

Prosthodontic Treatment of a Patient with Combination Syndrome: A Clinical Case Report

Sheng-Wei Feng

School of Dentistry, Taipei Medical University, Taipei, Taiwan

Pei-Bang Liao

Taipei Medical University Hospital, Taipei, Taiwan

May-Show Chen

School of Dentistry, Taipei Medical University, Taipei, Taiwan
Taipei Medical University Hospital, Taipei, Taiwan

Corresponding author:

Sheng-Wei Feng

School of Dentistry, Taipei Medical University, Taipei, Taiwan

250 Wu-Hsing Street, Taipei, Taiwan
Tel: 886-2-2736-1661 ext. 5148; Fax: 886-2-27362295

Abstract

Combination syndrome commonly occurs in patients with a completely edentulous maxilla opposed by a bilateral distal-extension removable partial denture. This syndrome poses a considerable challenge to dentists. The symptoms of the syndrome consist of anterior maxillary bone loss, mandibular bone loss, tuberosity overgrowth, and alveolar ridge canting. All of these effects render prosthetic treatment more difficult, and although it is preferable to use dental implants for functional support, complex cases still require conventional prosthetic treatments for medical or financial reasons.

This clinical report presents the prosthodontic management of a patient exhibiting combination syndrome along with a discussion of relevant literature.

Keywords: Combination syndrome, distal-extension RPD

Introduction

The oral rehabilitation of patients with an edentulous maxilla opposed by natural mandibular anterior teeth is a considerable challenge for many clinicians. These cases pose many potential problems, including loss of bone from the anterior edentulous maxilla and super-eruption of unopposed mandibular anterior teeth. Kelly (1972) proposed the term combination syndrome for this oral condition and its resultant clinical features. The Glossary of Prosthodontic Terms¹ has defined combination syndrome as: the characteristic features that occur when an edentulous maxilla is opposed by natural mandibular anterior teeth, including loss of bone from the anterior portion of the maxillary ridge, overgrowth of the tuberosities, papillary hyperplasia of the hard palatal mucosa, extrusion of mandibular anterior teeth, and loss of alveolar bone and ridge height beneath the posterior mandibular removable dental prosthesis bases – also called anterior hyperfunction syndrome.

Kelly (1972)² observed 20 patients equipped with complete maxillary dentures opposing distal-extension removable partial dentures (RPD). After three years of follow-up, six of these patients showed a reduction of the anterior bony ridge height (1.35 ± 0.83 mm) on lateral cephalometric radiography. Meanwhile, an increasing bone level of the tuberosities (1.38 ± 0.36 mm) was noted in five patients. Kelly (1972) proposed the preservation of posterior teeth to support lower partial dentures and a more stable occlusion to avoid combination syndrome. Preservation

of posterior occlusion and avoidance of anterior hyperfunction are considered the primary treatment suggestions for this complex condition. Saunder et al (1979)³ and Jameson (2001)⁴ suggested the use of an alternative tooth form and occlusal concept (linear occlusion) and minimum anterior contact for reducing further bone loss caused by hyperfunction of anterior teeth. Previous studies advocated osseointegrated implant-retained or implant-supported prostheses to change the occlusal force distribution and decrease the traumatic stress to the alveolar bone resulting from combination syndrome.⁵

The present report details the prosthodontic management of a specific patient exhibiting symptoms of combination syndrome.

Case Report

A 73-year-old male patient was referred to the Dentistry Department of Taipei Medical University Hospital in Taipei, Taiwan, for restorative treatment. The patient's chief complaints were inadequate retention of maxillary complete denture and inability to chew comfortably. No major systemic diseases or drug allergies were reported. On examination, the patient had an edentulous maxilla and nine natural mandibular anterior teeth (Figure 1). Clinically, the patient displayed anterior bone loss and flabby tissue of the maxillary ridge, overgrowth of the maxillary tuberosities, and over-erupted mandibular anterior teeth (Figure 2). The patient rejected any surgery and implant therapy due to financial considerations. The patient agreed to have a new complete denture and a mandibular removable partial denture



Figure 1. Panoramic radiograph showing a typical case of combination syndrome with severe resorption of the anterior maxillary and super-eruption of unopposed mandibular anterior teeth.



