

For the Perfect Class V and All Cervical Area Gingival Margins when Placing Direct Composites, Create an Injection Molding Matrix

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Received: September 06, 2017; **Published:** December 27, 2017

Abstract

With the increased use of composite restorative materials in metal-free minimally invasive dentistry instead of amalgam or gold, the dental team must have improved devices and techniques to achieve the highest quality marginal integrity in their general dental practices.

Restoring a Class V, this Injection molding technique using a Margin Perfect Matrix, replaces the historic cup-like, hard cervical matrices, the quill-pen type cervical former or the plastic-instrument hand-packing techniques, to place composite in Class V restorations and all other cervical areas. The MPM itself creates a highly polished and ideal emergence profile at the gingival margins without post-cure mechanical shaping and finishing.

Keywords: *Injection Mold; Metal Free; Gingival Margins; Emergence Profile*

Introduction

Customizing (Figures 10-16) a flat polyester band to fit an individual tooth, and then holding or “fixing” it firmly in place with a light cured composite resin “collar” creates an injection-mold. Injecting heavy-bodied composite into a fixed mold eliminates publishing a new technique the formation of voids and increase the intimate coverage of the restoratives. An author publishing a new technique has a responsibility to show clinical proof of his/her technique when introducing it to new colleagues. Using a Typodont model and a removable tooth, the actual results of this technique can be seen clinically and when in print.

Comparing the techniques being taught and used to restore a Class V with the present-day shaping devices that are being used.

- No rubber dam needed to isolate...the fixed MPM securely isolates any tooth, even those with sub-gingival margins up to 320° around the tooth.
- No gingival clamp to expose the margin and traumatize the soft tissue.
- No gingival retraction cord the MPM displaces the tissue, blocks bleeding and seals the marginal areas.
- No gingival margin shaping and polishing after polymerization with the “Cervical Collar Cut” of the MPM fitting into the gingival sulcus, the matrix transfers its high gloss, polished finish to the cured composite the anatomic shape is created by the MPM.
- No hand sculpting for emergence profile, it is formed by the MPM.

With the MPM there is no need for multiple sized cervical matrices as one size fits all Class V preparations from narrow anterior teeth to lower large first molars. The customizing step regulates the size.

Objective

To visually observe the results of using a matrix that confines and anatomically shapes a direct composite restoration, resulting in highly polished surfaces, excellent gingival margins, and accomplishes these needed qualities just by having it in place. Using a Typodont model and a removable tooth, the true results of the technique can be seen clinically when in print. The restoration can be placed, cured, and the tooth can be removed from the typodont tooth and clinically examined to see the results. This cannot be accomplished in the mouth.



Figure 1: Class V preparation in an upper pre-molar of a typodont model.



Figure 2: Margin Perfect Matrix in position isolating the entire area.

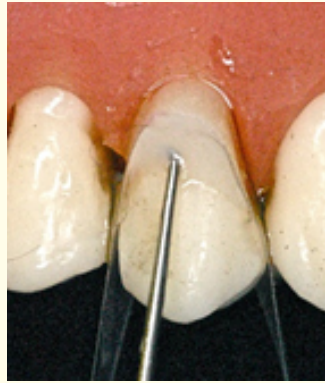


Figure 3: The preparation is filled and an explorer tine is imbedded in it for easy removal of the cured resin.



Figure 4: The tooth removed from the base of the typodont to clinically examine the emergence profile and the gingival margin.



Figure 5: Using the fixed tine, the restoration is removed and clinically examined. Note the excellent surface and margins created by the Margin Perfect Matrix.

A Clinical Case: Caring for a healthy geriatric patient, the decision was made to restore this lower pre-molar with a direct composite restoration rather than sacrifice healthy tooth structure for an indirect crown preparation.

After removal of the all of the carious material, the resulting sound tooth structure was prepared for an acid-etched restoration. The remaining enamel surfaces of the resulting margins all around the tooth were mechanically cleaned with a fine grit, flame shaped finishing diamond to remove any mineral deposits and to expose the ends of the enamel rods.



Figure 6

A Margin Perfect Matrix was then customized as seen in the Instructions For Use, in the package by forming “U” shape in the flat MPM enabling the “Cervical Collar Cut” to surround the prepared tooth.

The apical portions of the MPM were slipped into the sulcus in all areas around the cervical portion of the pre-molar. The MPM was firmly held against the periodontal ligament and the root surfaces through the operator’s finger pressure with one hand while an application of a BisGMA resin [such as Heliobond (Vivadent) or a flowable resin was placed on the outside of the MPM at the juncture of MPM and the adjacent tooth and soft tissue structures.

This “resin collar” was cured resting in a firmly held injection-molding matrix.



Figure 7

The entire surface areas of the tooth structures inside of this fixed mold were “scrubbed” with EDTA or 5.25% NaOCl to remove all organic debris, especially in the sulcus areas insuring the intimate contact of injected restorative resins against clean tooth structure. That solution was rinsed away, the excess water removed, and the adhesive resin was applied following the manufacturers instructions and cured. A thin layer of a flowable of the same shade as the final restoration, was then painted into the juncture of the MPM and around all of the edges of the cervical margins but not cured at this time.

