ri Aurobindo College of Dentistry

Indore, Madhya Pradesh

INDIA

MODULE PLAN

- TOPIC : PAEDIATRIC OPERATIVE DENTISTRY
- SUBJECT: PEDODONTICS
- TARGET GROUP: UNDERGRADUATE DENTISTRY
- MODE: POWERPOINT – WEBINAR
- PLATFORM: INSTITUTIONAL LMS
- PRESENTER: DR.KHUSHBOO BARJATYA

CONTENT

- Introduction
- History
- Objectives
- Epidemiology
- indication
- Importance of primary teeth
- Primary v/s permanent teeth
- Classifications
- Armamentarium
- Principles of cavity preparation
- Bibliography

INTRODUCTION

- Operative dentistry is the art and science of the diagnosis, treatment, and prognosis of defects of teeth that do not require full coverage restorations for correction. Such treatment should result in the restoration of proper tooth form, function, and esthetics while maintaining the physiologic integrity of the teeth in harmonious relationship with the adjacent hard and soft tissues, all of which should enhance the general health and welfare of the patient.

- Sturdevant

- Operative dentistry is a subject that deals with the diagnosis, prevention and treatment of problems and conditions of natural teeth, both vital and non vital, so as to preserve the natural dentition and restore it to the best state of teeth, function and esthetics.

- Gilmore

HISTORY

- Early dentists- barbers
- Later, cavity preparation and tooth restoration became widely popular.
- The first successful tooth restorations w ere developed in the United States.
- G.V.Black (1924) –" Father of operative dentistry"
- Charles E. Woodbury, E.K. Wedelstaedt, Waldon . Ferrier, and George Hollenback made significant contributions to the early development of operative dentistry.

M.E.J.Curzon, J.F.Roberts, D.B.Kennedy.Kennedy's Paediatric Operative Dentistry.4th edition. Reed publishing house;1996.

OBJECTIVES (AAPD)

- To repair or limit the damage from caries,
- To protect and preserve the tooth structure,
- To reestablish adequate function, restore esthetics (where applicable),
- To provide ease in maintaining good oral hygiene
- Pulp vitality should be maintained whenever possible

AAPDGuideline On Restorative Dentistry. American Academy Of Pediatric Dentistry . V 36 / NO 6 14 / 15

EPIDEMIOLOGY

Primary dentition

- 0-2yrs – 8% - sites lingual, interproximal areas of maxillary incisors, occlusal surfaces of 1st primary molars
- 3 yrs- occlusal surfaces of 2nd primary molars > 1st primary molars; mand> maxillary

Mixed dentition

- Occlusal surfaces of permanent molars
- Lingual pits in maxillary permanent incisors – lateral incisors

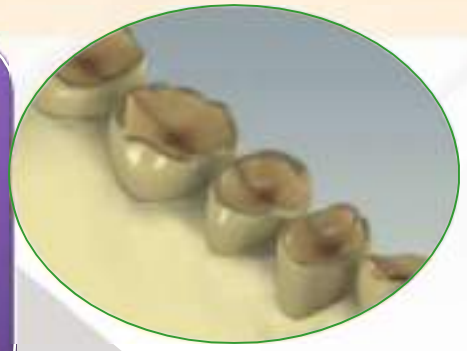
Early permanent dentition

- 1st permanent molar > 2nd permanent molar > premolars > maxillary anterior teeth > canine and mandibular incisors

M.E.J.Curzon, J.F.Roberts, D.B.Kennedy.Kennedy's Paediatric Operative Dentistry.4th edition. Reed publishing house;1996.

INDICATIONS

- Dental caries
- Tooth wear



- Trauma
- Developmental defects

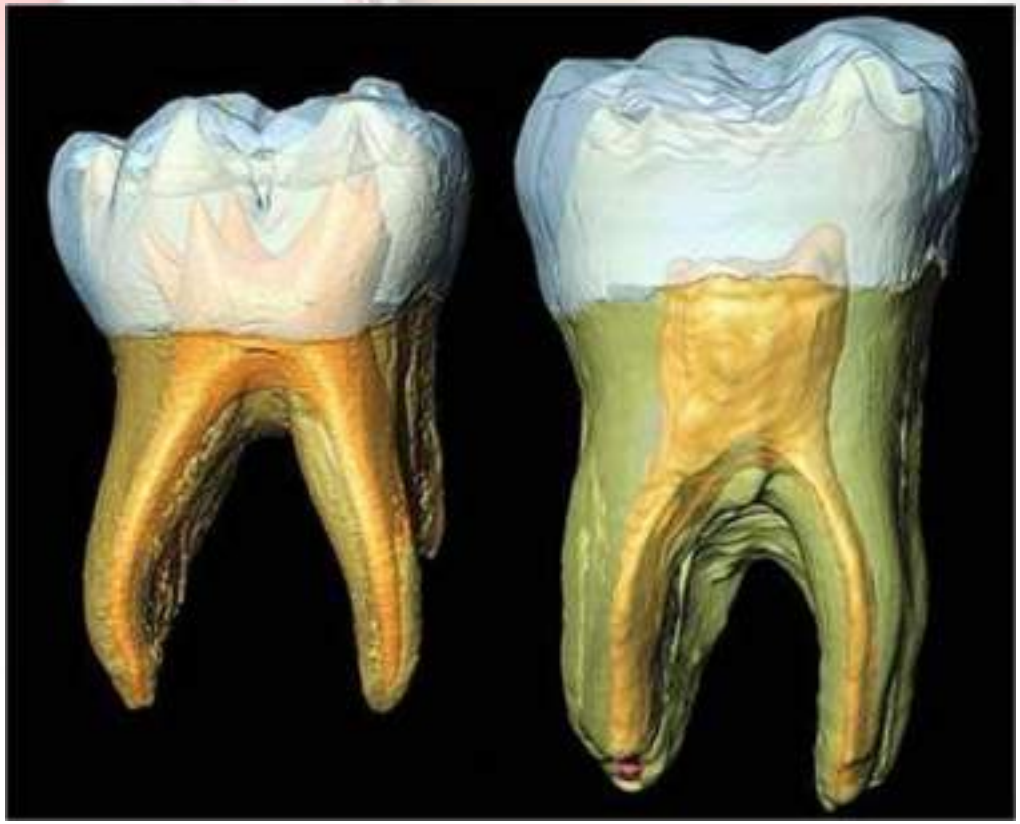
Nikhil Marwah. Textbook of Pediatric Dentistry.3rd edition. Jaypee Brothers Medical Publishers Private Limited;2014

IMPORTANCE OF PRIMARY TEETH

- Mastication
- Impairment of speech
- Esthetics
- Maintenance of arch length
- Prevents development of oral habits
- Prevent associated psychological effects

Nikhil Marwah. Textbook of Pediatric Dentistry.3rd edition. Jaypee Brothers Medical Publishers Private Limited;2014

PRIMARY V/S PERMANENT



PRIMARY V/S PERMANENT

General considerations

- 20 in number
- More white in color

General considerations

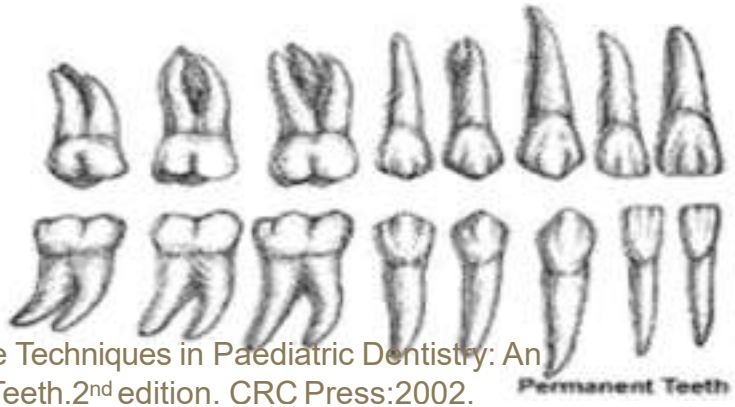
- 32 in number
- Darker, yellowish in color

Morphological Considerations (crown)

- Smaller and Bulbous crowns
- Crowns are wider mesiodistally

Morphological considerations (crown)

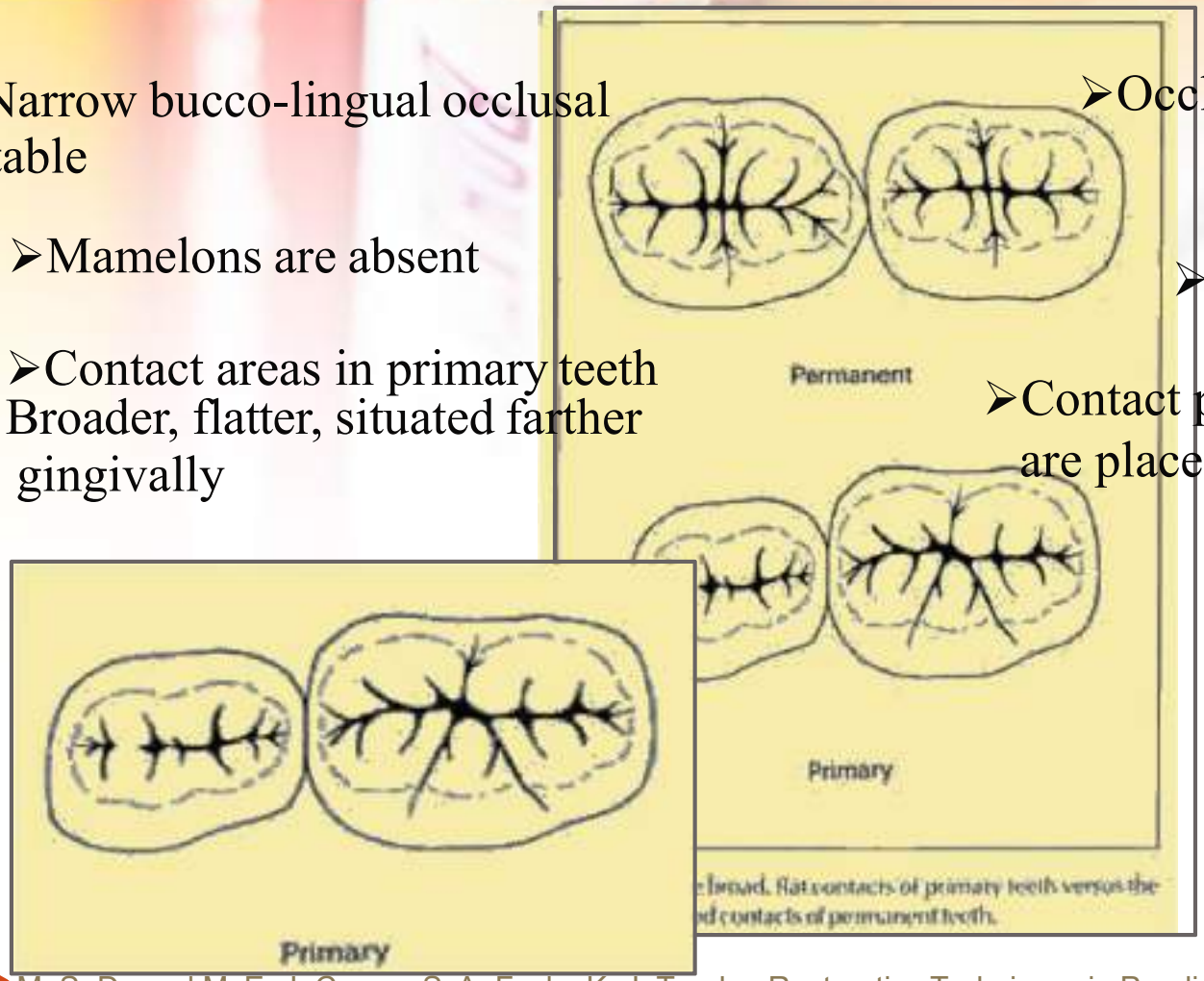
- Crowns are wider
- Crowns are wider occlusogingivally



M. S. Duggal,M. E. J. Curzon,S. A. Fayle, K. J. Toynba. Restorative Techniques in Paediatric Dentistry: An Illustrated Guide to the Restoration of Extensive Carious Primary Teeth.2nd edition. CRC Press:2002.

PRIMARY V/S PERMANENT

- Narrow bucco-lingual occlusal table
- Mamelons are absent
- Contact areas in primary teeth Broader, flatter, situated farther gingivally

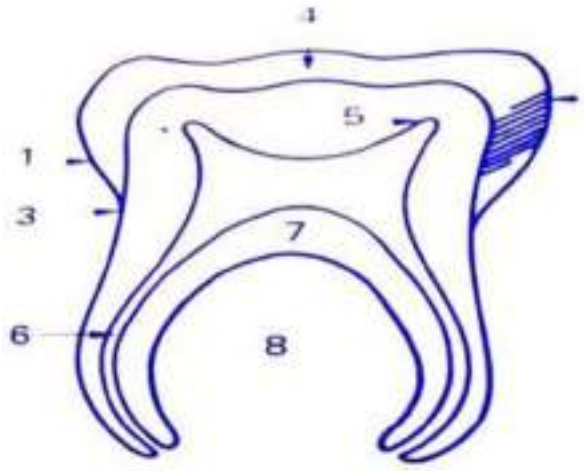


- Occlusal table is not narrow
- Mamelons are present
- Contact points in permanent teeth are placed more occlusally

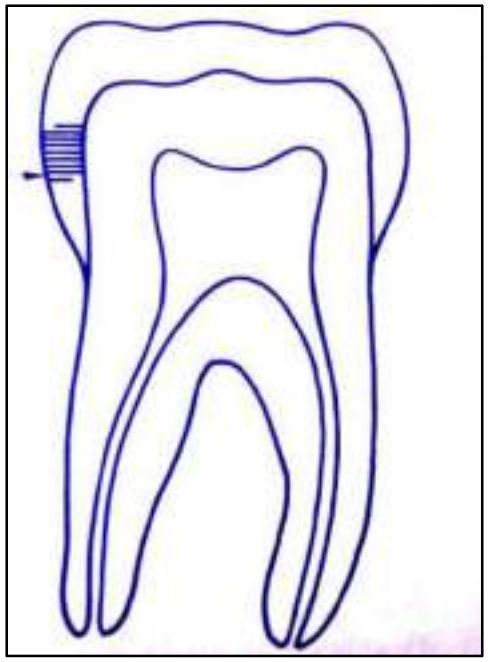
M. S. Duggal,M. E. J. Curzon,S. A. Fayle, K. J. Toynba. Restorative Techniques in Paediatric Dentistry: An Illustrated Guide to the Restoration of Extensive Carious Primary Teeth.2nd edition. CRC Press:2002.

