Latest Trends in Composite Restoration Matricing

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Human teeth are designed in such a way that they contribute significantly to their own support and as well as supporting the arch. A break in the continuity of the line of the contact areas throws additional responsibility on the periodontal membrane and alveolar bone, which they are not designed to sustain.[1]

The key to these proper relationships interproximally is the contact area in relation to its location, extent and sizes. The failure to comprehend these relationships will cause not only premature failure of restorations but also periodontal problems as well as carious involvement of adjacent tooth surfaces.[2]

With growing demands for esthetic fillings amongst patients, the use of composite resin restorations has increased significantly over the past decade. In contrast to amalgam fillings that can be pushed and condensed to form proper proximal contact, the composite resins are relatively non-condensable. The use of amalgam based matrices and wedges, results in a flat proximal contour with a high contact point whereas the contact area in the natural dentition lies in the upper middle-third of most teeth. Thus, the private practitioner must develop skills and constantly upgrade his knowledge to offer esthetic composite restorations with correct contours in order to have an edge over others.

Traditionally used matrix systems like Ivory system and Tofflemire are cumbersome to use, time consuming and also uncomfortable to the patient. So, to overcome these various manufacturers have come forward to improve the design and precision of the matrices which are easy, quick, great at conforming the tooth, easy to burnish, better adaptability and comfortable to the patient. Most importantly these systems help in establishing close to the natural contacts and contours.

This paper proposes to enumerate the various matrix systems that aid in restoring proper proximal contacts and contours in esthetic direct composite restorations. (Table)

Clinician'S Choice Dental Products

ConveXi-TS$_2$™ Convex Tofflemire™ Matrix Bands (Fig.1)

These bands are pre-contoured buccal/lingually and occlusal/gingivally and are available in two options. In contrast to the original ConveXi-T matrix bands that are 0.025 mm thin, the new ConveXi-T s2 (stainless steel) matrix bands are slightly more rigid at 0.030mm thick, facilitating easy placement when preparations are tight. Both versions are available in widths of 5.5mm and 6.3mm, facilitate the creation of inter-proximal contours necessary to recreate the contact areas and natural convex anatomy of the interproximal area.[3]

Dentsply

Palodent Sectional Matrix System (Fig. 2)

The Palodent® System employs a spring steel BiTine® ring and sectional matrices for placement of restorations in the posterior region. Sectional matrices are available in three sizes. BiTine rings are available in round and oval or elongated shapes to be used either singly or in combination.

The advantages of the sectional matrices and rings include natural contours for better control of contact areas and embrasures, ease of placement, better visualization of the operative field, and more comfort for the practitioner and patient. Eliminating the leverage of a conventional matrix retainer allows the practitioner to use less tension, avoiding excessive compression of tooth and easier formation of anatomical proximal contact areas.[4]

Palodent Plus (Fig.3)

The Palodent® Plus Sectional Matrix System employs a nickel-titanium retaining ring, interproximal wedge, Wedge Guard and sectional matrices for placement of restorations in the posterior region. Palodent® Plus EZ Coat matrices have a micro-thin, non-stick finish that minimizes the chance that bonding agent or composite sticks to the band, making matrix removal easier. The matrices are available in 5 sizes: 3.5mm, 4.5mm, 5.5mm, 6.5mm and 7.5mm.The retaining rings are available in narrow(dark blue), for most premolar and small molars or universal(light blue), for larger molars. Rings may be used either singly or in tandem, for simultaneous restoration of multiple surfaces. This system not only incorporates all the benefits of the Palodent system but also includes the innovative Wedge Guard combination wedge and shield [available in small (dark blue), medium (medium blue) and large(light blue) sizes] that protects approximating surfaces from inadvertent damage during preparation. Using the pin tweezers, the shield easily slides away, leaving the wedge securely in place.[5]

Bioclear Matrix System by Dr. David Clarke (Fig. 4)

This system offers covers all the possible restorative composite dentistry including Diastema Closure and Black Triangle Closure. It includes the Bioclear sectional Matrices for Anterior and Posterior composites. The kit also contains three wedging options, Sabre Wedges that helps in anatomical shaping of the composite, Soft Wooden Wedges that create the tightest gingival seal without creating black triangles, and the Interproximatior with its anatomic, translucent silicone state that separates teeth, creating a strong contact. Also included is the Tetra Ring with its four hands and clear matrix ring that compliments injection of composite and modern cavity preparations. Lastly, ContacEZ helps to lighten the contact.[6]

Directadental Products

Fender Mate (Fig. 5)

This is a pre-curved, one-piece sectional matrix and wedge that provides for quick, safe and predictable composite restorations, with a tight contact and cervical sealing.

