

CLINICAL REPORT

Double-crown-retained removable dentures: Types and clinical application

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ABSTRACT

A 55-year-old man wearing maxillary and mandibular clasp-retained removable partial dentures (RPDs) sought improvement in retention, support, mastication efficiency, and esthetics. Three prosthodontic treatment options were provided to the patient, who selected maxillary and mandibular conical crown-retained removable partial dentures (CCRPDs) without strategic implants. Oral health-related quality of life (OHRQoL) and satisfaction of the patient were evaluated before treatment and 2 weeks and 1 year after inserting the CCRPDs. The patient reported better retention, support, stability, mastication efficiency, esthetics, and an improved OHRQoL after CCRPD placement than before treatment. These improvements were maintained after 1 year. (J Prosthet Dent 2025;133:18-23)

Double crown-retained removable partial dentures (DCRPDs) can be telescopic or conical and are available in 4 types: telescopic crowns (rigid and nonrigid), conical crowns, double crowns with additional retention mechanisms, and double crowns with gold coping (galvano coping or gold foil coping).¹⁻⁴ In the telescopic crown system (cylindrical crown), the opposing external surfaces of the primary crown are parallel to each other, to the intaglio surface of the secondary crown, and to the path of RPD insertion.² The telescopic crown system has been considered nonrigid (resilient) when a clearance fit is provided between the primary crown occlusal surface and the secondary crown.² In contrast, the system has been considered rigid if no clearance fit is provided (space approximately 0.03 mm).³ In the conical crown system, the walls of the primary crown have external cone-shaped surfaces with a total angle of convergence ranging between 1 and 8 degrees.^{3,5,6}

As the retention of the system may decrease with long-term use,^{6,7} additional retention mechanisms involving the provision of a clearance fit around the primary crown have been recommended.⁷⁻⁹ Retention is typically achieved with a friction pin or through a locking (latch) or spring bolt mechanism.^{8,9} A double crown with a gold coping system uses a mesostructure (gold coping crown) between the primary crown and RPD metal framework.^{4,10,11} A mesostructure is an

intermediate structure and may feature galvano coping (coping made of electroplated gold) or gold foil coping.^{4,11} This report presents the treatment of a patient who required replacement maxillary and mandibular RPDs and was treated using the concepts of the conical crown system. The differences in the patient's satisfaction and oral OHRQoL with the previous clasp-retained RPDs and the new conical crown-retained CCRPDs were assessed.

CLINICAL REPORT

A 55-year-old man visited the Department of Prosthodontics, Greifswald University with the chief complaint of the loss of esthetics and function of his existing clasp-retained maxillary and mandibular RPDs. His medical, social, and systemic health was noncontributory. Extraoral and intraoral examinations with esthetic and functional screening revealed an inadequate vertical occlusal dimension. Comprehensive examination revealed that the mandibular teeth and maxillary right canine had a good prognosis. Severe bone resorption with localized

The author declares no conflicts of interest relevant to this paper.

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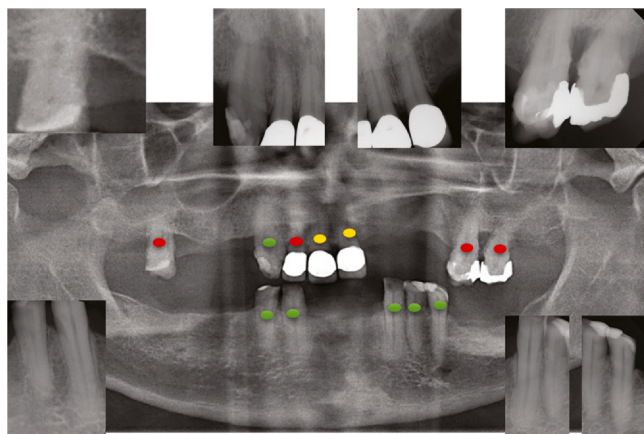


Figure 1. Diagnostic panoramic and periapical radiographs. Tooth prognosis: hopeless (red dot), questionable (yellow dot), and good (green dot).