PRIMARY V/S PERMANENT

- Enamel is thin, (1mm)
- Dentin thickness between pulp and enamel is less hence:
  Caries progress is faster.
  Chances of pulpal exposure are more
- Enamel rod orientation



- More thicker than the primary teeth
- Dentine thickness is uniform
- Enamel rod orientation



PRIMARY V/S PERMANENT

Roots are long and slender

Roots have short trunk

They are more divergent and flaring

Undergo physiologic resorption

Roots are short and robust

Large undivided portion of root is seen

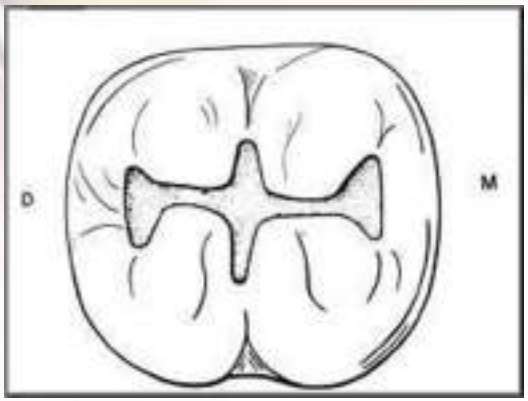
They are less divergent and do not flare

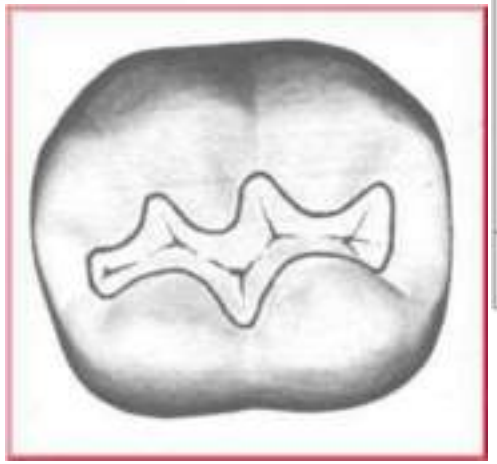
Only pathologic changes are seen

CLASSIFICATIONS

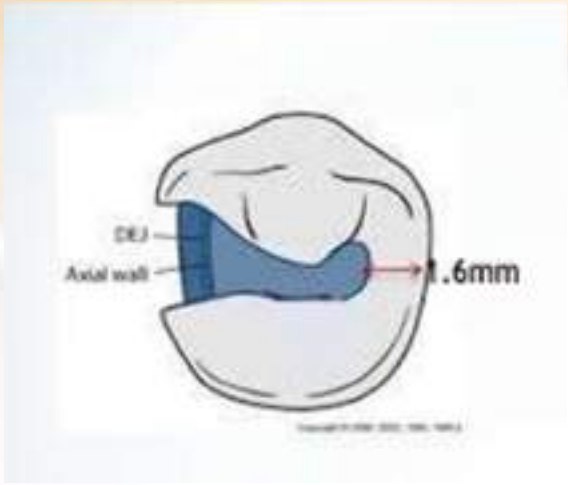
- G.V.Black's classification

Class 1 - All pit and fissure lesions on occlusal surfaces of premolars and molars, lesions on the occlusal 2/3rds of facial and lingual surfaces of molars, and lesions on the lingual surfaces of maxillary incisors





Class 2 – Lesions on the proximal surface of the posterior teeth



Theodore M. Roberson, Harald 0. Heymann Edward J. Swift, Jr.Sturdevant's Art and Science of Operative Dentistry. 4th edition. St. Louis: Mosby;2002.

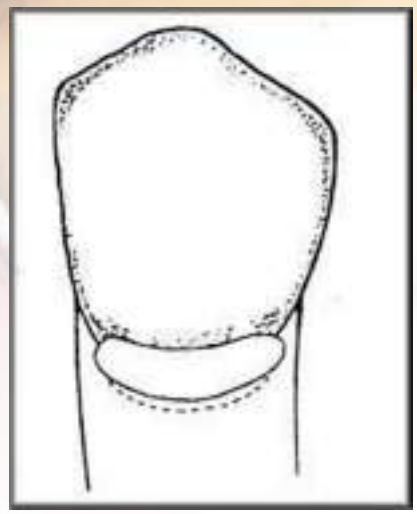
Class 3 – Lesions on the proximal surface of the anterior teeth without involving the incisal edge

Theodore M. Roberson, Harald 0. Heymann Edward J. Swift, Jr.Sturdevant's Art and Science of Operative Dentistry. 4th edition. St. Louis: Mosby;2002.

Class 4 – Lesions on the proximal surface of the anterior teeth involving the incisal edge

Theodore M. Roberson, Harald 0. Heymann Edward J. Swift, Jr.Sturdevant's Art and Science of Operative Dentistry. 4th edition. St. Louis: Mosby;2002.

Class 5 – Lesions on the gingival third of the facial or lingual surfaces of all the teeth



Theodore M. Roberson, Harald 0. Heymann Edward J. Swift Jr.Sturdevant's Art and Science of Operative Dentistry. 4th edition. St. Louis: Mosby;2002.

Class 6 – Lesions on the incisal edge of the anterior teeth or the occlusal cusp tips of posterior teeth (Simon's modification)

Theodore M. Roberson, Harald 0. Heymann Edward J. Swift, Jr.Sturdevant's Art and Science of Operative Dentistry. 4th edition. St. Louis: Mosby;2002.

FINN'S MODIFICATION

1. Class I: cavities involving the pits and fissures of the molar teeth and the buccal and lingual pits of all teeth.
2. Class II: cavities involving proximal surface of molar teeth with access established from the occlusal surface.
3. Class III: cavities involving proximal surfaces of anterior teeth which may or may not involve a labial or a lingual extention.

M. S. Duggal,M. E. J. Curzon,S. A. Fayle, K. J. Toynba. Restorative Techniques in Paediatric Dentistry: An Illustrated Guide to the Restoration of Extensive Carious Primary Teeth.2nd edition. CRC Press:2002.

- 4. Class IV: Cavities of the proximal surface of an anterior tooth which involve the restoration of an incisal angle.

- 5. Class V : Cavities present on the cervical third of all teeth including proximal surface where the marginal ridge is not included in the cavity preparation

STURDEVANT'S CLASSIFICATION:

CAVITY	FEATURE
Simple cavity	**A cavity involving only one tooth surface**
Compound cavity	A cavity involving two surfaces of a tooth
Complex cavity	A cavity involves more than two surfaces of a tooth.

Theodore M. Roberson, Harald 0. Heymann Edward J. Swift, Jr.Sturdevant's Art and Science of Operative Dentistry. 4th edition. St. Louis: Mosby; 2002.

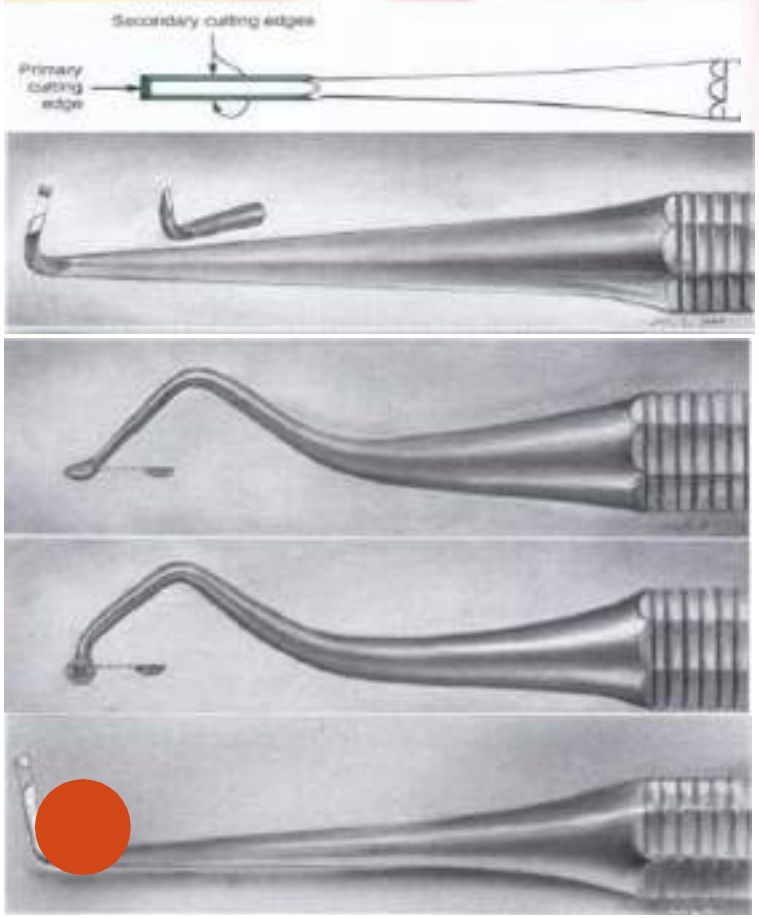
MOUNT AND HUME'S CLASSIFICATION:

1. Size1- minimal involvement of dentin
2. Size 2- moderate involvement, remaining tooth structure strong enough to support restoration
3. Size 3- large cavity with weakened tooth structure
4. Size 4- extensive caries with loss of bulk of tooth structure

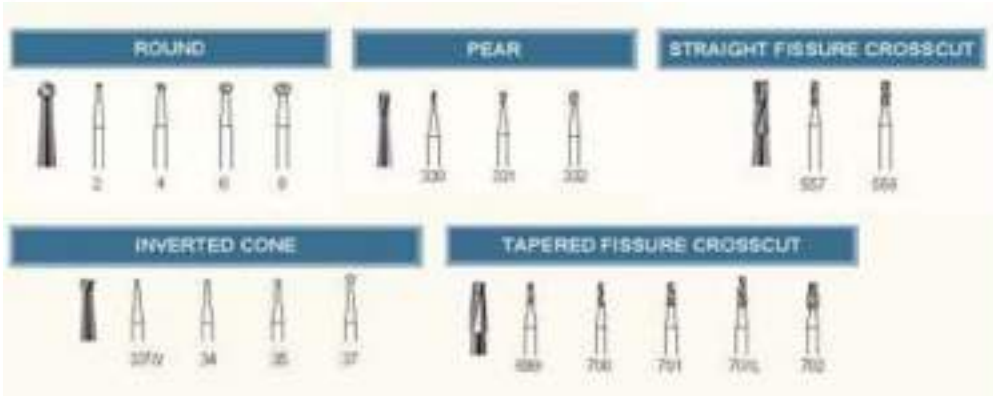
M. S. Duggal,M. E. J. Curzon,S. A. Fayle, K. J. Toynba. Restorative Techniques in Paediatric Dentistry: An Illustrated Guide to the Restoration of Extensive Carious Primary Teeth.2nd edition. CRC Press:2002.

ARMAMENTARIUM

- G.V.Black's classification:
  - Cutting instruments



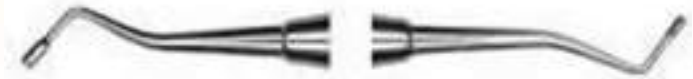
Hand	Rotary
Chisels Hatchets	Burs Stones
Excavators Hoes	Discs



ARMAMENTARIUM

Condensing instruments

Hand pluggers



Mechanical pluggers

Theodore M. Roberson, Harald 0. Heymann Edward J. Swift, Jr.Sturdevant's Art and Science of Operative Dentistry. 4th edition. St. Louis: Mosby; 2002.
Nikhil Marwah. Textbook of Pediatric Dentistry.3rd edition. Jaypee Brothers Medical Publishers Private Limited;2014

ARMAMENTARIUM

- Plastic instruments
- Spatulas
- Carriers
- Carvers
- Plastic filling instruments
- Burnishers

- Finishing and polishing instruments

Hand

Orangewood sticks
Polishing points
Finishing strips

Rotary

Finishing burs
Mounted brushes
Rubber cups and

Theodore M. Roberson, Harald 0. Heymann Edward J. Swift, Jr.Sturdevant's Art and Science of Operative Dentistry. 4th edition. St. Louis: Mosby; 2002.

ARMAMENTARIUM

- Isolation instruments
  - Rubber dam kit
  - Saliva ejector
  - Cotton rolls
  - High volume ejector

- Miscellaneous instruments
  - Mouth mirrors
  - Probes
  - Pliers
  - Cotton tweezers

Theodore M. Roberson, Harald 0. Heymann Edward J. Swift, Jr.Sturdevant's Art and Science of Operative Dentistry. 4th edition. St. Louis: Mosby; 2002.

ARMAMENTARIUM

MARZOUK'S CLASSIFICATION:

Exploring instruments

- Mouth mirrors
- Explorers
- Probes
- Cotton tweezers

Instruments for tooth structure removal

- Hand – chisels, excavators
- Rotary – headpieces, burs, abrasives

Restoring instruments

- Cement spatulas
- Plastic filling instrument
- Amalgam carriers
- Condensers
- Burnishers
- Carvers

Finishing and polishing instruments

- Finishing strips
- Finishing burs
- Brushes
- Rubber cups

Nikhil Marwah. Textbook of Pediatric Dentistry.3rd edition. Jaypee Brothers Medical Publishers Private Limited;2014

MATRICES

- It is thereby used as a temporary wall, which is created opposite to the axial walls, surrounding areas of the tooth structure that were lost during cavity preparation.

- **Matrix** is a device used during the restorative procedures to hold the plastic restorative material within the tooth while it is setting.

MATRICES

- Classification:

1. Place of application
   - Posterior – T-Band, Toffelmire
   - Anterior – Celluloid matrix

2. Constituents
   - Metallic – Ivory no.1, Ivory no.8
   - Non metallic – Mylar strips

3. Presence / absence of retainer
   - With retainer – Ivory no.1, Ivory no.8
   - Without retainer – S-band

MATRICES

4. Form
   - Anatomical – Celluloid crown form
   - Non anatomical – Ivory no.1

5. Use
   - Universal – Ivory no.8, Toffelmire
   - Unilateral – Ivory no.1

Edwina A. M. Kidd, Bernard G. N., Smith Timothy F, Watson H. M, Pickard. Pickard's Manual of Operative Dentistry.8th edition. Oxford: University Press; 2003

Matrices

- Recent modifications of matrix
- Sectional matrix
  - Easy to place, gives a large preparation area and reduces working time
  - Mesial and distal proximal area restorations can be accomplished by one matrix
- Smartview matrix
  - Comes with smartband sectional matrices and titanium instruments
  - Non stick surfaces, anatomical contours
  - Mostly used for composite restorations

Edwina A. M. Kidd, Bernard G. N., Smith Timothy F, Watson H. M, Pickard. Pickard's Manual of Operative Dentistry.8th edition. Oxford University Press: 2011.

Types of matrices used for tooth restoration

- Matrices for class I cavity (compound cavity)
  - Double banded tofflemire

- Matrices for class II
  - Single band tofflemire
  - Ivory matrix no.1
  - Ivory matrix no.8
  - Black's matrices
  - Soldered band or seamless copper band matrix
  - Anatomical matrix
  - Auto matrix
  - S-shaped matrix
  - T-shaped matrix

Types of matrices used for tooth restoration

- Matrices for cavity preparation for amalgam on distal surface of cuspid
  - S- shaped matrix
  - Tofflemire
- Matrices for class III tooth colored restorations
  - Celluloid strips
- Matrices for class IV tooth colored restorations
  - Celluloid strips
  - Aluminium foil
  - Transparent crown form matrices
  - Anatomic matrix
  - Modified S-shaped band of copper, tin, aluminium

TYPES OF MATRICES USED FOR TOOTH RESTORATION

- Matrices for class V amalgam restorations
  - Window matrix
  - S-shaped matrix

- Matrices for classV tooth colored restorations
  - Anatomic matrix
  - Aluminium or copper collars
  - Celluloid strips

MATRICES

Sectional matrix

Smart view matrix system

WEDGES

- It is defined as a piece of wood, metal etc. one end of which is an acute angled edge formed by two converging planes used to tighten or exert force in various ways.

- 1883- wedges of boxwood, orangewood, balsam wood were made.

- 1st metal wedge- Ottolengui steel wedge.
- Current wedges – plastic, metal, wood, celluloid
- Recent wedges – Luci-wedge, Hawe-Neos dental

Edwina A. M. Kidd, Bernard G. N., Smith Timothy F, Watson H. M, Pickard. Pickard's Manual of Operative Dentistry.8th edition. Oxford: University Press; 2003

WEDGES

- Types
- Acc. to anatomy
  - Anatomical – in shape of embrassures
  - Non- anatomical – round
- Acc. to material used
  - Wooden – hard wood or soft wood
  - Plastic – in various shapes
- Acc. to color
  - Colored
  - Light reflecting – used with composite

Edwina A. M. Kidd, Bernard G. N., Smith Timothy F, Watson H. M, Pickard. Pickard's Manual of Operative Dentistry.8th edition. Oxford: University Press; 2003

ISOLATION

- **Rubber dam:**
  - 1864 – Sanford Christie Barnum
  - 1882 – SS White introduced a rubber dam punch, Dr.Doleus Palmer introduced set metal clamps.

