

CLINICAL REPORT

Restoring the functionality of implant-supported prostheses with a reloading technique: A clinical report

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Although implant-supported prostheses (ISPs) provide a predictable treatment option for completely or partially edentulous patients, up to 38.7% of all ISPs have been reported to present some type of complication after 5 years.¹

Complications related to the apicocoronal or mesiodistal relationship between teeth and ISPs are frequent, including implant infraocclusion and loss of interproximal contact areas.^{2,3} The infraocclusion of implants has a prevalence of 50.5% (at implant level) (95% confidence interval [CI]=26.3 to 74.5%),⁴ although the quality of evidence is very low, with a mean infraocclusion of about 0.58 mm and, in 20.8% of the situations, greater than 1 mm. The infraocclusion increases with time at an average infraocclusion rate of 0.05 mm per year.⁴ Infraocclusion occurs because ISPs act similarly to ankylosed teeth⁵ and because occlusal schemes that avoid working and nonworking contacts to reduce shear forces in a nonaxial direction with wide freedom (1 to 1.5 mm) for maximum intercuspation and centric relation are often advocated.^{6,7} As a consequence, the extrusion of antagonist teeth may occur, altering the occlusal plane.

The prevalence of the loss of interproximal contact areas has been reported to be 46.36% (95% CI=32.3 to 60.6%),⁴ although the quality of evidence is very low. The loss of interproximal contact areas can cause food

ABSTRACT

The prevalence of infraocclusion and/or loss of interproximal contact areas with implant-supported restorations is high, and replacement of these prostheses has been advocated for the treatment of mild or moderate infraocclusion; however, replacement is complicated if the manufacturer of the implant is unknown. A technique is presented for correcting the infraocclusion of posterior prostheses that are directly connected to the implant. Advantages include possibly preventing marginal bone loss secondary to the removal and reconnection of the prosthetic attachments and reducing the number of appointments. (*J Prosthet Dent* 2022;■:■-■)

impaction (in 40% of ISPs),⁸ patient dissatisfaction, and peri-implant marginal bone loss.⁹ Natural teeth have been reported to move in a vertical and sagittal direction not only during maxillary growth but also at a lower rate in adults.¹⁰ Loss of interproximal contact areas depends on factors that include tooth location, type of tooth, pulp vitality of adjacent teeth, patient age and sex, as well as the magnitude of occlusal forces.¹¹

Among the less invasive therapeutic options for treating moderate (≤ 1 mm) or severe (> 1 mm) implant infraocclusion, the adjustment or replacement of ISPs (and/or adjacent teeth) has been recommended.¹² However, in ISPs where the prosthetic abutment is directly connected to the implant, the repeated connection-disconnection of prosthetic attachments is interpreted by the peri-implant tissues as a wound, initiating epithelial proliferation over this area with subsequent marginal bone loss and allowing for the formation of an apically migrated connective tissue insertion.¹³ As patients may seek to change an ISP placed in other centers or even in other countries, the clinician is faced

