Matrices, Wedges and Seperators

Learning Objectives

- How to replaces the missing wall
- To Forms point of contact with adjacent tooth
- To Permits adequate condensation,prevents cervical overhang of restoration.
- To Possess exact three dimensional contour of future restoration
- To Displace gingiva and rubber dam away from cavity margins during insertion of restorative material.
- To Maintain shape during hardening of material.
- To Confine restorative materials within cavity preparation and predetermined surface configurement.

Contents

- Introduction
- Ideal requirements
- Functions of Matrices
- Parts of matrix
- Specifications
- Classification
- role of seperators and types
- Different Types in Detail
- Conclusion

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IDEAL REQUIREMENTS:

1.Should replace the missing wall temporarily

2.Should be easily inserted and removed

3.Should be sufficiently rigid to retain contour given to it

4. Should not react or adhere to the restorative material

5.Should resist the condensation pressure.

6.Should be more comfortable for the patient

7.Should be small and handy so that access and visibility is not affected.

8.should be Inexpensive

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FUNCTIONS AND OBJECTIVES

- Replaces the missing wall
- Forms point of contact with adjacent tooth
- Permits adequate condensation ,prevents cervical overhang of restoration.
- Possess exact three dimensional contour of future restoration
- Displace gingiva and rubber dam away from cavity margins during insertion of restorative material.
- Maintains shape during hardening of material.
- Confirms restorative materials within cavity preparation and predetermined surface configurement.

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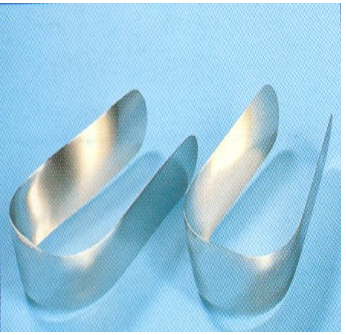
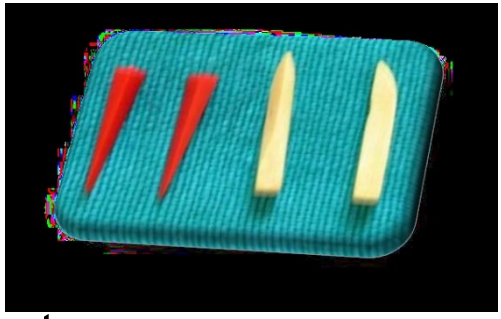


PARTS OF A MATRIX



Band : which is a piece of a metal or polymeric material used to support and give form to the restorative materials during its introduction and hardening.

Matrix retainer : is a device by which band can be retained in its designated position and shape.

The retainer could be a mechanical device, a wire, dental floss or a compound

Wedges - Wedges are used interdentally to ensure close adaptation of the matrix band with the gingival seat of prepared proximal cavity.

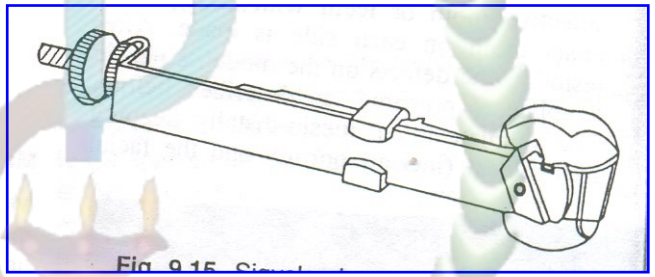


Fig. 9.15

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SPECIFICATIONS

- To achieve optimum results, the matrix must meet the following requirement
  - Ease of application.
  - Not to be cumbersome.
  - Removability.
  - Rigidity
  - Height.
  - Proximal contours
- **Position of the matrix-** It should always be 1 mm below the gingival seat and 1 mm above the marginal ridge.

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CLASSIFICATION OF MATRICES:

- **BASED ON MODE OF RETENTION**
- With retainer

  Eg: Tofflemire, ivory no1 & 8 matrices
- Without retainer.

  Eg: Automatrix
- **BASED ON MATERIAL USED**
- Metallic

  Eg:stainless steel, copper and brass
- Non-metallic

  Eg:Celluloid and polyester available as strips, open faced crowns (semicircular shape), crown forms (surrounds full tooth)

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- **BASED ON THE SUPPORT**
  - Compound supported
  - Non compound supported
- **BASED ON THE DENTITION**
  - Deciduous
  - Permanent
- **BASED ON THE RETAINER**
  - Matrix without retainer (Automatrix)
  - Matrix with retainer
- **BASED ON SHAPE OR DESIGN**
  - Straight
  - Contra angled.
- **BASED ON THE POSITION**
  - Circumferential
  - Unilateral

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MATRIX FOR AMALGAM RESTORATION

- Tofflemire matrix (double banded for class I &class II)
- Matrix Class II cavity preparation-
  - Ivory Matrix No.1
  - Ivory matrix No. 8
  - Black's matrices
  - Soldered band or seamless copper band
  - Anatomical matrix
  - Roll in band matrix or auto matrix
  - T-shaped matrix band
  - S-shaped matrix

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MATRICES FOR TOOTH COLORED RESTORATION

- **MATRICES FOR CLASS III PREPARATION WITH TEETH IN NORMAL ALIGNMENTS (MYLAR STRIP)**

- **MATRIX FOR CLASS IV DIRECT TOOTH COLORED RESTORATIONS**
  - Plastic strip for inciso proximal cavities
  - Aluminium foil incisal corner matrix.
  - Transparent crown form matrices
  - Anatomic matrix

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➢ MATRICES FOR CLASS V PREPARATION FOR DIRECT TOOTH COLORED RESTORATIONS

- Anatomic matrix for non light cured restorative materials
- Aluminium or copper collars for non light cure restorative materials
- window matrix

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CLASS I WITH PALATAL OR BUCCAL EXTENSION

- An additional small piece of matrix band material is contoured to the facial or lingual axial configuration of the contemplated restoration and inserted between tooth and the previously positioned and the retained matrix in the area of the facial or lingual extension of the cavity preparation.
- This piece of material should lap over the margins of the extension by about 1.4 – 2mm circumferentially.
- Create a separation between the two bands with a beaver tail burnisher.
- Select a wedge that will create and maintain the proper separation between two bands.

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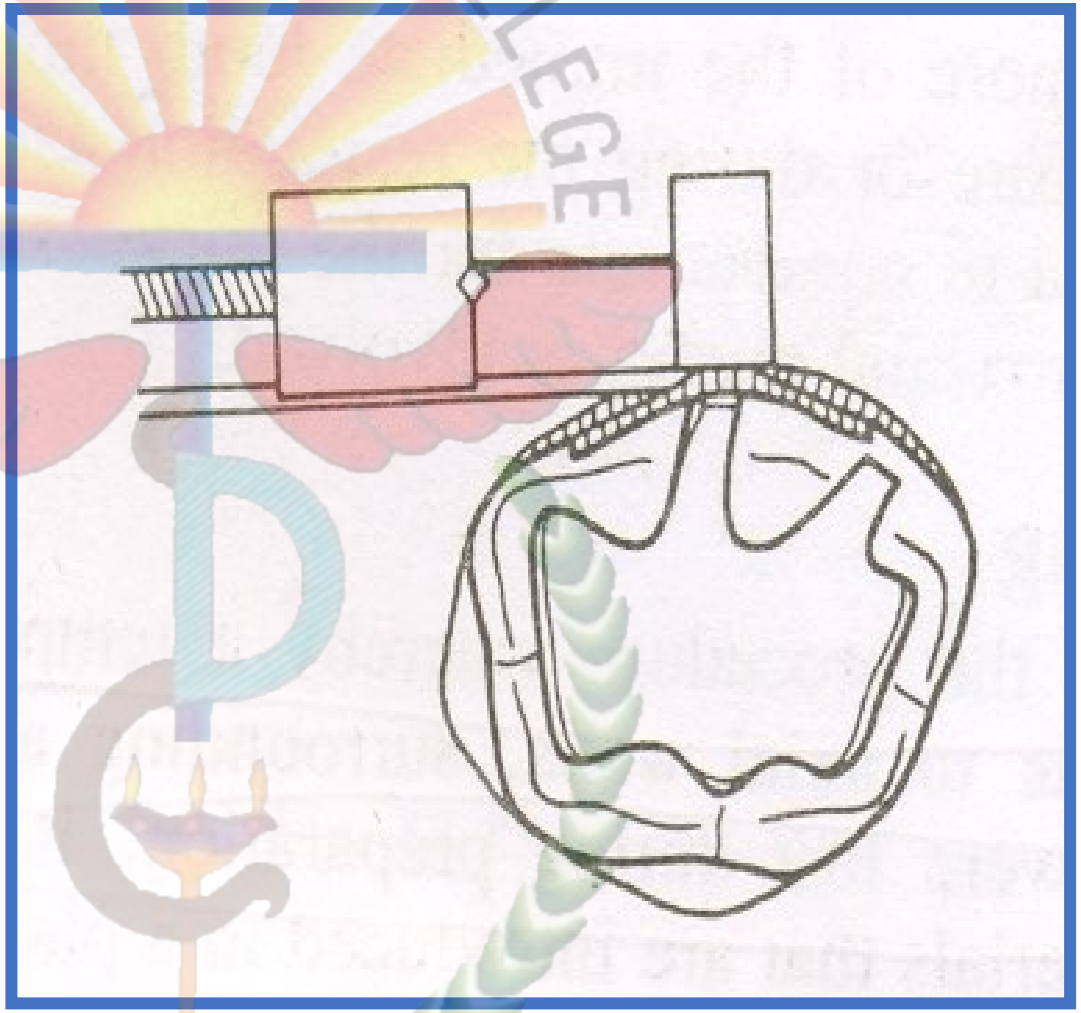
Bartons Technique



CLASS II CAVITY PREPARATION

a. Class 2 simple (unilateral)- ivory no.1

b. Circumferential (for complex or simple restorations)
- Tofflemire
- Wagner
- Siqveland

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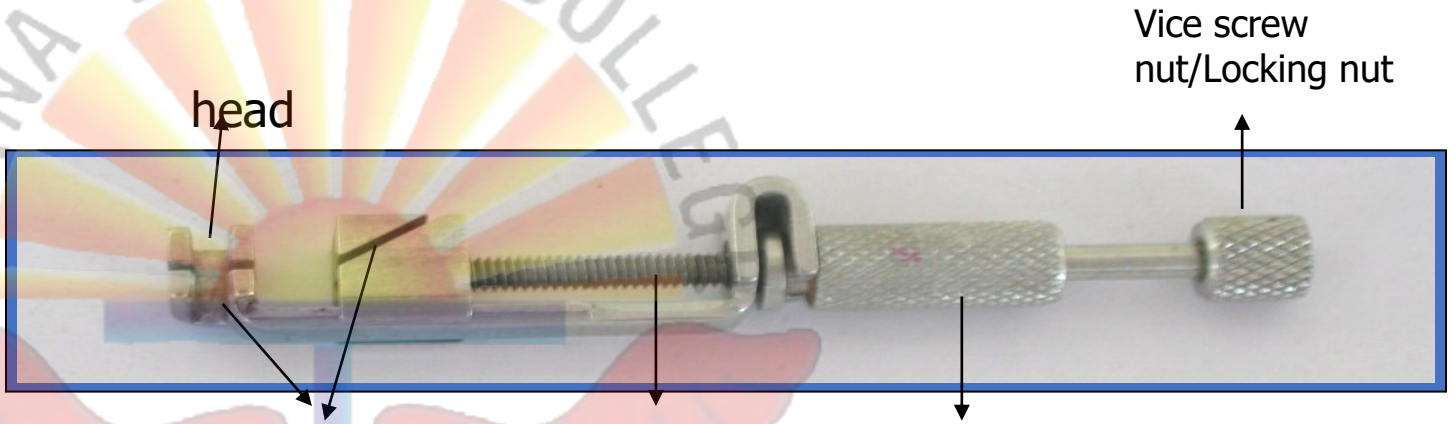
TOFFLEMIRE MATRIX



