorly established contact areas. In such a case, delay the crowning
- **Rectify**: Extend the slice subgingivally by holding the thin tapered bur parallel to the long axis of the tooth.

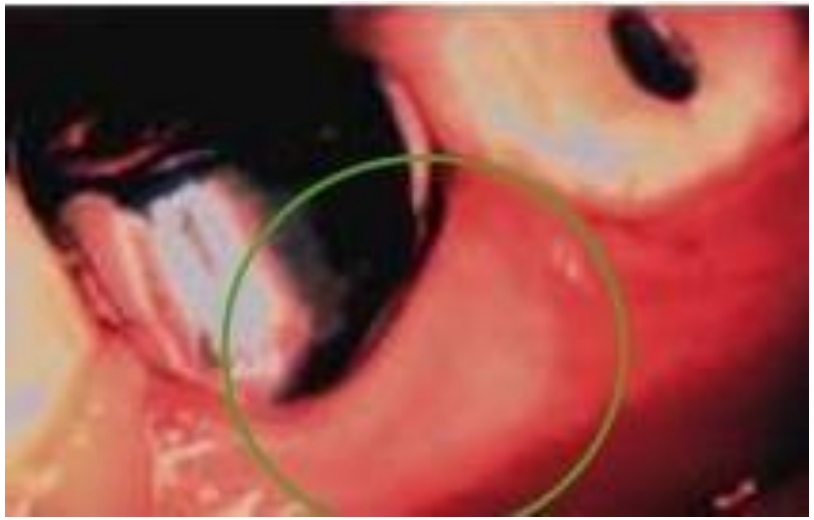
POOR MARGINS

- **Reason:** Marginal integrity is reduced in poorly adapted crown
- **Result**: Recurrent caries, chances of plaque retention
- **Rectify:** Proper adaptation



OVER EXTENSION OF CROWN

- **Reason**: Insufficient trimming of crown
- **Result**: Identified with gingival blanching leading to loss of periodontal attachment and periodontal problems due to food lodgement
- **Rectify**: By identifying adequate 1mm gingival extension of the crown margin, scratching the line, trimming the excess and crimping followed by polishing



