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CONTACT POINT. METHODS OF RESTORATION

Minsk BSMU 2016

МИНИСТЕРСТВО ЗДРАВООХРАНЕНИЯ РЕСПУБЛИКИ БЕЛАРУСЬ
БЕЛАРУССКИЙ ГОСУДАРСТВЕННЫЙ МЕДИЦИНСКИЙ УНИВЕРСИТЕТ
1-я КАФЕДРА ТЕРАПЕВТИЧЕСКОЙ СТОМАТОЛОГИИ

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КОНТАКТНЫЙ ПУНКТ. СПОСОБЫ ВОССТАНОВЛЕНИЯ

CONTACT POINT. METHODS OF RESTORATION

Учебно-методическое пособие



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PROXIMAL CONTACTS

A healthy dentition comprises of fully erupted teeth with proper occlusal and proximal contacts that help to stabilize and maintain the integrity of the dental arch. All the teeth have tendency toward mesial drift, which is primarily resisted by contact point of adjacent teeth. Clinicians role is to re-establish the original or correct the faulty contact to form physiologically stable contact and inability to restore this relationship disrupts harmony and can result in deleterious consequences like food impaction.

Interproximal spaces are triangular spaces normally filled with gingival tissue. The sides of the triangle are proximal surface of the contacting teeth; and apex is contact area. Embrasures are the spaces that widen out from contact when teeth are in proximal contact. Each interdental space has four embrasures: facial, lingual, occlusal/incisial, gingival. The embrasure form serves two purposes: makes spill way for the escape of the food during mastication and prevents food from being forced through the contact area.

Proximal convexity of the teeth creates area of contact between adjacent teeth within the same arch (fig. 1). These are called proximal contact area. Initially as teeth erupt the teeth contact each other at a point (contact point). With the passage of time, physiologic tooth movement causes frictional wear enlarging the contact point to contact area.

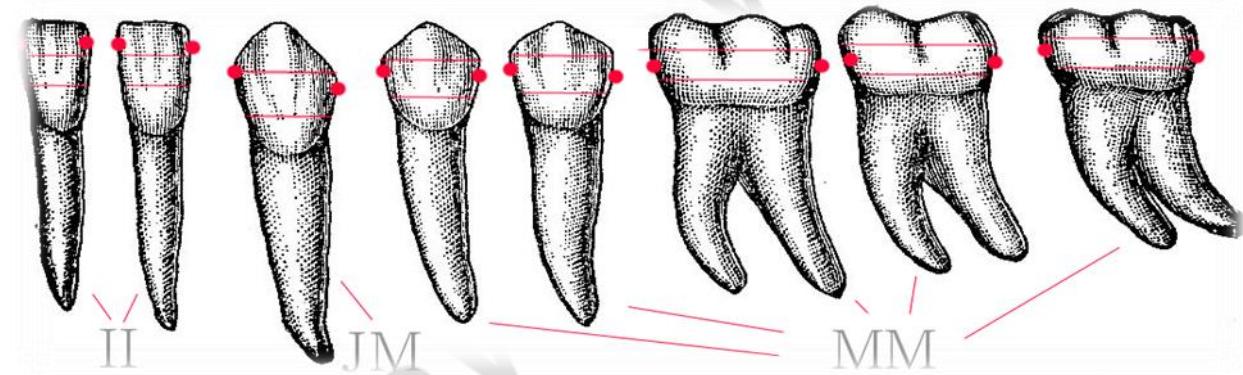


Fig. 1. Contact points

Importance of contact is as follows:

1. Preserves the stability and integrity of the arch by maintaining normal mesio distal relationship of teeth.
2. Prevent food impaction interdentally.
3. Protect the soft tissue from periodontal disease.
4. Premature restorative failure does not occur if stable proximal contact is present.

Problems associated with faulty reproduction of contacts and contours are as follows:

1. Food impaction/retention.
2. Gingival recession/inflammation.
3. Periodontal complication (acute abscess or bone loss).

4. Fractured restoration.
5. Faulty occlusion.
6. Shifting of teeth (mesial drift).

Posterior teeth contacts situated slightly buccal to the center and lingual embrasures are usually larger than buccal (fig. 2). Posteriorly size of contact area is about 1.5–2mm.

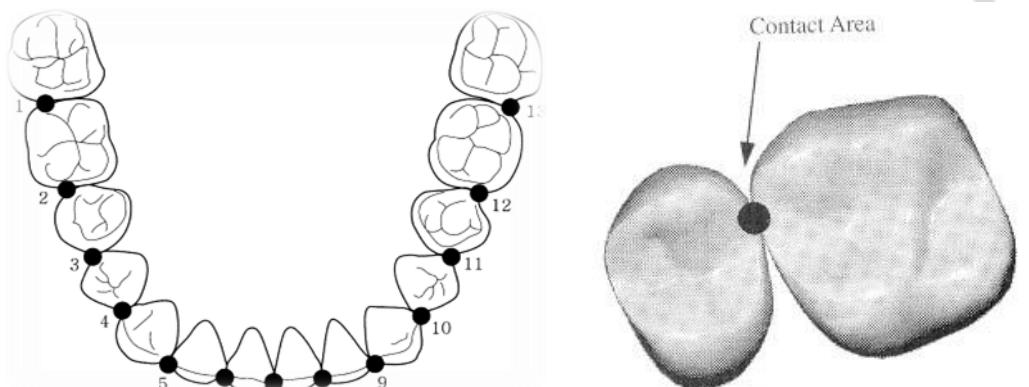


Fig. 2. Location of contact area posteriorly

Embrasures are v shaped spaces present interproximally around the proximal contact existing between the adjacent teeth. Types: buccal, lingual, incisal/occlusal, gingival embrasures (fig. 3).

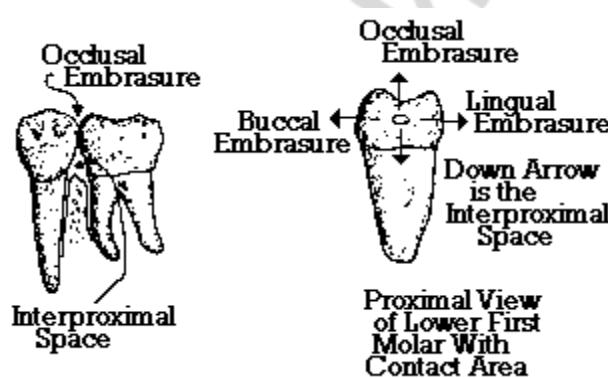


Fig. 3. Embrasures

Functions of embrasures are as follows:

1. Serve as spillways for the escape of food during mastication.
2. Prevent trapping of food in to the contact area.
3. Protect the underlying supporting tissue during mastication.

Problems associated with faulty reproduction of contacts in restoration.

1. Improper contact size.

Too broad contact (deficient convexity) (fig. 4) may be displaced buccally, lingually, occlusally, and /or gingivally:

- it will change the tooth anatomy
- it will change the interdental «col» by broadening it. The delicate non keratinized epithelium may get damaged increasing the chance of periodontal tissue diseases

- with too broad contact the interdental area is difficult to clean, it increases the risk of future decay and periodontal disease (fig. 4)

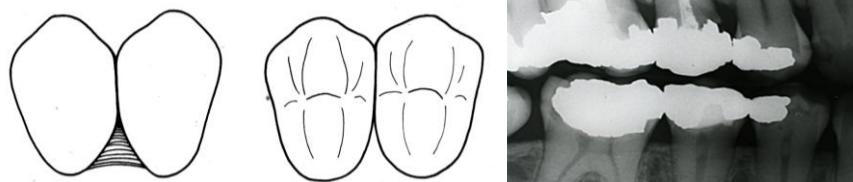


Fig. 4. Too broad contact area

Too Narrow contact (excessive convexity) (fig. 5)

- it will change the tooth anatomy;
- the embrasure size will increase leading to impaction of food vertically and horizontally, thereby damaging periodontal tissue;
- too narrow contact of interdental area increases the risk of future decay and periodontal disease.