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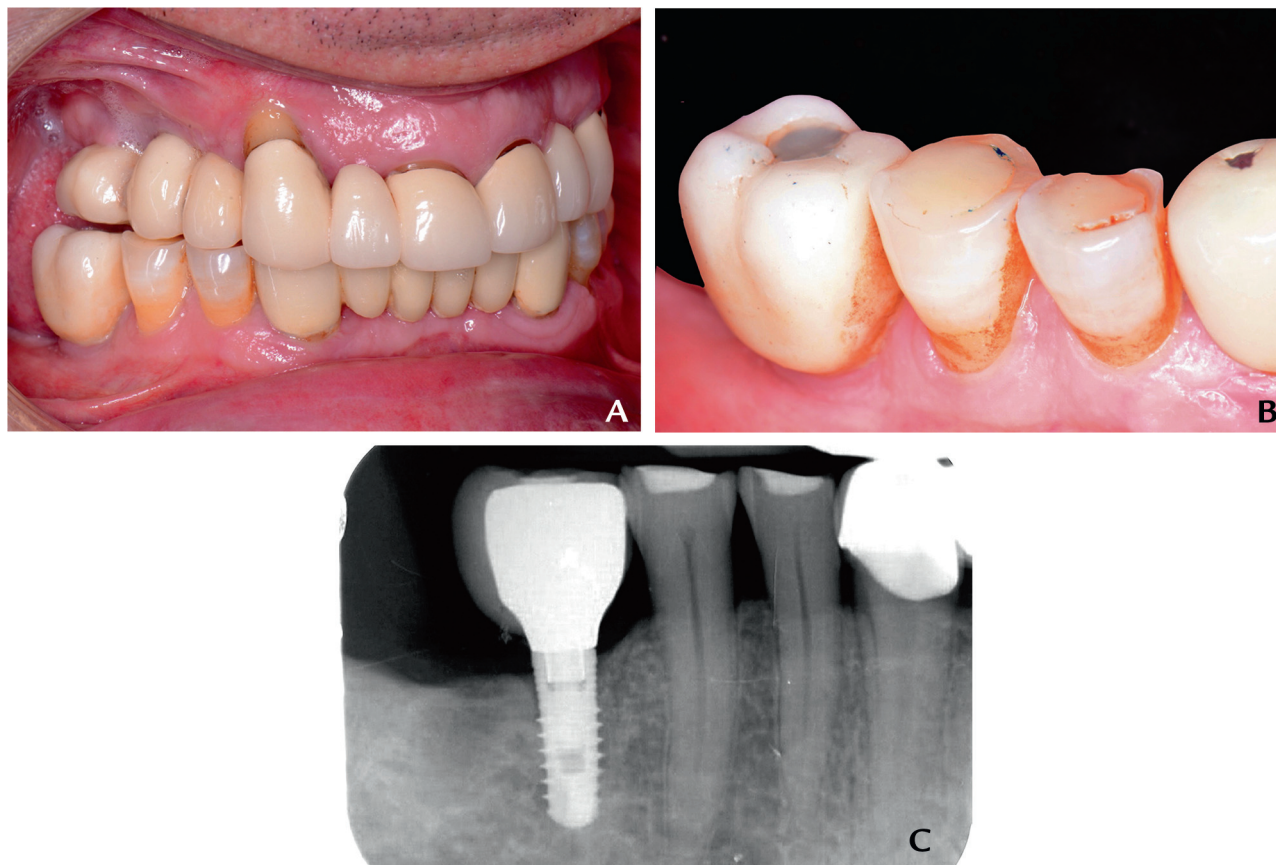


Figure 1. Initial situation. A, Mandibular right first molar in infraocclusion. B, Lateral view of screw-retained crown directly connected to implant. C, Periapical radiograph.

with the difficulty of identifying the characteristics of the dental implant,¹⁴ often resulting in the purchase of the wrong prosthetic attachments and several unproductive appointments.

This article presents a straightforward implant reloading technique for restoring implant infraocclusion with or without the loss of interproximal contact areas.

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A 73-year-old man with a mandibular right posterior open occlusal relationship (Fig. 1A) presented for treatment. After clinical analysis, it was decided to reestablish functionality by placing 3 onlays in the premolars and the mandibular first molar. The mandibular first molar had been replaced with a screw-retained metal-ceramic ISP placed in another country 9 years previously (Fig. 1B). The crown was connected directly to the implant platform and had an infraocclusion of approximately 1 mm (type C according to Jemt et al)¹⁵ (Fig. 1C). To avoid penetrating the peri-implant epithelial insertion secondary to the removal of the ISP and, in turn, risking marginal bone loss,¹³ the decision not to disconnect

the abutment was made. An onlay-type restoration using a nanohybrid composite resin marketed for computer-aided design and computer-aided manufacturing (CAD-CAM) technology (Grandio blocs; VOCO) was designed to seat on the infraoccluded ISP.

The onlay was prepared conventionally, similar to a tooth preparation, with a 1.5-mm functional cusp reduction, 1-mm nonfunctional cusp reduction, and chamfer finish line in the middle third. The screw access channel was used for retention (Fig. 2A). The abutment's torque was assessed with a dynamometric torque wrench (PD-082; Reiner Dental), and the abutment screw was isolated with Teflon tape and flowable composite resin (Admira Fusion Flow; VOCO). The preparation was scanned with an intraoral scanner (Cerec Bluecam; Dentsply Sirona), and the onlay was designed by using CAD technology (CEREC AC 4.2; Dentsply Sirona) (Fig. 2B). The low translucency block (Grandio blocs 14L A3.5 LT; VOCO) was milled using CAM technology (inLab MC XL; Dentsply Sirona) on the same day as the preparation (Fig. 2C). For cementation, the ISP was etched with 5% hydrofluoric acid (IPS Ceramic Etching GEL; Ivoclar AG) for 1 minute, rinsed carefully to avoid