INGESTION/INHALATION OF CROWN

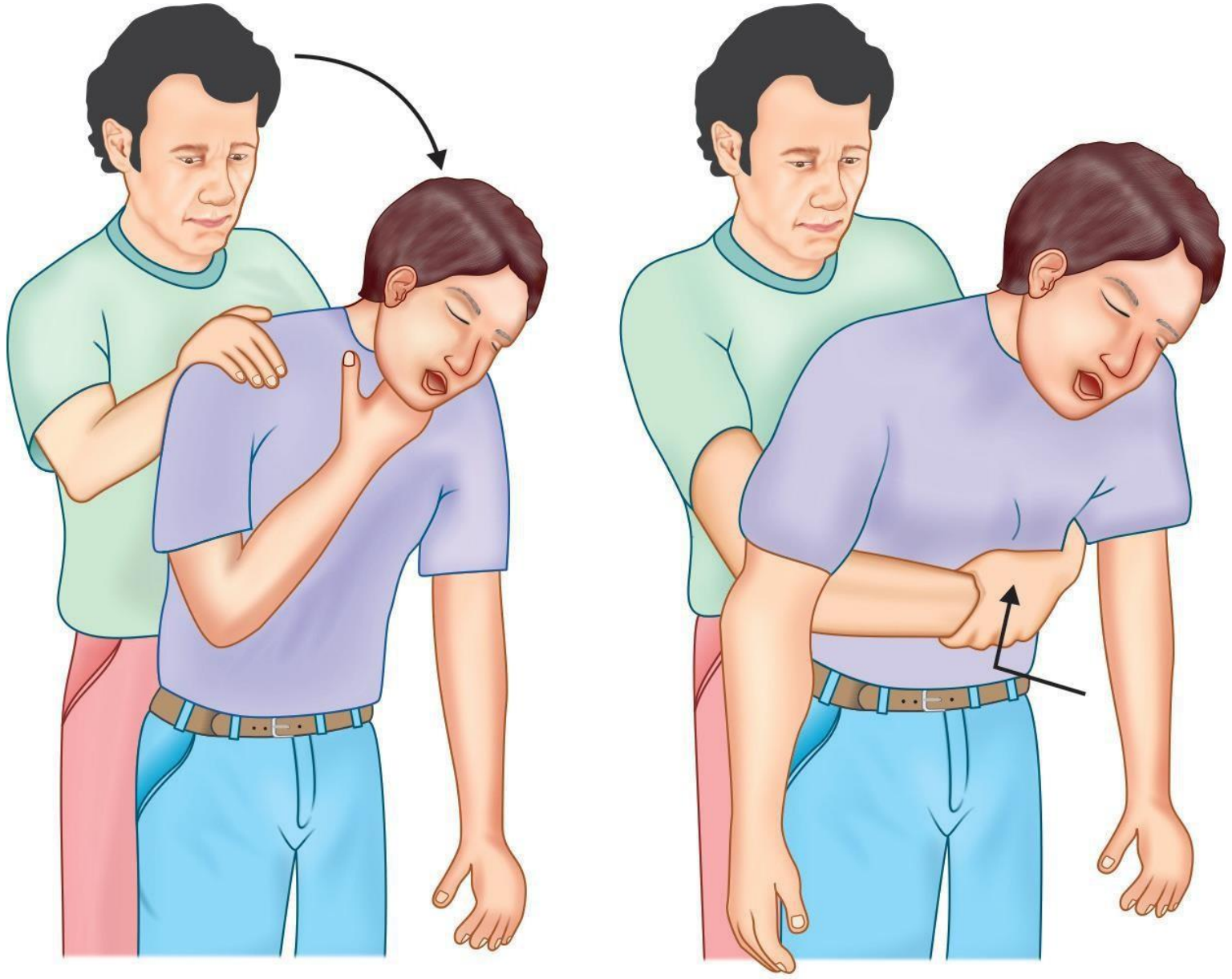
- **Reason:** uncooperative behaviour of child or negligence of the dentist
- **Prevention:**
  Rubber dam for isolation till crown cementation. It prevents accidental swallowing or aspiration of a crown.
  Throat pack with gauze piece.
  Floss attachment by means of impression compound on the occlusal surface of the crown is the preferred practice by some clinicians.