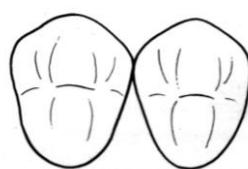


Fig. 5. Too narrow contact

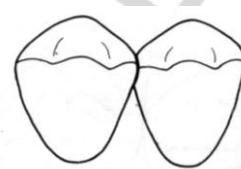


Fig. 6. A concave contact

A *concave contact area* will usually be in restoring adjacent teeth simultaneously (fig. 6). It is accompanied by the adjacent restoration with a convex proximal surface. Besides broadening and mislocating the contact area, the interlocking between concavity and adjacent convexity can immobilize the contacting teeth, depriving them of normal, simulating physiologic movements, resulting in periodontitis or mechanical breakdown. Also in restoration with concave contact area, it is impossible to create the proper size of marginal ridge or adjacent occlusal anatomy.

2. Improper contact location.

If contacts are placed:

- too occlusally — it will cause flattening of marginal ridges, resulting in too shallow occlusal embrasure
- too buccally/lingually — it will encroach upon the respective embrasure
- too gingivally — it will reduce the size of gingival embrasure and encroach upon interdental gingiva

3. Open contacts (fig. 7) would create the problem impinging of food causing accumulation of debris, plaque and damage of the periodontal disease.

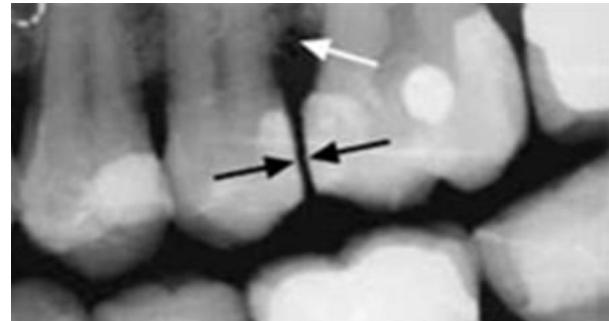


Fig . 7. Open contact

PHYSIOLOGY OF TOOTH FORM

Facial and lingual convexities.

Normal tooth contours act in deflecting food only to the extent that the passing food stimulates tissues by the gentle massage without irritating them.

Areas of proximal contour adjacent to the contact area.

In addition to creating a contact area of proper size, location and configuration, it is also essential to restore to a proper contour that portion of the proximal surface not involved in the contact. This would include the occlusal, buccal, lingual, and gingival areas to the contact ones. Fabricating a restoration that does not reproduce the concavities and convexities which occur here naturally will lead to restoration over hangs and under hangs, vertical and horizontal impaction and impingement of debris (fig. 8).

Marginal ridge with no triangular fossa (fig. 8).

In this situation there are no occlusal planes in the marginal ridges for the occlusal forces to act upon, so there are no horizontal components to drive the teeth toward each other, closing the contact. Furthermore, the vertical force will tend to impact food interproximally.

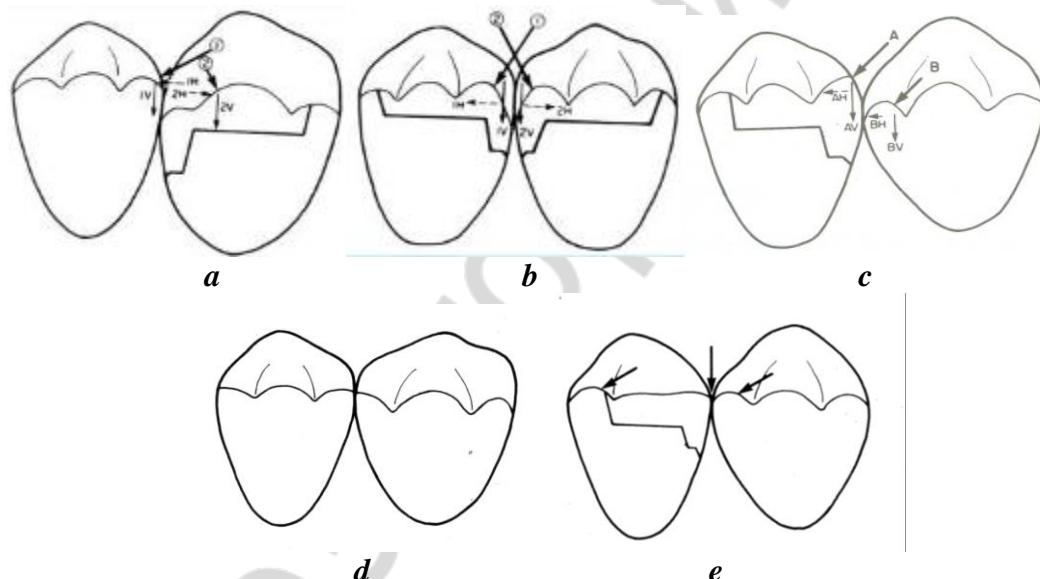


Fig. 8. Mistakes of marginal ridge restoration:

a — absence of a marginal ridge in the restoration, b — marginal ridge with an exaggerated occlusal embrasure, c — adjacent marginal ridge not compatible in height, d — marginal ridge with no occlusal embrasure, e — a marginal ridge with no triangular fossa

Thin marginal ridge in the mediiodistal bulk is susceptible to fracture or deformation, shallow or deep adjacent fossa or bulky occlusal anatomy (fig. 9).

Improper marginal ridge in the bucco-lingual direction creates premature contacts during functional and static occlusion (fig. 10). Increasing depth of adjacent triangular fossa magnify stresses in this area. Increasing height of marginal ridge in center make it amenable to adverse effects of horizontal components of force.

Marginal ridges are not compatible in dimension or location with the rest of the occluding surface (fig. 11) makes problems.

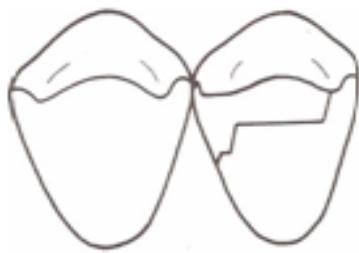


Fig. 9. A thin marginal ridge



Fig. 10. Improper Marginal

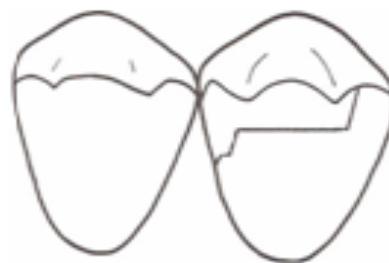


Fig. 11. Marginal ridges not ridge compatible in dimension or location with the rest of the occluding surface

There are three forms of the teeth: tapering, square and ovoid. Each form has different position and size of contact point (fig. 12)