- Also called as Universal matrix.
- Designed by B.R.Tofflemire.
- Ideally indicated when 3 surfaces of posterior tooth have been prepared.
- Commonly used for two surfaces class II restorations.
- Bands are available in 2 thickness:
- -0.05 mm
- -0.038 mm

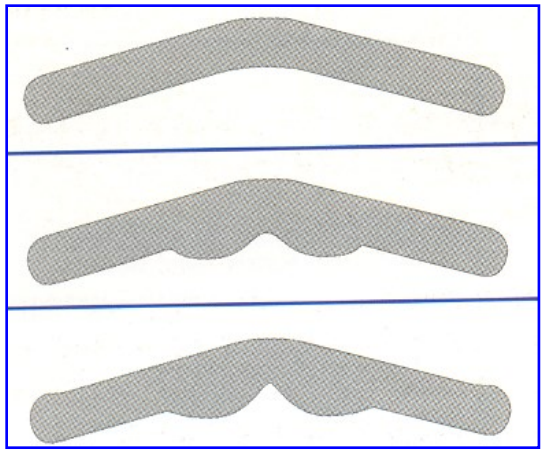


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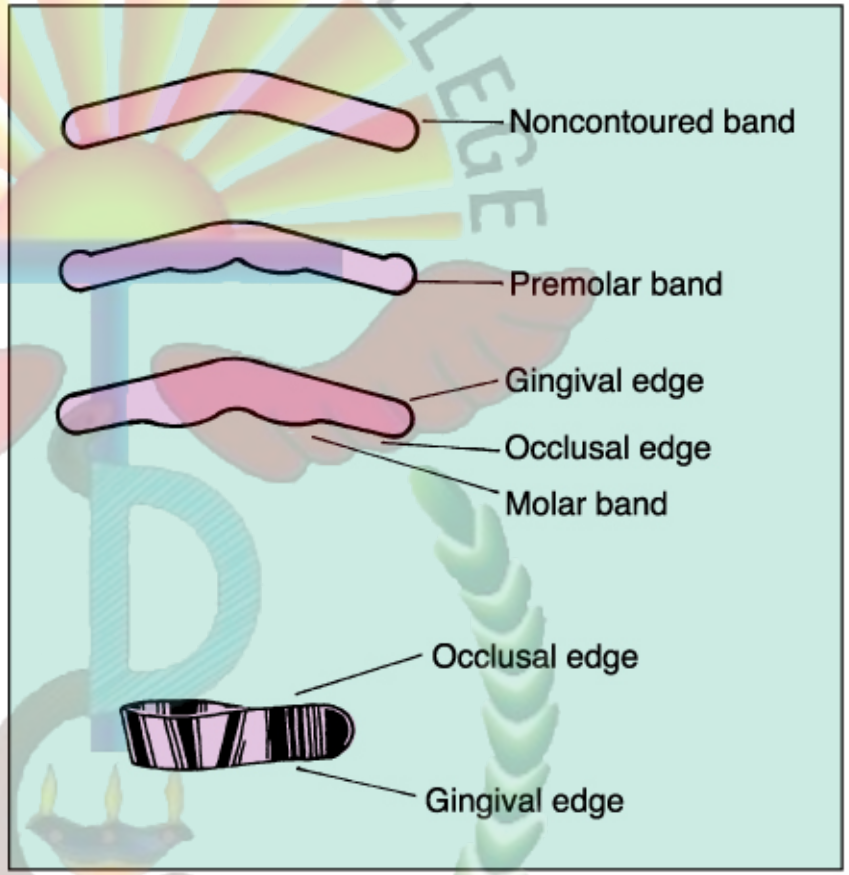
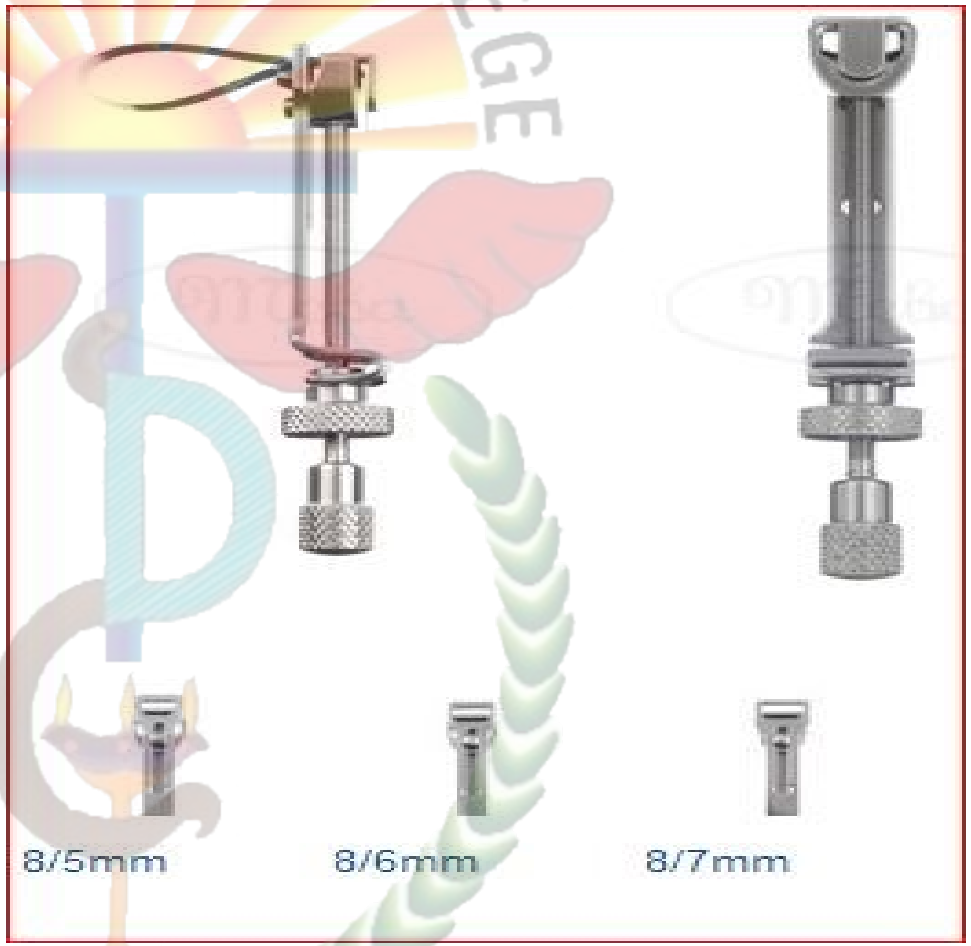
Fig. 49-2 Types of matrix bands.



CONTRA-ANGLE RETAINER

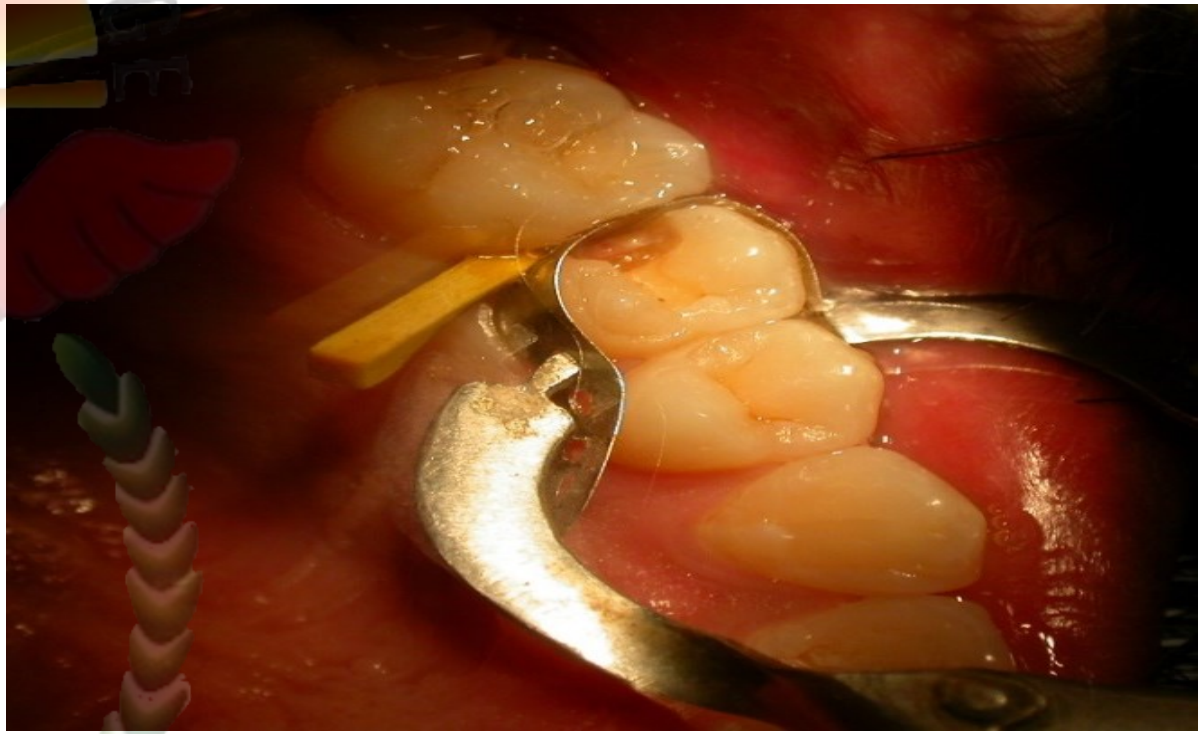
IVORY NO. 8



CLASS II CAVITY PREPARATION

IVORY MATRIX NO.1

- The band encircles a posterior proximal surface so it is indicated in unilateral class II cavities.
- The band is attached to retainer via a wedge shaped projection which engages with the tooth at the embrasures of the unprepared surfaces.