S.No.	Company/ Manufacturer	Matricing system
1	Clinician's choice	Convexi-TS2
2	Dentsply(mallifer)	Palodent Palodent Plus
3	Dr. David Clarke	Bioclear Matrix System
4	Directa Dental	FenderMate
5	Garrision Dental Products	Composi-Tight System Composi-Tight Gold System Composi-Tight Silver System Composi-Tight 3D™ Sectional Matrix System Composi-tight 3D System with Slick Bands Matrices Composi-Tight 3D Clear Sectional Matrix System
6	Kerr corporation	Metafix matrix system
7	Triodent Dental Products	V-Ring Sectional Matrix System V3 System - Posterior Composite Restorations V3 Blue System V4 clearmetal Matrix System 360° Cervical Matrix for Composite
Other Aids in Developing Proximal Contact		
1	Ad Dent	Trimax Composite Instrument
2	Garrision Dental Products	Per Form Proximal Contact Instrument
3	Ivoclar Vivadent	Optra Contact Instrument

Fender Mate is designed to be inserted either buccally or lingually. The matrix reaches from the base of the wedge to just a few millimeters above the occlusal surface. The side of the wedge facing the adjacent tooth has an angled wing. During insertion, the wing presses the matrix firmly against the preparation giving a tight seal at the cervical margin. To form the contact point the matrix has a pre-contoured indentation, which mimics natural contours.[7]

Garrison Dental Solutions

Composi-Tight System

Composi-Tight ensures an anatomically accurate contact at a tooth's natural height of contour. It represents a leap forward in posterior composite construction. The original system includes naturally contoured bands in different sizes and G-rings as the retaining device. It also includes a ring placement forceps and band and wedge placement forceps. The ring has a round cross-section and the tines taper inwards, allowing it to grip below the infra-bulge of the teeth thereby increasing retention.[8]

Further improvement was made in the system by introducing the **Composi-Tight gold system (Fig. 6)** that has rings with an oval cross-section which are stronger and resilient than the original system.[9] The gold colour comes from a secondary stress-relieving process that helps secure the pre-set tension.

Retaining the separating power and resiliency of the gold system, **Composi-Tight Silver Plus™** (Fig. 7) was introduced with modifications in the rings. The rings have a flat cross-section, electro-polished and are color-coded for easier identification: standard tines [yellow] for single restorations; long tines [blue] for M.O.D. and multiple tooth restorations.[10]

The rings were further modified in two different styles in the **Composi-Tight 3D™** Sectional Matrix System[11]. (Fig. 8)

1. The **orange Soft Face™ 3D-Ring** can be used in most circumstances because of its ease of placement and its ability to adapt to a wide variety of tooth anatomies while reducing flash and restoring proper contour.
2. The **gray thin tine G-Ring®**, with its burnished tine ends, is utilized in cases where the shape of the dentition makes ring retention more problematic, such as between a canine and bicuspid, or on very short or malpositioned teeth.