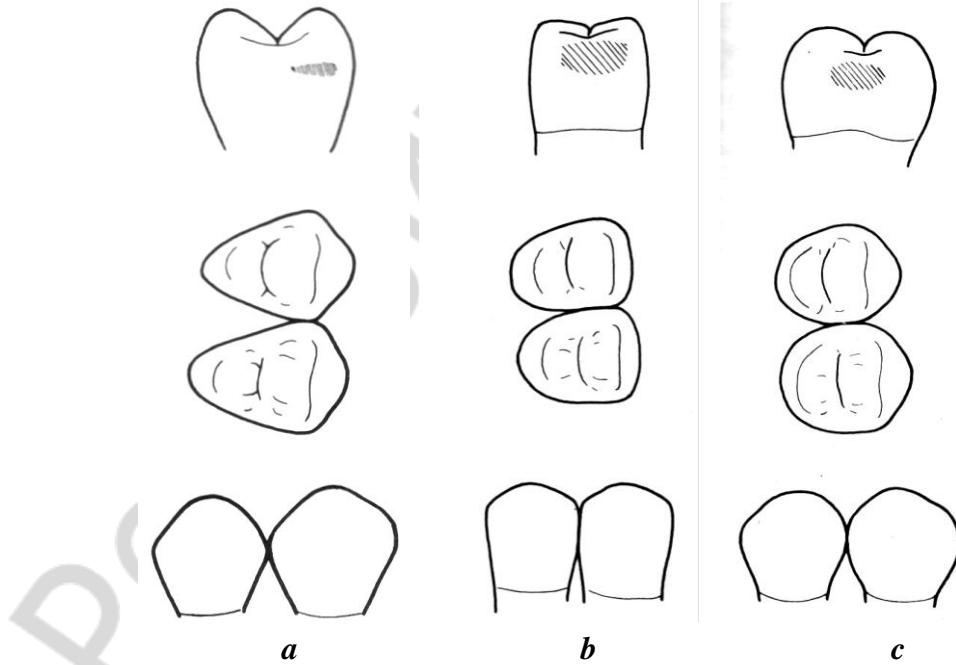


Fig. 12. Position and size of contact point at different forms of the teeth:
a — tapering, b — square, c — ovoid

MATRICES

What is matricing? It is derived from the Latin word «Mater» i. e. mother. The first successful matrix was introduced in to dentistry by Dr. Louis Jack in 1871. A dental matrix can be defined as piece of properly shaped material which forms the missing wall of the restoration, gives form and shape to the restoration during insertion and condensation of restorative material.

A matrix system must do the following three things:

1. Recreate the natural tooth shape and interproximal contact
2. Seal the proximal and gingival walls of the prepared proximal cavity
3. Overcome the thickness of the band

Components of matrix system:

1. Band — piece of metal or polymeric material used to support and give form to the restorative materials during its introduction and hardening.
2. Matrix retainer — is a device that retains band in its designated position and shape. The retainer could be a mechanical device, a wire, dental floss or a compound.
3. Wedges — are used interdentally to ensure close adaptation of the matrix band with the gingival margin of prepared proximal cavity.

Functions of matrix are as follows:

1. Replaces the missing wall.
2. Permits adequate condensation.
3. Forms point of contact with adjacent tooth.
4. Prevents cervical overhang of restoration.
5. Maintains shape during hardening of material.

Classification:

Based on anatomic contour — anatomic, non anatomic

Based on the material used — metal, copper, brass, plastic

Based on the retainer — with or without retainer

Based on the position — circumferential, unilateral

Evolution of matrix systems

Black's matrix system>Ivory matrix system (1 and 8)>Tofflemire matrix system>Anatomic and Automatrix system>Sectional matrix system etc.

Position of the matrix should always be 1 mm below the gingival margin of cavity and 1–2 mm above the marginal ridge.

Black's matrices consist of stainless steel metal placed on the proximal surface and then tied around the tooth with dental floss or ligature.

Soldered band or seamless copper band are indicated for badly broken down teeth especially those receiving pin retained amalgam restorations with large buccal and lingual extensions.

Most simple matrix is matrix bands in a practical dispenser — 3m (fig. 13).



Fig. 13. Matrix band

Next step of matrices evolution is anatomically pre-shaped Hawe Adapt® stainless steel matrices (0.45 mm in thickness) (fig. 14, *a*). Hawe anatomically pre-shaped contoured matrices in stainless steel are 0.45mm in thickness (fig. 14, *b*). Transparent anatomically pre-shaped contoured matrices are also available (0.7 mm) (fig. 14, *c*).

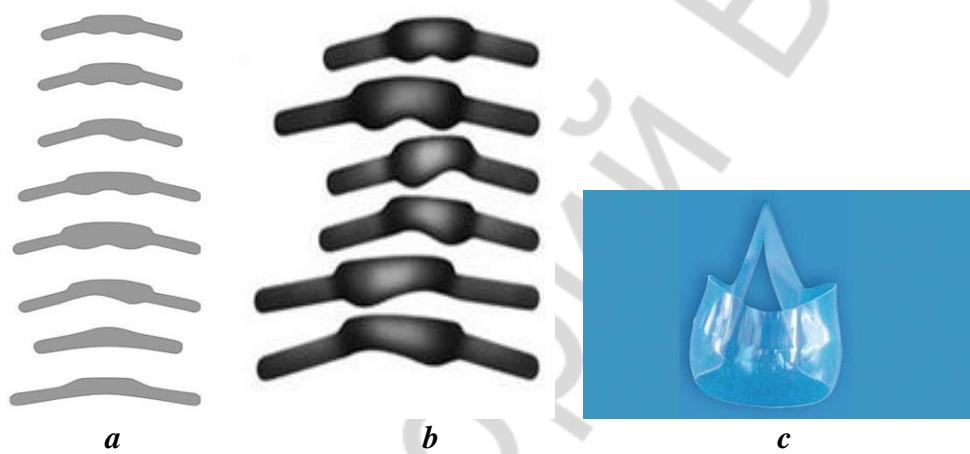


Fig. 14. Matrices:
a — anatomically pre-shaped, *b, c* — contoured matrices

Next generation is sectional matrix, that is the perfect system for micro-restorations (fig. 15). They may be metallic or plastic. It sets new standards for the treatment of unilateral composite fillings in posterior teeth. The sectionals are the heart of the system, carefully pre-shaped just like the original tooth. They are color-coded (the height and curve).

Uniquely thin matrices are available in blue and transparent plastic:

- the new blue colour, offering an alternative to the transparent, was chosen to increase the contrast between the matrix and the tooth structure while having a negligible influence on the composite conversion rate. This is a big advantage, offering better visual control of the composite application, filling procedures and handling. The longer lateral wings of the blue line help in the application and insertion in the proximal area. There is no discoloration of the dyed matrix when it is in contact with etching gels, bonds and primers. The blue line is a step forward in simplifying and accelerating everyday procedures;

– the transparent approximal shaper allows perfect adaptation and shaping of sectionals in interdental spaces. The combined effect of wedges and approximal shapers allow continuous adaptation of sectionals along the total approximal-cervical filling margin.

The user-friendly application forceps are the ideal instrument for precise and simple location of the approximal shaper.



Fig. 15. Transparent sectional matrices

Matrix retainer. Tofflemire, Ivory, Supermat, Automatrix etc.

Tofflemire is a versatile type of matrix retainer (fig. 16). It is also referred to as universal matrix. It was designed by B.R. Tofflelemire.

Advantages: the main advantage is that it can be placed on it's the buccal or lingual side of tooth as per requirement, it is very stable in it's position.

Indication: for MOD Class II cavities, Class I cavities with buccal and lingual extensions.

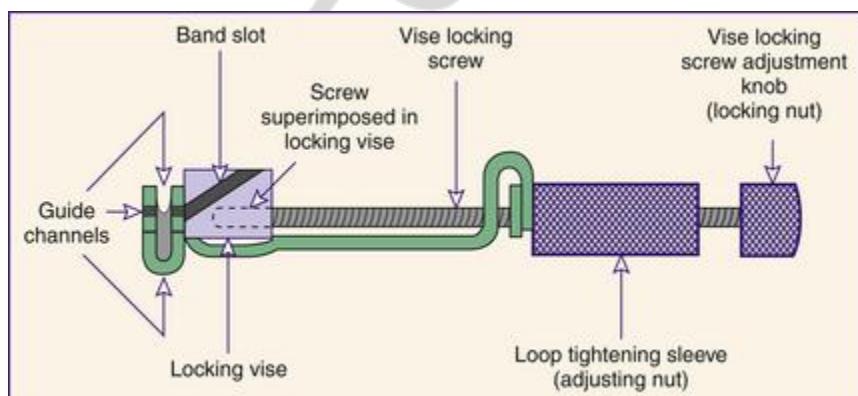


Fig. 16. Tofflelemire retainer

Ivory no.1 matrix. The matrix consist of a stainless steel band which encircles the proximal surface of posterior tooth (fig. 17, a). This is attached to the retainer via a wedge shaped projection. An adjusting screw at the end of the retainer adapts the band to the proximal contours of the prepared tooth.