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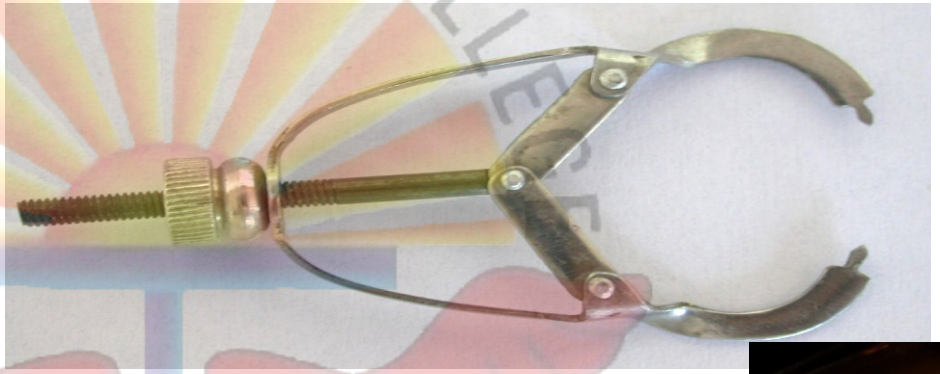
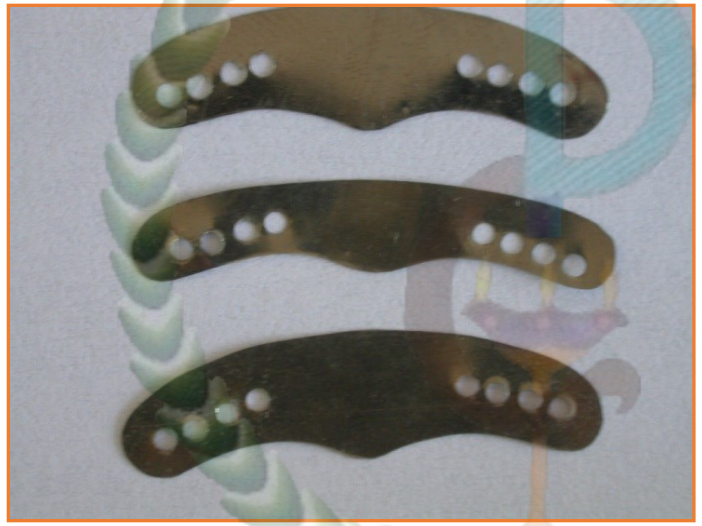
- Circumferential matrices for two surface preparations are often more stable than unilateral type Ivory No. 1





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Wedges

- A **wedge** is either triangular or round and made of wood or plastic.
- The wedge is inserted into the lingual embrasure to position the matrix band firmly against the gingival margin of the preparation.
- Wedges are defined as a piece of wood one end of which is an acute angle formed by two converging planes used for insertion between embrasure areas of two adjacent teeth thus creating a seperation between them.

- Length of a wedge is ½ inch or 12.7 m.m.
- The wedges are of following types
- Wooden
- Plastic
- Metallic
- Transparent wedges for light cure composite resins
- Haemostatic wedges-impregnated with vaso- constrictor
- Straight or curved
- Wedges are available as-preformed & customised
- The cross section of a wedge is triangular
- It is inserted from the bigger embrasure to the smaller one

Method of wedge placement

- Simple wedging
- Wedge wedging
- Piggy back wedging
- Double wedging

BLACK'S MATRICES

- The blacks matrix is one of the early custom made matrices. it consist of thin strip of stainless steel metal placed on the proximal surface and then tied around the tooth with dental floss or ligature.

- Hollenback modified Black's matrix by supporting it with low fusing modeling compound before inserting the amalgam.

- Sweeney further modified the technique by placing a wedge interproximally at the gingival margin.

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BLACKS MATRIX FOR SIMPLE CASES

Recommended for the majority of small and medium size cavities.

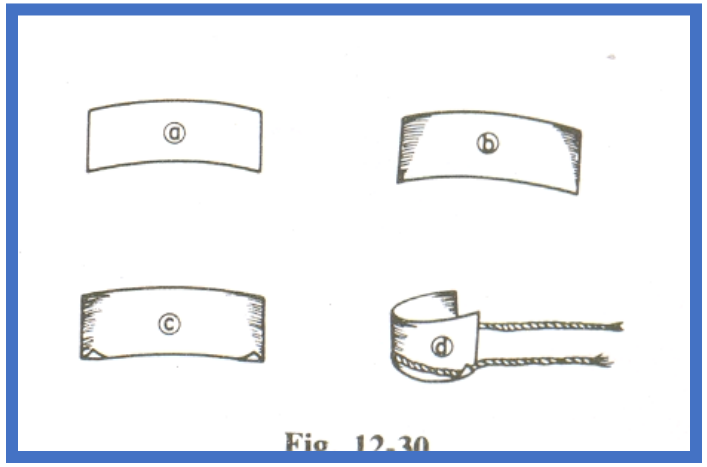

Fig. 12-30

PROCEDURE :

- Cut a metallic band so that it will extend only slightly over buccal and lingual surfaces of the tooth beyond extremities of cavity preparation.
- Corners of the gingival ends are turned up to hold the ligature.

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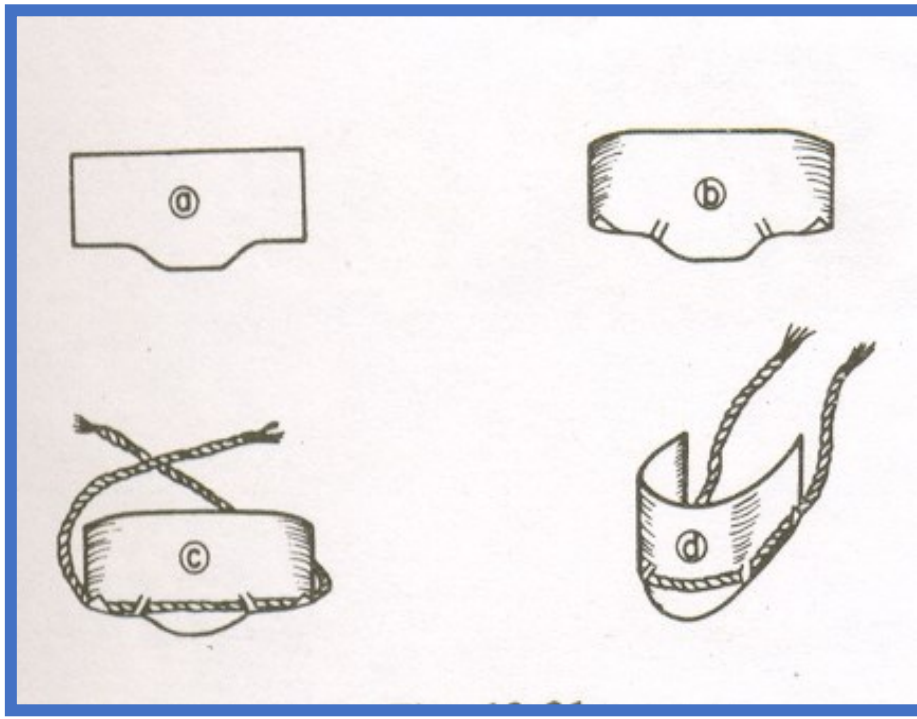
BLACKS MATRIX WITH A GINGIVAL EXTENSION

- To cover the gingival margin of a subgingival cavity.



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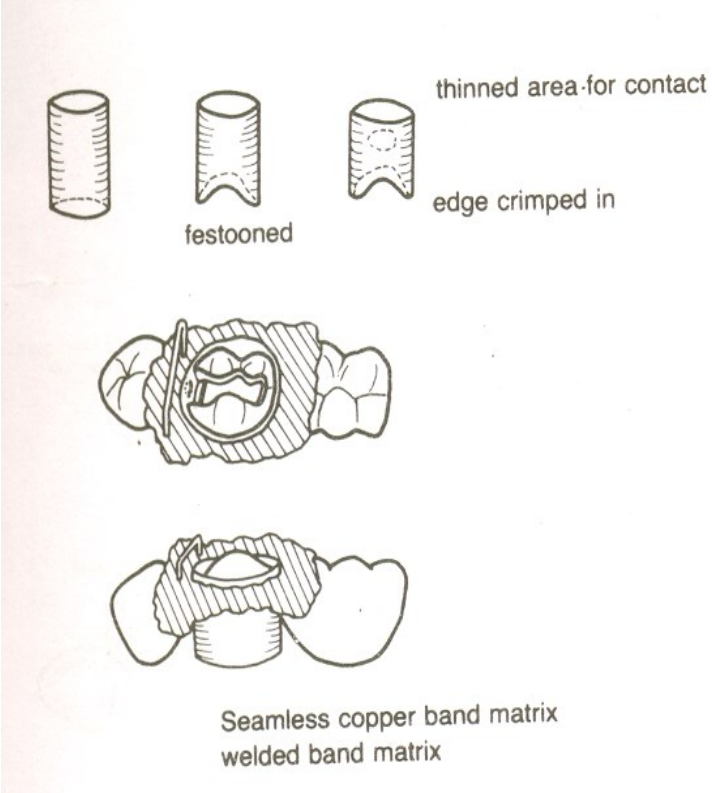
SOLDERED BAND OR SEAMLESS COPPER BAND

- Indicated for badly broken down teeth especially those receiving pin retained amalgam restorations with large buccal and lingual extensions.



- Assorted copper bands sizes 1 to 20. size No. 1 band -> 4 mm in diameter. Size No. 20 bands -> 12 mm in diameter wall ,thickness 0.15mm

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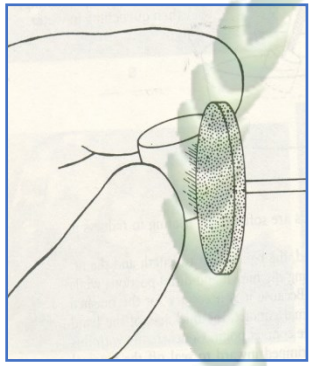
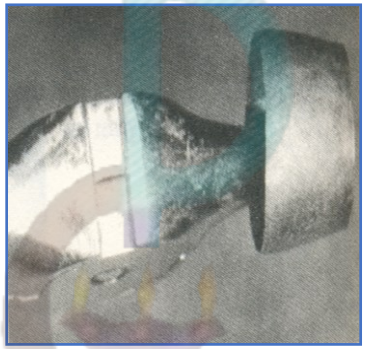
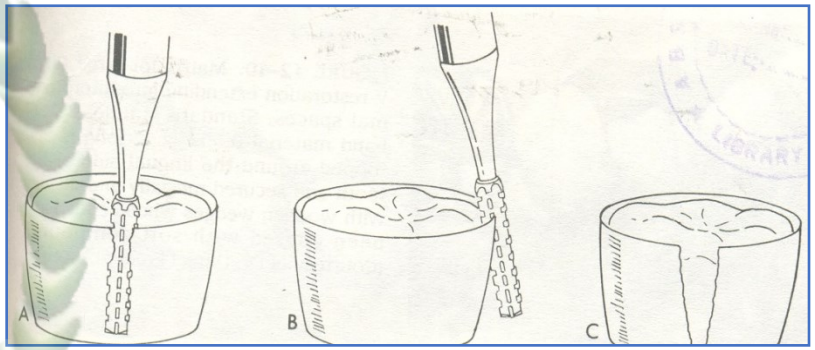
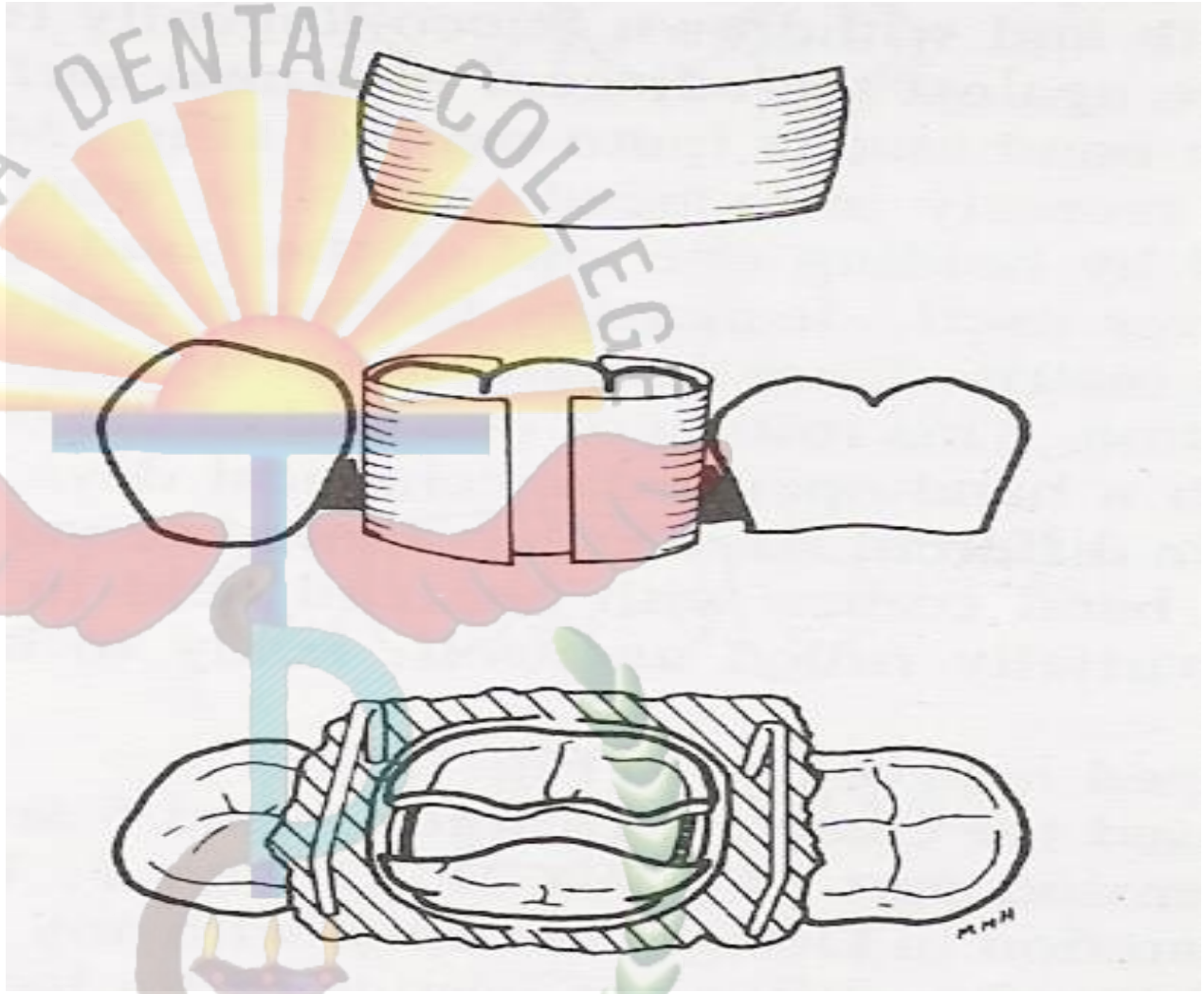
PROCEDURE

