



Short Communication

# Closing open contacts adjacent to an implant-supported restoration



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Received 22 January 2019; Final revision received 28 January 2019

Available online 30 March 2019

## KEYWORDS

Dental implant;  
Interproximal open contacts;  
Restoration-level impression;  
Resin bonding

**Abstract** Loss of interproximal contact between fixed implant-supported restorations and the adjacent teeth is one of the most common complications in implant dentistry. This article presents a clinical chairside technique for closing open contacts adjacent to an implant-supported restoration. A silicon model is perfused from a restoration-level impression using the open tray technique. Composite resin is bonded to the implant-supported ceramic restoration extraorally to restore the interproximal contact. The tooth and restoration contact is double confirmed on the silicon model and in the mouth. This chairside procedure may save time and improve patient comfort.

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Loss of interproximal contact between fixed implant-supported restorations and the adjacent teeth has been previously reported.<sup>1–3</sup> The phenomenon of interproximal contact loss seems to be multifactorial.<sup>4,5</sup> Over time, the size of the space may enlarge, and the number of open contacts increases.<sup>4</sup> Therefore, it is difficult to prevent interproximal contact loss due to its causative factors.<sup>5</sup> The resultant open contacts may create food impaction, dental caries, migration of teeth, periodontal issues, etc.<sup>4</sup> To prevent these negative effects, a new contact must be

established between the restored implant and adjacent tooth either by modifying the implant restoration or restoring the adjacent tooth.<sup>4</sup> A retrievable crown can be removed and transferred to the dental laboratory to add porcelain on the interproximal aspect of the implant-supported ceramic crown to close the gap. However, the traditional technical procedure is time-consuming and the technician may not have a cast to evaluate the contact.

With the development of bonding science, improved resin adhesion to zirconia and silica-based ceramics can be obtained.<sup>6–8</sup> Mechanical and chemical surface conditioning methods can increase the bond strength of resin to ceramic.<sup>6–8</sup> This article presents a chairside technique for closing the gap adjacent to an implant-supported restoration using an extraoral bonding procedure in a time-saving and feasible manner.

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## Technique

The patient presents with the need to close an open interproximal contact distal to the implant-supported zirconia restoration at the mandibular right first molar due to food impaction (Fig. 1A). Use the following procedures to execute this method.

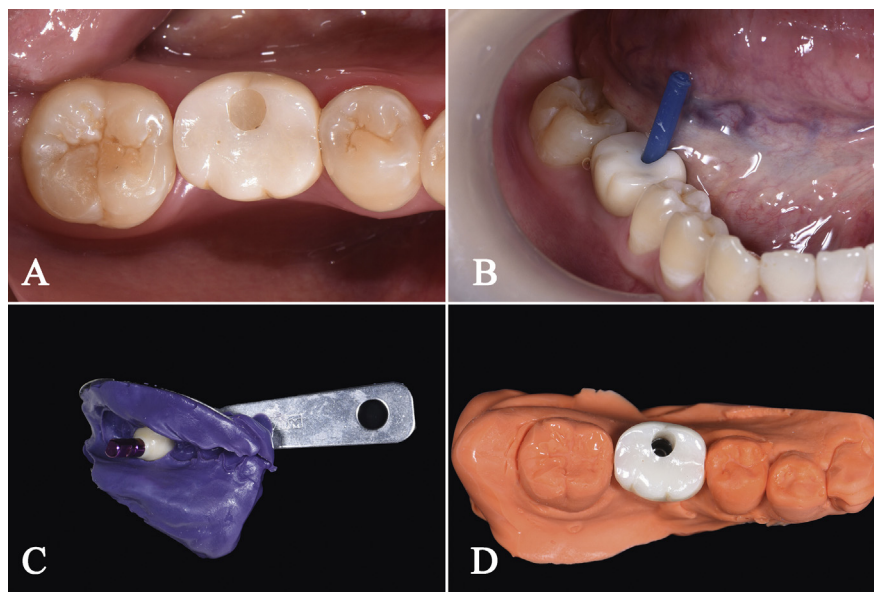
1. Gently open the restoration's screw access hole and insert wax twine into it (Fig. 1B).
2. Make an impression using a partial tray with an open window and polyether impression material (Impregum, 3M, St. Paul, USA).
3. After the material polymerizes, remove the wax twine and loosen the screw. Remove the impression along with the restoration from the patient's mouth. Engage the implant analog to the restoration in the impression (Fig. 1C).
4. Perfuse a silicon model from the impression using addition-type silicone rubber (O-bite, DMG, Hamburg, Germany) (Fig. 1D).
5. Gently remove the restoration. Apply airborne particle abrasion to the interproximal surface of the restoration using 50  $\mu\text{m}$  grain size and 2.5 bar propulsion pressure for 30s (Fig. 2A). Coat a 10-methacryloyloxydecyl dihydrogen phosphate (MDP) containing adhesive (Scotchbond Universal, 3M, St. Paul, USA) (Fig. 2B) and photopolymerize it. Layer composite resin (Clearfil AP-X, Kuraray, Tokyo, Japan) on the restoration (Fig. 2C) at a thickness approximately equal to that of the gap and photopolymerize it.
6. Insert the restoration into the silicon model and evaluate the interproximal contact using dental floss. Make adjustments when necessary. Polish the restoration with cotton wheels and steam clean it.