Advantages

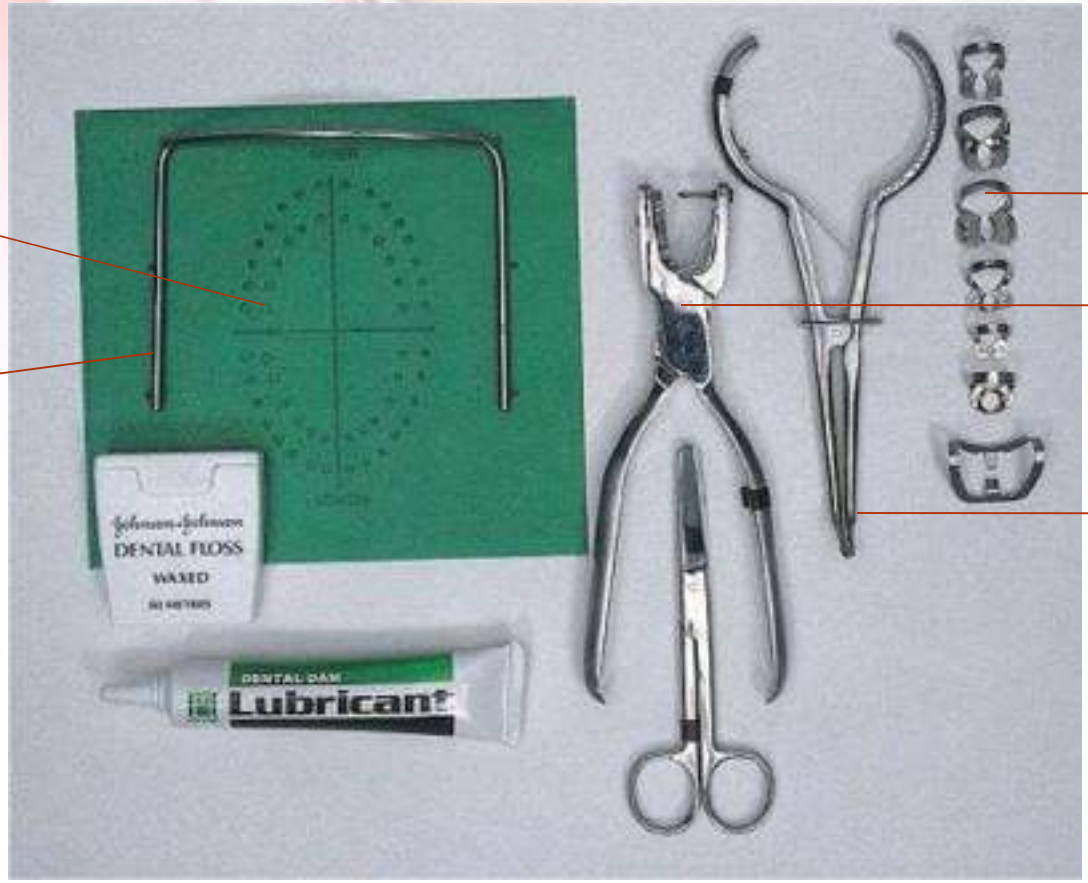
- Moisture control, dry field, aseptic
- Accessibility
- Improved material properties
- Prevents aspiration

Euphesisms
Raincoat
Hanger
Clip

Disadvantages

- Patient acceptance
- Trauma to tissues
- Latex allergy
- Frame causes indentations

ARMAMENTARIUM:



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HYGENIC® Gloss Finish Winged and Wingless Clamps

ANTERIOR

#9* #W9 #212

PREMOLAR

#00 #W00 #1*

Upper & Lower Bicuspids — Upper Bicuspids

#2* #W2** #2A* #W2A**

Large Bicuspids — Bicuspids

SERRATED JAWS

Serrations for improved retention

#12A* #13A*

Lower Right Molars/ Upper Left Molars — Lower Left Molars/ Upper Right Molars

MOLAR

#3 #W3 #7* #W7

Small Lower — Lower

#8 #W8 #4* #W56

Upper — Upper — Small Upper — Upper & Lower

MOLAR - SPECIAL USE

For irregularly shaped, structurally compromised or partially erupted molars

#8A* #W8 A #14 #W14

Small — Medium

#14A* #W14

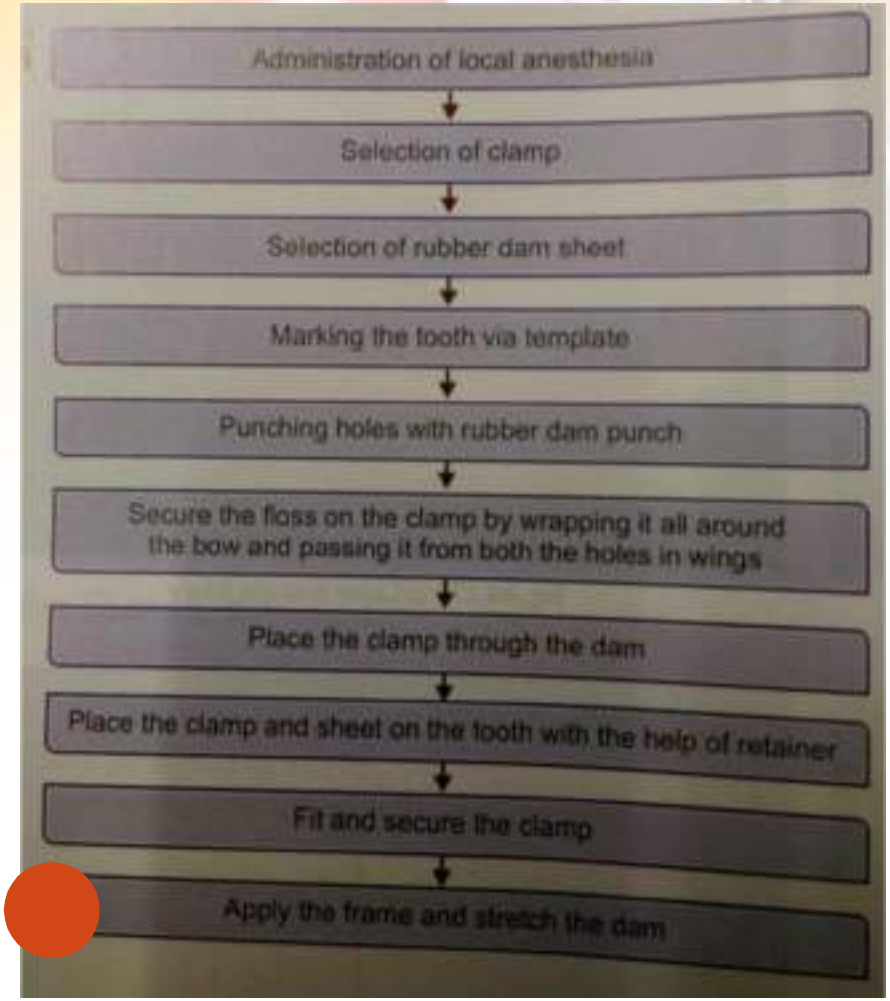
Large

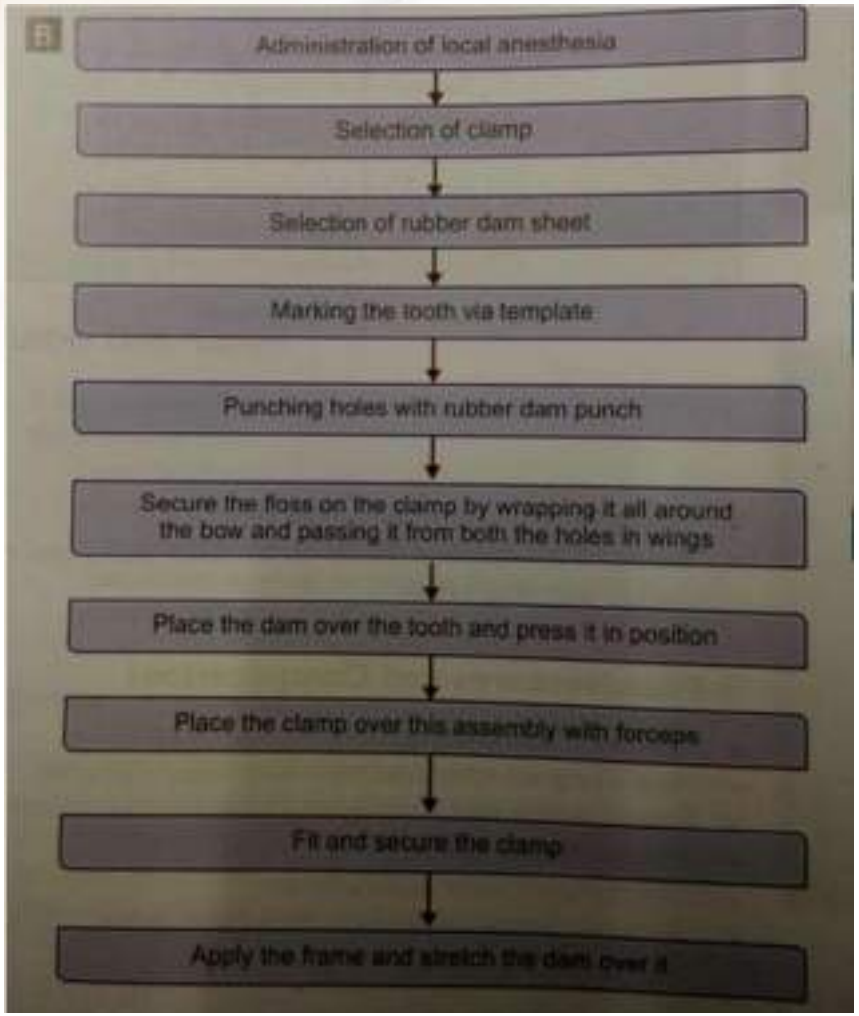
* Included in System 9 Clamp-Pak

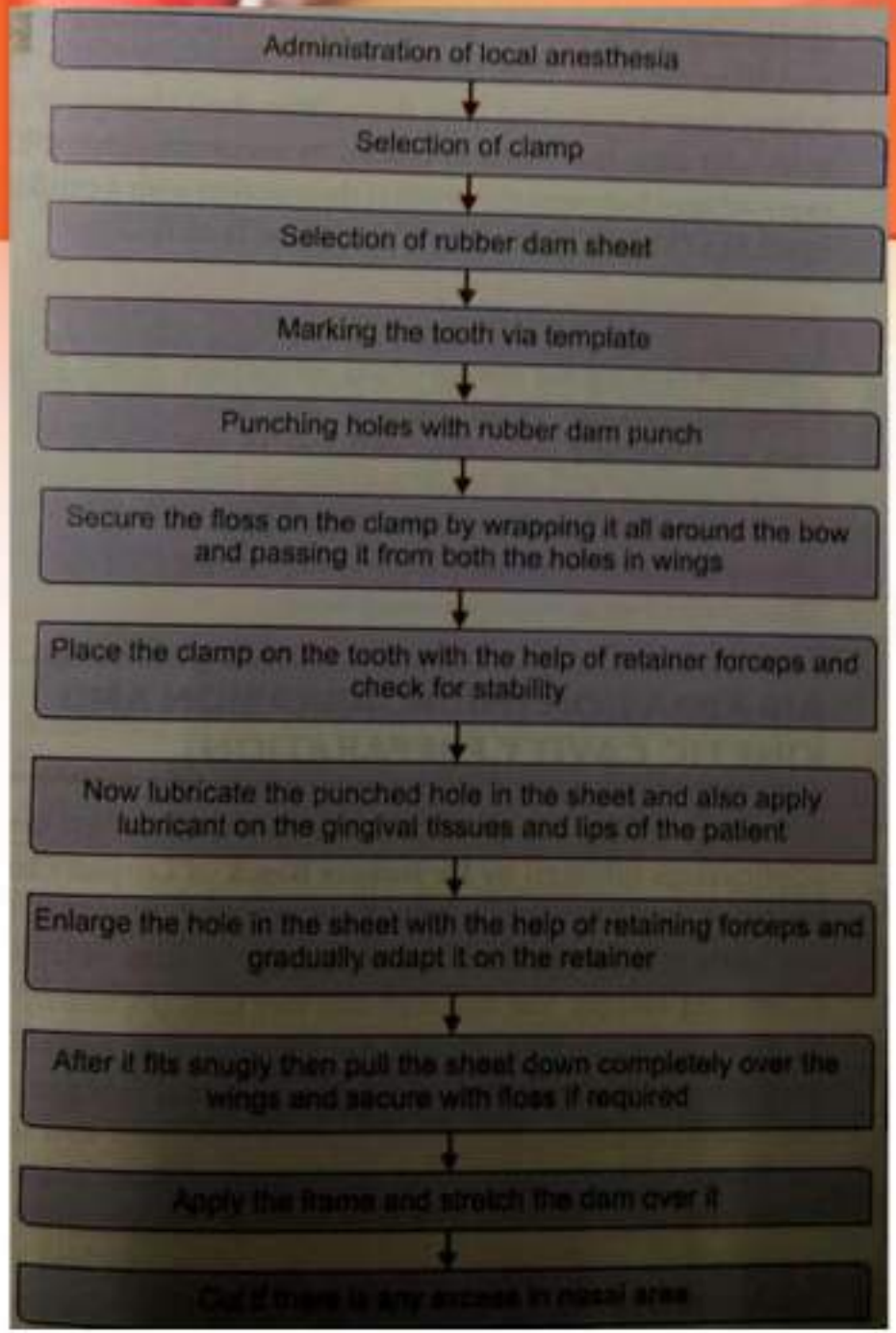
Brinker Gingival Tissue Retractors

#B1 Lower Molars — #B2 Upper Left Molars — #B3 Upper Right Molars — #B4 Anterior & Canines — #B5 #B6 Class V restorations on all teeth

Procedures for rubber dam placement:






Administration of local anesthesia
Selection of clamp
Selection of rubber dam sheet
Marking the tooth via template
Punching holes with rubber dam punch
Secure the floss on the clamp by wrapping it all around the bow and passing it from both the holes in wings
Place the clamp on the tooth with the help of retainer forceps and check for stability
Now lubricate the punched hole in the sheet and also apply lubricant on the gingival tissues and lips of the patient
Enlarge the hole in the sheet with the help of retaining forceps and gradually adapt it on the retainer
After it fits snugly then pull the sheet down completely over the wings and secure with floss if required
Apply the frame and stretch the dam over it

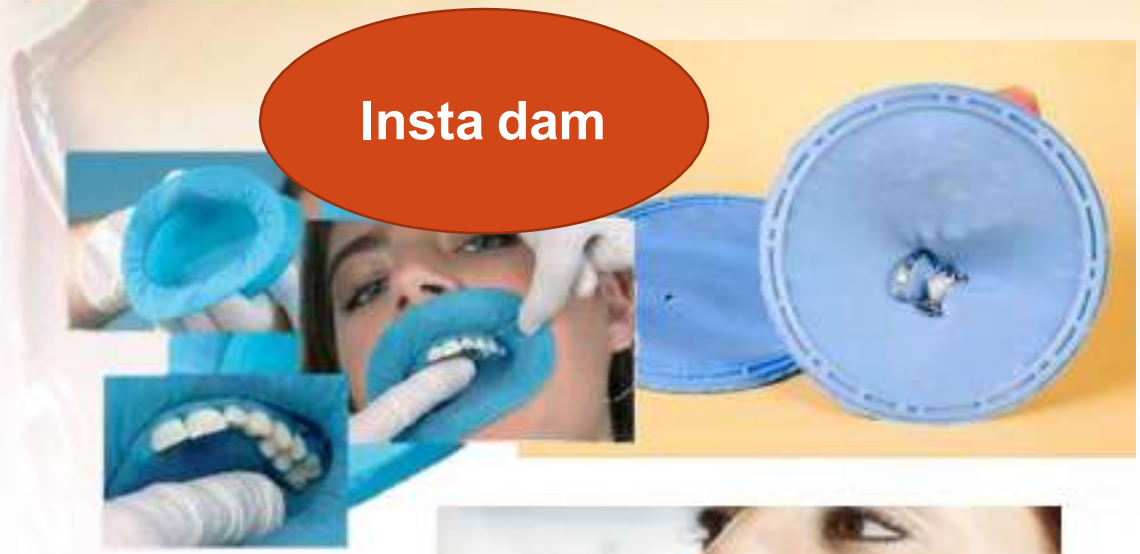
RECENT ADVANCES IN RUBBER DAM

Articulated frame.

Safe T frame

RECENT ADVANCES:

- Quickdam or insta dam
- Optra dam
- Split dam technique



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Insti dam

Dry dam.

Handi dam

Opti dam.

Optra dam.