periodontitis was observed around the maxillary molars and maxillary right lateral incisor, with pocket depths of 3 to 6 mm, tooth mobility of grades 1 and 2 according to the Miller classification, and extensive caries associated with the crown on the maxillary lateral incisor (Fig. 1). He declined deep cleaning and periodontal treatment. The incisors had metal-ceramic crowns with poor margins, and caries was present in all the mandibular teeth. Preliminary treatment included extracting teeth with a hopeless or highly questionable prognosis, management of caries, professional scaling, improvement of oral hygiene, and removal of crowns on the maxillary central incisors. The existing RPDs and interim crowns were used to gradually increase the vertical dimension of occlusion (VDO) with an initial increase of 2 mm, and an additional 2 mm after 1.5 months. The VDO was confirmed by evaluating the physiological rest position, phonetics, swallowing threshold, and patient images for esthetics.¹² After 3 months, the optimal VDO was determined, and a comprehensive re-evaluation indicated that the residual teeth had a good prognosis. The patient was presented with 3 prosthodontic treatment options: metal-ceramic crowns on all natural teeth, followed by maxillary and mandibular clasp-retained RPDs; maxillary and mandibular CCRPDs to cover all

natural teeth; or a sinus lift followed by the placement of 6 implants in the maxilla and 5 in the mandible for fixed prostheses. The second option, without implant placement, was selected by the patient.

All teeth were prepared to receive double-conical crowns. The double-cord technique (Ultrapak E Epinephrine Knitted Cord; Ultradent Products, Inc) was used for tissue management.¹³ A single-step impression technique with a monophasic impression material (Impregum Penta Polyether Medium Body; 3M) was used to make the definitive impression. The definitive cast was used to fabricate the primary crowns and custom trays (Fig. 2). After border molding in the edentulous areas (Xantopren function; Kulzer GmbH), a single-step impression technique (Impregum Penta Polyether Medium Body; 3M) was used for the pick-up impression (Fig. 3). The resulting second definitive cast held the primary crowns and was used to fabricate the secondary crowns and the RPDs (Fig. 2). An arbitrary facebow (Artex facebow; Amann Girrbach AG) was used to mount the second maxillary working cast on a semiadjustable articulator (Artex CPR; Amann Girrbach AG). The vertical dimension and centric relation were registered with a gothic arch tracing (Fig. 4). During the clinical evaluation of the RPD, the static and dynamic occlusion and phonetics were assessed. Ten days later, the finished maxillary and mandibular RPDs and primary crowns were received. The interim crowns were removed, and the abutments were cleaned (Consepsis Scrub STARbrush; Ultradent Products, Inc). The intaglio and marginal fits of the primary crowns were reevaluated, and the stability, support, retention, phonetics, occlusion, and esthetics of the maxillary and mandibular RPDs were evaluated (Fig. 5). As the primary crowns from the same arch should be cemented accurately, rapidly, and whenever possible in a single step (typically not more than 4 primary crowns simultaneously),¹⁴ the crowns were labelled for rapid and error-free handling. Vaseline (Vaseline Petroleum Jelly; Unilever) was applied to the intaglio surfaces of the secondary crowns. The primary crowns were then cemented using self-adhesive resin cement (RelyX Unicem; 3M), and excess cement was removed. The RPDs were inserted intraorally, and the

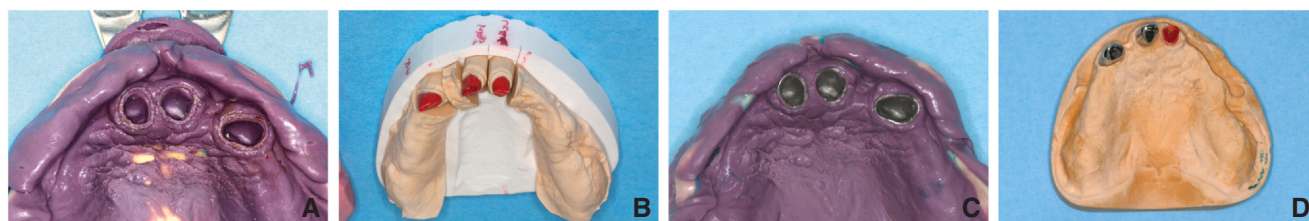


Figure 2. A, First definitive impression. B, First definitive cast with dental stone dies. C, Second definitive impression (pick-up impression). D, Second definitive cast with acrylic resin dies.