7. Insert the restoration intraorally and evaluate the proximal contact as well as the restoration's adequate seat intraorally. Make adjustments when necessary.
8. Replace the screw to new one and torque it with a wrench according to the manufacturer's instructions to their recommended torque value. Seal the screw access hole with PTFE tape and a photopolymerize flowable composite resin (Beautiful Flow, Shofu, Tokyo, Japan) (Fig. 2D).

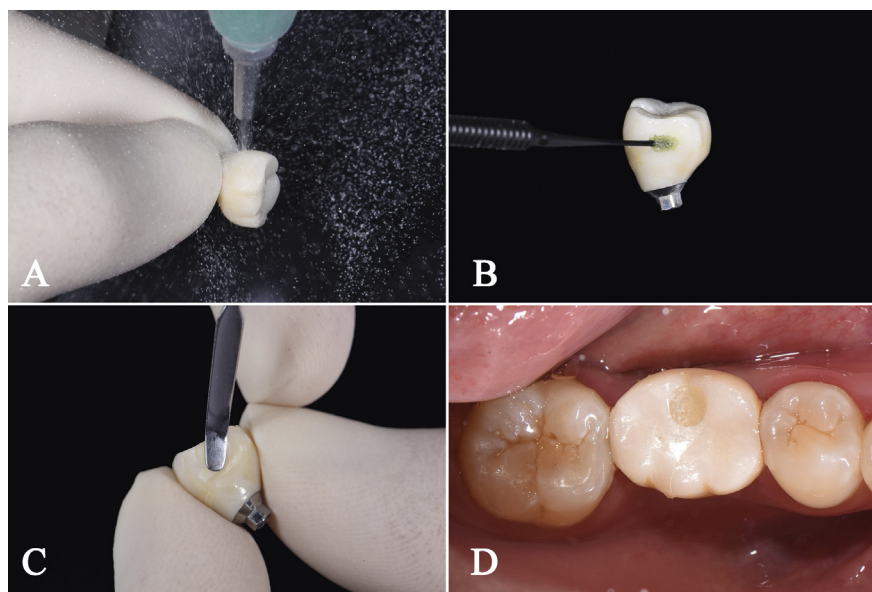
## Discussion

This article described a chairside technique for closing an open interproximal contact adjacent to an implant-supported restoration. The main advantage of this technique is that the restoration is modified using bonding a direct composite-resin, and the interproximal contact is evaluated on the silicon model extraorally. In contrast to traditional dental laboratory restoration modifying techniques, the present chairside procedures can save time and improve patient comfort.

In recent years, ceramic restorations have frequently been used for implant-supported restorations. Because of its quasi-chemical inertness, zirconia has limited bonding potential.<sup>10</sup> The combination of physicochemical pre-treatments contributes to the bond strength of composite resin to zirconia ceramics.<sup>9</sup> In the present technique, airborne particle abrasion is used to roughen the surface of the zirconia to increase the mechanical interlock and total bonding area.<sup>9</sup> Bonding agent containing MDP monomer is used to enhance the zirconia chemical bonding values of the bonding agent.<sup>9</sup> Furthermore, if the restoration material is a silica-based ceramic, etching the interproximal surface with hydrofluoric acid and



**Figure 1** Transfer the open contact from mouth to model. (A) Open contact distal to implant-supported restoration, (B) Wax twine inserted into screw access hole before impression using an open tray and restoration-level technique, (C) Definitive restoration as an impression coping and implant analog is engaged, (D) Definitive restoration on silicon model.



**Figure 2** Procedures of closing open contact. (A) Airborne particle abrasion, (B) Coated MDP-containing adhesive, (C) Layered direct composite-resin, (D) Definitive intraoral restoration. MDP, 10-methacryloyloxydecyl dihydrogen phosphate.

subsequent silanization is a well-established method to achieve durable adhesion.<sup>8</sup>

In this article, the definitive restoration is used as an impression coping to transfer the implant position. Compared to the traditional open tray impression technique, the present method reduces the clinical steps and chairside time. Moreover, hard silicone is used as the model material instead of plaster, which is attributed to its rapid setting time and certain elasticity that may mimic the physiologic mobility of natural teeth. If it's not like this, the implant analog and adjacent teeth are rigidly fixed within a stone cast. It is difficult to check the fit of the restoration and the interproximal contact after modifying the contour. However, it is easier to evaluate the interproximal contact on the silicon model than on a stone cast.

In conclusion, this article described a chairside technique for closing open contacts adjacent to implant restoration in a time-saving and feasible manner. The potential shortcoming of this technique is the aging and loss of composite resin, and even newly forming open contacts due to multiple factors.<sup>4,5</sup> Accordingly, clinicians should monitor patients to determine whether they are developing gaps adjacent to the implant-supported restoration. If this occurs, modification of the existing implant restorations or adjacent teeth may be required.

### Conflicts of interest

The authors have no conflicts of interest relevant to this article.

### Acknowledgements

Financial supported by the National Nature Science Foundation of China (81701003) and Peking University School and Hospital of Stomatology (PKUSSNCT-16B03).

### Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.jds.2019.02.004>.

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