Indication: to restore unilateral Class II cavity when the contact on the unprepared side is very tight.

Ivory No .8. This matrix consist of a band that encircles the entire crown of the tooth. The circumference of the band can be adjusted with the adjusting screw present in the retainer (fig. 17, b).

Indications: for restoring Class II cavities on one or both proximal surface (bilateral) of posterior teeth.

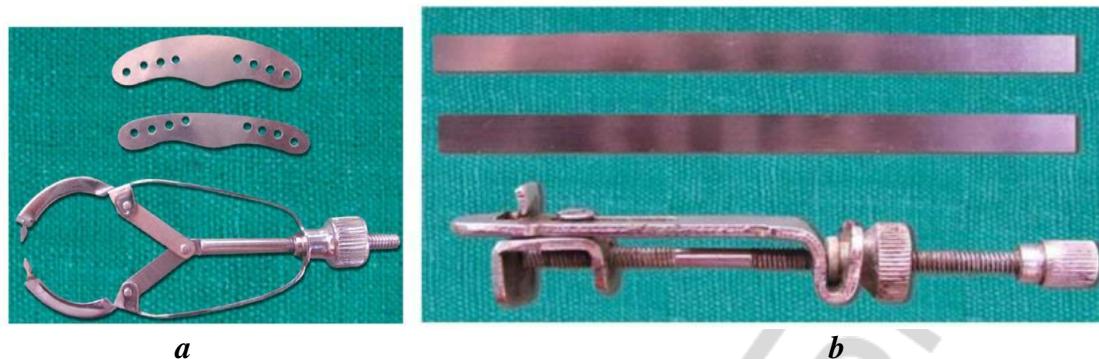


Fig. 17. Matrix retainer Ivory: a — No. 1, b — No. 8

Automatrix 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. Ratchet is used to clinch the band securely to the tooth. Wedging is not usually required. It is removed in angular direction. Automatrix is designed for any tooth regardless of its circumference and height (fig. 18).

Components: automatrix band (available in three widths), automate tightening device (adjust loop of band according to circumference of the tooth to be restored), shielded nippers (used to cut auto lock loop, so that band can be separated and removed from the tooth).



Fig. 18. Automatrix

Indication: complex amalgam restoration especially when one or more cusp are to be replaced.

Advantages: convenient to be used, improved visibility due to lack of interference from a retainer, rapid application.

Disadvantage: bands are flat, so difficult to burnish, it cannot develop proper proximal contact and contour, it is also expensive.

SuperMat is designed for large posterior restoration (fig. 19). The system is aimed to achieve fast, easy, standardised application. The unique thin ring matrices are contoured according to statistical data for dental anatomy and are available in two band heights with a single shape for molars and premolars, in steel or transparent plastic. They are pre-fitted to SuperCap®, the tension adjunct to the SuperMat® system.



Fig. 19. SuperMat®

Advantages: universal tensioning instrument, no tightening device, for patient's comfort, clear view of the working area, do not interfere with light curing, good anatomical shape, tight contact.

Height is 5–6.5 mm, thickness is 0.03 mm (metal) and 0.05 mm (plastic).

Omni-Matrix is a quick, easy-to-use, disposable retainer and matrix (fig. 20). Simply adjust the band's circumference by twisting the conical handle. Its patented, articulated head swivels, fitting comfortably into any quadrant of the mouth. Once the restoration is complete, the Omni-Matrix band is easily released, leaving restorative material intact. The stainless steel matrix band is thin, adaptive, and burnishable, and the wingless design allows wedges to be placed with ease.

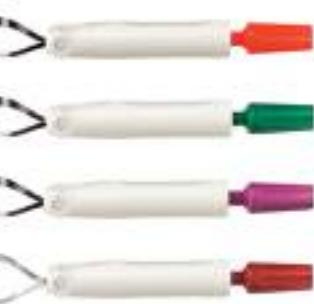


Fig. 20. Omni-Matrix

matrix band is thin, adaptive, and burnishable, and the wingless design allows wedges to be placed with ease.

Advantages:

- aseptic and disposable;
- perfect placement—first time, every time;
- color coded;
- superior patient comfort;
- adaptive, burnishable band;
- no placement instruments required;
- no lip, cheek, or glove capture.

Lucifix® offers blue and transparent posterior matrices with integrated fixing device (fig. 21). The new blue colour, offering an alternative to the transparent, was chosen to increase the contrast between the matrix and the tooth structure while having a negligible influence on the composite conversion rate. This is a big advantage for better visual control of the composite application, filling procedures and handling. There is no discolouration of the dyed matrix when in contact with etching gels, bonds and primers.

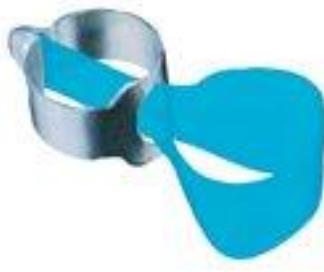


Fig. 21. Lucifix®



Fig. 22. Walser matrix

The traditional matrix holder is no longer needed. The matrices can be adjusted to individual requirements by gingival or occlusal clapping. The matrix is 0.75 mm in thickness.

Unlike conventional matrices and sectional matrices you can put or remove a Walser matrix with a single motion (fig. 22). It has different shapes: O-shape for MOD fillings and single, freestanding teeth, X-shape for biplane fillings with existing interdental space, ON-shape for terminal teeth, extra-large molars and for use over cofferdam clamps. Advantages:

- fitted and removed within a few seconds;
- cost saving of up to 8.000 €/year*;
- no screws or spanners are required;
- adapt to the tooth form automatically;
- simultaneously ideal cotton roll holder;
- rare papilla bleedings;
- X-shape for two fillings simultaneous;
- ideal for composite fillings and over cofferdam.

Sectional matrices and contact ring systems. The McKean principle of separation is based on equal and opposite forces vectors 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 separated forces.

The separation is a time dependent phenomenon with the separation increasing in 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.

Three systems based on the McKean concept are available:

- Palodent BiTine and BiTine II > Palodent > Palodent Plus;

- Contact Matrix (Danville Materials);
- Composi-Tight (Garrison dental solutions).

Different types of matrix systems are designed for different clinical situations (fig. 23)

Treatment	Matrix System	Treatment	Matrix System
Minimal Class II	Palodent®Plus Sectional Matrix System	MOD	Palodent®Plus Sectional Matrix System or The Palodent® System Sectional Matrix System
Wide and/or deep Class II	Palodent®Plus Sectional Matrix System or AutoMatrix® Retainerless Matrix System	Core Build-up	AutoMatrix® Retainerless Matrix System
Class II with missing cusp	Palodent®Plus Sectional Matrix System or AutoMatrix® Retainerless Matrix System		

Fig. 23. Criteria of choice matrix system

Flat matrices do not ensure formation of convex surface (fig. 24)