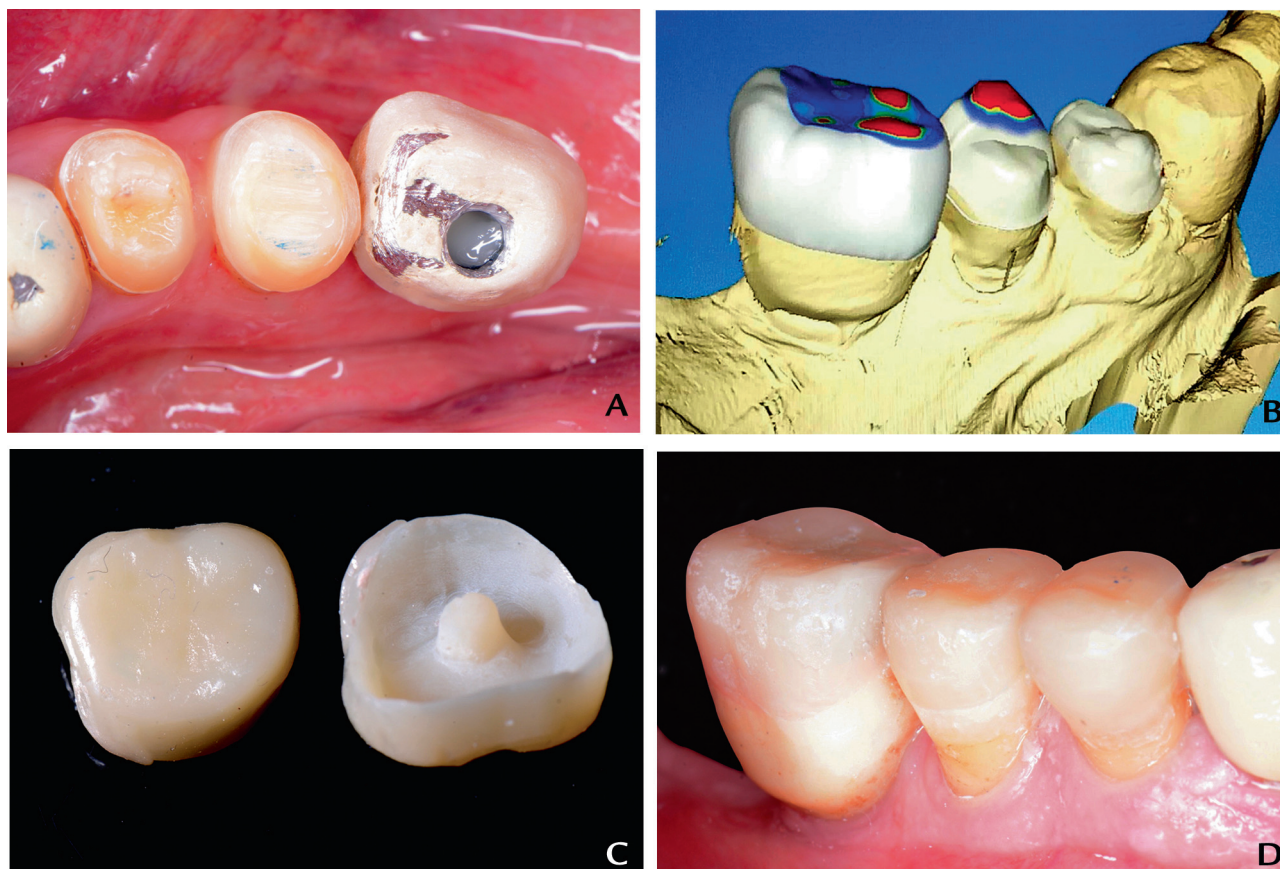


Figure 2. A, Preparation of infraoccluded implant-supported prosthesis with chamfer finish line at middle third. B, CAD-design onlay. C, Occlusal and internal views of milled onlay. Access to abutment screw to gain mechanical retention. D, Cemented onlay. CAD, computer-aided design.

