

Prosthodontic Rehabilitation of Combination Syndrome Using CAD-CAM Assisted Telescopic Prosthesis – A Case Report

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Citation of this Article: Dr. Rajat Lanzara, Dr. Amit Khattak, Dr. Dinesh Kumar, Dr Anup Gopi, “Prosthodontic Rehabilitation of Combination Syndrome Using CAD-CAM Assisted Telescopic Prosthesis – A Case Report ”, IJDSIR- January - 2020, Vol. – 3, Issue -1, P. No. 01-05.

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Type of Publication: Case Report

Conflicts of Interest: Nil

Abstract

Combination syndrome is a dental condition seen in patients wearing a maxillary complete denture, opposing a mandibular distal extension denture with preserved mandibular anterior teeth. The groups of complications include flabby tissue with severe resorption of bone in the maxillary anterior region, fibrous overgrowth of tissues in maxillary tuberosities, tilting of occlusal plane posteriorly downwards, supra eruption of mandibular anterior teeth and decreased vertical dimension of occlusion. Difficulty in chewing, mastication and frequent fractures of maxillary dentures are common problems in such cases. Clinical manifestations of combination syndrome make it

a challenging condition for prosthetic rehabilitation. Rehabilitation with over denture preserves teeth, proprioception, underlying hard and soft tissues. Metal denture base gives rigidity to the prosthesis and prevents frequent fractures. The present case report describes a successful prosthetic rehabilitation of combination syndrome with maxillary metal base complete denture and mandibular CAD/CAM assisted telescopic denture.

Keywords: Combination syndrome, CAD/CAM, Telescopic prosthesis, Prosthodontic rehabilitation

Introduction

Destructive changes in the hard and soft tissues have been reported in patients with maxillary complete denture

opposing a mandibular distal extension partial denture. These changes have been originally described by Ellsworth Kelly in 1972 and termed them as Combination syndrome.[1] He described multiple signs or symptoms that commonly occurred in this situation include loss of bone from the anterior maxillary ridge, overgrowth of tuberosities, papillary hyperplasia of hard palate and extrusion of lower anterior teeth and loss of bone under the partial denture bases. Other features that have been reported include loss of vertical dimension of occlusion, occlusal plane discrepancy, poor adaptation of prosthesis, periodontal changes and epulis fissuratum.[2] Loss of posterior teeth forces the patient to bite more frequently on anterior teeth leading to pseudo mandibular prognathism.[3] Such positional changes of in anterior teeth promote parafunctional activities, thereby augmenting the force per unit area on the maxillary ridge.[4] Abnormalities related to occlusal forces, occlusion, occlusal plane and irregular bone loss cause difficulty in chewing, mastication and affects overall systemic health in such conditions. The management of such situation involves surgical and/or prosthodontic intervention.[5] But many a times owing to patient's age, medical condition, choice and other systemic conditions surgical option is eliminated. In such cases prosthetic management is taken up. The advancements in digital technology in dentistry particularly CAD/CAM has completely revolutionised the quality, accuracy, and success of any prosthetic treatment. This case report describes prosthodontic rehabilitation of a case of combination syndrome with complete metal base maxillary denture and CAD/CAM assisted mandibular telescopic over denture prosthesis.

Case Report

A 78 year old male patient presented with a complaint of difficulty in chewing food due to multiple missing teeth.

The patient had diabetes mellitus and was on oral medication, no other relevant history and all other routine investigations were within normal limits. Patient had been wearing dentures since 5 years but was never comfortable for chewing and also reported history of frequent denture fractures during function. On intraoral examination patient had completely edentulous maxillary arch. (Fig. 1a) Anterior region of maxillary ridge had flabby tissues and posterior region had enlarged tuberosities. On evaluation of mandibular ridge, the anterior teeth were periodontally compromised (Fig. 1b) and flattening of posterior ridge. Grade II mobility was found in teeth 32,31,41 which exhibited hopeless prognosis and were extracted. Prosthetic treatment options given to patient were implant supported prosthesis and removable prosthetic option. Owing to the medical condition and age, the patient didn't prefer for surgical placement of implants. So a removable prosthetic option with complete metal base maxillary denture and CAD/CAM assisted mandibular telescopic over denture was planned.