Chest x-ray showing inhaled crown

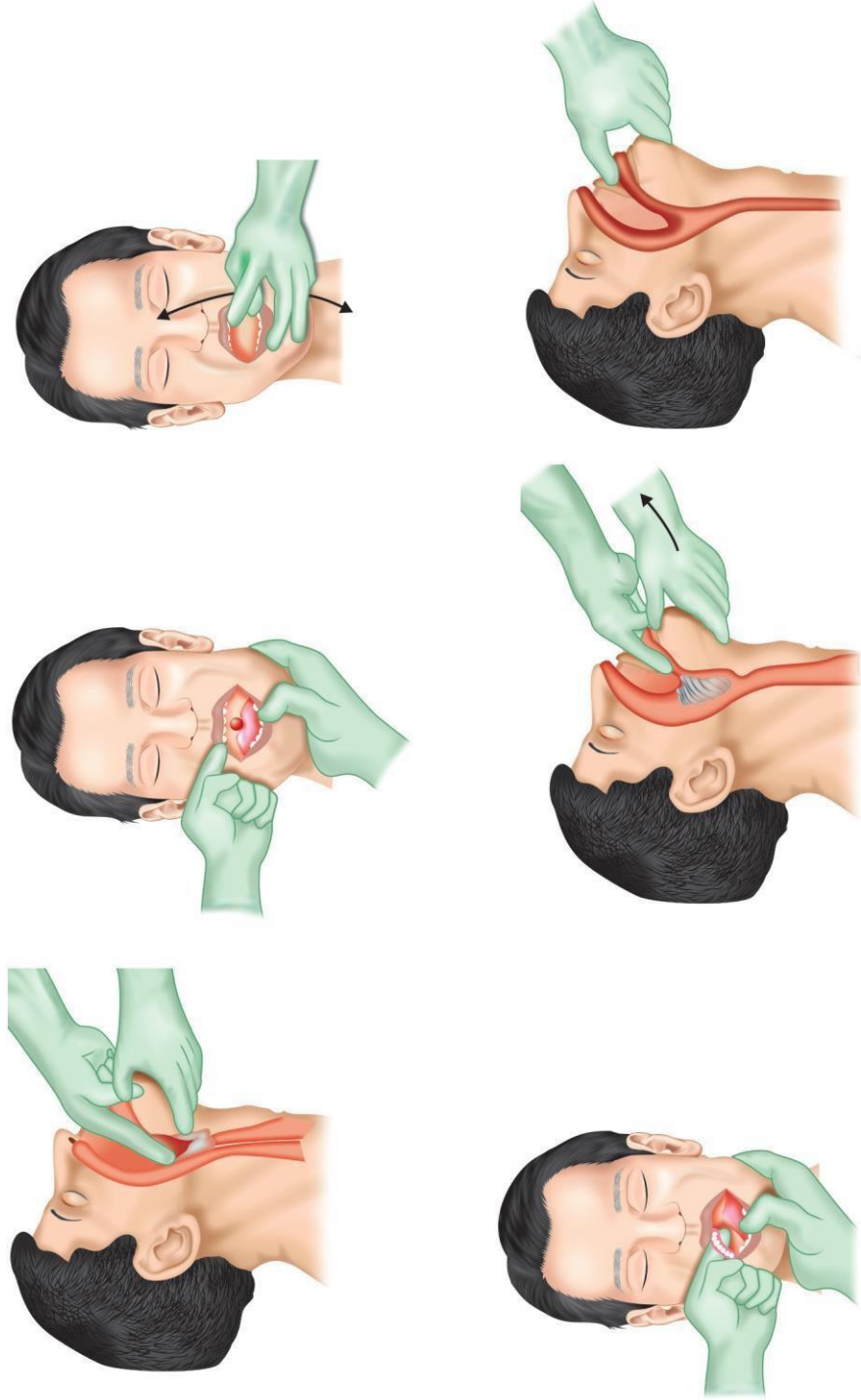
MANAGEMENT:

- Immediately after ingestion of crown check for its location in mouth.
- Attempt to removal of ingested crown can be made by holding the child upside down as soon as possible.
- Advice posteroanterior (PA) radiograph of chest to check the presence/location of crown. If crown is not found in radiograph, then assume its passage through alimentary tract within 5 to 10 days. Parents should be advised for constant check until its passage through stool. Advise abdominal X-ray, if crown not found in chest or in stool.