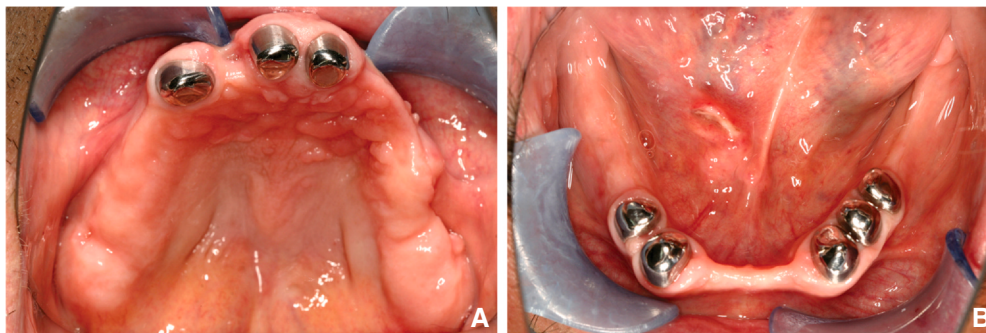


Figure 3. Clinical evaluation of primary crowns. A, Maxillary. B, Mandibular.

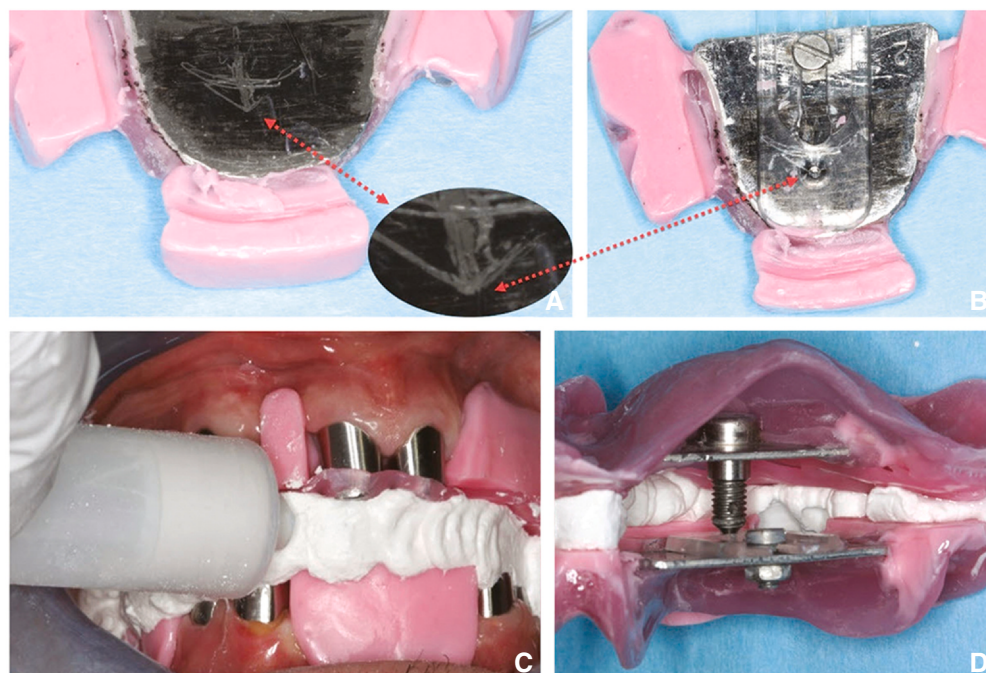


Figure 4. Gothic arch tracing. A, B, Arrows represent centric relation. C, D, Gypsum occlusal registration.