- A stainless steel band is cut according to the measured diameter of the crown of the tooth.
- Two ends soldered together.
- Band is then smoothened to remove rough edges cervically and occlusally.
- Contour the band with contouring pliers.
- Band seated on the tooth and tightened at the cervical end with flat bladed plier.









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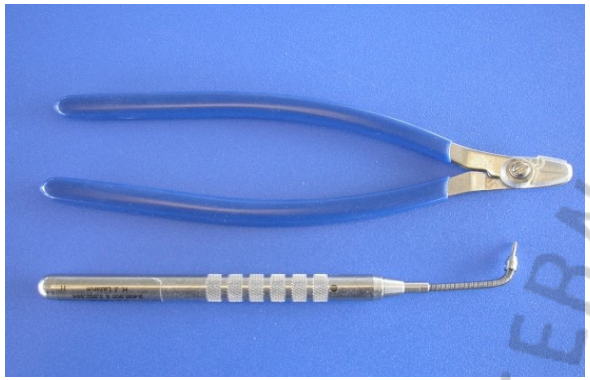
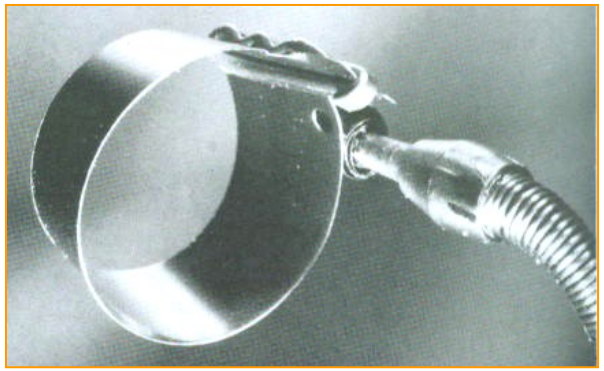


AUTO-MATRIX



- Designed by L.D.CAULK Company.

-Bands vary in height from 3/16 to 5/16 inches.

-Supplied in two thickness 0.0015 & 0.002 inches.

- Designed for any tooth in the arch regardless of its dimension.
- Best used in Extensive class II restorations, especially those replacing one or more cusps.

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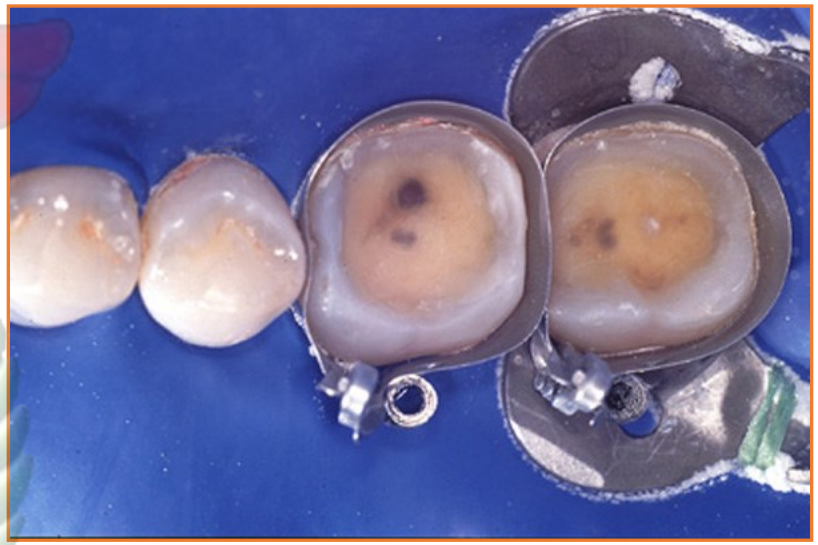
ROLL IN BAND MATRIX OR AUTO MATRIX

- Band is self retained by holding one end of the band and rolling the other end over itself, decreasing the band length and consequently, the matrix diameter until it fits tightly over the tooth and preparation.
- The wrench is tightened until it clicks.
- Wedging not usually required.
- Removed in angular direction



FOUR SIZES AVAILABLE.

- Narrow regular
- Wider regular
- Medium thin
- Medium regular.

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ADVANTAGES:

- Convenient to place
- Primarily useful in patients who can't tolerate retainers.
- Improved visibility due to absence of retainer
- Facial and lingual placement of auto lock loop.

DISADVANTAGES:

- Expensive
- Instability renders it less suitable.
- Proper contours and contacts may be difficult to achieve.

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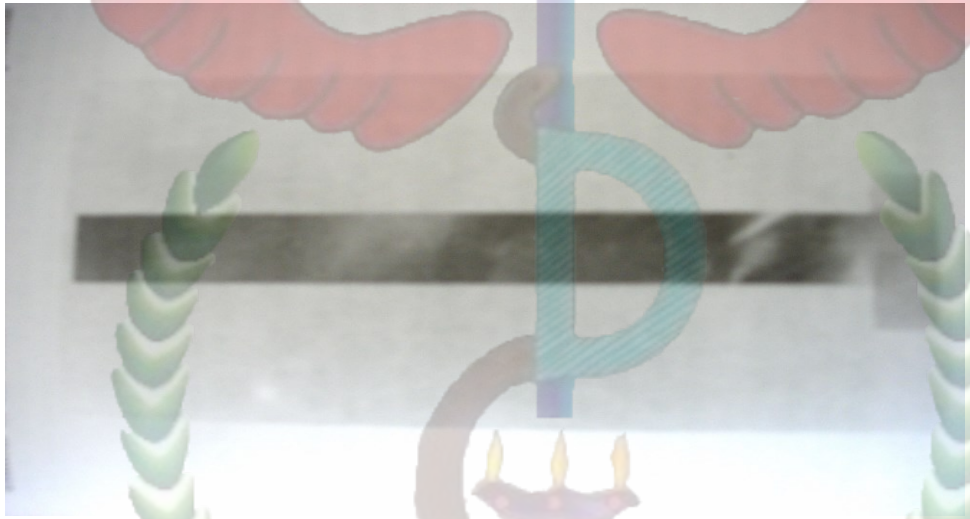
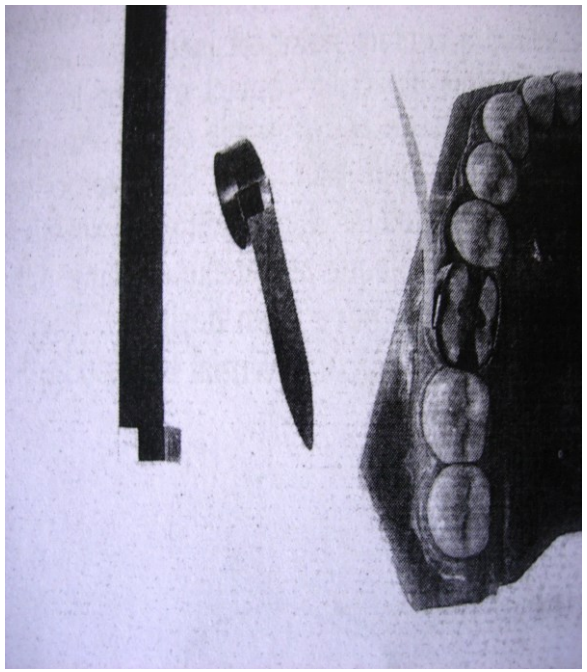
T-SHAPED MATRIX BAND

- Premade T-shaped brass or stainless steel matrix bands.
- Long arm curled circumferentially to overlap the horizontal arm of T
- Section is then bent over the long arm.
- Wedges and stabilizing compound can be applied to add further stability





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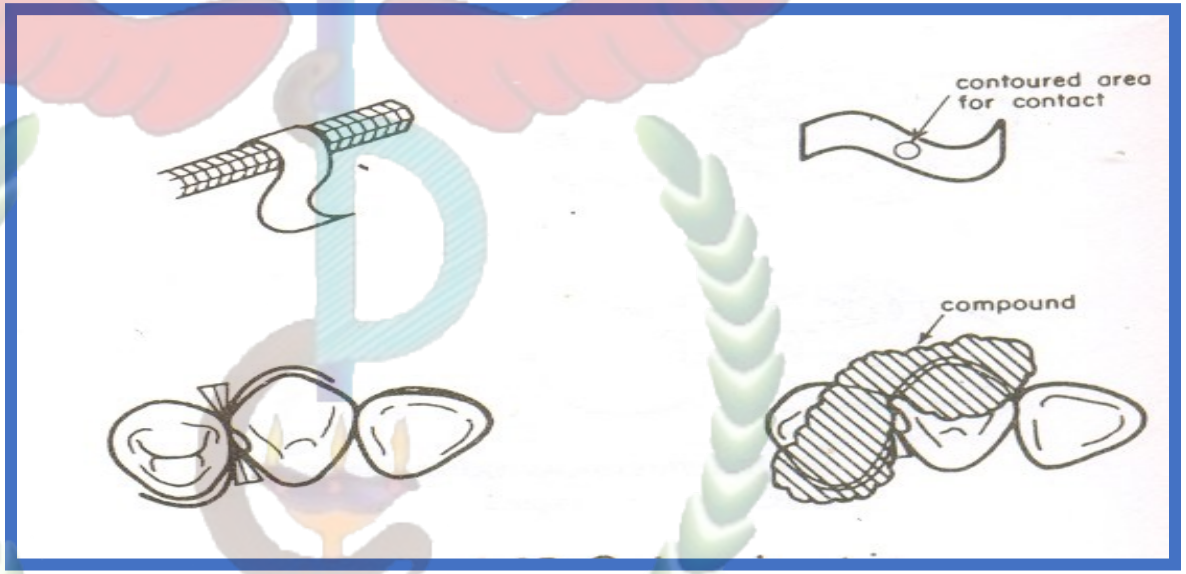
S-SHAPED MATRIX

- Ideal matrix for class III with either labial or lingual access.
- Mainly used for cavity preparation on the distal of the cuspid.
- Mirror handle used to produce S-shaped strip.
- Band contoured with contouring pliers.
- Placed interproximally and wedged & covered with compound



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MATRICES FOR TOOTH COLOURED RESTORATION

Matrices for class III preparation with teeth in normal alignments.