Long guard extension clamp

Tiger clamp

Super clamp

Recent alternatives to Rubber Dam

Kool dam (Pulpdent Corporation)

- Provides hands-free evacuation, retraction, and safety shielding, as well as illumination

Fast dam

Title	**Efficiency and patient satisfaction with the Isolite system versus rubber dam for sealant placement in pediatric patients.**
Authors	Alhareky MS[1], Mermelstein D[2], Finkelman M[3], Alhumaid J[4], Loo C[2]. Pediatr Dent. 2014 Sep-Oct;36(5):400-4.
Level of evidence	IIA
Aim	The purpose of this clinical study was to compare the chair time and degree of patient satisfaction after use of the Isolite system (IS) versus rubber dam (RD) during the application of pit and fissure sealants.
Materials and methods	The patients included in this study ranged from seven to 16 years old. In each subject, pit and fissure sealants were applied to one permanent molar in each quadrant. IS dental isolation was used on one side; RD isolation was used on the other side. Chair time was assessed using a stopwatch, and patient acceptance was evaluated using a questionnaire.
Result	Forty-two subjects (23 females and 19 males) were enrolled in the study. The average chair time was 19.36 minutes for the application of pit and fissure sealants on the RD side; average chair time was 10 minutes for the IS side (P<.001). Sixty-nine percentof the subjects were more comfortable using IS, while 31 percent found RD to be more comfortable (P=.02).
Interpretation	Isolite is a viable alternative to the conventional rubber dam. The use of Isoliteis associated with reduced chair time and greater patientsatisfaction.

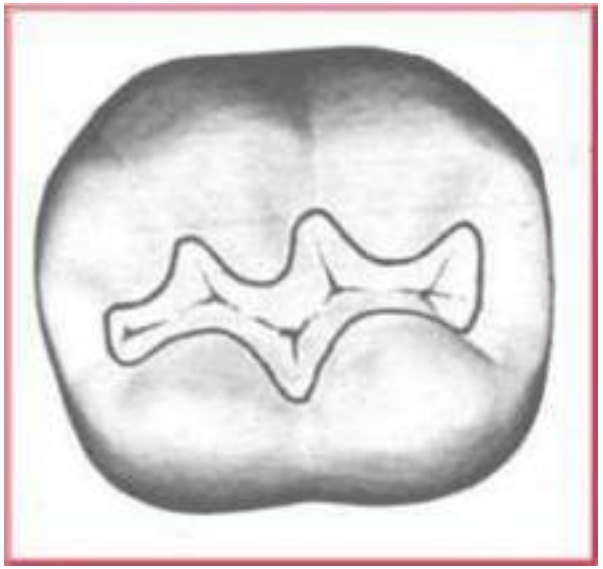
OTHER ISOLATION METHODS:

Edwina A. M. Kidd, Bernard G. N., Smith Timothy F, Watson H. M, Pickard. Pickard's Manual of Operative Dentistry.8th edition. Oxford: University Press:

PRINCIPLES OF CAVITY PREPARATION

- Tooth preparation is defined as the mechanical alteration of a defective, injured, or diseased tooth to best receive a restorative material that will reestablish a healthy state for the tooth, including esthetic corrections where indicated, along with normal form and function.

- Sturdevant



Principles of cavity preparation

- Initial tooth preparation – the mechanical alterations of the tooth are extended to sound tooth structure (sound dentin or enamel supported by noncarious dentin) in all directions (facially, lingually, gingivally, incisally or occlusally, mesially, and distally) while adhering to a specific, limited pulpal or axial depth.
  - Outline form and initial depth
  - Primary resistance form
  - Primary retention form
  - Convenience form

Theodore M. Roberson, Harald 0. Heymann Edward J. Swift, Jr.Sturdevant's Art and Science of Operative Dentistry. 4th edition. St. Louis: Mosby; 2002.

FINAL TOOTH PREPARATION

- Removal of any remaining infected dentin and old restoration
- Pulp protection if needed
- Secondary resistance and retention form
- Procedure for finishing the external walls
- Final procedures

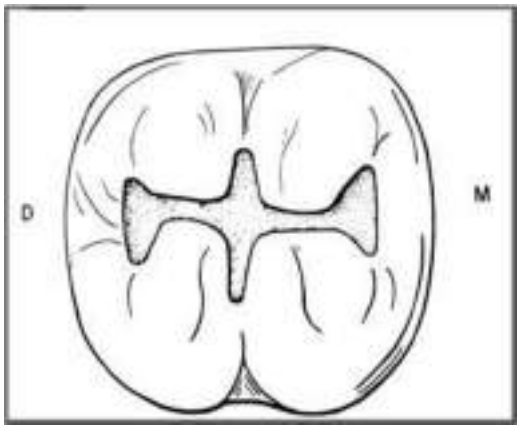
Theodore M. Roberson, Harald 0. Heymann Edward J. Swift, Jr.Sturdevant's Art and Science of Operative Dentistry. 4th edition. St. Louis: Mosby; 2002.

Outline form and initial depth:

- placing the preparation margins in the positions they will occupy in the final preparation
- preparing an initial depth of 0.2 to 0.8 mm pulpally of the DEJ position

Principles involved

1. all friable and/or weakened enamel should be removed
2. all faults should be included
3. all margins should be placed in a position finishing to afford good of the margins of the restoration.



Theodore M. Roberson, Harald 0. Heymann Edward J. Swift, Jr Sturdevant's Art and Science of Operative Dentistry. 4th edition. St. Louis: Mosby; 2002.

FEATURES OF OUTLINE FORM:

- preserving cuspal strength
- preserving marginal ridge strength
- minimizing faciolingual extensions
- using enameloplasty
- connecting two close (less than 0.5 mm apart) faults or tooth preparations
- restricting the depth of the preparation into dentin to a maximum of 0.2 mm for pit-and-fissure caries and 0.2 to 0.8 mm for the axial wall of smooth surface caries

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PRIMARY RESISTANCE FORM:

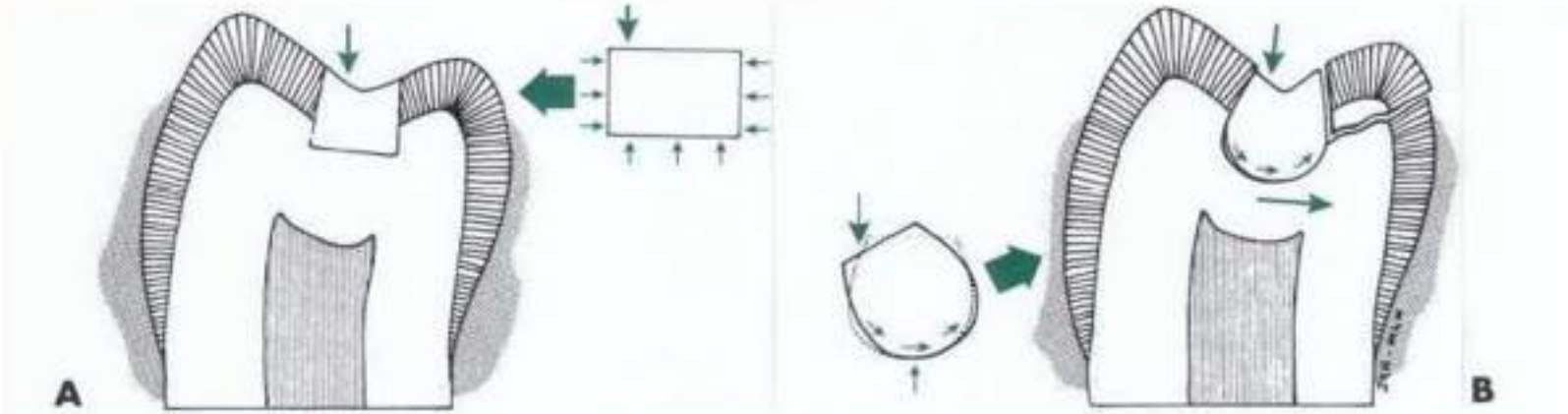
- It is defined as that shape and placement of the preparation walls that best enable both the restoration and the tooth to withstand, without fracture, masticatory forces delivered principally in the long axis of the tooth.

Principle:

- to use the box shape with a relatively flat floor
- to restrict the extension of the external walls
- to have a slight rounding (coving) of internal line angles
- in extensive tooth preparations, to cap weak cusps and envelope
  or include enough of a weakened tooth
- to provide enough thickness of restorative material

FEATURES:

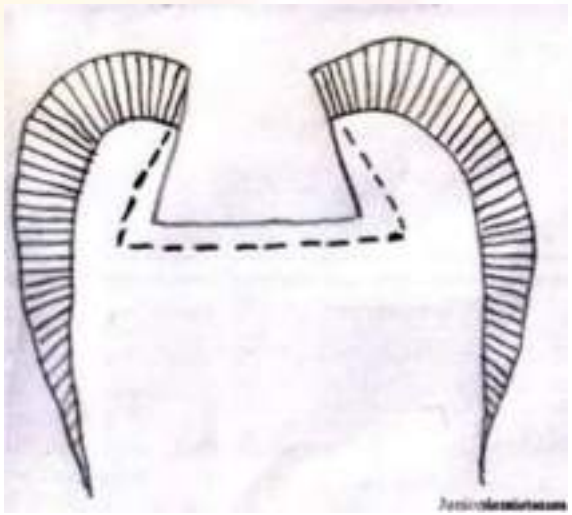
Relatively flat floors Box shape
Inclusion of weakened tooth structure
Preservation of cusps and marginal ridges
Rounded internal line angles
Adequate thickness of restorative material
Reduction of cusps for capping when indicated

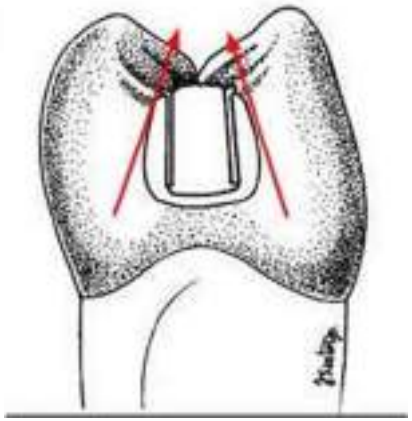


A box preparation will prevent restoration from rocking, whereas a rounded cavity preparation will lead to rocking of the restoration within the cavity.

PRIMARY RETENTION FORM:

- shape or form of the conventional preparation that resists displacement or removal of the restoration from tipping or lifting forces.
- In class I and class II cavity – the external walls are made





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CONVENIENCE FORM:

- shape or form of the preparation that provides for adequate observation, accessibility, and ease of operation in preparing and restoring the tooth.
- obtaining this form, may necessitate extension of distal, mesial, facial, or lingual walls to gain adequate access to the deeper portion of the preparation
- occlusal divergence of vertical (longitudinal) walls of tooth preparations for Class II cast restorations
- extending proximal preparations beyond proximal contacts

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Removal of any remaining enamel pit or fissure, infected dentin, and/or old restorative material, if indicated:

- Affect the esthetics
- Affect the retention
- Radiographic evidence indicates presence of caries below the old restoration.
- The tooth pulp was symptomatic preoperatively
- The periphery of the remaining old restorative material was not intact

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- In large preparations with extensive soft caries, the removal of infected dentin may be accomplished early in the initial tooth preparation.
- Large areas of soft caries usually are best removed with spoon excavators by flaking up the caries around the periphery of the infected mass and peeling it off in layers.
- For harder caries removal, round steel burs at very low speed, and round carbide burs rotating at high speeds.
- <u>Removal of remaining old restorative material, when indicated:</u>
- Also is accomplished with use of a round carbide bur, at slow speed

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Pulp protection, if indicated:

- The reason for using traditional liners or bases is to either protect the pulp or to aid pulpal recovery or both.
- When the thickness of the remaining dentin is minimal, heat generated by injudicious cutting can result in a pulpal burn lesion, an abscess formation, or pulpal necrosis.
- Some ingredients of various materials
- Thermal changes conducted through restorative materials
- Forces transmitted through materials to the dentin
- Galvanic shock
- The ingress of noxious products and bacteria through microleakage.

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Secondary resistance and retention forms:

1. Mechanical preparation features

2. Treatments of the preparation walls with etching, priming, and adhesive materials

- Many compound and complex preparations require these additional features.
- When a tooth preparation includes both occlusal and proximal surfaces, each of those areas should have independent retention and resistance features.

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1.Mechanical preparation features

Retention locks, grooves, and coves

- Vertically oriented retention locks and retention grooves are used to provide additional retention for proximal portions of some tooth preparations.
- The locks are for amalgams and the grooves are for cast metal restorations.
- Horizontally oriented retention grooves are prepared in most Classes III and V preparations for amalgam and in some root surface tooth preparations for composite.
- Retention coves are appropriately placed undercuts for the incisal retention of Class III amalgams, occlusal portion of some amalgam restorations

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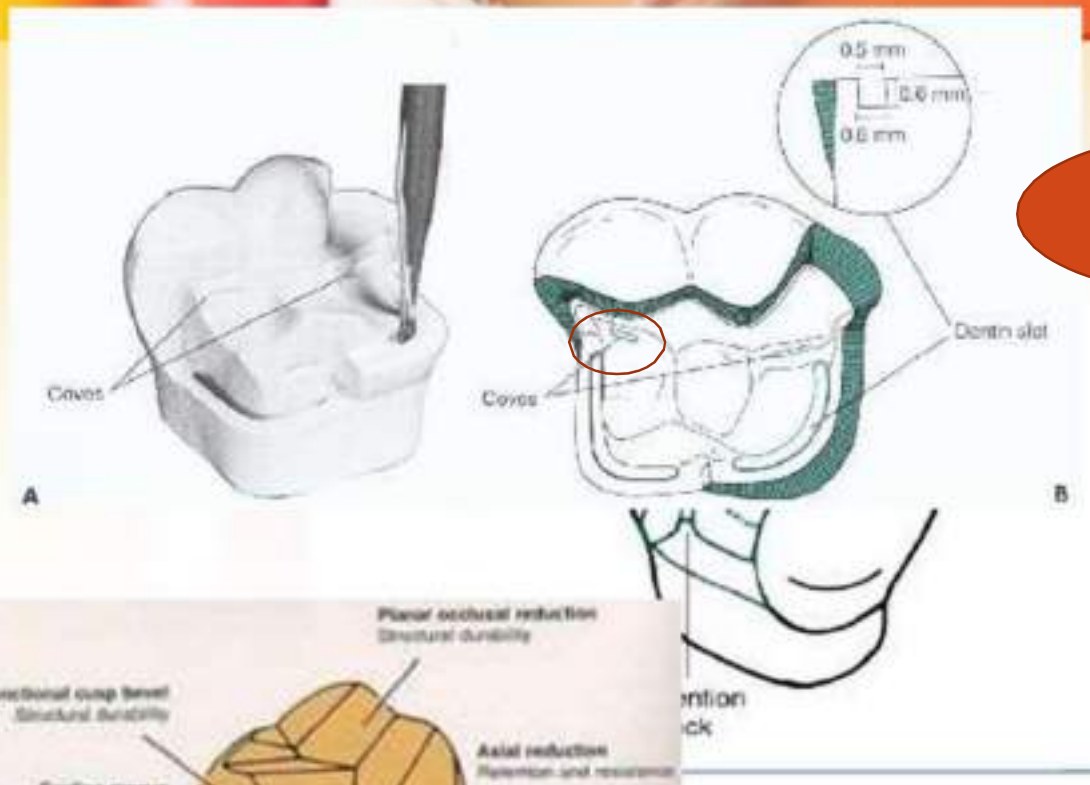
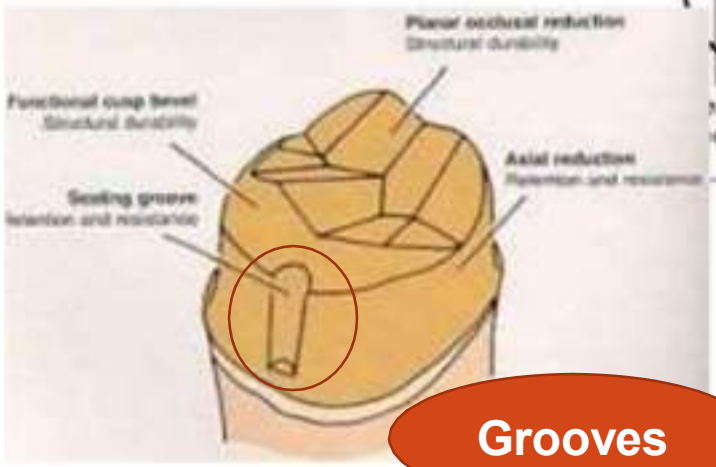


Coves



Grooves

Locks

2. Placement of Etchant, Primer, or Adhesive on Prepared Walls

- In addition to mechanical alterations to the tooth preparation, certain alterations to the preparation walls by actions of various materials also afford increased retention, as well as resistance to fracture.