At the initial appointment, diagnostic impressions were made using irreversible hydrocolloid (Algitex, DPI India) and study models retrieved for a comprehensive treatment planning. A custom tray was prepared on maxillary cast using autopolymerising polymethylmethacrylate (DPI, India). Considering flabby tissues in the maxillary ridge impression was made using Hobkirk's impression technique. After completion of border moulding a complete arch impression was made using medium body elastomeric impression material (Affinis, Coltene Whale dent). The region of flabby tissues was demarcated on the impression and was cut with a BP blade. Window was prepared in the tray to record flabby tissues in the most passive form using light body consistency elastomeric impression material (Affinis, Coltene Whale dent) and final impression was made.(Fig. 2) Master cast was

retrieved and block out of undercuts was completed on master cast which was then duplicated using reversible hydrocolloid. A refractory cast was poured using phosphate bonded investment (Degugest, India) material. Designing of metal framework was completed using wax. (Fig. 3a) A complete palate major connector with four tissue stops, two each in anterior and posterior region. Additional struts in the form of loops were added circumferentially to aid in retention of acrylic to the metal framework. Spruing, investing, burnout and casting were completed to fabricate metal framework. The framework was retrieved, finished and polished. Framework was evaluated on master cast and all laboratory steps were followed to fabricate permanent denture base using heat cure poly methylmethacrylate (Lucitone). (Fig. 3b)

Surveying of mandibular diagnostic cast was carried out to determine position of components and design of metal framework for telescopic prosthesis. Teeth preparation planned for 33,43,44,45 included metal primary copings followed by secondary coping in metal ceramic as component of cast partial framework. A lingual plate major connector design and occlusal rest on 37 with reverse circlet clasp was selected. Mouth preparation was done as planned following all clinical protocols and impression was made using a 2-step polyvinyl impression technique (Affinis, Coltene Whale dent) and model were poured. The master cast was finished and scanning was completed (Ceramil Map 400, Amanngirrbach). (fig. 4a) The designing in CAD-CAM allowed a circumferential margin around primary copings which offered resistance form to the secondary copings. Complete parallelism between copings was maintained by electronic surveying (Ceramil mind, Amanngirrbach) which was essential for passive fit and path of insertion of secondary prosthesis. (Fig. 4b) The milling of primary copings were done in wax (Ceramill wax 71 XS, Ceramill motion 2,

Amanngirrbach). The wax copings were cast following conventional procedure.

The primary copings after finishing were cemented in-situ (Fig. 5a) using type-1 glass ionomer cement (Fuji) and final impression was made in a 2-step technique using elastomeric impression material (Affinis, Coltene Whaledent). (Fig. 5b) Master cast was poured in die stone (Zhermack, India). Block out of undercuts was completed on master cast which was then duplicated using reversible hydrocolloid. A refractory cast was poured using phosphate bonded investment (Degugest, India) material. Designing of metal framework was completed using wax. Spruing, investing, burnout and casting were completed to fabricate metal framework. The framework was retrieved, finished and polished. Try-in was done to evaluate for fit, retention, support and stability. (Fig. 6) Ceramic facing (Ceramco-3, GmbH, Germany) was applied for all secondary copings. (Fig. 7a) Jaw relation recording and teeth arrangement with lingualised occlusal scheme was done. Try-in was completed to evaluate aesthetics, occlusion and phonetics. All conventional lab procedures were followed to fabricate maxillary and mandibular prosthesis (Fig.7b,7c). The prostheses were inserted in situ and evaluated for retention, stability and aesthetics. (Fig. 8a, 8b, 8c, 8d) Post operative instructions for use, care, hygiene and maintenance of prosthesis were advised. The prosthetic management significantly improved form, function, aesthetics, confidence and overall improved general health of the patient.