Matrices for class III preparations with irregular alignment

Class III

- Usually transparent matrix strips are used.
- Celluloid strips- Silicate cements
- Cellophane strips- resins
- Mylar strips can be used for either material

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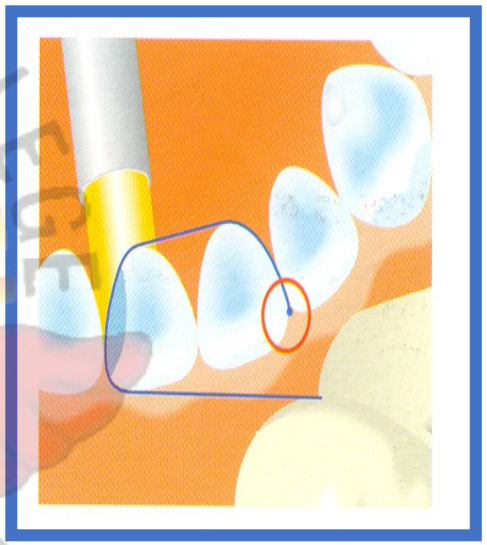
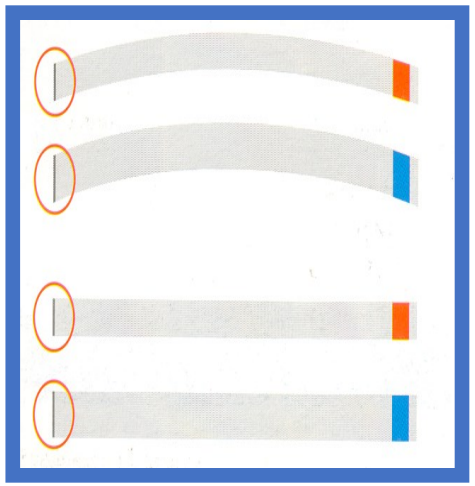
TRANSPARENT ANTERIOR MATRIX BAND WITH INTEGRATED STAY

- Self adhesive at one end.
- Strip can be positioned and fastened safely.
- No need to hold the matrix band with a finger
- No hindrance to light curing





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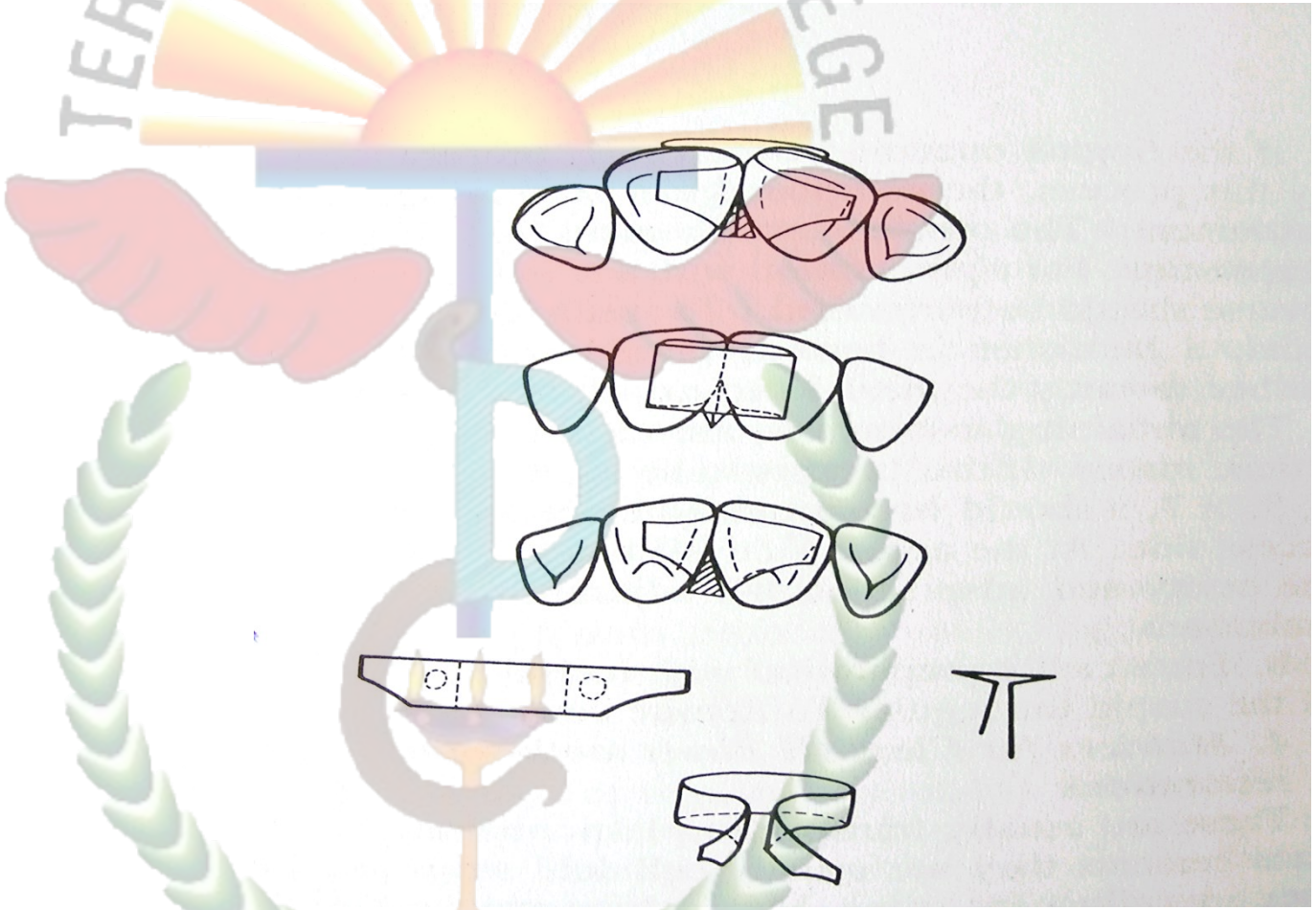
Matrix for two small proximal preparation contact with each other.



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TRANSPARENT CROWN FORM MATRICES

- These are stock plastic crowns which can be adapted to tooth anatomy.
- Bilateral class IV -> use entire crown form
- Unilateral class IV -> cut plastic crown incisogingivally into two halves and use only the side corresponding to the location of the preparations.

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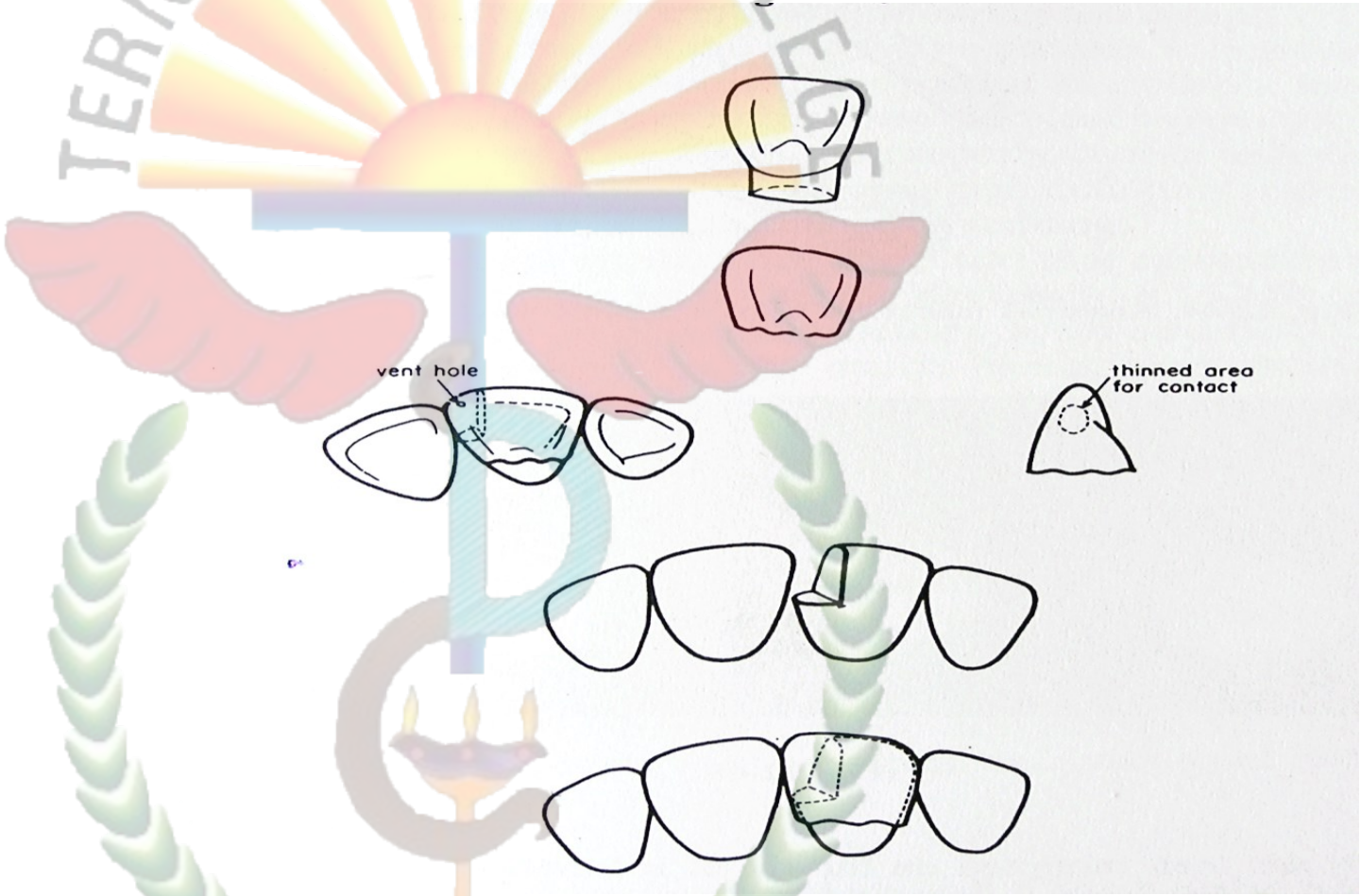

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MATRICES FOR CLASS V PREPARATION FOR DIRECT TOOTH COLORED RESTORATIONS