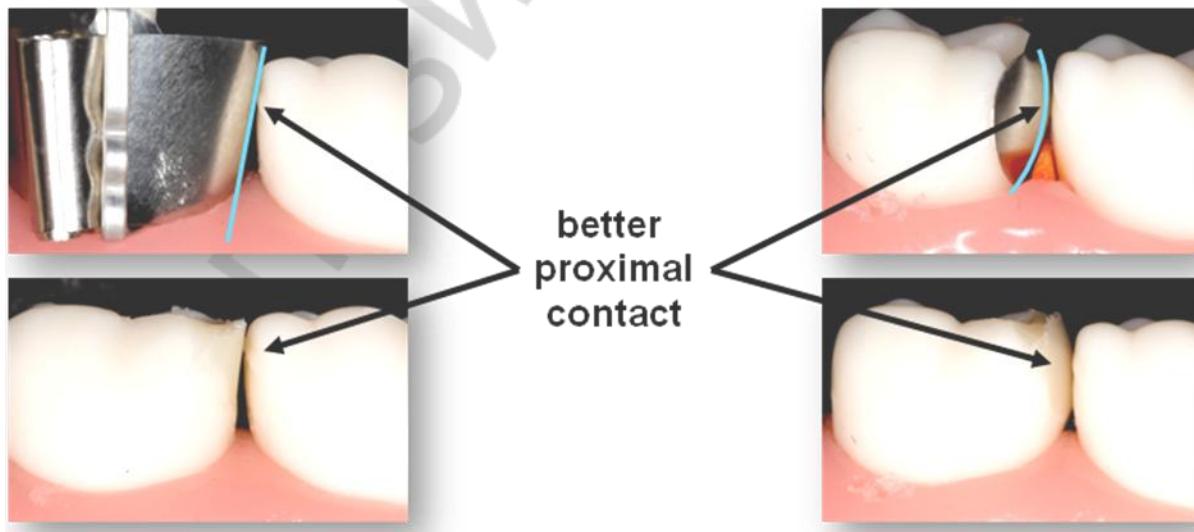


Fig. 24. Comparison of flat and contoured matrices

The Palodent Plus system provides everything needed to create a tight gingival seal, accurate anatomy for predictable contacts and minimal finishing – even on significantly damaged teeth. The system helps to minimize the stresses of challenging Class II restorations.

The Palodent Plus system includes special wedge-guards, unique Pin-Tweezer, 4 different sizes of sectional matrices, wave-shaped wedges, NiTi-ring for molars and a narrow ring for pre-molars and pedodontics.

Wedge-guard (fig. 25) protects the adjacent teeth from damage which may occur during the preparation of the cavity, can be turned into ordinary wedges by simply removing the metal band, matrix band can then be inserted without replacement of the wedge, available in three sizes: small, medium and large.



Fig. 25. Unique wedge-guard

Unique Pin-Tweezer (fig. 26). Pin in tip positively grips holes in the wedge-guards, matrix bands and wedges. It allows secure placement and removal of matrix system components. Naturally closed position minimizes risks of dropping components.



Fig. 26. Pin-Tweezer

Matrix bands have pronounced marginal ridge, optimally shaped gingival apron to prevent gaps in gingival axial corner and contamination of cavity (eg through gingival bleeding) (fig. 27), available in four sizes: 3.5mm, 4.5mm, 5.5mm, 6.5mm. Palodent Plus EZ Coat matrix bands provide:

- non-stick coating (PTFE) for easier band removal;
- pronounced marginal ridge for ideal anatomy;
- significantly greater curvature on horizontal plane allowing the matrix band to wrap around the tooth;

- large gingival apron that is optimally shaped to significantly prevent gaps in gingival-axial corner;
- colour-coded inner-side of bands for easier recognition in the drawer.

Matrix application:

1. Try- in the wedge and adjust as required.
2. Remove the wedge.
3. Place the Palodent matrix band.
4. Place the wedge and firmly insert with the amalgam condenser. Plastic wedge allows to maintain placement of the wedge without having to further adjust if our environment becomes moist. A little amount of lubricant can solve that problem and allowed it to slip into place without altering the matrix placement.
5. Evaluate for proper seal with a sharp *explorer*.
6. Place the ByTine ring.
7. *Burnish* matrix with a plastic instrument to form proper contours and contacts.

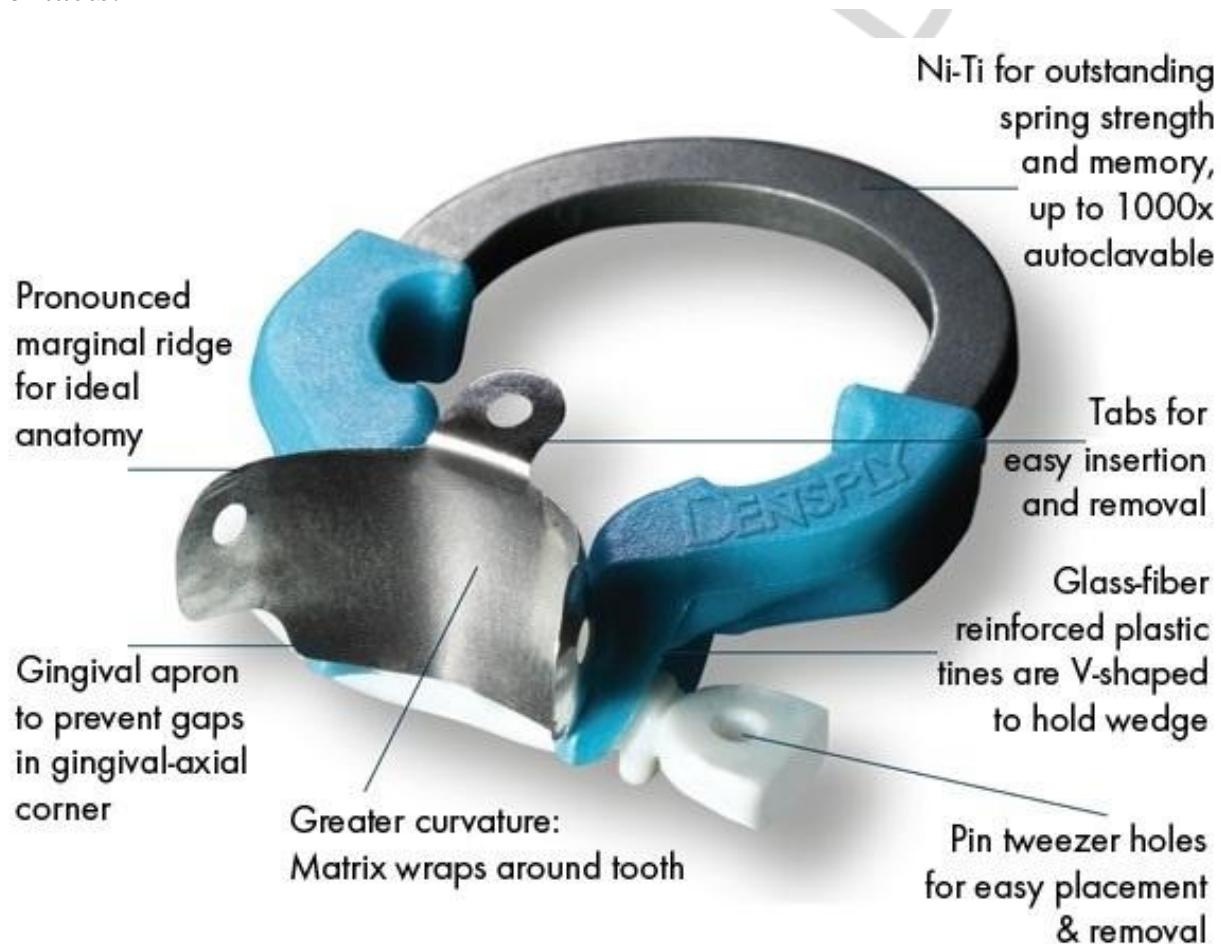


Fig. 27. Components of PalodentPlus system (matrix, ring and wedge)

Wedges have unique V-wing-shape (fig. 28), anatomically designed unique v-shaped cross-sectional wedges are less harm to the papilla, stackability (fig. 28, c) for tight seal and less flush. They do not separate teeth, easy to insert and remove, just cervical adaptation (separation by ring).



