

# Clinical Use of a Sectional Matrix and Ring

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## PURPOSE

After a series of dramatic improvements in wear resistance, strength and ability to bond to dentin, resin composites have been used increasingly by clinicians for restoring Class I and II cavity preparations. Unlike amalgam, resin composites cannot always be formed effectively against the traditional matrix band to create optimal contacts.

Several techniques have been introduced to achieve an optimal proximal contact. The examples are sectional matrix and ring, the Contact Pro hand instrument and use of Beta quartz glass ceramic inserts.<sup>1</sup> Pre-wedging, where a wedge is inserted and pressed very firmly into the proximal space prior to preparing the tooth, is another recommended technique.<sup>2</sup> Packable high-viscosity resin composites have been tested *in vitro*. The use of packable resin did not result in tighter proximal contacts when compared to the medium-viscosity hybrid resin composites.<sup>3-5</sup>

A number of studies used a special measuring device, called the Tooth Pressure Meter,<sup>6</sup> to quantify proximal contact tightness. In both *in vitro* and *in vivo* studies, a sectional matrix, in conjunction with the separation ring, was shown to result in increased proximal contacts relative to that which existed preoperatively. On the other hand, these same studies found that the proximal contacts were lighter than those that existed preoperatively when the traditional matrix band with Tofflemire and wedge were used. These studies supported use of the sectional matrix with separating ring in order to achieve tight contacts.<sup>7-8</sup>

The metal matrix and Mylar strip were compared in an *in vitro* study for Class II resin composite restorations. The Mylar strip resulted in significantly higher amounts of excess material at the restoration margins when compared with metal matrices.<sup>9</sup> Another study found that a separation ring used with both traditional circumferential and sectional matrices improved proximal contacts.<sup>10</sup>

It is widely accepted that proximal contacts are very important features in healthy teeth. A lack of proximal contacts contributes to food impaction, secondary caries, tooth movement and periodontal complications.<sup>11</sup> Even though the optimal level of tightness is not yet identified, it is most desirable to restore the tooth back to the situation<sup>1</sup> prior to treatment. From the available literature, the sectional matrix with separation ring seems to be the most reliable device for restoring proximal contacts in posterior teeth.<sup>7-10</sup> Originally, sectional matrix systems consisted of rings

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with simple tines. The Palodent Sectional Matrix (Darway, Inc, San Mateo, CA, USA) and the G-Ring (Garrison Dental Solutions, Inc, Spring Lake, MI, USA) are representative examples. More recently, the tines have been redesigned to be V-shaped to fit into the buccal and lingual embrasures. Examples of this design would be Omni-Matrix Sectional Matrix (Ultradent Products, Inc, South Jordan UT, USA) and the original V-Ring (Triodent, Katikati, New Zealand). More recently, the Composi Tight 3D Ring (Garrison Dental Solutions, Inc) and the V3-Ring (Triodent) matrix rings have included a silicon coating on the V-shaped tines. This article describes one of the currently available systems for assuring appropriate proximal contacts using the V-3 ring when restoring the proximal contacts of posterior teeth.

**DESCRIPTION OF THE DEVICES  
AND CASE STUDY**

The V3 Sectional Matrix System (Table 1) is one type of sectional matrix system. It includes the V3 Ring, V3 Matrices and Wave-Wedges. There are two sizes of rings: the universal green and the narrow yellow rings. Special forceps are used to apply the separating rings, while the Pin Tweezers are used for placing the Wave-Wedge and adapting the matrices to the preparation.<sup>12</sup>

Step 1: A rubber dam was placed. The “pre-wedging” method was used prior to the preparation. The circle end of the wedge was grasped and the wedges inserted interproximally (Figures 1 and 2).

Step 2: The preparation was completed while the wedges were pressed firmly in the interproximal spaces (Figure 3).

Step 3: The matrices were grasped using the occlusal tab and slid interproximally. The occlusal tabs were folded on the marginal ridges of the adjacent teeth. The forceps were then used to place the rings occlusal to the wedges (Figures 4, 5 and 6). The buccal view of another case is shown to illustrate how the rings sit occlusally to the wedges (Figure 7).

Step 4: After resin placement, the rings were removed with forceps. Both the wedges and the matrices were removed. The holes on the buccal and lingual

ends of the matrix (Figure 4) allowed the clinician to grasp the bands and remove them easily.

Step 5: The restoration was checked for optimal proximal contacts and finished (Figure 8). The occlusion was checked and modified, as necessary, then the restoration was polished. The complete restoration, immediately after removal of the rubber dam, is shown (Figure 9).

**Potential Problems**

- 1) The application of the ring is limited by the bucco-lingual width of the proximal box. Accordingly, practitioners need to have an alternative method available to achieve an acceptable proximal contact when the width of the box makes use of a ring system inappropriate.
- 2) The height of the rings are the same, making it challenging when two rings need to be placed on top of each other.
- 3) In this case, the rubber dam retainer prevented placement of the ring on the distal box. The ring was placed on top of the other ring instead.

**SUMMARY OF ADVANTAGES  
AND DISADVANTAGES**

This technique allows the clinician to restore Class II preparations in proper form and function. The minimal excess of resin at the buccal and lingual margins reduces the time required for finishing the restorations. The optimal proximal contacts, proper contour and heights are important factors in the longevity of Class II resin composite restorations.

**Advantages**

- 1) The tab helps to stabilize the position of the matrix occlusal-lingually (Figure 6).
- 2) The silicon material on the tines of the ring helps to adapt the ring and the matrix to the buccal and lingual embrasures. This minimizes excess composite material in these areas (Figure 10).
- 3) The silicon material may also serve to protect the soft tissues from injury.
- 4) The V-shaped notches on the bottom of the ring allow it to adapt, despite the presence of the wedge in the buccal and lingual embrasures. This is more efficient than having to carefully trim the wedge so that it does not extend into either embrasure (Figure 7).

Table 1: *Materials*

| Product Name                                  | Manufacturer            | City, State or Country |
|---|-------------------------|------------------------|
| V3 Ring                                       | Triodent                | Katikati, New Zealand  |
| Bonding Agent:<br>Optibond<br>Solo Plus       | Kerr Corporation        | Orange, CA, USA        |
| Resin Composites:<br>Filtek Z250              | 3M ESPE                 | St Paul, MN, USA       |
| Etchant:<br>Ultra-Etch 35%<br>Phosphoric acid | Ultradent Products, Inc | South Jordan, UT, USA  |



Figure 1. Three sizes of Wave Wedges and Pin Tweezers.



Figure 2. Pre-wedging before the start of the preparation.



Figure 3. Finished preparation.



Figure 4. Three styles of matrix and Pin Tweezers.



Figure 5. Two styles of ring and ring forceps.



Figure 6. The occlusal view of the matrices, wedges and rings placement.

### Disadvantages

- 1) Matrix strips are much longer than is required to extend past the buccal & lingual cavosurface margins of the box preparation. This makes them more difficult to place and stabilize on the tooth prior to placement of the ring. This is

- especially true when both the mesial and distal boxes are included in the preparation (Figures 6 and 10).
- 2) The technique can be time-consuming. The optimum level of proximal contacts could possibly have been achieved with other systems.





Figure 7. Buccal view with rings in place. Note gingival notches on the rings allow rings to accommodate wedges and seat fully.



Figure 8. Complete restoration.



Figure 9. Complete restoration immediately after rubber dam removal.



Figure 10. A second case illustrating an optional ring application with one ring extending to the distal and the other to the mesial.

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