patient was directed to close his mouth tightly. The cement was then left to polymerize under occlusal loading of the RPDs. After 15 minutes, the RPDs were removed and cleaned and excess cement was removed. The same steps were repeated for the mandibular crowns. Finally, the occlusion was reevaluated and adjusted as needed (Fig. 6). Two weeks after inserting the CCRPDs, the patient reported an improvement in OHRQoL and overall satisfaction with the new RPDs in the following domains: retention, support, stability, mastication efficiency, and esthetics.¹⁵ The positive outcomes were maintained 1 year after the insertion of the CCRPDs (Fig. 7). During the 6-monthly maintenance appointments, specific attention was directed toward ensuring the health of the abutments and the optimal fit of the CCRPDs. Optimal fit was important as

the RPDs had distal extension bases that were not supported by implants and stress-breaking elements were not incorporated.¹⁶ After 1.5 years, the CCRPDs were relined. No caries or complications were reported or identified.

DISCUSSION

The patient reported considerable esthetic improvement with his new RPDs, consistent with previous reports and studies on the esthetic outcomes of double crown systems.^{17–19} The double crown system can help avoid the social embarrassment caused by metal clasps, improving OHRQoL.¹⁹ Using a tooth-colored retainer instead of a metal clasp improves the esthetic appearance of the

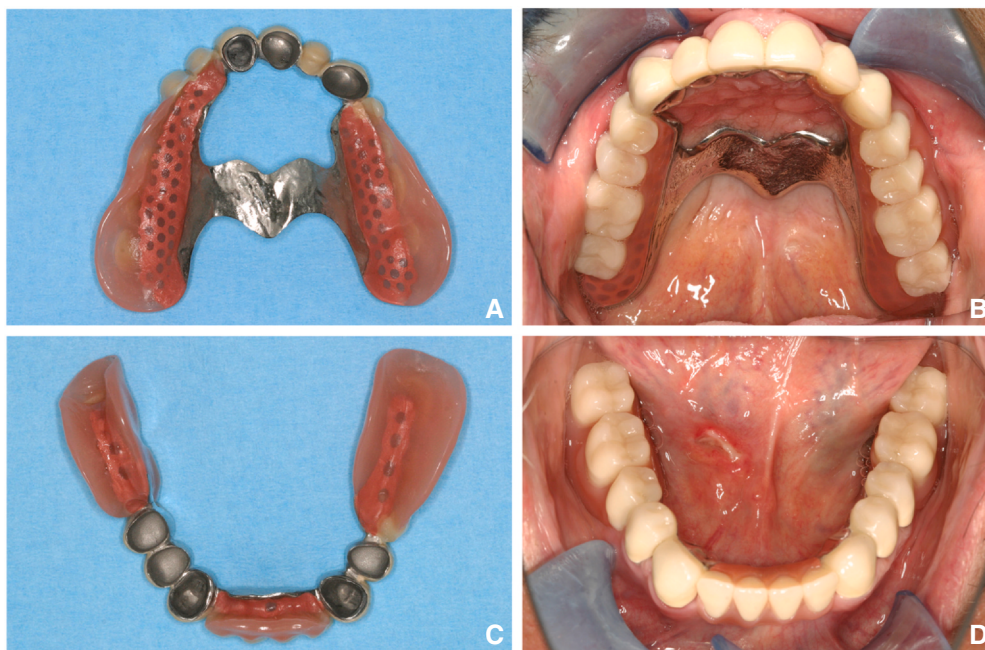


Figure 5. Conical crown-retained RPDs. A, B, Maxillary. C, D, Mandibular. RPDs, removable partial dentures.



Figure 6. A, Intraoral image during preprosthodontic treatment. Existing clasp-retained RPDs and interim crowns contributed to gradual increase in VDO. B, C, Intraoral and extraoral images after inserting CCRPDs. CCRPDs, conical crown-retained removable partial dentures; RPDs, removable partial dentures; VDO, vertical dimension of occlusion.