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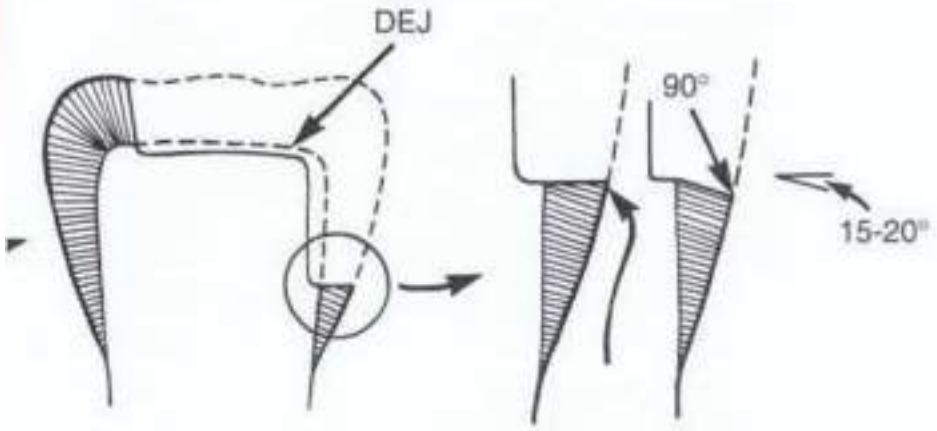
Procedures for finishing the external walls:

- Finishing the external walls of the preparation entails consideration of both degree of smoothness and cavosurface design, since each restorative material has its maximum effectiveness when the appropriate conditions are developed for that specific material.
- When a preparation has extended onto the root surface (no enamel present), the root-surface cavosurface angle should be either 90 degrees (for amalgam, composite, or porcelain restorations) or beveled (for intracoronal cast metal restorations).

- The90-degree root-surface margin provides a butt joint relationship between the restorative material and the cementum /dentin preparation wall, a configuration that provides appropriate strength to both.



- ***Objectives***

a. Create the best marginal seal possible between the restorative material and the tooth structure

b. Afford a smooth marginal junction

c. Provide maximum strength of both the tooth and the restorative material at and near the margin

Factors

a. The direction of the enamel rods

b. Support of the enamel rods both at the DEJ and laterally (preparation side)

c. The type of restorative material to be placed in the preparation

d. The location of the margin

e. The degree of smoothness or roughness desired

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Final procedures: cleaning, inspecting, and sealing:

- Removing all chips and loose debris that have accumulated, drying the preparation (do not desiccate), and making a final complete inspection of the preparation for any remaining infected dentin, unsound enamel margins, or any condition that renders the preparation unacceptable to receive the restorative material.

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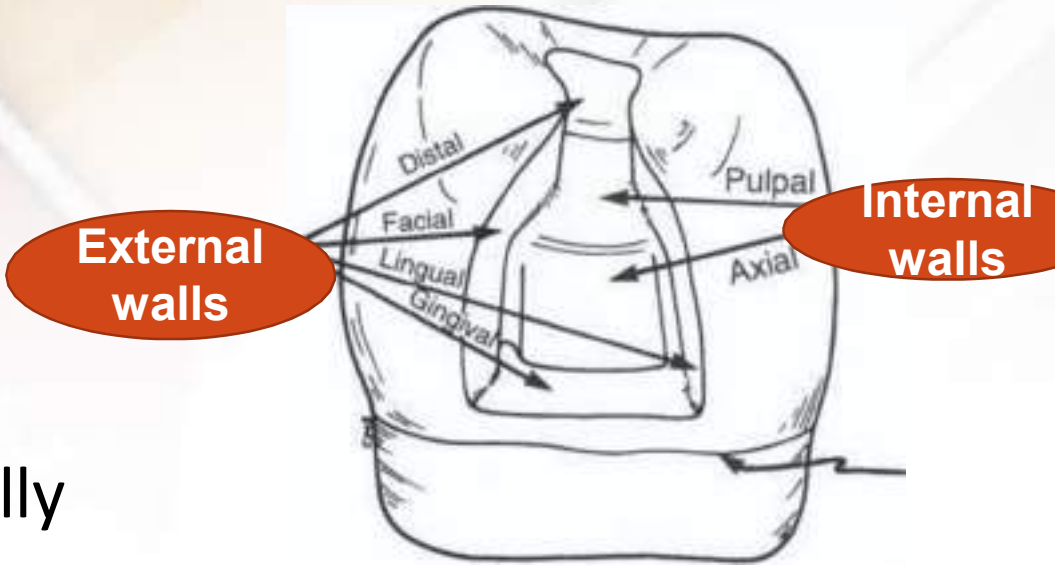
M.E.J.Curzon, J.F.Roberts, D.B.Kennedy.Kennedy's Paediatric Operative Dentistry.4th edition. Reed publishing house;1996.

- **External Wall**-An external wall is a prepared (cut) surface that extends from the external part surface.
- **Floor (or Seat)-**A floor (or seat) is a prepared (cut) wall that is reasonably flat and perpendicular to those occlusal forces that are directed occlusogingivally (generally parallel to the long axis of the tooth).
- **Enamel Wall**-The enamel wall is that portion of a prepared
- **Dentinal Wall**-The dentinal wall is that portion of a prepared



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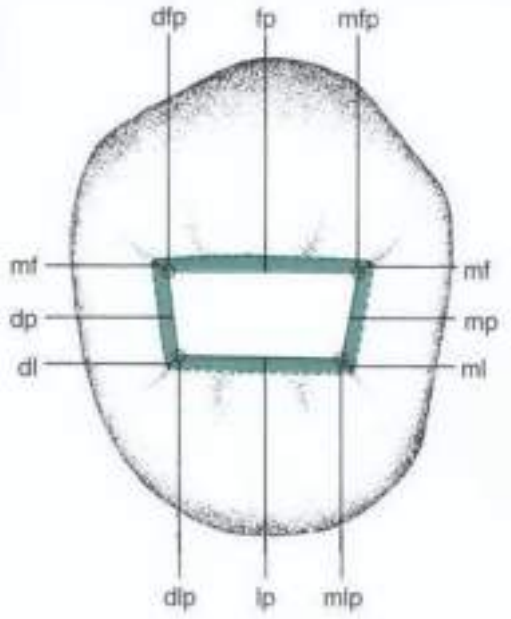
M.E.J.Curzon, J.F.Roberts, D.B.Kennedy.Kennedy's Paediatric Operative Dentistry.4th edition. Reed publishing house;1996.

Tooth preparation angles:

- **Line Angle-** A line angle is the junction of two planal surfaces of different orientation along a line. An internal line angle is a line angle whose apex points into the tooth. An external line angle is a line angle whose apex points away from the tooth.
- **Point Angle -** A point angle is the junction of three planal surfaces of different orientation



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- Edwina A. M. Kidd, Bernard G. N., Smith Timothy F, Watson H. M, Pickard. Pickard's Manual of Operative Dentistry.8th edition. Oxford: University Press; 2003
- M.E.J.Curzon, J.F.Roberts, D.B.Kennedy.Kennedy's Paediatric Operative Dentistry.4th edition. Reed publishing house;1996.
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Thank you!!!

Paediatric operative dentistry – Restorative considerations & current concepts

Presented by – Dr. Akash Ardeshana

Dept of Paedodontics and Preventive Dentistry

content

- Amalgam preparation for primary molars
- Cavity preparation for adhesive material
- Modification of cavity design
- Step for composite restoration
- Step for GIC restoration
- Summary
- Bibliography

amalgam preparation

- Dental amalgam has been the most commonly used restorative material in posterior teeth for over 150 years and is still widely used throughout the world today.

- Dental amalgam has declined in use over the past decade, perhaps due to the controversy surrounding perceived health effects of mercury vapor, environmental concerns from its mercury content, and increased demand for esthetic alternatives.

AAPD Guideline on Restorative Dentist.
REFERENCE MANUAL V 36 / NO 6 14 /15

- With regard to safety of dental amalgam, a comprehensive literature review of dental studies published between 2004 and 2008 found insufficient evidence of associations between mercury release from dental amalgam and the various medical complaints.

- However, on July 28, 2009, the Food and Drug Administration **(FDA)** issued a “final rule” that reclassified dental amalgam to a Class II device (having some risk) and designated guidance

- that included warning labels regarding:
  - (1) possible harm of mercury vapors;
  - (2) disclosure of mercury content;
  - (3) contraindications for persons with known mercury sensitivity.

- With regard to clinical efficacy of dental amalgam, results comparing longevity of amalgam to other restorative materials are inconsistent.

AAPD Guideline on Restorative Dentist.
REFERENCE MANUAL V 36 / NO 6 14 /15

Title	The longevity of amalgam versus compomer/composite restorations in posterior primary and permanent teeth: findings From the New England Children's Amalgam Trial.
Authors	Soncini JA[1], Maserejian NN, Trachtenberg F, Tavares M, Hayes C.
Level of evidence	IIb
Aim	The authors compared replacement rates of these types of restorations in posterior teeth during the five-year follow-up of the New England Children's Amalgam Trial.
Materials and methods	The authors randomized children aged 6 to 10 years who had two or more posterior occlusal carious lesions into groups that received amalgam (n=267) or compomer (primary teeth)/composite (permanent teeth) (n=267) restorations and followed them up semiannually. They compared the longevity of restorations placed on all posterior surfaces using random effects survival analys**.**
Result	The average+/-standard deviation follow-up was 2.8+/-1.4 years for primary tooth restorations and 3.4+/-1.9 years for permanent tooth restorations. In primary teeth, the replacement rate was 5.8 percent of compomers versus 4.0 percent of amalgams (P=.10), with 3.0 percent versus 0.5 percent (P=.002), respectively, due to recurrent caries. In permanent teeth, the replacement rate was 14.9 percent of composites versus 10.8 percent of amalgams (P=.45), and the repair rate was 2.8 percent of composites versus 0.4 percent of amalgams (P=.02).
conclusion	Although the overall difference in longevity was not statistically significant, compomer was replaced significantly more frequently owing to recurrent caries, and composite restorations required seven times as many repairs as did amalgam restorations.

- Thesurvival rate of the amalgam restorations was 94.4 percent, that of composite restorations was 85.5 percent. Annual failure rates ranged from 0.16 to 2.83 percent for amalgam restorations and from 0.94 to 9.43 percent for composite restorations.
- Secondary caries was the main reason for failure in both materials.
- Risk of secondary caries was 3.5 times greater in the composite group.

AAPD Guideline on Restorative Dentist.
REFERENCE MANUAL V 36 / NO 6 14 /15

Rounded-end, high-speed carbide burs No. 329, No. 330, No. 245, and No. 256, which may be used for cutting
cavity preparations.

Modifications of cavity preparation in primary teeth:

1. **Class I**

- Narrow occlusal table – buccolingual dimension of cavity is reduced
- 0.5mm pulpal to DEJ
- Maximum intercuspal width should be minimum
- Walls should be parallel or slightly convergent
- Outline form should limit to the central pit, its buccal and lingual grooves and triangular fossa
- Pulpal floor should be slightly concave
- Total depth of the cavity – 1.5
- All pits and fissures should be included

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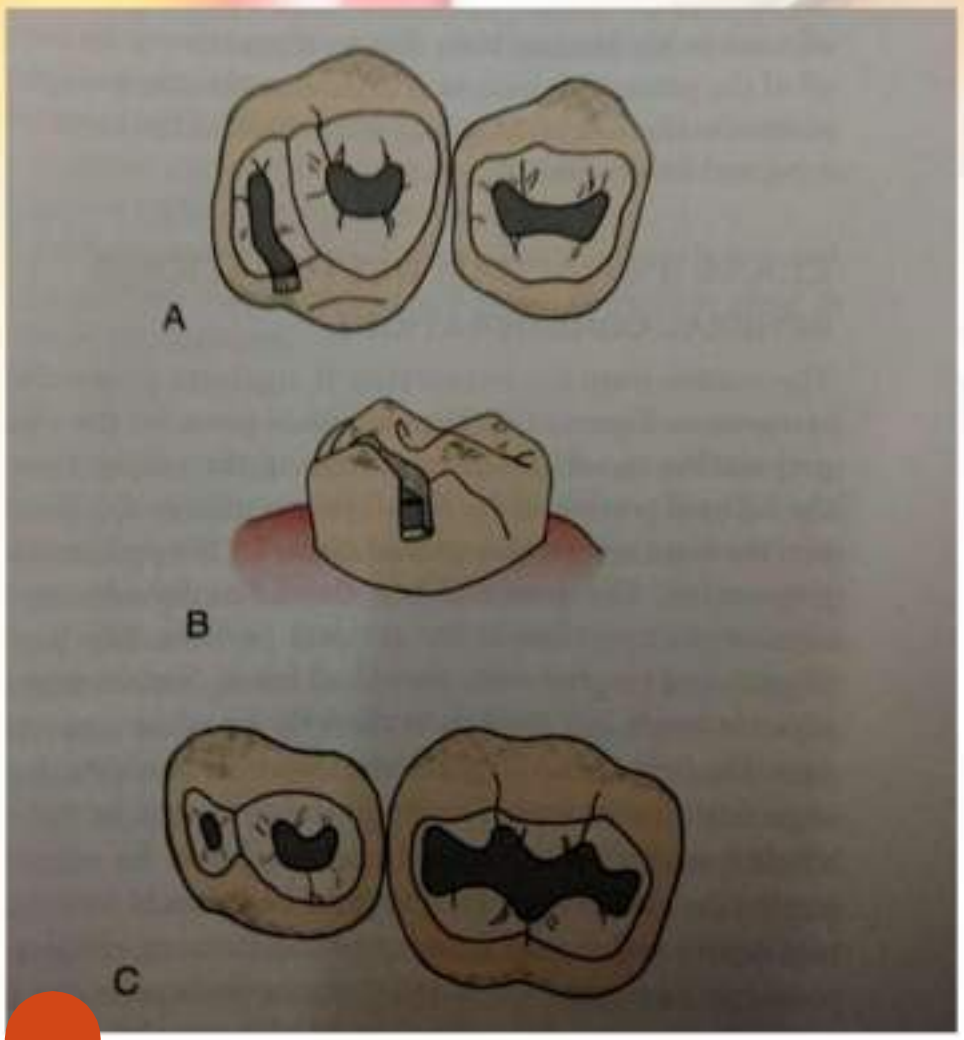
Steps

External outline form

- Start preparation with a no.330 bur, perpendicular to occlusal surface- mesial to distal
- Include all deep and defective grooves blend the outline to form a smooth flowing arcs and curves
- Contour the outline parallel to mesial and distal marginal ridges
- Width of cavity – 1/3rd intercuspal width

Internal outline form

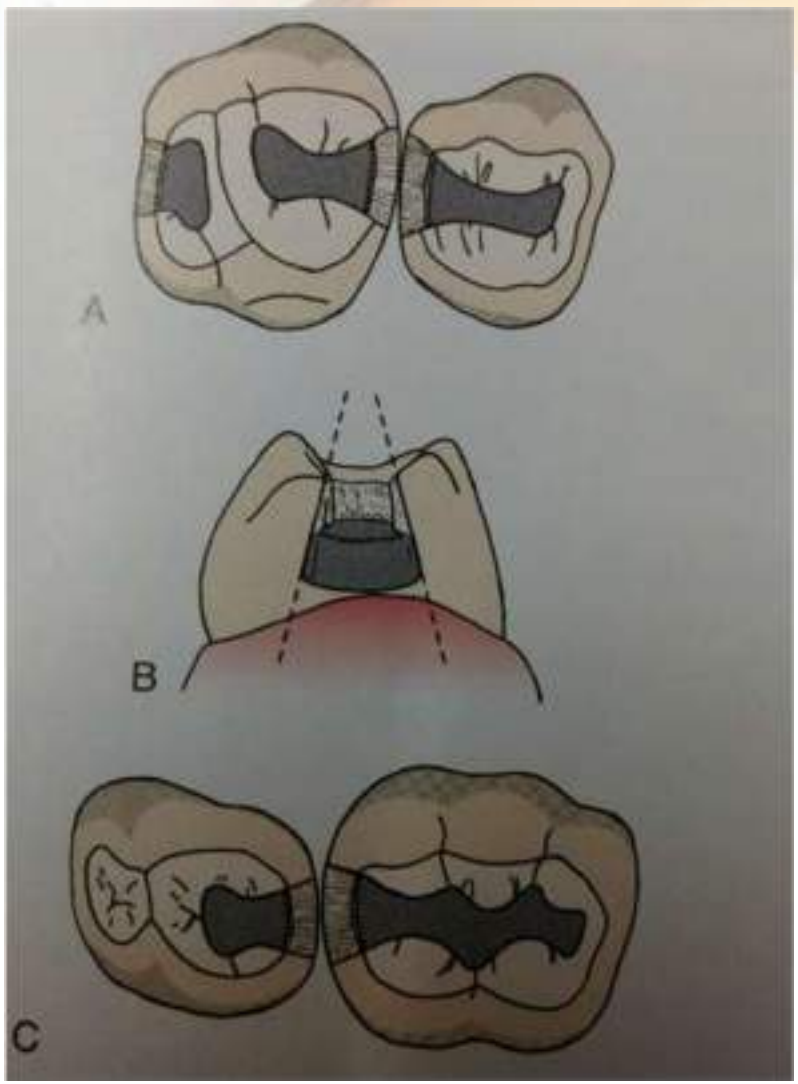
- 0.50-1.0 mm into the dentin – 330 bur
- Round line angles – no.330 bur
- Converging walls
- Sharp cavosurface angle – 169L bur