To eliminate the unwanted bonding between the composite to the matrix band, SLICK BANDS™ (Fig. 9) were introduced that have a micro-thin coating to the dead soft stainless steel this facilitates easy removal of the bands.[12]

The **Composi-Tight 3D™** (Fig. 10) Clear is a step forward that combines transparent and translucent materials to allow for trans-enamel polymerization. Curing light can be applied from both the buccal and lingual surfaces without interference from metal matrix bands and opaque separator rings. This easily allows for proper curing of deeper proximal boxes.[13]

Kerr

Metafix Matrix System (Fig. 11)

The All-in-One Meta Fix matrix claims to be the perfect solution for Class II MO/OD/MOD composite fillings in the posterior area with the innovative integrated tightening-opening system. The ring matrix band is 0.038 mm for stable placement without distortion through tight intact contact points. It creates contact Point easily and has a contoured shape for perfect contact point control. It is available in three sizes and is a light matrix system for excellent patient comfort and better visibility of the working area.[14]

Triodent Dental Products

V-Ring Sectional Matrix System (Fig. 12)

The V-Ring made of NiTihas exceptional qualities of strength and resilience to produce perfect, tight contacts. The ring's V-shaped tines accommodate the wedge and work on narrow and wide embrasures. The V-Ring's slim tines exert even pressure on both teeth for ideal separation. They grip tightly into the undercuts on both teeth, giving excellent retention. In harmony with Triodent's matrices and wedges, the V-Ring produces tight contacts and restorations with a natural, anatomical shape.[15]

V3 System - Posterior Composite Restorations (Fig. 13)

This system has the widest indications for use of any sectional matrix system.The system includes components that are able to achieve perfect contacts and the best tooth anatomy. The complete V3 package includes V3 Ring, V3 Tab-Matrices, Wave-Wedges, Pin-Tweezers and Forceps to perform high-quality posterior composite restorations that closely replicate the anatomy of the tooth. The V3 Ring that is made of NiTiand has Glass-fiber reinforced plastic tines, is both a powerful clamp and separator of the teeth, resulting in perfect contacts. The matrix and wedge combine to seal and shape the posterior composite restoration so that very little finishing is necessary.[16]

V3 Blue System (Fig. 14)

V3 Blue incorporates all the benefits of the V3 Sectional Matrix System, with its wide indications for use. The V3 Blue Ring is made from plastic instead of nickel-titanium. It replicates the anatomical and separation qualities of the NiTi ring to produce high quality posterior composite restorations with predictable, tight contacts and superior tooth anatomy with minimal finishing. Benefits of this system are Spring force creates optimal tooth separation, V-shaped tines allow to wedge from both sides simultaneously, Ring tines anatomically shaped for superior adaptation, Tines do not collapse into wide cavities, Spring angle allows for easy stacking for multiple restorations, Flexible Wave-Wedges adapt to matrix, Matrices anatomical in shape for natural restorations, Designed for single use but can be autoclaved.[17]

The V4 Clearmetal Matrix System (Fig.15)

V4 is the matrix system for all Class II restorations, creating predictable, tight contacts and natural contours with the added benefit of transparency to ensure complete resin polymerization, especially with bulk fill and deep cavities. The V4 System™ includes the V4 Ring™ Molar and Premolar the Clear Metal Matrix™ with resin filled "micro-windows", and the highly adaptive V4 Wedge™. In addition to all the benefits of the V3 system, the Ring, matrix and wedge in V4 system are transparent for peace-of-mind light-curing.[18]

360° Cervical Matrix for Composite (Fig.16)

Even the most difficult-to-reach Class V cavity can be restored adequately with the 360° Cervical Matrix that is available in three sizes: small, medium and large. This is a rotatable matrix system that gives easy access everywhere. Not only does the matrix rotate 360° on its handle, but there are also three tweezer positions. The 360° Cervical Matrix is clear for curing, and flexible to facilitate a well-sealed gingival margin and quality esthetics. This system prevents formation of voids and formation of air-inhibited layer.[19]

Additional Aids used to Build Contacts for Copmposite Restorations

Trimax™ Composite Instrument (By Ad Dent) (Fig. 17)

The Trimax composite instrument is designed to achieve ideal proximal contact areas in light cured posterior composite restorations. The optically clear light tip acts as micro light guides that provides increased curing ability by allowing high light energy transmission to the full depth of the restoration. By curing in layers and using focused light energy provided by the specially designed light tip, post-curing shrinkage is minimized. They come in three sizes; premolar, molar and large molar. Each light tip has an annular groove positioned 4 mm above its tip to guide the dentist in achieving an ideal marginal ridge position for each restoration.[20]

Per Form™ Contact Former (Garrision Dental Products) (Fig. 18)