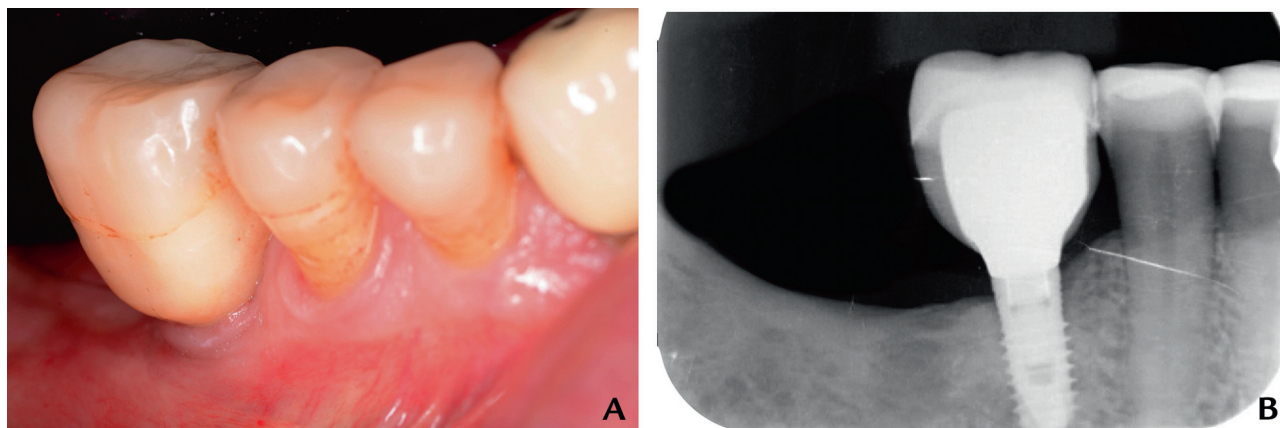


Figure 3. Follow-up at 32 months. A, Intraoral photograph. B, Periapical radiograph.

any exposure to oral tissues to the hydrofluoric acid, and dried. Silane (Metal Primer Z; GC) was then applied—since metal was exposed by the preparation—and dried with the air syringe after 1 minute. The onlay was airborne-particle abraded with 110- μ m aluminum oxide, coated with a universal primer (Monobond Plus; Ivoclar

AG), left for 10 seconds, and air-thinned, and then cemented with dual-polymerizing resin cement (Multi-link Automix Yellow; Ivoclar AG). The occlusion was adjusted using 200- μ m articulating paper (Articulating Paper; Bausch) followed by 40- μ m paper (Occlusions-papier; Bausch), both in maximal intercuspal position and

in excursive movements, and the onlay was polished with polishing cups (Dimanto; VOOCO) (Fig. 2D). After 32 months of follow-up, no biological or mechanical complications, such as screw loosening or debonding of the onlay, occurred (Fig. 3).

DISCUSSION

The described technique is an alternative to replacing an ISP with moderate or severe infraocclusion, with or without the loss of interproximal contact areas, where the ISP is directly connected to the implant platform in the premolar and/or molar region. This technique has advantages including that the occlusion and interproximal contact areas of the infraoccluded ISP are restored, providing function and preventing food impaction. Another advantage is avoiding the risk of penetrating the peri-implant epithelial insertion after removal of the ISP, thereby risking marginal bone loss. Moreover, the procedure does not require identification of the implant or the acquisition of new implant components, thereby minimizing patient costs, since the fabrication of an onlay is more economical than the fabrication of a new ISP. In addition, delays inherent in acquiring the wrong prosthetic attachments are avoided.

Limitations of the technique include that the preparation of the ISP might loosen the abutment screw, a particular problem with a cemented crown, which would then need to be prepared to access the abutment screw. For this reason, in patients whose ISP is cemented and whose occlusal morphology is poor, avoiding preparation and instead airborne-particle abrading the occlusal surface to increase micromechanical retention is recommended. When using 2 different materials with different optical properties, a color mismatch may be observed, limiting this technique to the premolar and molar regions. Also, achieving adhesion between different materials (nanohybrid composite resin, ceramic, and/or metal) can be difficult, so in some situations, recementing a debonded onlay may be necessary.

SUMMARY

The described technique restores lost function in patients with implant infraocclusion with or without the loss of interproximal contact areas in posterior ISPs directly screwed to the implant. This technique avoids penetrating the peri-implant epithelial insertion secondary to the removal of the ISP, in turn, risking marginal bone

loss, and simplifies treatment in patients whose implant characteristics are unknown.

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