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Salvaging The Periodontically Compromised Teeth By Double-Crown Retained Partial Prosthesis Fabricated By CAD-CAM Technique - A Case Report.

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Abstract

Overdenture is defined as any removable dental prosthesis that covers and rests on one or more remaining natural teeth, the roots of natural teeth, and/or dental implants. Within the physiologic limits, when tensile stress falls on abutment teeth in an overdenture, it stimulates bone formation, thereby preserving bone. Telescopic overdenture enhances retention, stability, support, phonetics and improves masticatory efficiency as proprioception feedback mechanism is maintained. Telescopic overdentures can even be given in periodontally compromised cases with 3 or more teeth present. Use of CAD-CAM technology in fabrication of telescopic overdenture saves time, gives preciseness to the fit, lessens the risk of deviation from planned geometry by restricting the overdenture to single path of insertion and the risk of microporosities in overdenture framework is minimized. The following case report describes the procedure for fabricating a telescopic overdenture by CAD-CAM technique with primary and secondary copings and framework milled from Co-Cr alloy.

Keywords: CAD-CAM technology, Co-Cr milled copings, double-crown, periodontically compromised teeth, telescopic overdenture, tooth-supported overdenture.

Introduction

Preservation of teeth that are present is more important though there has been rapid development of implant dentistry.[1] Double-crown retained removable partial dentures prostheses are anchored by means of primary crowns attached to teeth/ implants and by secondary crowns attached to denture framework.[2] The use of CAD-CAM technology for fabricating secondary crowns and frameworks is less known to dentists. However, this could help simplify the fabrication, decrease inaccuracies in castings, and thus reduce adjustments by a dental technician.[3] The following case report describes the procedure of fabricating double-crown retained RPDs with both primary and secondary copings fabricated by CAD-CAD technique.

Case History

A 55 year old man presented at Department of Prosthodontics with chief complaint of inability to chew and unaesthetic smile. He was referred from Department of endodontics and had no relevant past medical history. Clinical examination showed completely edentulous upper arch and partially edentulous lower arch with ongoing root canal treatment with 33, 34, 35 and 43, 45 (Figure 1: Frontal intraoral view). The present teeth were also grade I mobile and supraerupted with radiographic examination showing moderate amount of bone loss seen with the present dentition (Figure 2: Radiographic examination). In 1st appointment, diagnostic impression was recorded, casts were poured, record base and rim were fabricated. Diagnostic jaw relation was recorded and mounted on three point mean value articulator to check interocclusal distance between two arches. In 2nd appointment, primary impression was recorded for upper edentulous arch with impression compound and tooth preparations were done with lower teeth and a deep chamfer margins was given (Figure 3: Mandibular teeth preparation). Occlusal reduction of 2 – 3 mm was done to accommodate primary and secondary crowns. In 3rd appointment, upper border molding and wash impression was recorded with elastomeric impression material. Gingival retraction was done with lower prepared teeth and elastomeric impression was recorded in a stock tray (Figure 4: Mandibular definitive impression). Mandibular impression was poured with type IV die stone and was sent for fabrication of primary copings. A custom tray was also fabricated for mandibular arch. Die stone model was scanned by laboratory scanner and design for primary coping was made in software (Exocad). Borders of individual abutments were selected, relative parallelism of each coping was designed (Figure 5: Designing of path of insertion) and a taper of 2 degree were given (Figure 6: Designing of primary coping). Resin pattern was milled in CAD-CAM machine (Ceramill map 400) and was checked in patient's mouth for marginal fit and accuracy in 4th appointment (Figure 7: Intraoral checking of milled wax pattern) and was sent back to lab for milling in Cobalt chromium alloy. In 4th appointment, facebow was also recorded and transferred to Hanau wide-vue articulator. In 5th appointment milled Co-Cr primary copings were checked for marginal fit and accuracy in patient's mouth and were cemented by interim cement (Figure 8: Temporary cementation of primary copings). Mandibular border moulding and final pick up impression was recorded with elastomeric material (Figure 9: Final pick up impression). Impression was poured in type IV die stone and model was sent for fabrication of secondary copings and framework. Secondary coping and framework pattern was designed in CAD CAM and a resin pattern was milled using same software and machine. Milled framework was checked in patient's mouth for fit and accuracy in 6th appointment (Figure 10: Resin pattern milled framework trial). Subsequently, centric and protrusive relation was recorded and transferred to articulator. Resin pattern framework was sent back for milling in Co-Cr alloy. In 7th appointment, Co-Cr milled framework was tried in patient's mouth and fit and accuracy was checked (Figure 11: Co-Cr milled framework trial). Subsequently porcelain build up was done on secondary copings in framework and teeth arrangement done was tried in patient's mouth in 8th appointment (Figure 12: Try-in). Acrylization, finishing and polishing of denture was done. In 9th appointment, primary copings were cemented with glass ionomer cement and final denture delivery of prostheses was done (Figure 13: Denture delivery). Patient was recalled after 24 hours, 1 month and 6 months.