Fig. 28. PalodentPlus Wedges; *a* — bottom view, *b* — approximal view, *c* — stackability

Ring ensures: better adaptation of matrix band, less flush and faster finish, no interference with wedges (fig. 29), good adaptation of matrix also in *bigger cavities*, very robust (> 1000 sterilization cycles), easy to open, reactivation possible. Nickel-Titanium is used for outstanding spring strength and memory, stackability for versatility, better adaptation of matrix band also in larger cavities. The ring grips around the tooth and does not fall into the cavity. V-shape design allows separation of teeth, outstanding spring strength and memory of the ring allows the creation of strong proximal contacts to be facilitated. The tines clasp around the wedge so it is possible to insert the wedge after placement of the ring. Available in two sizes: universal for molars, narrow for premolars.

Garrison 3D rings can cause *indentations* (fig. 30).



Fig. 29. No interference of ring with wedges



Fig. 30. Possible indentions of Garrison 3D rings (first arrow)

WEDGES

Wedges perform the following functions:

1. Create some separation to compensate for the thickness of the matrix band (thickness of the involved tooth periodontal ligament space that is 0.2–0.5 mm).
2. Assure close adaptability of the band.
3. Assure immobilization of the matrix band (prevent overhanging gingival margin of restoration).
4. Occupy the gingival embrasure space.
5. Define the gingival extent of the contact area as well as facial and lingual embrasures.
6. Establish retraction of the rubber dam and gingiva.
7. Protect the gingiva from unexpected trauma.

Classification of Wedges:

- 1) On the basis of method of fabrication:
 - a) Custom made wedges;
 - b) Pre fabricated wedges.
- 2) On the basis of material used for fabrication:
 - a) Wooden wedges;
 - b) Plastic or synthetic resin wedges.

Custom-made wedges are made by trimming wood or plastic material in triangular shape to match the embrasure. Trimming can be done by scalpel, gold knife or diamond stone.

Wooden wedges are made from wood (pine wedges are compressible, oak ones are not). It may be soft and resilient or hard. They are easy to trim and shape. They absorb water interiorly and swell up, which causes them more press against the matrix there by improving their retention. They are available in two shape: triangular (fig. 31) and round shape.

Triangular Shape Wedges are:

- most commonly used;
- indicated in cavities with deep gingival margin;
- the apex lies below the contact area;
- the side of the triangle should be matched with mesial and distal embrasure.

Round shape wedges are used to depress the rubber dam. They are preferred in ideal class II cavities preparation as wedging action to close the gingival margin/ its wedging action is more occlusal.

Prefabricated wedges:

- they are in triangular in shape and supplied in different sizes. Their shape should be modified by trimming to meet exactly the gingival embrasure;
- in cross section the base of the triangle in contact with the interdental papillae. The two sides coincide with corresponding gingival embrasure. The apex coincide with the gingival start of the contact area.

Synthetic Resin/ Plastic Wedges.

These are transparent (fig. 31, b) and non-transparent plastic wedges (fig. 31, c).

Indication: class II composite restoration. Light transmitting wedges help to assist in directing light into inter proximal areas during initial stages of class II composite curing.

Non-transparent plastic wedges are commonly available in different color and size. They have to be trimmed or plastically molded and bent according to the shape of the interdental col. They are disposable. Wedges have curved underside and contoured sides that leave room for the interproximal papilla and enable the wedges to more intimately adapt to the interproximal contours. Wedges also have a slightly upturned tip that prevents inadvertently piercing of the soft tissues and rubber dam during placement.

WedgeWands are anatomically-contoured, disposable, plastic wedges attached to plastic handles (wands) — placed without using an instrument. The angle of the wedges can be adjusted by bending the neck area where the wedge meets the wand, allowing their placement. Following placement, the handle is twisted to separate it from the wedge. The wedges come in three color-coded sizes (small, medium, large).

Advantages: disposable wand allows placement without forceps and contoured shape for more intimate interproximal adaptation. Disadvantages: are wand difficult to remove after wedge placement and high cost.

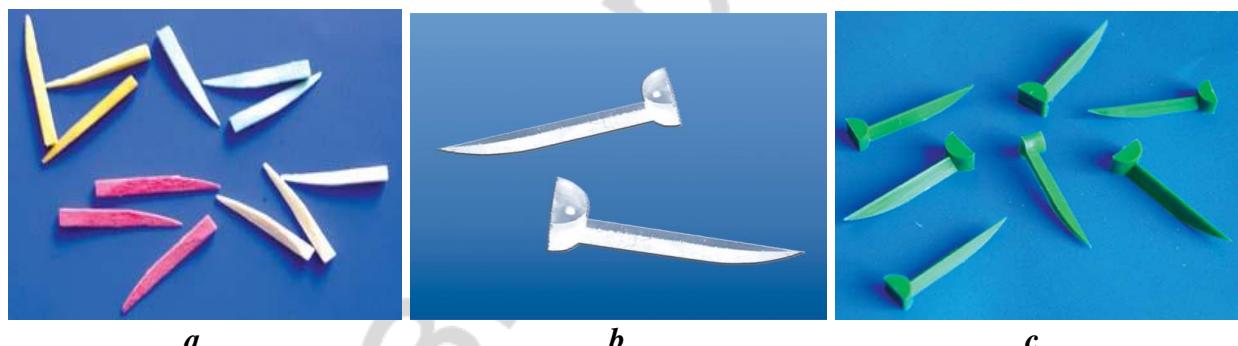


Fig. 31. Wedges: a — wooden, b — light transmitting, c — plastic

Garrison Dental Solutions, a leader in sectional matrix systems used for Class II composite restorations, announces the introduction of a new wedge: the **A+Wedge** (fig. 32). Unlike a typical wedge, it is coated with an astringent. Many dentists experience interproximal bleeding during composite restorative procedures and generally use a wedge and an astringent separately. The A+Wedge combines the two, thus simplifying the restorative procedure.

In addition to adapting naturally and mimicking interproximal anatomy, the A+Wedge is coated with aluminum sulfate that provides an astringent effect. Further, feedback from field trials indicated that the Garrison A+Wedge minimized or eliminated bleeding during the restoration and that the product is particularly ben-

eficial for use on patients with slight to mild gingivitis. Also, this all-new anatomical wedge improves clarity of the restoration area while adapting naturally to the contours of the teeth. The A+Wedge is the first and only plastic wedge coated with an astringent.

The wedges are designed to prevent back-out and are long enough to allow for proper matrix ring placement. The wedges come in a range of sizes — extra-small, small, medium, and large — and can be purchased by themselves or as a component in Garrison's sectional matrix kits.

Garrison Dental Solutions, a manufacturer of sectional matrix systems for Class II composite restorations, has introduced a new interproximal wedge: the **3D Fusion Ultra Adaptive Wedge** (fig. 33). The new wedge is the first to fuse two materials together to produce the perfect combination of adaptability and retention. The 3D Fusion Ultra Adaptive Wedge has a patent-pending design that combines a «Soft Face» overmold with a firm inner core and advanced mechanical features to produce a wedge with improved adaptation to interproximal irregularities. While insertion and separation are significantly improved with the new design, soft retentive fins help to prevent «back-out» even when wet.



Fig. 32. A+Wedge

Fig. 33. 3D Fusion Ultra Adaptive Wedge

Dr. Marc Gottlieb is the designer and engineer of the **ABC Wedge System**. The system is currently manufactured by Danville Materials.