Common errors in Class I amalgam restorations

1. Preparing cavity too deep
2. Undercutting marginal ridges
3. Carving the anatomy of amalgam too deep
4. Udercarving that leads to fracture
5. Not including all susceptible fissures

Class II amalgam



2. Class II

- Occlusal box
  - 1st molars – extend the occlusal box half way mesiodistally like dovetail
  - Mandibular 2nd molar – all pits and fissures should be included
  - Maxillary 2nd molars – nearest occlusal pit should be included
- Sharp cavosurface angle
- Rounded / beveled/ grooved axiopulpal line angle
- Proximal box – greater width
- More buccolingual extension of gingival seat / floor
- Occlusal convergence
- Axial wall should follow contour of external wall and 0.5 mm in dentine
- No retention grooves

M. S. Duggal,M. E. J. Curzon,S. A. Fayle, K. J. Toynba. Restorative Techniques in Paediatric Dentistry: An Illustrated Guide to the Restoration of Extensive Carious Primary Teeth.2nd edition. CRC Press:2002.
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- **Kennedy (1997)** contraindicated the idea of dovetail lock, as in primary teeth occlusal fissures are prepared which produces curved shape that provides retention.
  - **Rodda** recommended 1mm depth of cavity because the distance between the mesial surface of mandibular 1st molar and pulp horn is only 1.6 mm.

M. S. Duggal,M. E. J. Curzon,S. A. Fayle, K. J. Toynba. Restorative Techniques in Paediatric Dentistry: An Illustrated Guide to the Restoration of Extensive Carious Primary Teeth.2nd edition. CRC Press:2002.

Common errors in Class II amalgam restorations

1. Failure to extend occlusal outline into all susceptible pits and fissures
2. Failure to follow the outline of the cusps
3. Isthmus cut too wide
4. Flare of the proximal wall too great
5. Angle formed by the axial, buccal and lingual walls too great
6. Gingival contact not broken
7. Axial wall not confirming to the proximal contour of the tooth

Paul S. Casamassimo, Henry W. Fields Jr., Dennis J. McTigue, Arthur Nowak. Pediatric Dentistry: Infancy through Adolescence. 5th edition. Saunders: Elsevier ; 2013

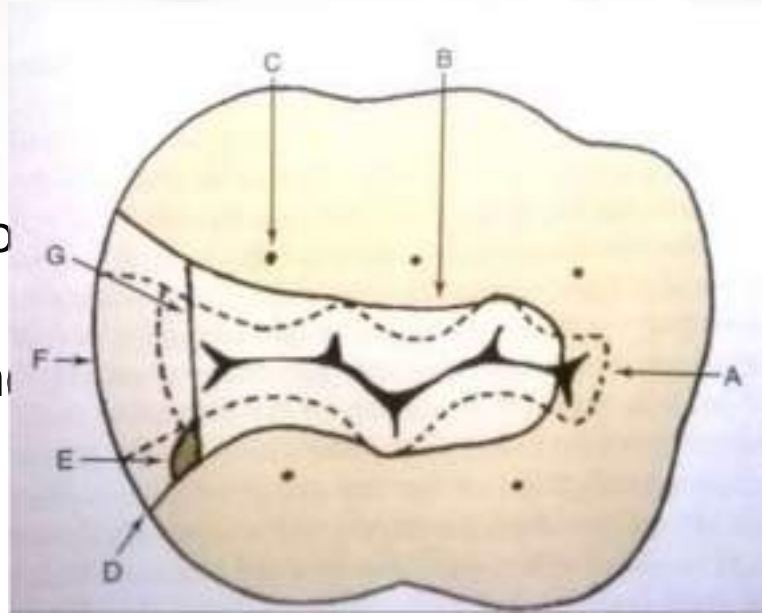
- Messer and Levering reported that SSCs placed in 4 your old and younger children showed a success rate approximately twice that of class II amalgam restoration up to 10 years.
- Roberts and Sherriff reported that after 5 year, one third of class II amalgams placed in primary teeth had failed or required replacement, whereas only 8% of SSCs required retreatment.

Paul S. Casamassimo, Henry W. Fields Jr., Dennis J. McTigue, Arthur Nowak. Pediatric Dentistry: Infancy through Adolescence.5th edition. Saunders: Elsevier ; 2013

Title	**Factors influencing dentists' choice of amalgam and tooth-colored restorative materials for Class II preparations in younger patients**
Authors	Simen Vidnes-kopperud, Anne Bjørg Tveit, Torunn Gaarden, Leiv Sandvik & Ivar Espelid. Acta Odontologica Scandinavica, 2009; 67: 74-79
Level of evidence	III
Aim	To identify factors associated with dentists' decisions on choice of restorative material in children and adolescents.
Materials and methods	In the period 20012004, 27 dentists in the Public Dental Health Service in Norway placed 4030 Class II restorations in 1912 patients. The reason for placement, previous caries experience (DMFT), oral hygiene, and characteristics of the cavity were recorded.
Results	The most frequently used material was resin composite (81.5%), followed by compomer (12.7%), amalgam (4.6%), and glass ionomer cement (1.2%). Tooth-colored restorations were more frequently placed than amalgam in younger patients (p0.017). Female patients received fewer amalgam restorations than male patients (p0.006).
Interpretation	The findings indicate that in a period when the use of amalgam

Problems with amalgam restorations:

- Accounts for anatomic or morphologic structural characteristics.
- Fracture of isthmus in Class II amalgam restorations
- Marginal failure in the proximal box, due to excessive flare of the cavosurface angle
- Failure to remove all caries or to extend the cavity into caries susceptible areas



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Adhesive materials in primary teeth

- In early mid 1960's, composite or resin based composites were suggested as replacement for class I and class II amalgam restorations.
- In due course of time, with the improvement in resin based composites due to smaller filler particle, increase in material strength and improvement of dentin bonding agents, led to improved clinical results.
- **Norman et al** reported that both amalgam and resin based composites produced satisfactory results over a long duration of time. Only difference seen were due to poorer marginal integrity for amalgam and greater

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Class I and Class II preparation:

- Absolute moisture control is required
- Unlike amalgam preparations, there is no current consensus about the precise design of Class II preparation for primary teeth to receive an adhesive material.
- **Leinfelder** recommended that Class II preparation be primarily restricted to the region of caries, with no occlusal extent
- A short bevel to the cavosurface margin should be given to increase surface area for bonding
- Wedges or matrices should be used before restoration is done for better contact

M. S. Duggal,M. E. J. Curzon,S. A. Fayle, K. J. Toynba. Restorative Techniques in Paediatric Dentistry: An Illustrated Guide to the Restoration of Extensive Carious Primary Teeth.2nd edition. CRC Press:2002.
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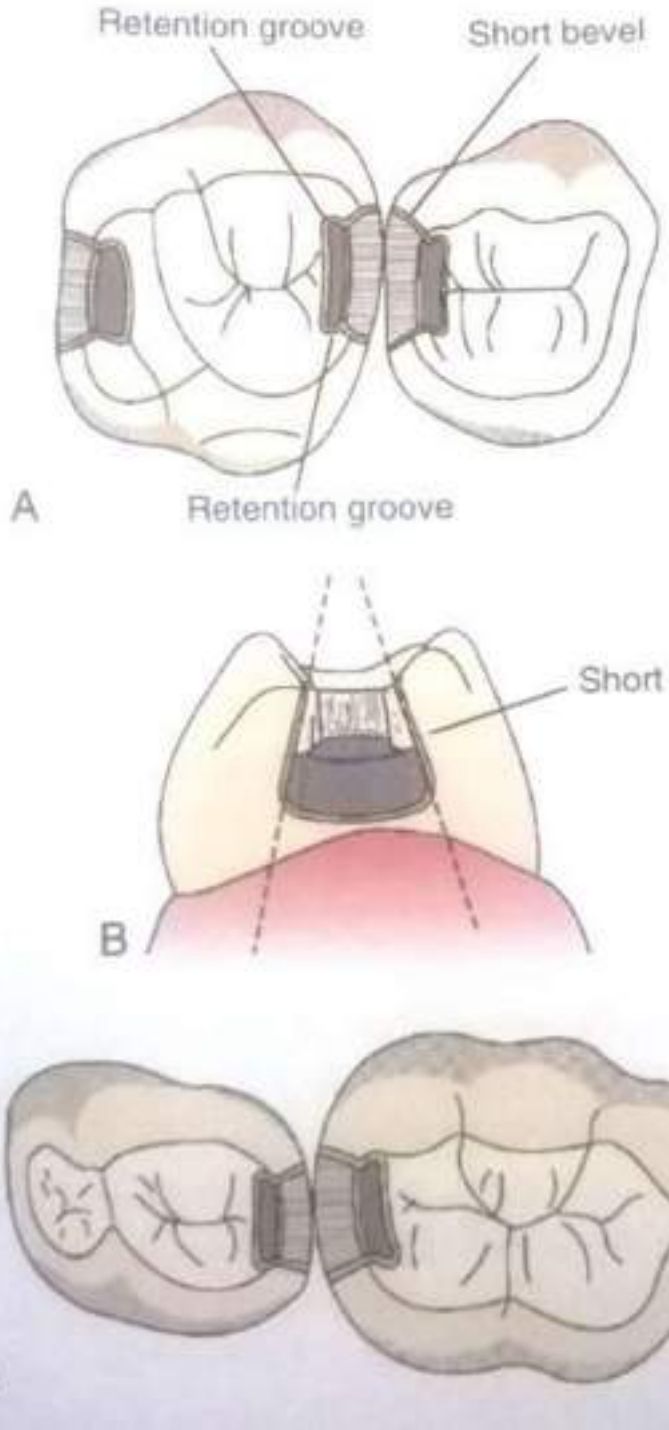
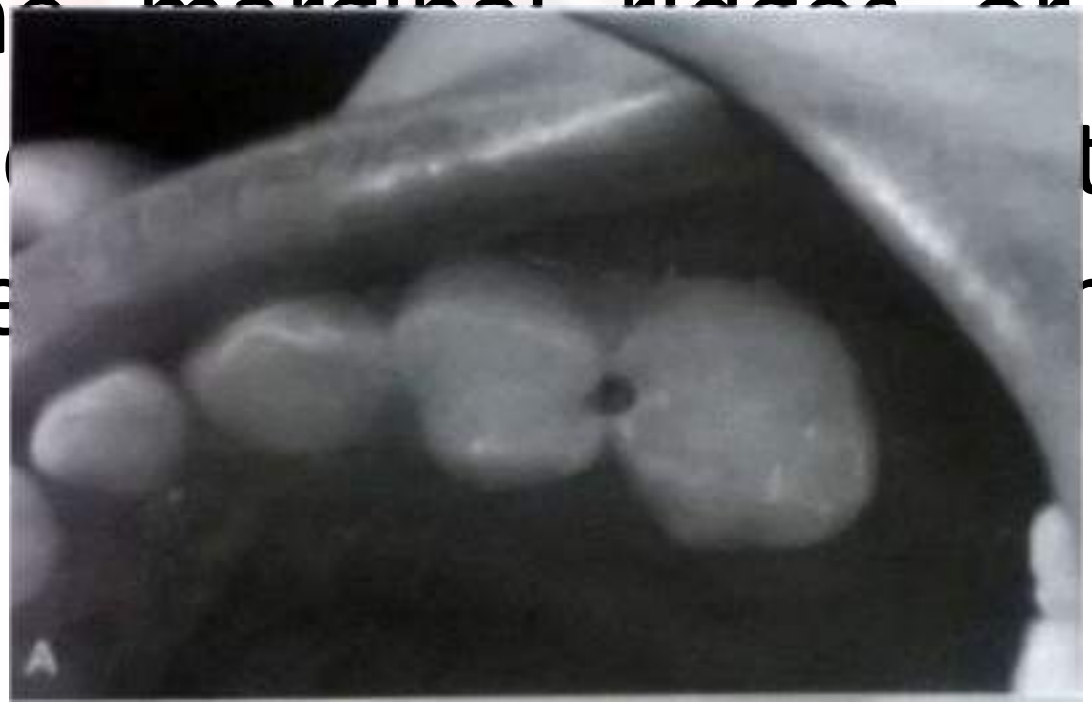

Retention groove
Short bevel
A
Retention groove
Short bevel
B
C

Title	Split mouth randomized controlled clinical trial of beveled cavity preparations in primary molars: an 18-Month follow up.
Authors	Oliveira CA[1], Dias PF, Dos Santos MP, Maia LC J Dent. 2008 Sep;36(9):754-8. doi: 10.1016/j.jdent.2008.05.006. Epub 2008 Jun 25.
Level of evidence	IB
Aim	This split-mouth, double-blind, randomized controlled study evaluated the clinical performance of composite restorations in Class I beveled margin cavity preparations in primary molars.
Materials and methods	A total of 94 Class I cavity preparations were performed in the carious primary molars of 32 children aged 4-10 years. Two cavity designs were used: conventional conservative preparation (G1) and modified preparation with cavosurface bevel (G2). All teeth were restored using TPH Spectrumtrade mark. The restorations were evaluated by two calibrated investigators at baseline, 6, 12 and 18 months using slight modified USPH criteria. The visible plaque index and fiber optic transilumination (FOTI) were also used.
result	Of the 94 restorations performed and evaluated at baseline, 76 restorations were available after 18 months. Seventy-three restorations were considered as clinical success, 10 were censored for drop out reasons and 5 were lost by natural exfoliation. Four restorations failed by secondary caries and two failed by marginal adaptation discrepancies. For all evaluation there was difference between the baseline, 6, 12 and 18 months ($p<0.05$) but there were no statistically significant difference in G1 and G2 for any criteria evaluated ($p>0.05$) at any period of the study. The visible plaque index was correlated to secondary caries.

- **Small Lesions. Very small incipient proximal lesions** may be chemically restored with topical fluoride therapy provided by the dentist, along with the judicious use of fluoride products designed for topical application at home.
- If this treatment regimen is accompanied by improved diet and improved oral hygiene, some incipient proximal lesions may remineralize or remain in an arrested state indefinitely.

Dean JA, Averry DR, McDonald RE. McDonald and Avery's Dentistry for child and adeloscent. Ninth edition, Elsevier, India 2011.

- In otherwise sound teeth free of susceptible pits and fissures, accessing small class II carious lesions via small openings in th in the fa teeth is be nique.



Int J Paediatr Dent. 2003 Jan;13(1):2-8.

Conventional versus resin-modified glass-ionomer cement for Class II restorations in primary molars. A 3-year clinical study.

Hübel S[1], Mejàre I.

Author information

Abstract

OBJECTIVE: To compare the clinical performance of two glass-ionomer cements (GICs)for Class II restorations in primary molars: a conventional cement (Fuji II) and a resin-modified cement (Vitremer).

DESIGN: Split mouth and random assignment to the two materials were used for the majority of the molars.