Fig. 1: Frontal intraoral view

Fig. 2: Radiographic examination

Fig. 3: Mandibular teeth preparation

Fig. 4: Mandibular definitive impression

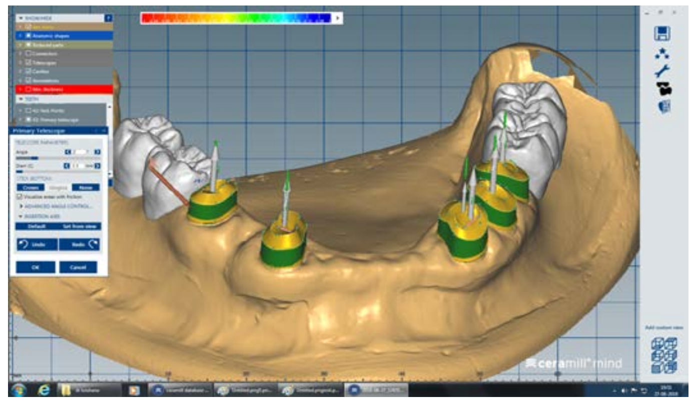

Fig. 5: Designing of path of insertion

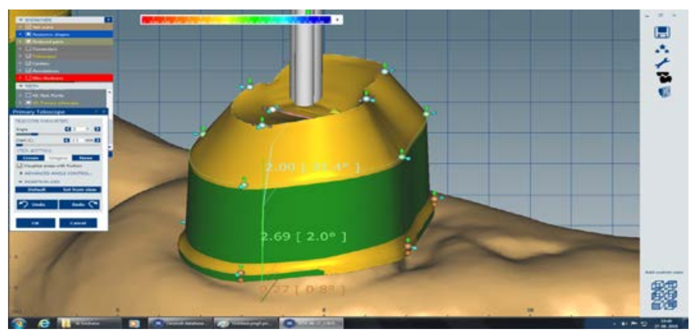

Fig. 6: Designing of primary coping

Fig. 7: Intraoral checking of milled wax pattern

Fig. 8: Temporary cementation of primary copings

Fig. 9: Final pick up impression

Fig. 10: Resin pattern milled framework trial

Fig. 11: Co-Cr milled framework trial

Fig. 12: Try-in

Fig. 13: Denture delivery

Discussion

Telescopic overdenture helps to improve denture retention and stability while preserving the residual dentition; however, this is associated with significantly higher costs.[4] Oral health-related quality of life can be improved with telescopic dentures especially in patients with few teeth.[5,6] Placing dental implants increases the cost of treatment. Milling secondary crowns and the prosthesis framework as one piece saves time and improves the cost effectiveness of the laboratory workflow, because a secondary joining process using welding or bonding is omitted. A precise, passive fit is essential for the success of an RDP.[7] A small total angle of convergence (2 degrees) was chosen as Co-Cr alloy was used for primary coping. Even slight deviations in taper of the primary crowns affect the fit of the prosthesis. Selection of the total angle of convergence depends on the materials used.[8] During the reworking of cast primary crowns, deviations from the planned cone angle can occur at high pressure and high rotational speed are used.[9] The milling process may reduce the risk of significant deviations from the planned geometry compared with cast frameworks.[10] Microporosities (for example, cavities or rough surfaces), which have been associated with cast components, may contribute to an increase in retentive force, thus weakening the periodontium. A long term follow up on this type of prosthesis is lacking.

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