(a)



(b)



(c)



(d)



(e)

Figure 2.: (a) Occlusal view of maxillary arch. (b) Occlusal view of mandibular arch showing tooth crowding. (c) Right-side view revealing the retained canine. (d) Preoperative frontal view showing greater bone resorption of the premaxillary area. (e) Left-side view indicating sufficient restoration space.

after some discussion.

Initial therapy included oral hygiene instructions, caries control, and nonsurgical periodontal therapy. At the first clinical appointment for prosthodontic treatment, a preliminary impression of the maxillary and mandibular arches was made with irreversible hydrocolloid materials (Hydrogum, Zhermack®, Badia Polesine, Italy) and poured with dental stone. A custom tray was fabricated for the maxillary complete denture impression and a wax relief was applied to the anterior flabby tissue area. A green modeling compound (GC Corp, Tokyo, Japan) was then used to obtain accurate denture border position and seal. The definitive impression of the maxillary arch was made with vinyl polysiloxane impression material (Virtual®, Ivoclar Vivadent, Schaan, Italy) (Figure 3a). A definitive cast was created with type III dental stone.

A Kennedy Class I RPD of the mandibular arch was designed after surveying the cast. Following tooth preparation, the definitive impression of the RPD framework was made with vinyl polysiloxane material (Aquasil, Dentsply Caulk, Milford, Delaware, USA). The altered-cast technique was promulgated to improve the stability of the mandibular RPD and correct any errors incurred at the first impression stage. After the face-bow transfer, the maxillary and mandibular master casts were mounted in centric relation on a

semi-adjustable articulator (Whip Mix 3040, Louisville, Kentucky, USA). In addition, an intraoral Gothic Arch Tracer (Simplex®, Dentsply, New York, USA) was applied to verify accurate and reproducible occlusal vertical dimension (OVD) and centric relation (CR)(Figure 3c).

The selection of maxillary anterior artificial teeth was determined by patient gender and personality. Balanced occlusion was indicated for this case to assure an even distribution of occlusal force and prevent occlusal interferences on the residual ridge. The tooth arrangement was checked for esthetics and CR position and then submitted for processing. After prescrip, both casts were remounted, adjusted, and polished. At a subsequent appointment, the finished prostheses were delivered and minimal occlusal adjustment was needed. The patient was pleased with their appearance and chewing ability. A maintenance program including oral hygiene instruction and prosthesis home care was established. At the 18-month maintenance visit, no complications were observed.

Discussion

Treatment of patients with an edentulous maxilla opposed to natural mandibular anterior teeth and a distal-extension RPD is considered a challenge for dental practitioners. Combination syndrome has a prevalence rate



Figure 3.: (a) Maxillary impression prepared by mucostatic impression technique. (b) Altered-cast impression for the distal-extension RPD. (c) Gothic arch tracer to record the CR position.



Figure 4.: Frontal and lateral views of the finished prostheses at the time of delivery. Even occlusal contacts and minimum anterior contacts were provided for this case.

of approximately 24% for denture patients⁶. Therefore, it is necessary for dentists to understand the particular problems of patients and provide a comprehensive treatment plan.

Increasing pressure on the premaxillary alveolar ridge and loss of adequate posterior occlusal contacts are important factors in relation to combination syndrome^{6, 7}. The bone loss in the midline of the maxilla observed by Kelly (1972) was 0.43 mm/year. López-Roldán et al (2009)⁸ and Barber et al (1990)⁹ reported similar results (0.32 mm/year and 0.36 mm/year, respectively) among patients wearing a maxillary complete denture and mandibular overdentures on two implants, a situation in which the prosthetics are biomechanically similar to Kelly's cases. Maximum support of the denture-bearing area, preservation of the mandibular posterior abutment, and balanced occlusion were all proposed to prevent bone loss and excess pressure on the anterior maxillary alveolar ridge. Similarly, Van Waas et al (1993)¹⁰ suggested the avoidance of total tooth extraction, the preservation of a few teeth, and the use of overdentures.

In the present case, the mucostatic impression technique with relief at the anterior maxillary flabby tissue was applied to accurately record the entire functional denture-bearing area (Figure 3a). In addition, the maxillary right canine root was retained for preservation of alveolar bone and proprioception. Meanwhile, a proper occlusal plane, the balancing of tooth contacts during excursive movements, the elimination of anterior contacts, and remounting techniques were used to gain better distribution of occlusal force and reduce stress on the anterior maxillary alveolar ridge.