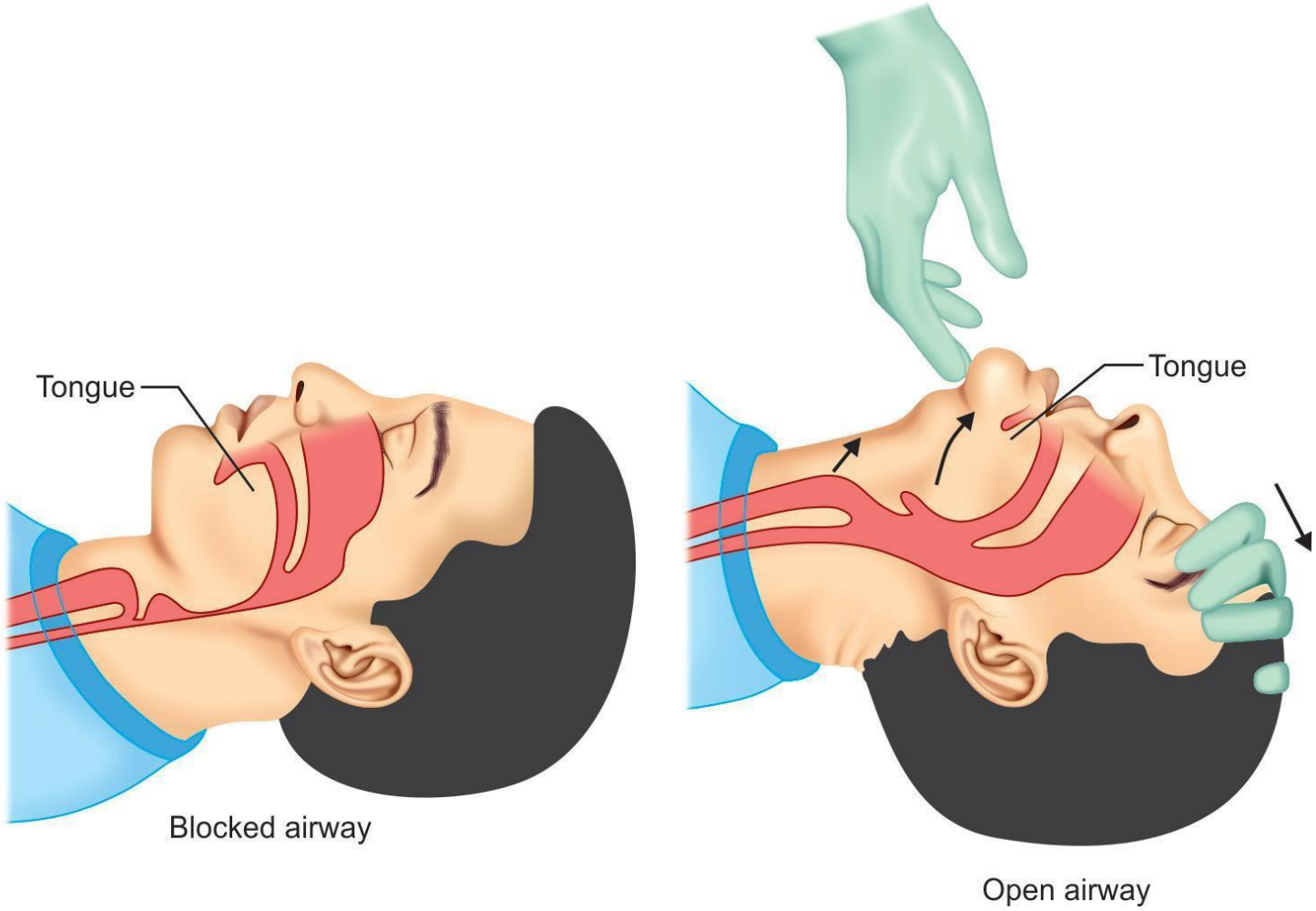
Heimlich maneuver



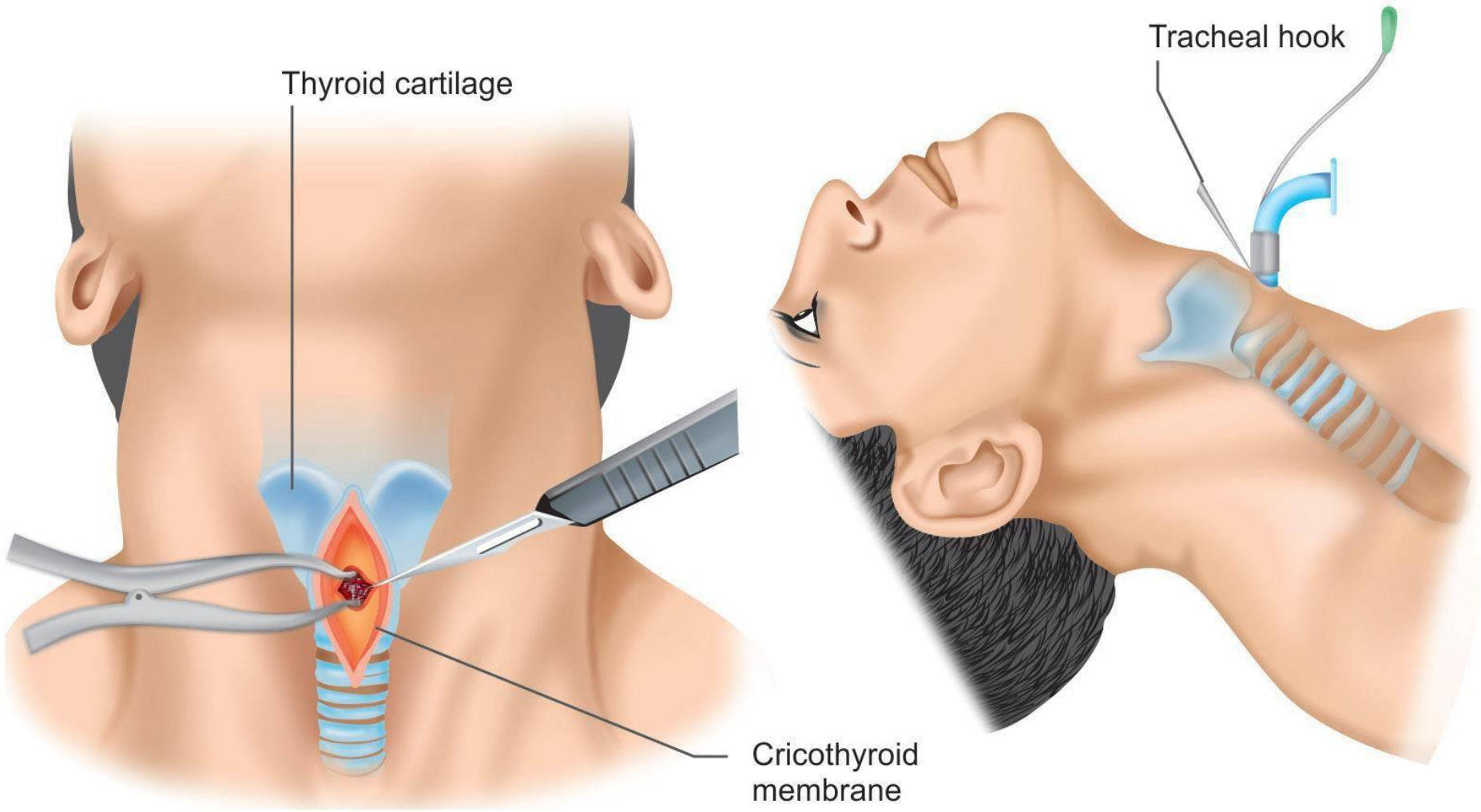
FOREIGN BODY CHECK



ATTEMPT TO VENTILATE



HEAD TILT AND CHIN LIFT



CRICITHYROTOMY PROCEDURE

At a glance…	
Esthetics	Poor
Durability	Very good. Crimped and cemented crowns are very retentive
Time consumption	Fastest crown to place
Selection criteria	Severely decayed teeth Little concern for esthetics Difficult to control gingival haemorrhage and moisture Uncooperative patient for fine preparation
Crimping, contouring, trimming	Can be crimped, trimmed
Types	Untrimmed, uncontoured Pretrimmed Recontoured For anterior and posterior
Advantages	Not technique sensitive Can be done minimal tooth structure
Disadvantage	Unesthetic

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THANK YOU