The **PerForm™** Contact Former is a cure-through contact forming instrument to be pressed directly into the first increment of uncured composite in Class II restorations. Mesial or distal pressure is applied to place the interproximal contact at appropriate position. It allowscomplete control over the location of the contact on Class II restorations.[21]

Optra Contact (By Ivoclar Vivadent) (Fig.19)

OptraContactis an instrument that helps to achieve large and tight proximal contacts in posterior teeth. Optra Contact features a patented forked working end with which a

composite bridge is formed while the first layer is cured which then stabilizes the matrix. Also, Optra Contact allows contacts to be selectively created in the anatomically-correct upper third of the proximal surface. Optra Contact is available in two sizes: one for molars and one for premolars or for large and small cavities.[22]

Summary & Conclusion

It can be said without any doubt that performing a direct posterior composite restoration with ideal contacts and contours is no longer a cumbersome task. A number of dental companies have come up with wide range of products that claim to reproduce the lost natural contacts and contours. With the above mentioned products and techniques this does not seem to be an intangible goal. Depending on the feasibility, knowledge and skills, it is for the operator to decide appropriate matrix system to corroborate composites with natural contacts and contours and to finally improve the longevity of composite restorations.

References

References are available on request at editor@healtalkht.com

Fig. 1: ConveXi-T™ Convex Tofflemire™ Matrix Bands

Fig. 2 : Palodent Sectional Matrix System

Fig. 3 : Palodent plus Sectional Matrix System

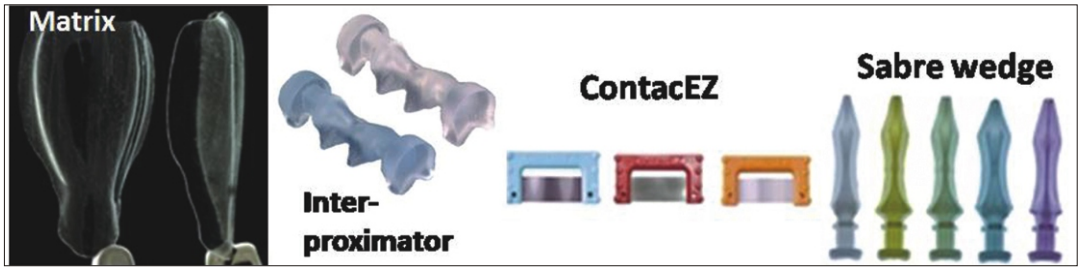

Fig. 4 : Bioclear Matrix system

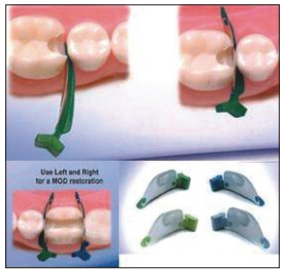

Fig. 5 : FenderMate

Fig. 6 : Composi-Tight Gold System

Fig. 7 : Composi-Tight Silver System

Fig. 8 : Orange Soft Face 3D Ring and Gray thin Tine G-Ring

Fig. 9 : Slick Bands

Fig. 10 : 3D Clear Sectional Matrix System

Fig. 11 : Metafix Matrix System

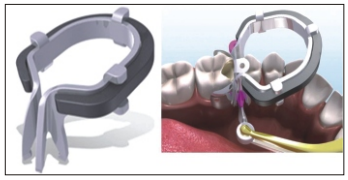

Fig. 12 : V-Ring Matrix System

Fig. 13 : V3 Matrix System

Fig. 14 : V3 Blue Matrix System

Fig. 15 : V4 Clearmetal Matrix System

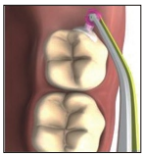

Fig. 16 : The 360° Cervical Matrix

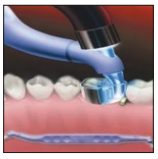

Fig. 17 : Trimax Composite Instrument

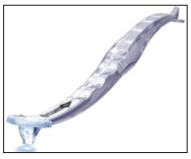

Fig. 18 : Perform Contact Former

Fig. 19 : Optra Contact Instrument

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