SAMPLE AND METHODS: Forty consecutive 4-7-year-old children were included. One operator made 115 restorations: 53 with Vitremer and 62 with Fuji II. The restorations were evaluated clinically, radiographically and from colour photographs.

RESULTS: The cumulative success rate of the Vitremer restorations was 94% and that of the Fuji II restorations 81%. The difference is statistically significant. The risk of a failed restoration was more than five times higher with Fuji II than with Vitremer as the restorative material. Of the 13 unsuccessful restorations, seven had lost their retention, four had secondary caries, and two were fractured.

CONCLUSIONS: The resin-modified GIC offered advantages over the conventional GIC for restoring approximal caries in primary molars.

Minimal Cavity Design

Tunnel

- This type of cavity design could be used when the contact area may remain sound and the marginal ridge may be quite strong, provided the lesion is more than 2.5 mm below the crest of the marginal ridge.

- Access to the lesion through the occlusal surface should be limited to the extent required to achieve visibility and, where possible, should be undertaken from an area that is not under direct occlusal load.

- For most patients, there is a fossa immediately mesial to the marginal ridge that is the most suitable position for initial entry.

Mount GJ. Minimal intervention dentistry: Rationale of cavity design. Oper Dent 2003;28:92-9.

- Resin composite is not indicated for restoration of these lesions because it will not be possible to access the proximal lesion to a sufficient degree to be able to reliably remove all demineralized enamel.

- Also, it will not be possible to provide a beveled margin to ensure proper adaptation of the resin to the enamel.

- On the other hand, glass ionomer will flow readily into a small cavity and has the ability to remineralized the enamel margins and any dentin on the axial wall that may be demineralized.

Mount GJ. Minimal intervention dentistry: Rationale of cavity design. Oper Dent 2003;28:92-9.

Indications and contraindications

- Use of tunnel preparation can be considered when small, proximal carious lesions necessitate restoration

•Large carious lesion are diagnosed, where access is particularly difficult.

•Overlying marginal ridge is subjected to heavy occlusion or demonstrates a crack

Fig. 1. Initial approach – Enter the lesion from the occlusal fossa aiming towards the lesion.

Fig. 2. Gain access – Turn the bur vertical and lean it buccally and lingually to ‘funnel’ the cavity for visibility.

Fig. 3. Completed cavity – axial wall left untouched.

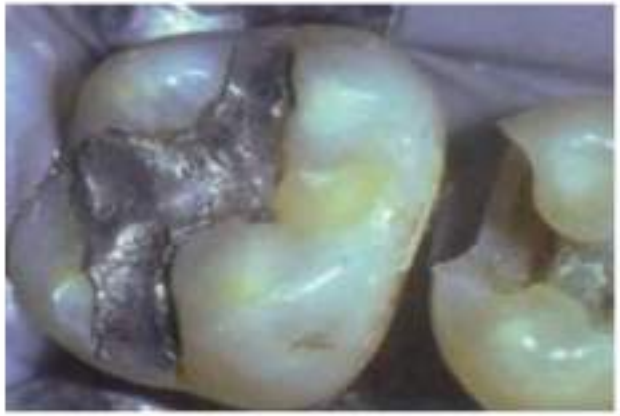


Fig. 4. GIC Restoration done

Advantages

- Preserves the marginal ridge - conservative approach
- Less potential for a restorative overhang
- Perimeter of the restoration is reduced, decreasing the potential for micro leakage.
- Potential for disturbance of the adjacent tooth is reduced

Disadvantages

- Highly technique sensitive, demanding careful control of the preparation by the operator
- Angulations of preparation often passes close pulp
- Visibility is decreased and caries removal is more uncertain -
- Fragile marginal ridge

Slot cavity preparation

- It is the creation of a small slot on the proximal aspect of posterior teeth. (Mount and Ngo 2000)
- Indicated if there is a small lesion involving the area of or below the marginal ridge only in deciduous teeth.
- The outline form will be dictated entirely by the extent of the breakdown of the enamel, removing only that which is friable and easily eliminated without applying undue pressure.
- Retention will be through adhesion, so it is only necessary to clean the walls around the full circumference of the lesion, leaving the axial wall because it will be affected by dentin only.

Hugh Devlin. Operative Dentistry-A Practical Guide to Recent Innovations.1st edition. Springer. Germany:2006.
Nikhil Marwah. Textbook of Pediatric Dentistry.3rd edition. Jaypee Brothers Medical Publishers Private Limited;2014

- Whenever required the contact area should be preserved while cavity preparation for maintaining a good contact area.

- For such a lesion, resin composite may be a useful material because on many occasions there will be an enamel margin around the full circumference.

- However, glass ionomer is still a sound option because the occlusal load will not be great and the ion exchange will remain valuable both for adhesion and remineralization.

Fig. 1. Small carious lesion on the proximal surface of the first bicuspid

Fig. 2. Slot cavity preparation

Fig. 3. Finished slot cavity

Fig . 4 Resin modified GIC Restoration done

Proximal Approach

- A further, very conservative approach to restoring a proximal lesion.
- It can be achieved on limited occasions only when the proximal surface of a tooth becomes accessible at the time of cavity preparation in an adjacent tooth.
- The lesion may have been revealed through radiographs or it may be noted only during cavity preparation.
- When such an approach is possible, it leads to considerable conservation of natural tooth structure.

Mount GJ. Minimal intervention dentistry: Rationale of cavity design. Oper Dent 2003;28:92-9.

Restoration of primary incisor and canine

- Indication :
  - Caries
  - Trauma
  - Developmental defects

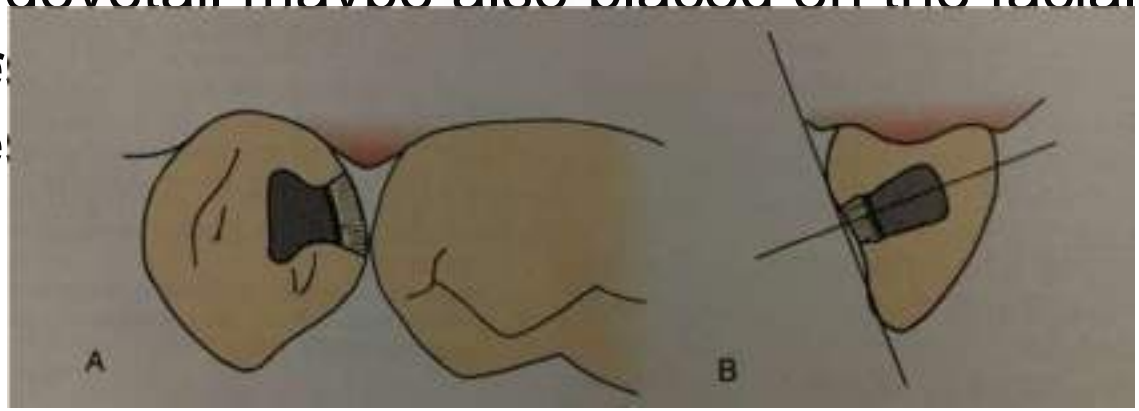
- Adhesive material usually resin based composite or resin ionomer products, are placed into class II and class V restorations in primary teeth.
  - class IV restoration may also be done.

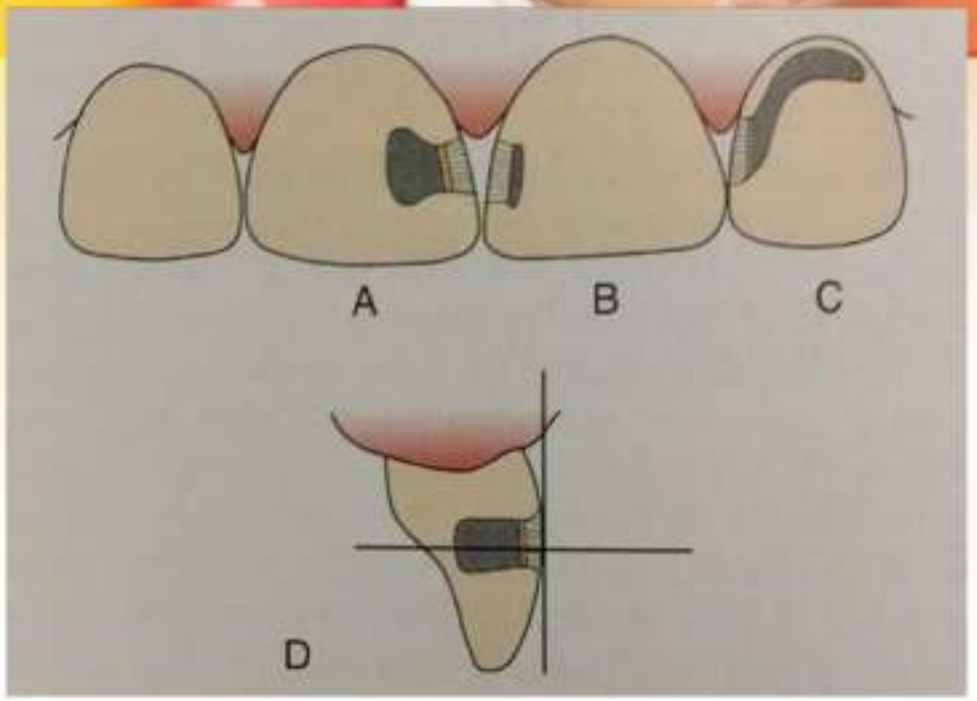
Class III restotrations:

- Preparations should be kept very small, due to large pulp chamber
- A slot preparation, with a short cavosurface bevel is recommended
- In children with bruxism when such restorations are done, an additional mechanical retention is required

Paul S. Casamassimo, Henry W. Fields Jr., Dennis J. McTigue, Arthur Nowak. Pediatric Dentistry: Infancy through Adolescence.5th edition. Saunders: Elsevier ; 2013

- Retentive locks on facial and lingual surfaces and by beveling the cavosurface margin to increase the surface area
- Restoring the distal surface of canines, a proximal box directed at a different angle towards the gingiva is essential
- A dovetail maybe also placed on the facial surface for r

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J Clin Pediatr Dent. 2004 Winter;28(2):125-9.

Comparative clinical evaluation of slot versus dovetail Class III composite restorations in primary anterior teeth.

Trairatvorakul C[1], Piwat S.

Author information

Abstract

This study compares the clinical characteristic evaluations of slot against dovetail class III composite restorations. Focusing on the primary anterior teeth of children aged 2 years 6 months to 5 years 3 months with the mean age of 4 years, thirty-six matched pairs of class III of slot and dovetail preparations were made by one investigator These preparations were evaluated for marginal adaptation, anatomic form, secondary caries and marginal discoloration after 6, 12, and 24 months by another investigator with the intra-examiner reliability of 0.95 - 1 (Kappa Statistic). The results revealed no statistical significance in the difference of clinical characteristics between the two designs ($p > 0.05$).

- Mandibular primary incisors with small proximal carious lesions may not require conventional restorations at all.
- Enameloplasty of the affected proximal surface (usually described as "disking") to open the proximal contact and to remove most, if not all, of the cavitation,
- followed by topical treatments with fluoride varnish, will often suffice until the teeth exfoliate naturally.
- Extraction is usually indicated when mandibular primary incisors have extensive caries.

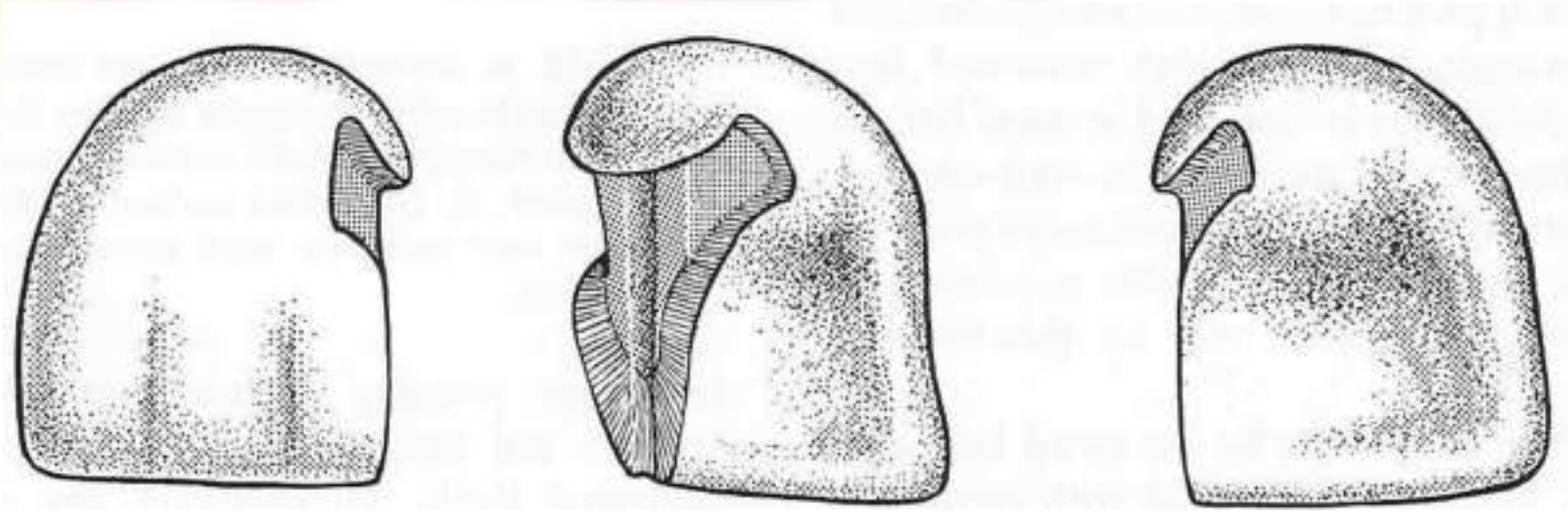
Paul S. Casamassimo, Henry W. Fields Jr, Dennis J. McTigue, Arthur Nowak. Pediatric Dentistry: Infancy through Adolescence. 5th edition. Saunders: Elsevier; 2013

Class V restorations:

- Pulpal wall should be convex, parallel to the outer enamelsurface
- Lateral walls are slightly flared near proximal surfaces to prevent undermining of the enamel
- The final preparation should include all the carious tooth structure
- A short bevel is placed around the entire cavosurface margin.
- Cavity depth approximately 1 mm from the outer enamel surface.
- Mechanical retention can be given.

M. S. Duggal,M. E. J. Curzon,S. A. Fayle, K. J. Toynba. Restorative Techniques in Paediatric Dentistry: An Illustrated Guide to the Restoration of Extensive Carious Primary Teeth.2nd edition. CRC Press:2002.
Paul S. Casamassimo, Henry W. Fields Jr., Dennis J. McTigue, Arthur Nowak. Pediatric Dentistry: Infancy through Adolescence.5th edition. Saunders: Elsevier ; 2013

- Restoration of proximal incisal caries in primary anterior teeth



- McEvoy has described a similar preparation and restoration for primary incisors, except that the retentive locking component is placed on the labial surface only in the gingival one third of the tooth."

- The lock extends minimally across two thirds of the labial surface and may extend even farther to include decalcified enamel in the cervical area.

Tooth preparation for composite restoration

- Basically, the tooth preparation for a composite restoration includes:
  1. Removing the fault, defect, old material, or friable tooth structure
  2. Creating prepared enamel margins of 90 degrees or greater (greater than 90 degrees usually preferable)
  3. Creating 90-degree (or butt joint) cavosurface margins on root surfaces
  4. Roughening the prepared tooth structure (enamel and dentin) with a diamond stone

Theodore M. Roberson, Harald 0. Heymann Edward J. Swift, Jr.Sturdevant's Art and Science of Operative Dentistry. 4th edition. St. Louis: Mosby; 2002.

- Differences from amalgam restoration include:

1. Less outline extension (adjacent suspicious or at-risk areas [grooves or pits] may be "sealed" rather than restored)
2. An axial and/or pulpal wall of varying depth (not uniform)
3. Incorporation of an enamel bevel at some areas (the width of which is dictated by the need for secondary retention)
4. Tooth preparation walls being rough (to increase the surface area for bonding)
5. Use of a diamond stone (to increase the roughness of the tooth preparation walls)

Theodore M. Roberson, Harald O. Heymann, Edward J. Swift, Jr.Sturdevant's Art and Science of Operative Dentistry, 4th edition. St. Louis: Mosby; 2002.