The effect of mandibular status on maxillary ridge resorption has been widely discussed and investigated. Carlsson et al (1967)¹¹ compared bone resorption of the anterior maxillary alveolar ridge among patients with maxillary complete dentures and three different mandibular statuses: (1) a mandibular complete denture; (2) mandibular anterior teeth with bilateral extension RPD; and (3) mandibular teeth only. Greater bone resorption was found in the groups that had anterior mandibular teeth with or without an RPD when compared to the group with mandibular teeth only. However, small and insignificant changes of the bone height were described over five-years of follow-up in

patients with a maxillary complete denture opposed by a bar-retained mandibular RPD¹². Other studies^{13, 14} showed no significant differences and proposed that the individual variations were larger, but the experimental data revealed that greater bone resorption occurred among patients with unilateral or bilateral RPD. To prevent the occlusal and enhance the treatment of cs, we propose that (1) the distal-extension mandibular RPD may serve a negative role for the deterioration of combination syndrome¹⁵; and (2) the application of dental implants in edentulous areas, especially at premolar or molar regions, could provide better posterior support¹⁶.

References

1. The glossary of prosthodontic terms. *J Prosthet Dent* 2005; 94: 10-92.
2. Kelly E. Changes caused by a mandibular removable partial denture opposing a maxillary complete denture. *J Prosthet Dent* 1972; 27: 140-50.
3. Saunders TR, Gillis RE Jr, Desjardins RP. The maxillary complete denture opposing the mandibular bilateral distal-extension partial denture: treatment considerations. *J Prosthet Dent* 1979; 41: 124-8.
4. Jameson WS. The use of linear occlusion to treat a patient with combination syndrome: a clinical report. *J Prosthet Dent* 2001; 85: 15-9.
5. Tolstunov L. Management of biomechanical complication of implant-supported restoration of a patient with combination syndrome: a case report. *J Oral Maxillofac Surg*. 2009; 67: 178-88.
6. Shen K, Gongloff RK. Prevalence of the 'combination syndrome' among denture patients. *J Prosthet Dent* 1989; 62: 642-4.
7. Palmqvist S, Carlsson GE, Owall B. The combination syndrome: a literature review. *J Prosthet Dent* 2003; 90: 270-5.
8. López-Roldán A, Abad DS, Bertomeu IG, Castillo EG, Otaolauruch ES. Bone resorption processes in patients wearing overdentures. A 6-years retrospective study. *Med Oral Patol Oral Cir Bucal* 2009; 14: 203-9.
9. Barber HD, Scott RF, Maxson BB, Fonseca RJ. Evaluation of anterior maxillary alveolar ridge resorption when opposed by the transmandibular implant. *J Oral Maxillofac Surg* 1990; 48: 1283-7.
10. Van Waas MA, Jonkman RE, Kalk W, Van 't Hof MA, Plooij J, Van Os JH. Differences two years after tooth extraction in mandibular bone reduction in patients treated with immediate overdentures or with immediate complete dentures. *J Dent Res* 1993; 72: 1001-4.
11. Carlsson GE, Bergman B, Hedegård B. Changes in contour of the maxillary alveolar process under immediate dentures. A longitudinal clinical and x-ray cephalometric study covering 5 years. *Acta Odontol Scand* 1967; 25: 45-75.
12. Uçta li S, Hasanreisio lu U, I eri H. Cephalometric evaluation of maxillary complete, mandibular fixed-removable partial prosthesis: a 5-year longitudinal study. *J Oral Rehabil* 1997; 24:164-9.
13. Crum RJ, Rooney GE Jr. Alveolar bone loss in overdentures: a 5-year study. *J Prosthet Dent* 1978; 40: 610-3.
14. Tallgren A. The continuing reduction of the residual alveolar ridges in complete denture wearers: a mixed-longitudinal study covering 25 years. *J Prosthet Dent* 1972; 27: 120-32.
15. Palmqvist S, Carlsson GE, Owall B. The combination syndrome: a literature review. *J Prosthet Dent* 2003; 90: 270-5.
16. Keltjens HM, Kayser AF, Hertel R, Battistuzzi PG. Distal extension removable partial dentures supported by implants and residual teeth: considerations and case reports. *Int J Oral Maxillofac Implants* 1993; 8: 208-13.
17. Carlsson GE. Responses of jawbone to pressure. *Gerodontology* 2004; 21: 65-70.