ANATOMICAL MATRIX

Procedure

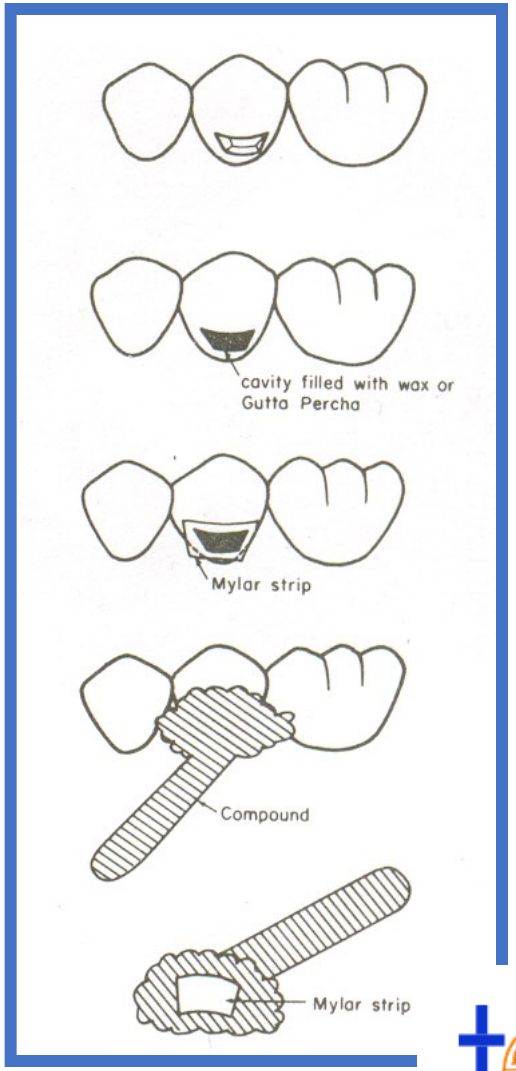
•Class V cavity filled with gutta percha or inlay and trimmed to proper contour.

•Coated with cocoa butter or Mylar strip

•Compound impression made.

•Compound removed when cooled and wax removed from the cavity.

•Restorative material placed in to cavity. Compound matrix held securely in place under pressure until the material sets.



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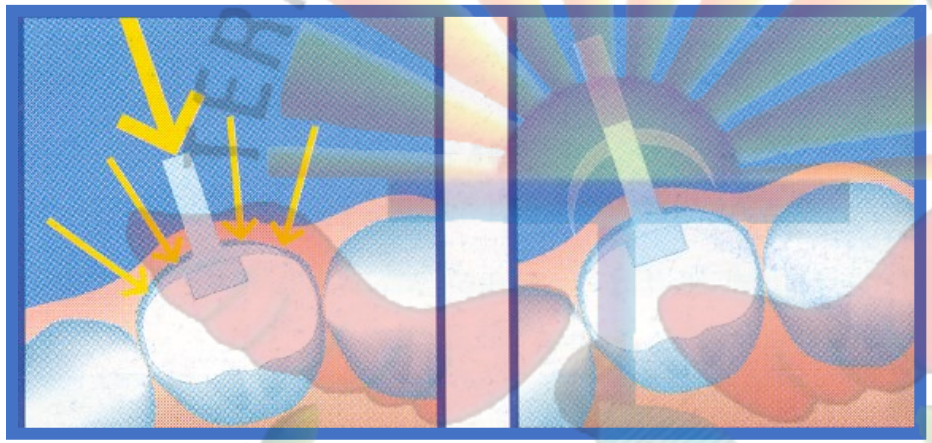
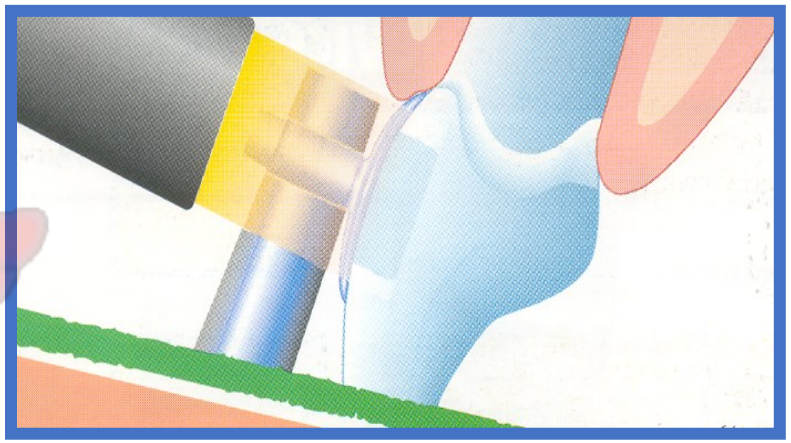
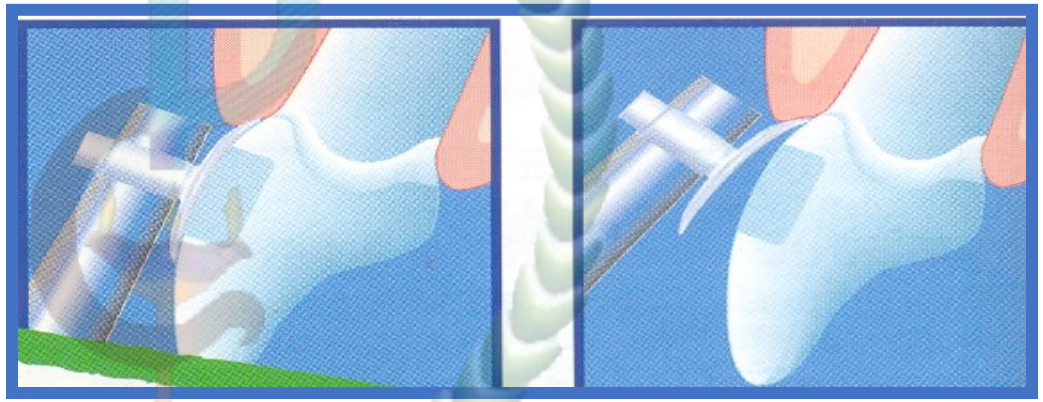
ANATOMICALLY SHAPED CERVICAL MATRIX BANDS







SECTIONAL MATRICES AND CONTACT RING SYSTEMS

Three systems based on the McKean concept are available:

- **PALODENT BITINE**
- **CONTACT MATRIX (Danville Materials)**
- **COMPOSI-TIGHT (Garrison dental solutions)**

- The McKean , Danville, Garrison have retentive designs.
- The first two have converging tines, and the Garrison has retentive balls at the tine end.
- The Palodent with parallel tines ,lacks retentive design.

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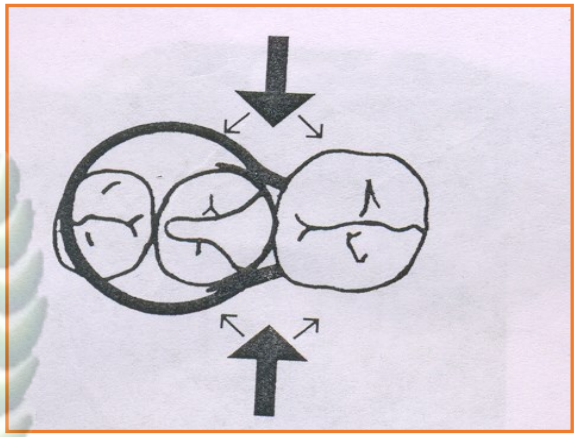
- The McKean principle of separation is based on equal and opposite forces exerted on the contacting teeth by the tines of the ring. The force vectors can be resolved into mesial and distal components, these components providing separating forces.
- The separation is time dependent phenomenon with the separation increasing with time. when the contact ring is removed after composite placement and curing, the tooth returns to its equilibrium position.
- The space taken up by the sectional matrix is eliminated.



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PALODENT MATRIX KIT

ORIGINAL BITINE ROUND RING

BITINE 11 OVAL RING

COMPOSI-TIGHT

Thickness: 0.03mm

Height : small :4.5

regular :6mm

large: 8.5mm

pedodontic :4 mm

CONTACT MATRIX

Thickness : lite:0.04mm

Stiff :0.06

Height

Small : 5.5 mm

Large 6.5 mm

INTRA-ORAL PROCEDURES

TOOTH MOVEMENT

It is the act of either separating the involved teeth from each other, bringing them closer to each other and / or changing their spatial position in one or more dimensions.

OBJECTIVES

- To bring drifted, tilted or rotated teeth in their indicated physiologic position.
- To close space between teeth not amenable to closure by contemplated restoration.
- To move teeth to another location, so that when restored they will be in a position most physiologically acceptable by the periodontium.

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- To move teeth occlusally (extrusion)or apically (intrusion) in order to make them restorable.
- To move teeth from a non functional or traumatically functional location to a physiologically functional one.
- To create space sufficient for the thickness of the matrix band inter-proximally for conservative means such as access to proximal cavity preparation.

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Two principle methods of tooth movements / separation:

- 1. Rapid or Immediate tooth movement / Separation.
- 2. Slow or Delayed tooth movement / Separation.

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RAPID OR IMMEDIATE TOOTH MOVEMENT

INDICATIONS:

RAPID OR IMMEDIATE TOOTH MOVEMENT

- **Wedge method**
  - Wood or plastic wedges
  - Elliot separator
- **Traction principle**
  - Non interfering true separator
  - Ferrier double bow separator

WEDGE METHOD:

- Separation is accomplished by the insertion of a pointed wedge shaped device between the teeth.
- The more the wedge moves facially or lingually, the greater will be the separation

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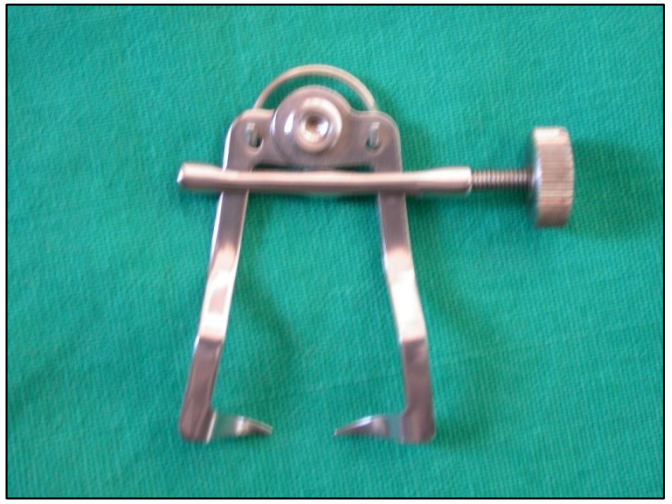
ELLIOT SEPARATOR:

- Often known as the crab claw separator.
- Single bow separators
- Less forceful than ferrier type
- Often requires compound for stabilization
- It is rapidly and quickly applied.



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INDICATIONS:

- For short duration separation that does not necessitate stabilization
- Useful in examining proximal surfaces or in final polishing of restored contacts.

TYPES :

- This separator is available with straight or curved types.
- Anterior and posterior types are also available.

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PROCEDURES

Adjust the two opposing wedges of the separator interproximally gingival to the contact area.

Move the knob clockwise so that the wedges moves towards each other.

Desired separation is observed.

The tightening screw can be removed and inserted from the other end if one chooses to separate teeth on the right side of the arch.

Softened compound is placed on the teeth below the separator and on the occlusal surface to give additional stability.

Wedges are used interdentally to ensure close adaptation of the matrix band with the gingival seat of prepared proximal cavity.

