

## TIPS FROM OUR READERS

### A modified injection technique using a prefabricated matrix with dual-access holes to close interdental gingival spaces

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Interdental gingival spaces are open gingival embrasures that detract from dental esthetics and may compromise function, speech, and periodontal health.<sup>1</sup> These voids often result from interdental papilla loss, gingival recession, or tooth morphology irregularities.<sup>2</sup>

Direct composite resin restorations have become a preferred approach for interdental gingival space closure because of their conservative nature and the enhanced esthetics of flowable composite resins.<sup>3</sup> However, commercially available matrix systems such as the BT Matrix (Bioclear) are associated with drawbacks that include sub-optimal adaptation, overfilling, and time-consuming finishing.<sup>4</sup> Additionally, the absence of an injection port limits control during composite resin placement—a key advantage in contemporary injection molding techniques.<sup>5,6</sup>

To overcome these limitations, a dual-access matrix technique was developed by modifying a prefabricated matrix to include an injection hole and a ventilation hole. This adaptation enhanced control over composite resin flow, minimized air entrapment, and facilitated the efficient removal of excess material. This technique is applicable not only to interdental gingival space closure but also to other clinical situations, including Class IV restorations. In contrast with custom-made clear indices, it provides a straightforward, reproducible approach to clinical implementation.

## PROCEDURE

To facilitate understanding of the clinical context, the procedural steps are illustrated in [Figure 1A-C](#), and the preoperative condition ([Fig. 2A](#)) clearly shows the interdental gingival space prior to treatment.

1. Create 2 access holes (injection and ventilation) in the BT Matrix using a dental dam punch ([Fig. 1A](#)). Ensure the hole diameter is slightly larger than the syringe tip to allow smooth injection. Inspect the holes for any burrs and remove them if present.
2. Clean the tooth surface, isolate it with a dental dam, and protect adjacent teeth with polytetrafluoroethylene (PTFE) tape. Note that in certain countries, only medical-grade PTFE tape should be used according to local regulations. Apply 37% phosphoric acid etching agent (K-ETCHANT GEL; Kuraray Noritake Dental Inc) for 15 seconds, rinse, and dry. This selective enamel etching step is recommended to enhance bonding when using self-etching adhesives.<sup>7</sup> Apply a self-etching adhesive (Clearfil SE Bond 2; Kuraray America Inc), air thin, and light polymerize (VALO Grand; Ultradent Products Inc).
3. Insert the dual-access matrix into the interdental space, adjust its position with dental floss, and

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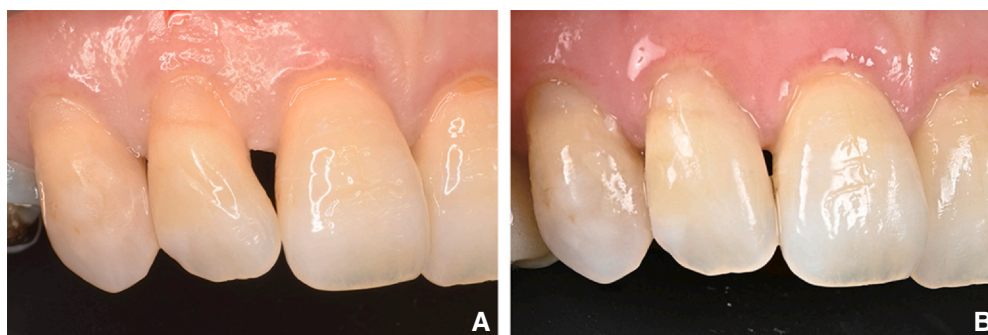
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**Figure 1.** Modified instrument and its application in clinical use. A, Matrix modified by creating two holes. B, Intraoral view immediately before composite resin injection; floss knot not tight to tooth, which may result in overhang if matrix not firmly held. C, Palatal view immediately after composite resin filling.



**Figure 2.** Restoration of interdental gingival space. A, Preoperative view. B, Postoperative view.

secure it with ligation (Fig. 1B). Care should be taken to ensure the knot is firmly adapted to the tooth to prevent an overhang.

4. Inject a highly filled flowable composite resin (Clearfil Majesty ES Flow, Low-flow, Universal-shade; Kuraray America Inc) through the injection hole, ensuring even distribution. Back the tip out slightly as the injection progresses to promote uniform material placement. Allow excess resin to escape through the ventilation hole to prevent air entrapment and maintain a proper contour (Fig. 1C).
5. Remove excess composite resin and adjust the contour, verify occlusion, and complete the final polishing (Fig. 2B).

## PATIENT CONSENT

The patient provided written informed consent for the use of clinical photographs and the publication of this report.

## REFERENCES

1. Yang J, Zhu Y, Xie X, Lu D, Song L. The incidence and severity of open gingival embrasures in adults treated with clear aligners and fixed appliances: a retrospective cohort study. *Head Face Med.* 2023;19:31.
2. Pradeep AR, Karthikeyan BV. Peri-implant papilla reconstruction: realities and limitations. *J Periodontol.* 2006;77:534–544.
3. Wahbi MA, Al Sharief HS, Tayeb H, Bokhari A. Minimally invasive use of colored composite resin in aesthetic restoration of periodontally involved teeth: Case report. *Saudi Dent J.* 2013;25:83–89.
4. Loomans BAC, Opdam NJM, Roeters FJM, Bronkhorst EM, Huysmans MCDNJM. Restoration techniques and marginal overhang in Class II composite resin restorations. *J Dent.* 2009;37:712–717.
5. Terry DA, Powers JM. A predictable resin composite injection technique. Part 1. *Dent Today.* 2014;33:98–101.
6. Watanabe K, Tichy A, Kamoi K, et al. Restoration of a microdont using the resin composite injection technique with a fully digital workflow: a flexible 3D-printed index with a stabilization holder. *Oper Dent.* 2023;48:375–384.
7. Li N, Nikaido T, Alireza S, Takagaki T, Chen JH, Tagami J. Phosphoric acid-etching promotes bond strength and formation of acid-base resistant zone on enamel. *Oper Dent.* 2013;38:82–90.

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