prosthesis while also improving its function.^{17–19} However, CCRPDs are associated with a risk of overcontoured retainers.¹⁸ The crown preparation and the veneering technique should be adjusted to prevent overcontouring of the double crowns and improve the esthetic outcome.¹⁸ Furthermore, the need to accommodate the required space for both primary and secondary crowns while also assessing the potential risk of endodontic therapy²⁰ demands a judicious approach that factors in both clinical and anatomic considerations. Consistent with the findings of previous studies, the current patient reported a clear improvement in his OHRQoL.^{21,22} Bergman et al²³ reported that most patients expressed high satisfaction with conical crown-retained RPDs in terms of esthetics and function, also consistent with Wagner and Kern.¹⁷ The improvement in patient mastication efficiency in the current patient

was similar to those reported previously.^{23,24} Molin et al²⁴ reported that 90% of the patients treated with conical crown-retained RPDs experienced excellent or good mastication efficiency and that the RPDs helped 15% improve their diet. The current patient did not report a clear change in cleanability after provision of the new RPDs. A follow-up study²⁵ on oral hygiene has reported that the type of removable denture does not affect oral hygiene.

SUMMARY

CCRPDs were used effectively to resolve the patient's concerns regarding prosthesis retention, support, stability, mastication efficiency, and esthetics. Additionally, CCRPDs were effective in enhancing OHRQoL.

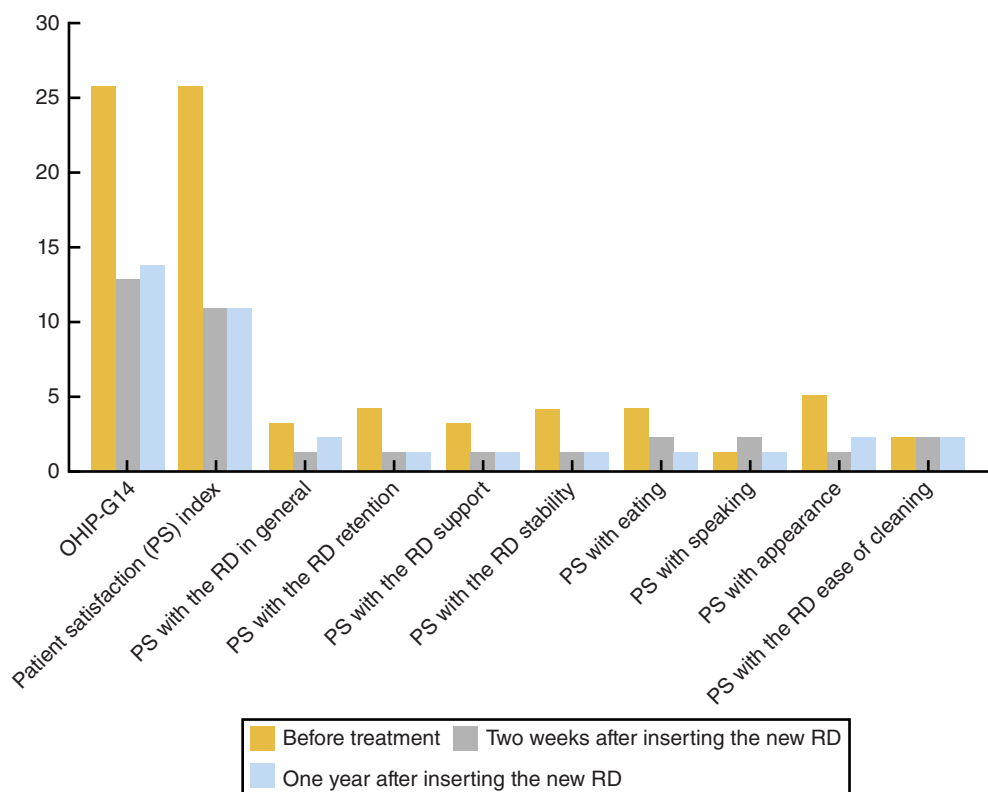


Figure 7. Patient oral health-related quality of life (OHIP-G14) and satisfaction with RDs before treatment and at 2 weeks and 1 year after treatment; lower score indicates more favorable outcome. OHIP-G14, Oral Health Impact Profile-German version; PS, patient satisfaction; RD, removable denture.

PATIENT CONSENT

Patient privacy and confidentiality were maintained in this clinical report. The patient was assured regarding anonymization of data during publication. The patient provided written informed consent for the use of his intraoral images for educational and publication purposes.

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<https://doi.org/10.1016/j.prosdent.2023.09.041>