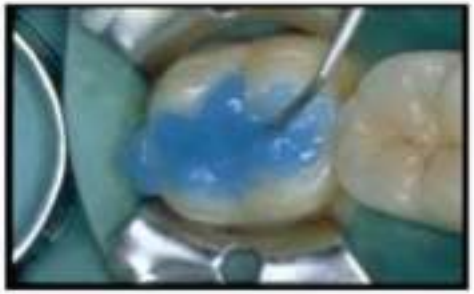
Steps

- Administration of anasthesi, rubber dam and wooden wedge in inter proximal area
- A small round or pear-shaped diamond bur in a high-speed handpiece to gain access to the caries.
- The occlusal outline should not extend into all the fissures but needs to incorporate a small isthmus and a dovetail for retention.
- Create access, and remove caries with a no. 330 bur
- Deeper caries should be removed using a slow-speed round bur.

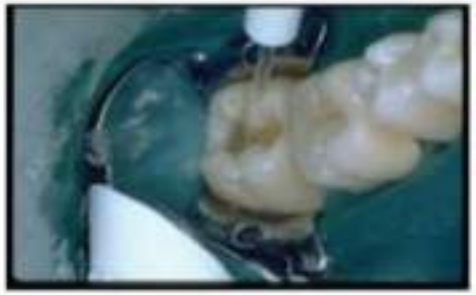
- Place a sectional matrix or plastic matrix.
  - Etch preparation for 15 to 20 second
- Placed dentine bonding agent
- With plastic instrument of pressure syringe, place the composite in the preparation
- Finishing and polishing
- Remove the rubber dam

Pre operative - silver amalgam restoration

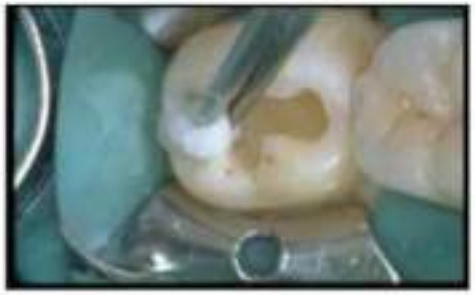
After cavity preparation



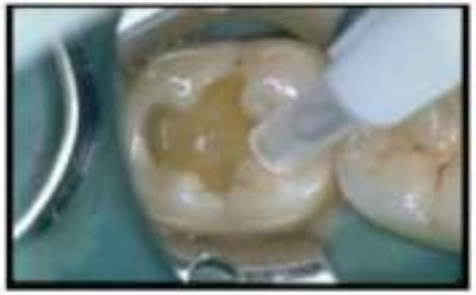
Acid Etching



Rinsing with water



Blot excess water using mini sponge or cotton



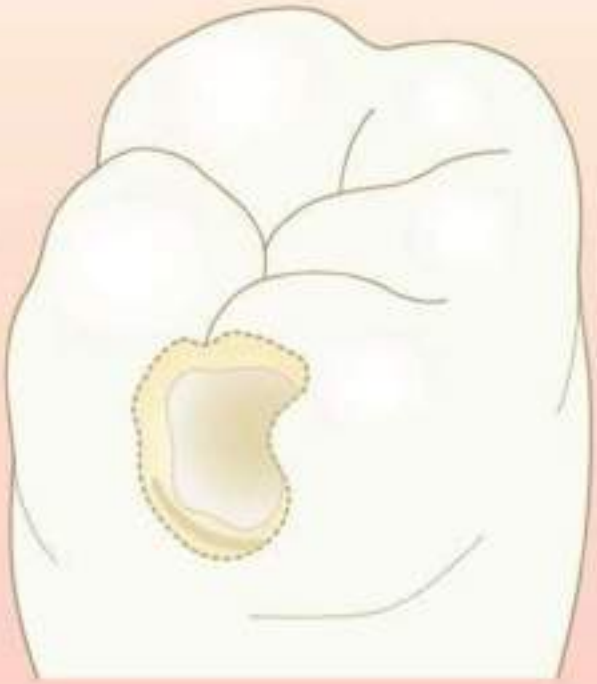
Application of bonding agent


A
B
C
D


E
F

Steps for GIC restoration

- Removal of caries and prepare the cavity surface as smooth as possible.
- Clean tooth surface using a slurry of plain pumice and water.
- Condition cavity with cavity conditioner —20% polyacrylic acid for 10 seconds.
- Wash vigorously with water spray for 30 seconds.
- Dry for 5 seconds lightly but not dehydrate the surface.
- Application of the GIC materials with the help of celluloid strip or matrix.
- Light cure for RMGIC.



Class II cavity for GIC restoration

Summary

- Paediatric dentistry is a dynamic combination of ever improving materials and tried and true techniques.
- Though many aspects of primary teeth restoration have not changed for decades.
- Still there has been a tremendous development when in comes to newer materials or techniques in restoration of primary teeth.

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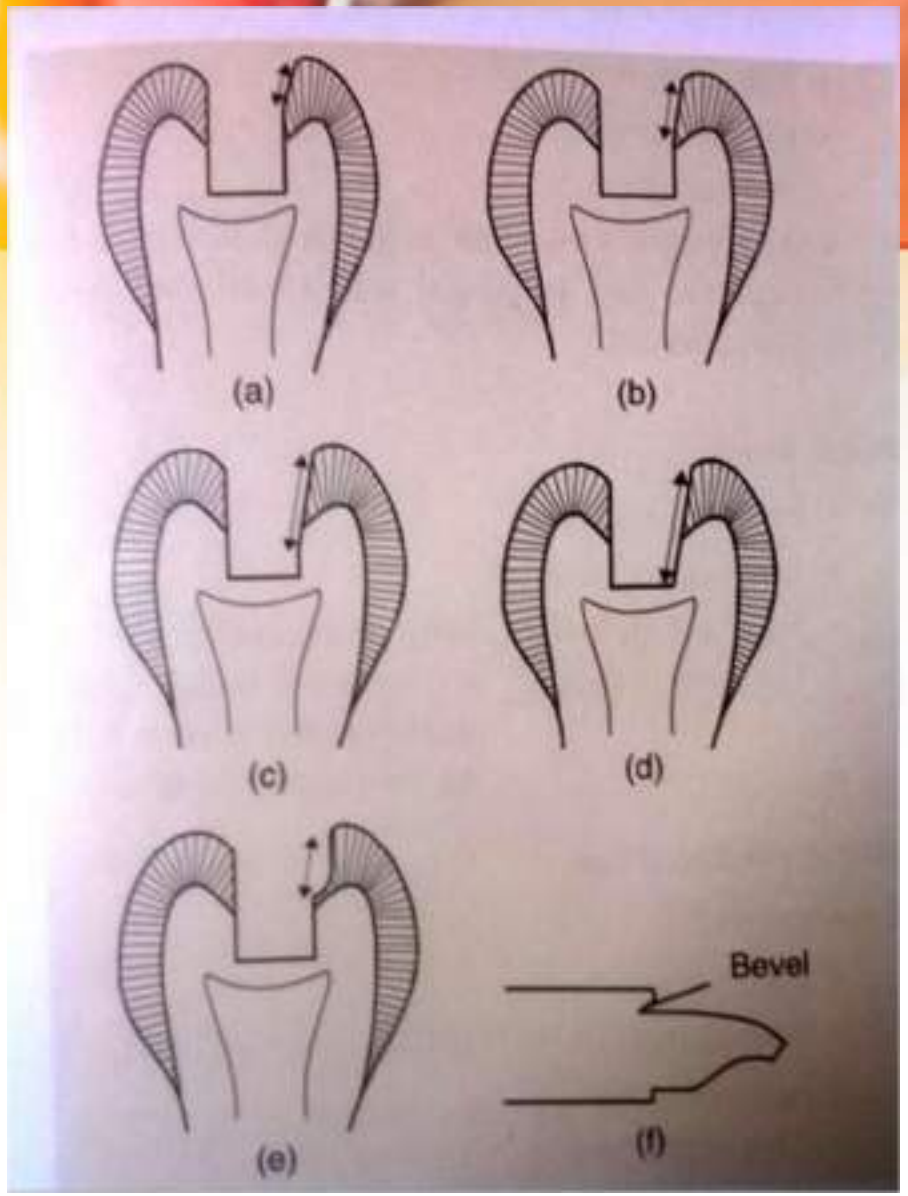
Thank you!!!

Differences in amalgam cavity preparation in primary and permanent tooth

Primary tooth	Permanent tooth
Intercuspal width should not more than one third	One forth or 1.5 mm
Cavity depth : 1.5 mm	Minimulm: 1.5 to 2 mm
Proximal box •No gingival bevel •Gingival floor incline occlussaly •Retentive groove is not indicated	Proximal box: •Gingival bevel should be given •Gingival floor is perpendicular to axial wall •Retentive groove for secondary retention form
Width of proximal box : 1mm	Proximal box should be 0.2- 0.8 mm in dentine

Differences in amalgam and composite cavity preparation in primary and permanent tooth

	Amalgam	composite
Outline form	Include the fault and adjacent suspicious areas	Include fault but do not extend to the adjacent suspicious areas.
Pulpal depth	Minimum 1.5	1-2 pulpar floor usually not uniform
Axial depth	0.2 to 0.5 mm inside Dej	Only extent of the defect, not uniform
Cavosurface margine	90^0	90^0
Occlusal bevel	No	No
Primary retention form	Occlusal dovetail and convergence	Etching and bonding
Secondary resistance	Box shape cavity, groove, slots, locks	Grooves only large or root surface preparations. Box for large cavity



Different type of bev

a. Ultra short / pratial bevel
b. Short bevel
c. Long bevel
d. Full bevel
e. Hollow bevel
f. Inverted bevel

- Bevel is any abrupt inclination between the two surface of prepared tooth or between the cavity wall and the cavosurface margins in the prepare cavity.
- Bevel are usually recommended on the labial surface of ant teeth
- In posterior restoration, bevels are not indicated since the thin layer of composite might chipped off under stresses leading to marginal gaps and sensitivity.

composite

Heintze SD[1], Rousson V. 2012	Meta analysis	For class I and class II :The overall success rate of composite resin restorations was about 90% after 10 years, which was not different from that of amalgam.
Soncini JA J Am Dent Assoc 2007 Bernardo M. et al. (J Am Dent Assoc 2007)	RCT	the main reason for restoration failure in composite and amalgam was recurrent caries.
Soncini JA, et al. (J Am Dent Assoc 2007) Hickel R, et al. (Am J Dent 2005)	RCT	
Fuks AB, et al. (Pediatr Dent 2000)	RCT	composite resins are indicated for class II restorations in primary molars that are expected to exfoliate within two years.
Heintze SD, Rousson V. (J Adhes Dent 2012)	Meta analysis	that etching and bonding of enamel and dentin significantly decreases marginal staining and detectable margins in

AAPD Recommendation

- In primary molars, composite resins are successful when used in Class I restorations.
- For Class II lesions in primary teeth, the success of composite resin restorations for two years.
- In permanent molars, composite resins can be used success-fully for Class I and II restorations.
- Evidence from a meta-analysis shows enamel and dentin bonding agents decrease marginal staining and detectable margins for the different types of composites.

GIC

Qvist V et al. Acta Odontol Scand 2004;62(1):37-45.	RCT	**The overall median time from treatment to failure of glass ionomer restored teeth was 1.2 years.**
Toh SL, Messer LB. Pediatr Dent 2007;29(1):8-15.	Systematic review &Meta-analysis	**conventional glass ionomers are not recom-mended for Class II restorations in primary molars.**
		Composite restorations were more successful than glass ionomer cements where moisture control was not a problem.
Chadwick BL, Evans DJ. (Eur Arch Paediatr Dent 2007;8(1):14-21.)	systematic review	A systematic review supports the use of RMGIC in small to moderate sized Class II cavities and GIC cannot be recommended for class II cavities in primary molars.
Alves dos Santos MP, Luiz RR, Maia LC. (J Dent 2010;38(6):451-9.)	RCT	According to one randomized clinical trial, cavosurface beveling leads to high marginal failure in RMGIC restorations and is not recommended.

AAPD Recommendation

- There is evidence in favor of glass ionomer cements for Class I restorations in primary teeth.
- resin-modified glass ionomer cements for Class I restorations are efficacious, and expert opinion supports Class II restorations in primary teeth.
- There is insufficient evidence to support the use of conventional or resin-modified glass ionomer cements as long-term restorative material in permanent teeth.

- Interim therapeutic restoration/atraumatic restorative technique (ITR/ART) using high viscosity glass ionomer cements has value as single surface temporary restoration for both primary and permanent teeth.
- Additionally, ITR may be used for caries control in children with multiple open carious lesions, prior to definitive restoration of the teeth.

Compomer

Soncini JA et al (J Am Dent Assoc 2007;138(6):763-72.)	RCT	**Class I compomer restorations in primary teeth was not statistically different compared to amalgam, but compomers were found to need replacement more frequently due to recurrent caries.**
Duggal MS et al. (Brit DentJ 2002;193(6):339-42.)	RCT	In Class II compomer restorations in primary teeth, the risk of developing secondary caries and failure did not increase over a two-year period in primary molars.
Welbury RR et al. (Br Dent J 2000;189(2):93-7.)	RCT	The compomer also performed significantly better in terms of anatomical form, marginal integrity, cavo surface discoloration and maintenance of interproximal contact compare to GIC at 42 month period.

J Clin Pediatr Dent. 2009 Fall;34(1):53-8.

Two-year clinical evaluation of three restorative materials in primary molars.

Daou MH[1], Tavernier B, Meyer JM.

Author information

Abstract

A variety of alternatives to amalgam are now available for use in Class I and Class II restorations in primary teeth, including glass ionomer cements, compomers and resin modified glass ionomer cements (RMGIC).

OBJECTIVES: This study evaluated the two-year clinical performance of three restorative dental materials: A resin modified glass ionomer cement (Fuji IILC), a compomer (Dyract AP) and a high viscosity glass ionomer cement (Fuji IX), in primary molars of pediatric patients with high caries risk activity and compared these results to those reported for amalgam restorations.

STUDY DESIGN: One hundred and forty nine Class I and Class II cavities in 45 patients aged 6 to 8 years were restored with compomer, glass ionomer cements and amalgam. Restorations were evaluated according to modified Ryge criteria by two examiners at baseline, and after 6, 12, 18 and 24 months of oral function. The data was submitted to statistical analysis (binomial and hyper geometric tests, $p<0.05$).

RESULTS: Two-year recall rate was 62.42%. Class I performed better than class II restorations. The difference in marginal discoloration between compomer and amalgam restorations was statistically significant ($p=0.014$). No other significant differences were found between GIC, compomer and amalgam restorations. The clinical performance of the three restorative materials compared to amalgam in Class I and Class II cavities at two-year recall was acceptable.

CONCLUSIONS: The results, even in a population with high caries risk activity, suggest that these materials are suitable alternatives to amalgam in Class I and Class II restorations in primary teeth.

J Clin Pediatr Dent. 2015 Summer;39(4):315-21. doi: 10.17796/1053-4628-39.4.315.

Clinical Evaluation of Restorative Materials in Primary Teeth Class II Lesions.

Sengul F[1], Gurbuz T[1].

Author information

Abstract

OBJECTIVE: The aim of this study was to evaluate clinical success of primary teeth class II lesions restored with different restorative materials [Hybrid Composite Resin (HCR), Resin Modified Glass Ionomer Cement (RMGIC), compomer, and Giomer Composite Resin (GCR)] followed up for 24 months.

STUDY DESIGN: This study was carried out on 146 primary molars of 41 children in the age range of 5-7 years. The class II lesions in primary molars of a patient were restored using different restorative materials. Restorations were evaluated according to FDI-criteria and their survival rates were determined. Data were analysed with Pearson chi-square, Kaplan-Meier and Wilcoxon (Breslow) tests ($\alpha = 0.05$).

RESULTS: The failure rates of restorative materials were as follows: compomer 33.3%, RMGIC 28.1%, HCR 22.5% and GCR 21.1%.

CONCLUSIONS: While the functional failure was the most important factor in restorative material failure, RMGIC was the most successful material in terms of biological evaluation criterion and GCR had the longest survival rate.

AAPD Recommendation

- Compomers can be an alternative to other restorative materials in the primary dentition in Class I and Class II restorations.
- There is not enough data comparing compomers to other restorative materials in permanent teeth of children.

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