ABC (Absolute Best Contact) Wedge (fig. 34). With a little imagination, this wedge looks like an elephant's head and its parts will be described as such. The ears were designed to support the sectional band in three dimensions (3-D) and prevent the sectional rings from crushing in the matrix band. The elephant's trunk is analogous to the anatomic wedge. Two wedges were used from the buccal and lingual surfaces, and the curved trunks slide past each other to seal off the gingival floor. A central groove is located on the back between the ears to line up the sectional separating ring and directs the pressure interproximally for maximum separation. The tooth was then easily restored in incremental layers, trimmed

back, and the bite was adjusted. The ABC Wedge can also be utilized to restore rotated, malpositioned teeth. They are available in various sizes and can be mixed and matched to fit any embrasure space. As with any new product or procedure, there is a learning curve. The ABC Wedge is intuitive and the system easy to learn and use right out of the box.

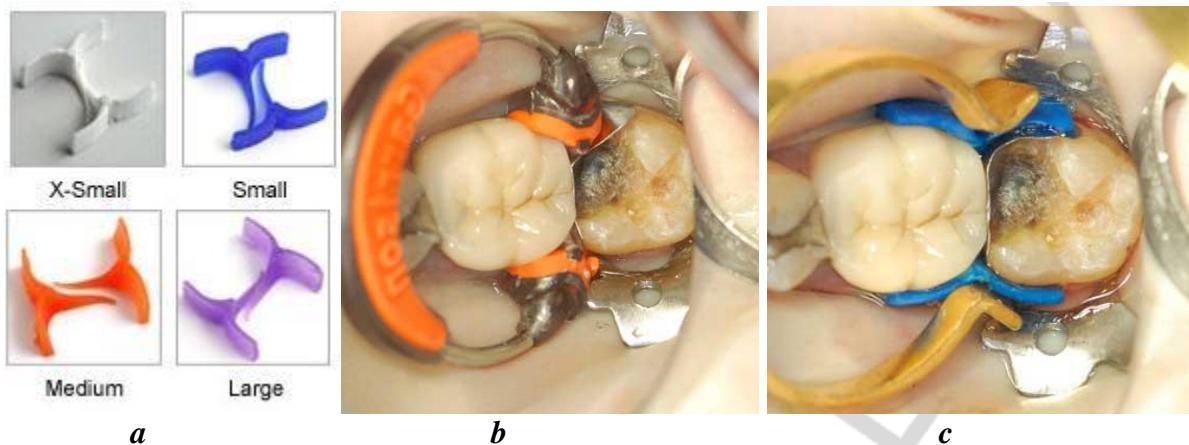


Fig. 34. ABC Wedge System:
a — wedges of different size, b — unsupported distorted matrix band, c — ABC Wedge supports the matrix band

Thanks to its light-reflecting power Adapt® ***Luciwedge®*** is ideal for approximal light-curing. The soft, highly elastic sole of the wedge ensures clean, continuous adaptation of the matrix along the entire cervical margin whilst being kind to the gingiva. Hard, main body of the wedge for perfect separation during the filling phase. Its ability to bend axially ensures perfect adaptation even in concave zones and in the widening interdental space (fig. 35). It increases matrix stability by means of continuous pressure zone.

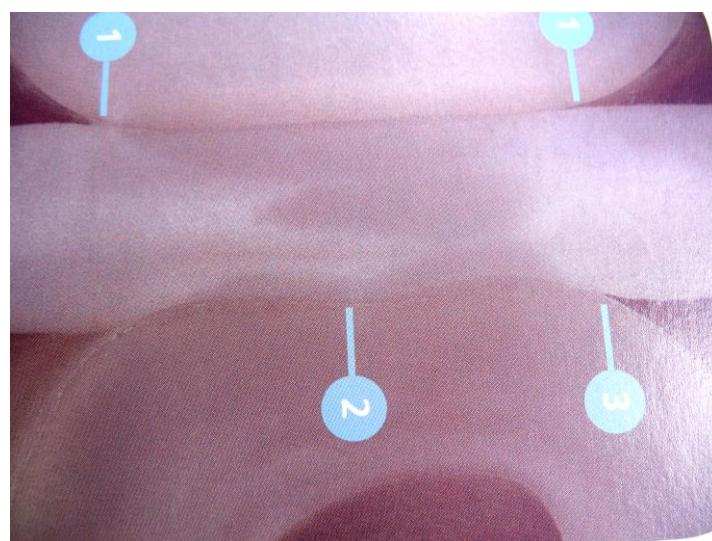


Fig. 35. Luciwedge. Markers indicate sites adapted to the anatomical shape of the teeth

Interdental Elastic Wedges

Opt4 Elastic wedges are fast, simple and reliable. Finally, there is a wedge that:

- provides complete gingival margin adaptation and seal;
- simultaneously wedges from both buccal and lingual;
- is compatible with all inter-proximal matrix systems.

Elastic Radiopaque Interdental Wedges from Opt4 Dental are as easy to use as they are effective (fig. 36). Using ring or dam clamp forceps, they stretch into a thin strand for fast placement between band and opposing contacts. Release and they snap back for reliable gingival adaptation (fig. 37). If using a sectional matrix ring, tines rest above or behind wedge. After restoration, pull either side of wedge out and cut to separate and remove both sides. Works with both sectional and Tofflemire matrix bands. In 2 color-coded sizes to adapt to all interproximal conditions.

Kit contains hard, blue elastic wedges and soft, yellow elastic wedges.



Fig. 36. Elastic Wedges



Fig. 37. Placement of elastic wedge

Technique of wedge insertion:

- select appropriate wedge, modify its shape according to the shape of the embrasure;
- length of the wedge should be half of an inch;
- grasp the wedges with the help of pliers and insert pointed tip from facial or lingual embrasure whichever is larger;
- wedge should come to lie slightly gingival to the gingival margin of the proximal cavity, pressing the band tightly against the tooth. Once placed it should be firm and stable;
- test tightness of the wedge with an *explorer*. The explorer is pressed against the matrix to the margin.

Piggy-Back Wedging useful in cases with gingival recession of interproximal tissue. In such cases when the wedge lies in the apical margin of proximal cavity another wedge smaller in size is piggy backed on the first one to fill the space and press the matrix band against the margin (fig. 38, a).

Double wedging. This method used in case of wide faciolingual proximal box. In such cases two wedges are inserted, one from facial and other from lingual embrasure. It should be used only if the middle two third of the proximal margins can be adequately wedged (fig. 38, b).

Wedge Wedging. Used in maxillary surface of first premolar where a concavity may be present on the proximal surface and extending to the root as groove or on the surface with a fluted root. In such case to wedge a matrix band tight against the tooth, a second wedge may be inserted between first and band (fig. 38, c).

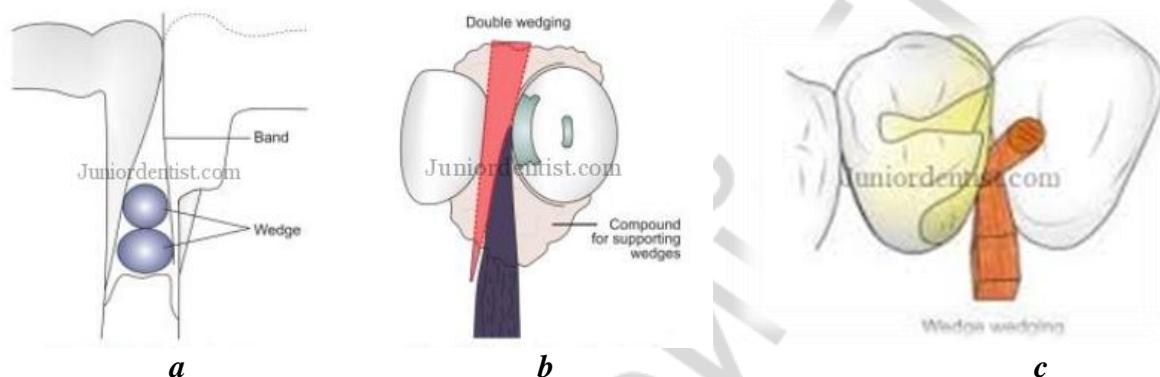


Fig. 38. Methods of insertion wedges: a — piggy-back, b — double wedging, c — wedge wedging

Test for tightness of wedge: press the tip of the *explorer* firmly at several points along the middle two thirds of the gingival margin to verify that it can not be moved away from the gingival margin (fig. 39).