Discussion

Combination syndrome has been defined in Glossary of Prosthodontic Terms 9th edition as “the characteristic features that occur when an edentulous maxilla is opposed by natural mandibular anterior teeth and a mandibular bilateral distal extension base removable partial denture, including loss of bone from the anterior portion of

maxillary ridge, hyperplasia of the tuberosities, papillary hyperplasia of hard palate's mucosa, supraeruption of mandibular anterior teeth, and loss of alveolar bone and ridge height beneath mandibular denture bases." Shen and Gongloff in 1989, reviewed records of 150 maxillary edentulous patients.[6] Among patients who had complete maxillary dentures and mandibular anterior natural teeth, one in four demonstrated changes consistent with the diagnosis of combination syndrome. Saunders et al [2] stated that the basic treatment objective in treating these patients is to develop an occlusal scheme that discourages excessive occlusal pressure on the maxillary anterior region, in both centric and eccentric positions. Stephen M. Schmitt [7] described a treatment approach to minimize the destructive changes. The prosthesis was made in 2 stages. Mandibular RPD was completed first. Acrylic resin teeth were used to replace the maxillary anterior teeth and cast gold occlusal surfaces for posterior denture teeth.

Surgical management may be considered in treating undesirable conditions associated with combination syndrome.[8] The flabby hyperplastic tissue can be surgically removed, the papillary hyperplasia can be eliminated and enlarged tuberosities can be reduced,[1] which allows the distal end of occlusal plane to be raised to proper level and allows the lower partial denture bases to be fully extended over the retro molar pad. Theil et al suggested that mandibular implant-supported over denture offered significant improvement in retention, stability, function and comfort for the patient.[9] While Wennerberg et al advised implant supported fixed prosthesis for mandibular arch.[10] Both implants retained and implant supported prostheses have become increasing popular and have been proven successful in prosthetic rehabilitation of partially and completely edentulous maxilla and mandible.[11] Langer A suggested tooth

supported telescopic denture as a successful modality for rigid splinting of abutments and better stress distribution.[12]

A telescopic prosthesis consist of primary copings which are permanently cemented on abutment teeth and secondary telescopic crowns which are rigidly connected to a detachable prosthesis. The primary copings prevent the abutment from mechanical, thermal or chemical damage while the secondary copings help in anchoring the prosthesis to the primary copings. A telescopic over denture was selected in this case because of its good retentive and stabilizing properties, rigid splinting action, and better distribution of stresses. It is a conservative approach to preserve tooth structure of abutment teeth, retains proprioception through periodontal ligament and also a great psychologic advantage to the patient by retaining the teeth. [12] Clinical longevity of a telescopic over denture is essentially influenced by the applied restorative concept of connecting the removable denture with the remaining teeth. [13] The number, alignment, periodontal status and parallelism of abutments including primary copings are essential for common path of insertion and better stress distribution. [14] In this case CAD/CAM technology helped in better designing of primary copings. Exact parallelism was maintained among copings and also a circumferential chamfer margin was designed in the primary copings which offered better resistance form for secondary prosthesis. Jameson had suggested the use of linear occlusion in cases of combination syndrome to achieve a stable occlusion. [15] In this case a lingualized occlusal scheme was used which offers better centralization of forces, efficient mastication and doesn't compromise with aesthetics. [16] Fabrication of telescopic prosthesis with CAD/CAM assisted designing and milling significantly improved retention, support and stability of prosthesis.

Conclusion

Clinicians have recognized a number of characteristic features of combination syndrome, but prosthetic management of such cases still remains a challenge. Although fixed restoration provides favorable conditions for preservation of oral function, telescopic over denture may be considered as successful option, combining good retentive and stabilizing properties with a splinting action. CAD/CAM technology application in designing and fabrication significantly improved accuracy, fit, retention, support as well as stability of prosthesis.

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