WEDGES

Synthetic
Natural

Preformed
Custom made

Round
Triangular

Medicated
Non medicated

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FUNCTIONS

- To **ensure close adaptation of the matrix band** with the gingival seat of prepared proximal cavity.
- They assure the close adaptability of the matrix band to the tooth **preventing plastic restorative materials from accumulating between the band** and the tooth below the gingival extremity of the cavity preparation.
- They occupy the **space designated to be the gingival embrasures,** preventing the restorative materials from impinging on it, thus assuring proper health for the gingival interdental col

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- They define the **gingival extent of the contact area.**
- They create some separation to **compensate for the thickness of the matrix band** and minor drifting of the teeth.
- They assure **immobilization of the matrix band** against movement both facially lingually and cervico-occlusally during insertion of restorative materials.

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CRITERIA FOR WEDGING

Not all cavities need to be wedged .

A gingival floor placed on a convex proximal surface
example -lower 2nd bicuspid, does not need a wedge.

Flat and concave surface -> require wedging

- Wedges must not restrict the band from bulging outward to develop a good contact point.

- Wedges must be fitted and customized.

There is no universal wedge, and each one must be fitted for its individually intended space. Trimming can be accomplished by as scalpel, a gold knife or a diamond stone

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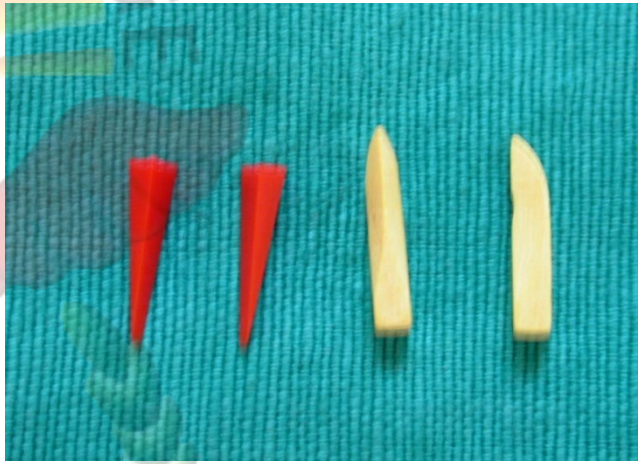
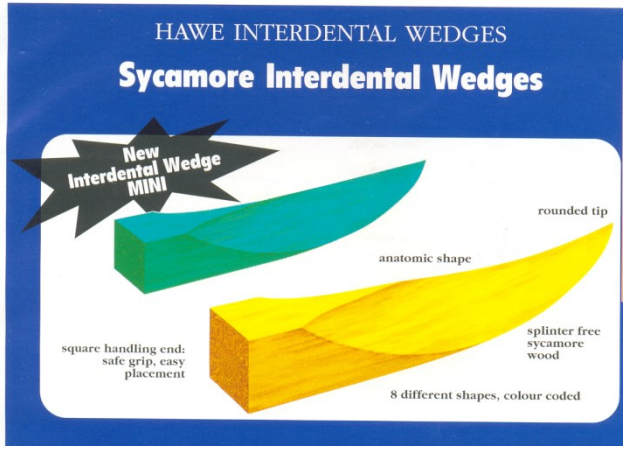
WOODEN WEDGES

- Easily cut & Trimmed .
- Absorb moisture intra orally to swell and expand slightly, thus improving proximal retention of band.
- Relatively flexible .
- Economical.

- Example : Orangewood, Hemowedges Maplewood, pine(soft) Oak (hard)





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COLOUR CODING FOR SIZES

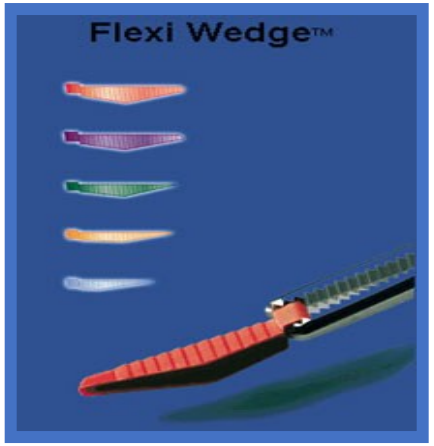
Number designates wedge length in mm (13=13mm)

PLASTIC /RESIN WEDGES

These can be opaque or transparent

Transparent plastic Wedges can transmit light through, suitable for light cured restorations.

Relatively rigid hence tooth separation occurs easily
ex:Luci wedges



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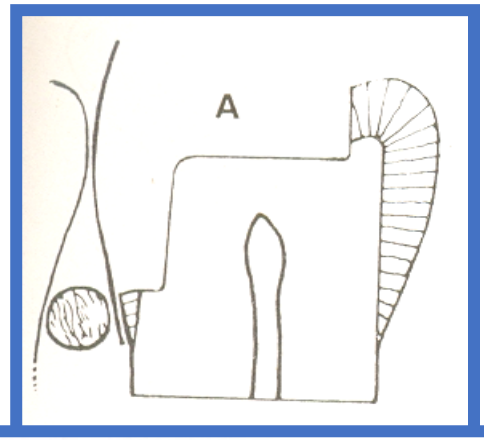
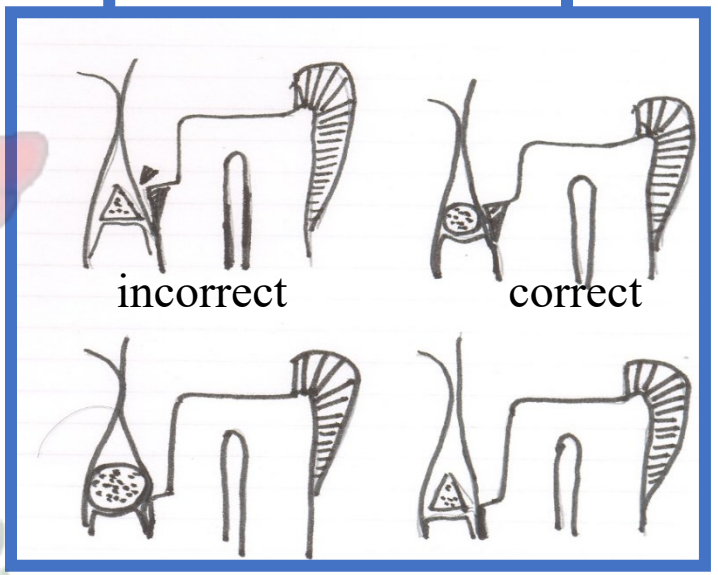
ROUND WEDGE

- Preferred in conservative Class II preparations because of its wedging action .
- Is nearer the gingival margin



TRIANGULAR WEDGE

- Preferred with class II preparations with deep gingival margins because of greatest width at its base



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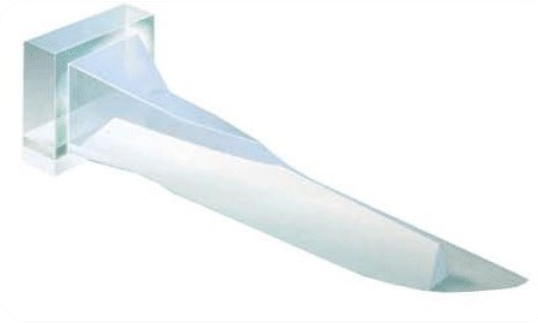
LIGHT TRANSMITTING WEDGES

- Are special transparent plastic wedges with a light reflecting core.
- They can transmit approx 90-95% of the incident light ,drawing the curing light to the gingival margin of the restoration thus directing a polymerization shrinkage towards the margins.
- Therefore these wedges are helpful in providing better marginal adaptation at a cervical areas of classic composite resin restoration



Types and techniques of wedge placement

SINGLE WEDGING

- USING A SINGLE WEDGE

DOUBLE WEDGING

- DOUBLE WEDGING
- PIGGY BACK WEDGING
- WEDGE-WEDGING

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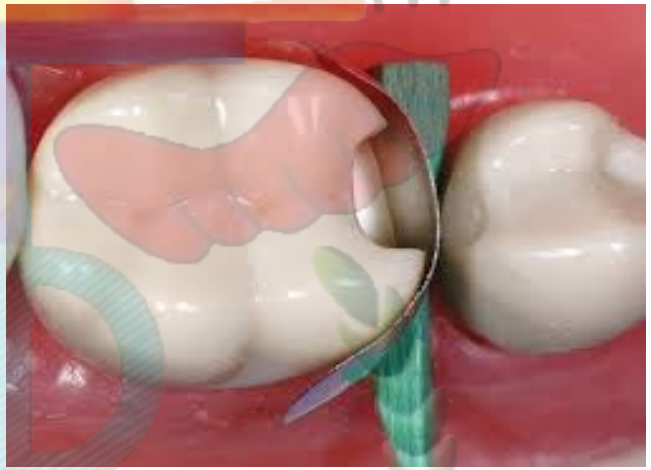
SINGLE WEDGE

Depending on the location of contact, embrasure size and shape, a single wedge may be placed on lingual or buccal side.



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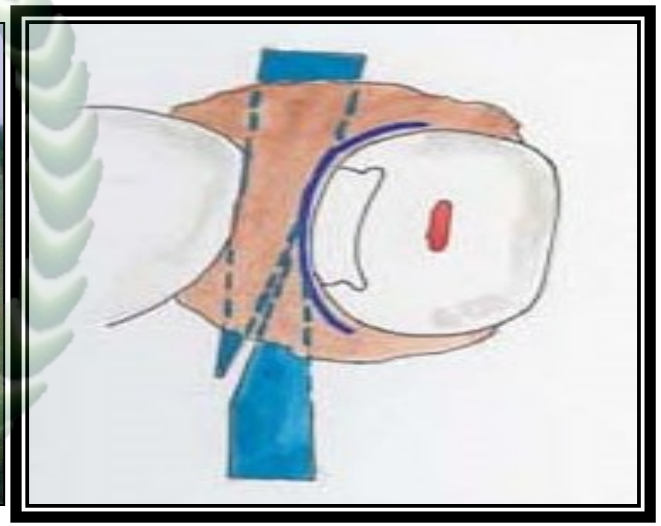
DOUBLE WEDGING TECHNIQUE

- If gingiva is healthy, and both facial and lingual embrasures are large of equal dimension, two wedges can be used simultaneously, one from facial and other from lingual embrasure.
- Helps to ensure that the gingival corners of a wide proximal box can be properly condensed and minimize gingival excess



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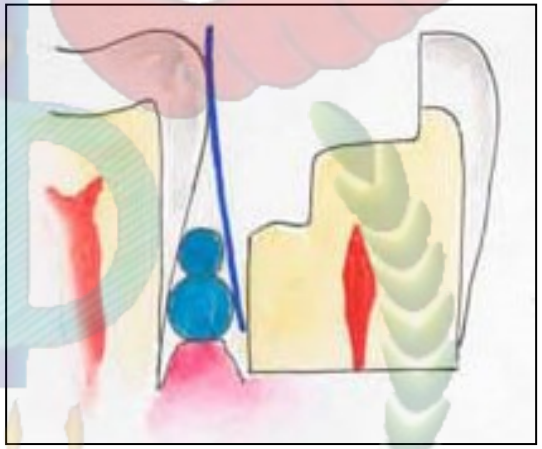
PIGGY BACK WEDGING TECHNIQUE (WEDGE ON WEDGE TECHNIQUE)

- Indicated when proximal box is shallow gingivally
- Gingival recession (apical) or both.
- If the wedge is significantly apical of the gingival margin, a second (usually smaller) wedge may be placed against the margin.