Wedges may be placed in correct or incorrect manner (fig. 40)

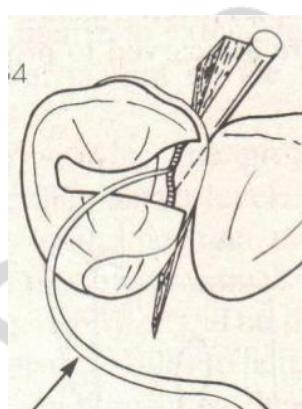


Fig. 39. Test for tightness of wedge

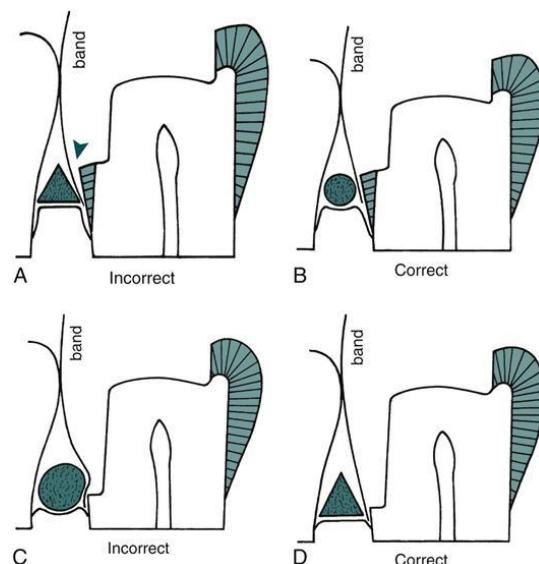


Fig. 40. Placement of wedge

Passive wedge is less traumatizing to the papilla than conventional wooden wedges, but do not assure wedging of the teeth. May be used in case of diastema, tremas:

1. Push matrix with one finger in the incisogingival direction and place a small cotton pellet into the interproximal space between the matrix and adjacent tooth.
2. Soak the pellet with disposable brush filled with cyanoacrilate.
3. The matrix is placed in its proper position.
4. Maintain the matrix in its position, while air-water spray soaks the cotton pellet.

This will harden the pellet immediately, in the exact shape of the interproximal space without either compression or traction on the soft tissue.

Elliot separator

It is also called crab claw separator (fig. 41). It is mainly used for short duration separation such as

1. Examination of proximal surface.
2. Final polishing of already restored proximal surface.



Fig. 41. Elliot separator

INSRUMENTS FOR CREATION OF THE CONTACT POINT

There are special instruments for creation the contact point: Optra-Contact, LM-Contact Formers, Contact pro 2, Light-Tip.



Fig. 42. OptraContact (Vivadent)

OptraContact (fig. 42) is easy to use and highly effective. The instrument is used to achieve large and tight proximal contacts in posterior teeth. OptraContact features a patented forked working end with which a composite bridge is formed while the first layer is cured. The bridge, which is created in the contact region, stabilizes the matrix (fig. 43). Furthermore, OptraContact allows contacts to be selectively created in the anatomically-correct upper third of the proximal surface. OptraContact is available in two sizes: one for molars and one for premolars or for large and small cavities.

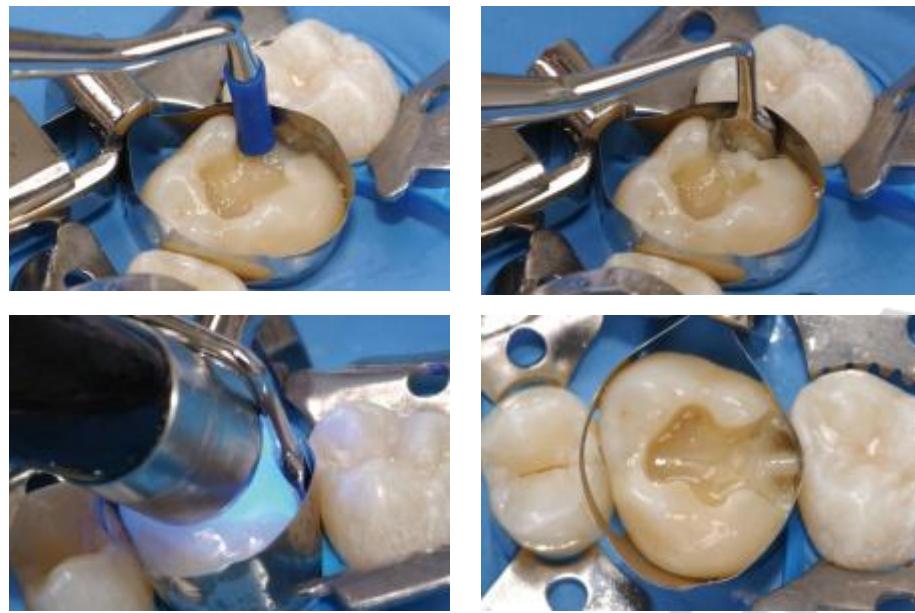


Fig. 43. Steps of Optra-Contact application

LM-Contact Formers. It is transparent tip for making correctly formed and tight approximal contact (fig. 44). Suitable for use with all matrices, will not stick to composite fillings, disposable, four sizes corresponding to the size of the cavity.

CONTACT PRO 2 technique. The unique design ensures ideally shaped and positioned interproximal contacts quickly and consistently in class II restorations with virtually no learning curve (fig. 45). The CONTACT PRO 2's light concentrating lens assures complete curing in the deepest proximal box preparations. Other features include: two sizes for increased versatility, visual guides that allow easy placement and alignment of tip, large handle and center sphere facilitates placing pressure against contacting tooth. Both ends are marked for mesial and distal use along with arrows indicating direction of required force.

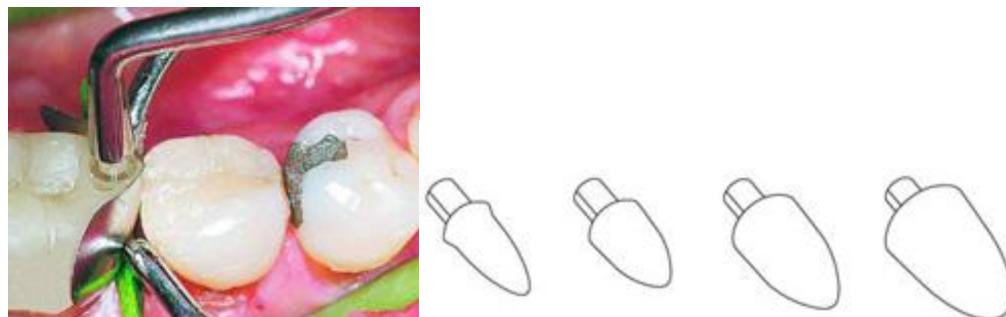


Fig. 44. LM-Contact Formers



Fig. 45. Contact Pro 2

Composite is placed and condensed up to the level of the pulpal floor in the proximal box of class II preparation	
Contact Pro-2 is inserted and pressed towards the adjacent tooth and light cured while maintaining pressure	
After withdrawing the instrument, surrounding cured composite is left behind maintaining the contact and contour	
The restoration is then further filled and cured incrementally resulting in a tight, ideally positioned and shaped contact.	

Light-cone Light-Tip helps to obtain tight contact with adjacent tooth when placing direct composite resins to Class 2 cavity preparations (fig. 46). Resin in depth of proximal box is thoroughly cured due to burst of light energy at the most apical end of the tooth preparation. Gap formation in cervical area of class 2 composite restoration is significantly reduced.



Fig. 46. Light-cone Light-Tip

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