The heavy bodied, functional composite was then injected into all microscopic voids thus eliminating any chance for to form, it is then shaped with a plastic instrument and #3 paint brush, and cured using two light sources simultaneously with the light guides in contact with the enamel cusps so that curing energy would be transmitted into and through tooth structure primarily rather than only to the composite. Shrinkage is controlled in this manner and as the entire functional composite is surrounding the core of the remainder of the tooth shrinkage will be a plus, as it locks the cured composite to place.



Figure 8

The resin collar that was created by the Heliobond is taken off by tugging it away with a #7/8 Bates scale and the MPM was removed. The final shaping was accomplished using a 48L-010 spiral bladed finishing carbide bur, from Brasseler or Komet not with diamonds, and polished with a Green Astropol polishing cup from Vivadent. Note the health of the gingivae immediately after restoring this tooth.



Figure 9

A 30 to 45 second digital manipulation of the MPM results in a “customized” circumferential, isolating injection mold.

Using a “clean technique” remove an MPM from the ten strip card by tearing at the perforations on each end.

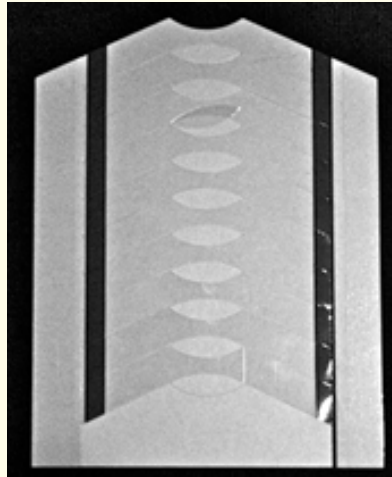


Figure 10: A Ten Strip Card of MPMs.



Figure 11: The Margin Perfect Matrix.

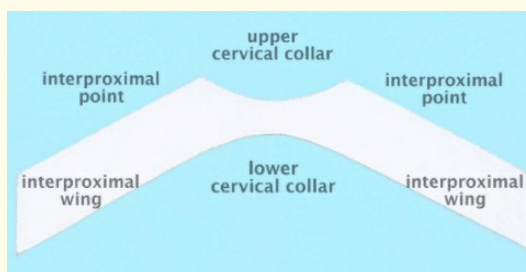


Figure 12: The Landmarks for the MPM.

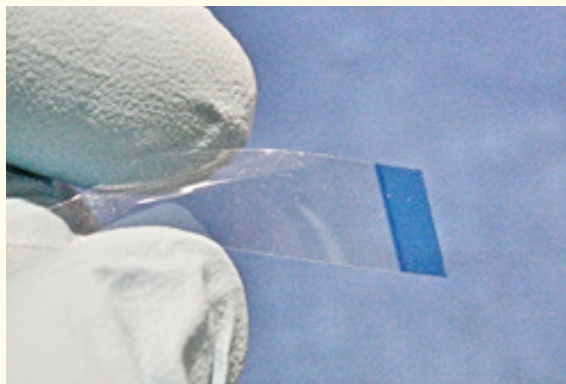


Figure 13: Viewing these landmarks, Bend the interproximal points towards the long axis of the tooth position.

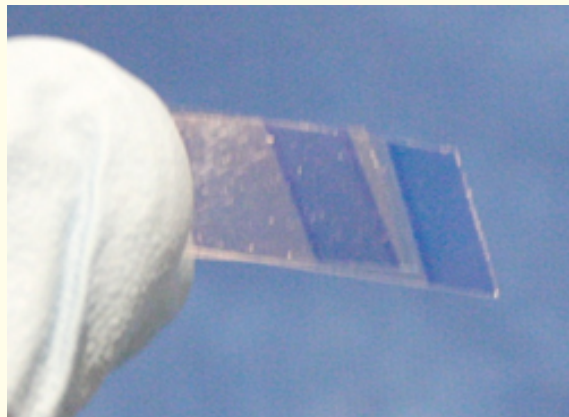


Figure 14: Fold the MPM in half so that the tear ends are together and role the fold firmly in finger tips to form a "U" shape.



Figure 15: The bent Interproximal Points should look like this so that the matrix will slide past the Interdental Papilla.



***Figure 16:** The Margin Perfect matrix after being “customized” and ready to place around a tooth to form an injection Mold.*

Discussion and Conclusion

Restoring a simple Class V and creating perfect non-staining and non-irritating margins can be a real challenge when using our present day cervical matrices and other techniques. The confidence gained witnessing the demonstration Class V done on the Typodont tooth that is discussed in the beginning of this paper, was paramount in developing a technique that can be used to injection mold a direct composite partial crown or any other Class V by itself or in combination with other prepared surfaces resulting in perfectly sealed margins, excellent anatomic shaping and non-traumatic soft tissue.

Disclosure

Dr. Belvedere is the creator of the Margin Perfect Matrix and has a financial interest in Margin Perfect Matrix, Ltd.

Volume 16 Issue 6 December 2017

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