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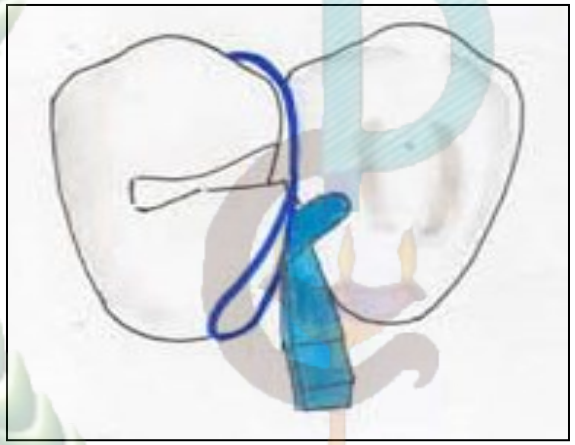
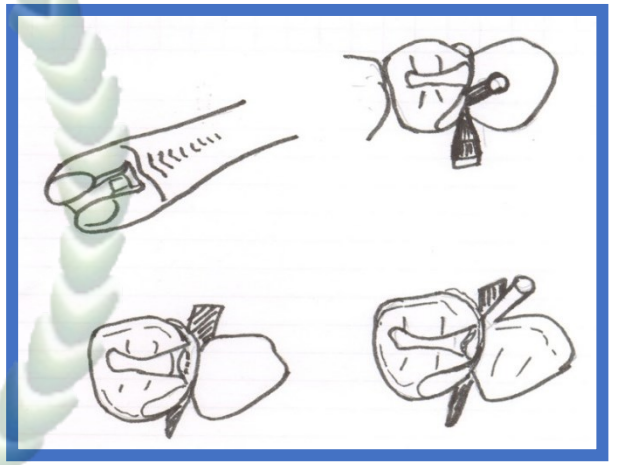
WEDGE WEDGING TECHNIQUE

- Occasionally, when a concavity (fluting) maybe present on the proximal surface that is apparent in the gingival margin (example fluted root of mesial surface of maxillary 1st premolar).
- Gingival margin located in this fluted concave area, will be concave. Hence, to wedge a matrix band tightly against such a margin, a second pointed wedge can be inserted between 1st wedge band





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TRACTION METHOD

- This is always done with mechanical devices which engage the proximal surfaces of the teeth to be separated by means of holding arms.
- Separators which work on traction principle:
  - Non interfering true separator
  - Ferrier adjustable separator
  - Ivory adjustable separator
  - Perry separator
  - Woodward separator
  - Parr's universal separator
  - Dentatus- nystrom separator

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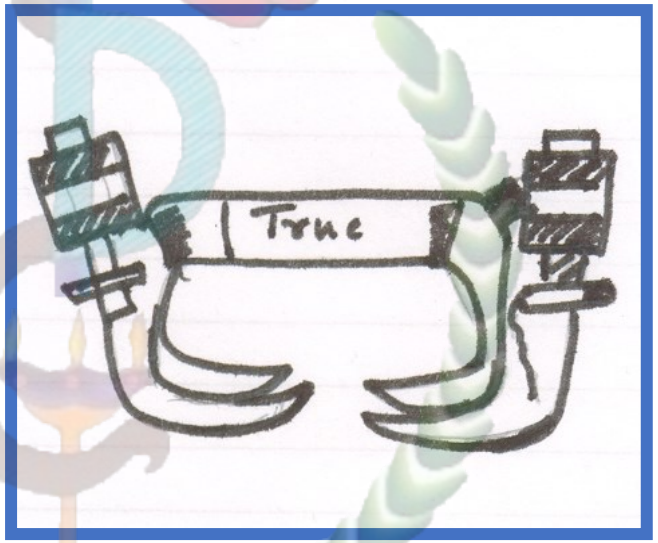
NON INTERFERING TRUE SEPARATOR

- **INDICATION**

Continuous stabilized separation required during dental operation.

- **ADVANTAGES**

Separation can be increased or decreased after stabilization



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FERRIER DOUBLE BOW SEPARATOR

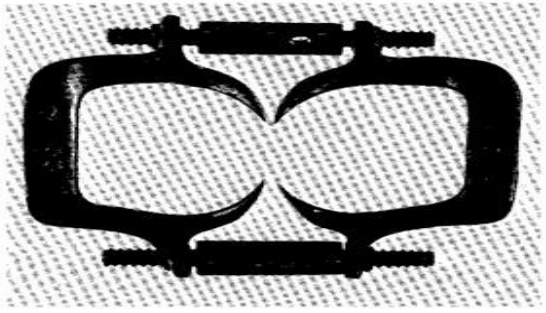

FIG. 6. No. 4 Ferrier separator with refined jaws for better access.

- Available in graduated sized from No. 1 to No. 6.
- Smaller No. 1 separation of most anterior teeth.
- Compound is used to stabilize the position of both bows on the teeth.
- Excessive pressure and possible tissue damage are avoided by using a wrench in the plane of least leverage.
- Separation is stabilized throughout the operation.
- Separation is shared by the contacting teeth and not at the expense of one tooth as with the previous type of instrument.

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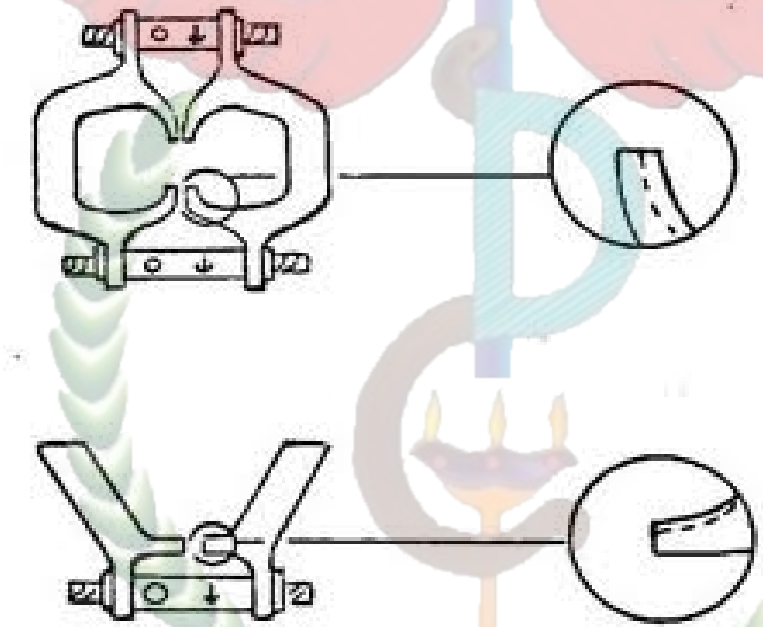


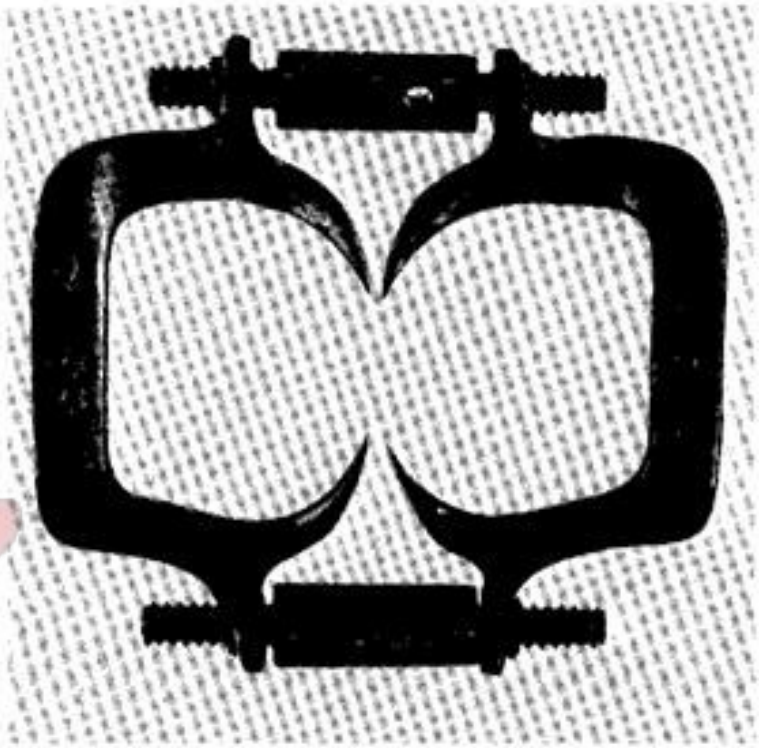
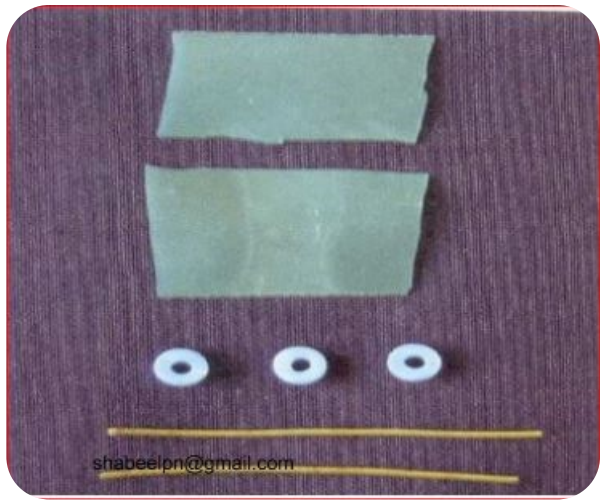


FIG. 6. No. 4 Ferrier separator with refined jaws for better access.

SLOW OR DELAYED TOOTH MOVEMENT

INDICATIONS:

- When teeth have drifted and / or tilted considerably, rapid movement of teeth to the proper position will tear the periodontal ligament.
- Therefore, slow tooth movement, over a period of weeks, will allow the proper repositioning of teeth in a physiologic manner.



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SEPARATING LIGATURE WIRES

OVERSIZED RESIN TEMPORARY CROWNS

ORTHODONTIC APPLIANCE

SEPARATING RUBBER BANDS

RUBBER DAM SHEET

SEPARATING WIRES

SEPARATING WIRES

- Thin pieces of wire are introduced gingival to the contact, then wrapped around the contact area.
- The two ends are twisted together to create some separation not to exceed 0.5mm.
- Twisted ends are then bend into the buccal or lingual embrasure.
- Wires are then tightened periodically to increase separation.
- Maximum amount of separation will be equivalent to the thickness of the wire

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OVERSIZED TEMPORARIES

- Resin temporaries that are oversized mesiodistally may achieve slow separation.

ORTHODONTIC APPLIANCES

- For tooth movement of any magnitude, fixed orthodontic appliances are the most effective and predictable method available.
- Comparable end results may be achieved by reasonable orthodontic appliances, but they require longer treatment.

Conclusion

The most matrices, retainers, wedges and separators to the profession have some good qualities but do not meet all the requisites. Thus the selection of matrix band and retainer, wedges and separators depends on dentists ability, type of restoration and material used and individual patients needs to obtain good results.

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Take Home Massage

It is Unacceptable to restore without applying matrix band in case of Class II cavities.

stabilize the band with the fingers while releasing the knob insures against fracture of the soft amalgam
Removal of band in angular direction

Probable SAQs and LAQs

Define Matricing
Classify Matrices
Classify Wedges
Functions Of Wedges
Methods of Wedging
Tooth Seperation

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