

Providing a Removable Partial Denture with Metal Posterior Occlusal Surface to a Patient with Nasopharyngeal Carcinoma

Ching-Yu Tu, MS

Graduate Institute of Clinical Dentistry,
School of Dentistry, National Taiwan
University, Taipei, Taiwan
Attending Staff, Department of
Dentistry, Cathy General Hospital,
Taipei, Taiwan

Wen-Yao Yu, DDS

College of Oral Medicine, Taipei
medical university, Taipei, Taiwan
Resident, Department of Dentistry,
Cathy General Hospital

Hui-Fen Yang, DDS

University Of Szeged, Hungary
Resident, Department of Dentistry,
Cathy General Hospital

Corresponding author:

Chien-Wu Yeh, DDS

School of Dentistry, National Taiwan
University, Taipei, Taiwan
Attending Staff, Department of
Dentistry, Cathy General Hospital,
Taipei, Taiwan

No.280, Sec. 4, Ren'ai Rd., Da'an
Dist., Taipei City 106, Taiwan (R.O.C.)
Tel:886-2-27082121-3662

Abstract

A patient with a history of nasopharyngeal carcinoma (NPC) and radiation therapy presented inadequate inter-occlusal space and severe occlusal wearing. A lower denture designed with metal occlusal surface was fabricated for the compromised dental status.

Key word: Nasopharyngeal carcinoma, limited restorative space, removable partial denture with metal occlusal surface

Introduction

Nasopharyngeal carcinoma (NPC) is a malignancy that arises from the lining epithelium of the nasopharynx. NPC patients are typically treated with large irradiation dose at all the major and minor salivary glands, thus caused severe and persistent xerostomia. The side effects of such treatment impact the quality of life. Complications include candidiasis, as a result of a shift in the oral microflora; transient taste alterations with nutritional compromise and accompanying weight loss, and trismus, due to muscle fibrosis which may lead to restricted movement of the mandible¹⁻⁴.

In NPC patient³, pre-radiotherapy consultation in dental clinic is needed. Since the long-term maintenance of teeth depends profoundly on good patient compliance with specific home care and preventive measures, patients must be encouraged to become actively involved in their oral health care program. Fluoride gel and chlorhexidine rinses may be used to control cariogenic flora during and after radiation therapy. And preventive extraction of those teeth with non-restorable caries, active periapical disease, moderate to severe periodontal disease, lack of opposing teeth and difficult to maintain oral hygiene, partial impaction or incomplete eruption, etc, must be done before radiation therapy to prevent osteoradionecrosis (ORN)^{5,6}.

Post-radiation instruction is also very important. Maintenance of a prosthesis is more challenging because a dry oral environment renders the patient more susceptible to candidal infections^{7,8}, mucosal irritation⁷, and decreased healing of hard and soft tissues made friable by radiation⁹. The absence of saliva also can lead to a shift to a more cariogenic diet that the patient perceives as more pleasant in taste



a. Maxillary occlusal view



b. Mandibular occlusal view



c. Frontal view, habitual closure position



d. Frontal view, open mouth



e. Right lateral view, closure position



f. Left lateral view, closure position

fig. 1 Intraoral finding



fig. 2 Panoramic film

and texture. Frequent followup visits should be initiated. Compliance with uoride application, degree of xerostomia, mucositis, taste alterations and signs of candidal or other microbial infection should be assessed during these recalls.

In this case, the patient had been consulted to dental department before radiation therapy, however, because of the fear of dental extraction, and the worry of NPC prognosis, the patient refused pre-radiation dental treatment. After 1 year treatment of NPC, patient came to our dental department due to the complication of radiation, including xerostomia, and poor oral and dental condition, he could not eat well, and this body weight was lost. Therefore he came to our department again for help.

Case report

The patient, a 67-year-old male with hypertension who had undergone a coronary angioplasty with stent placement, was diagnosed

with NPC in June of 2013 and was informed by his physician at that time that he had six months left to live. One month later, he was treated with surgical excision, chemotherapy, and radiotherapy.

In August of 2014, the patient, who was suffering from a post-therapy oral complication, xerostomia, presented to our department for full mouth rehabilitation with complaints about inefficient chewing ability.

At presentation, the patient's oral hygiene was very poor, and a large amount of plaque and food accumulation were noted. Therefore, the following issues were all detected: poor oral hygiene combined with post-radiation xerostomia, severe chronic periodontitis, and extensive decay. Moreover, insufficient restoration space and a loss of posterior support that led to anterior wearing facets were revealed after clinical (Fig. 1) and radiographic (Fig. 2) examinations.

At the circumstance without tooth extrac-



a. Maxillary occlusal view



b. Mandibular occlusal view

fig. 3 Wax up of restored worn dentition



a. 33.34 metal crowns delivery



b. Restore the wearing facet with composite resin on 13.12.22.23.24

fig. 4 Restored dentition before denture fabrication



a. Wax pattern on maxillary refractory cast



b. Wax pattern of posterior occlusal surface on mandibular refractory cast

fig. 5 Wax up for cast metal framework of partial dentures

tion for prevention osteoradionecrosis (ORN), a sequential treatment that consist of endodontic treatment which was performed on 15 and 35, full mouth prosthetic restoration was planned. Tests were conducted to evaluate the patient's extra-oral profile, swallowing ability, and the free space of about 6 mm. A diagnostic impression was made with alginate, and the diagnostic cast was then mounted on an articulator after being poured with dental stone. The vertical dimension was raised 2 mm higher on the articulator to regain sufficient space to perform a wax-up on the worn teeth numbered 11, 12, 13, 23, 24, 25, 32, 33, 34, 43 in order to improve their morphology (Fig. 3). Based on the diagnostic wax-up, the wearing facets were restored with composite resin and 33.34 metal

crowns were constructed in light of the new occlusal vertical dimension (OVD) and delivered to the patient (Fig. 4).

A final impression was made with an individual tray and vinyl polysiloxane material for removable partial denture fabrication. Upon the master cast, fabricating upper and lower occlusal rims and inter-occlusal relationship in centric relation was registered. The record was then transferred to an articulator via facebow transfer. Furthermore, a refractory cast was made and mounted to allow the preparation of the wax pattern for the denture framework with posterior occlusal surface (Fig. 5). This was followed by investing the framework with cobalt-chromium alloys. The framework was seated in patient's mouth (Fig. 6) to check the



a. Maxillary framework



b. Mandibular framework with posterior metal occlusal surface

fig. 6 Removable partial denture framework try-in



a. Maxillary occlusal view



b. Mandibular occlusal view



c. Frontal view



d. Right buccal view



e. Left buccal view

fig. 7 Denture delivery. The mandibular denture has metal occlusal surface

fit of its components, and the occlusion was accessed and adjusted via inspection and the use of articulating paper.

As to the artificial teeth arrangement, the upper teeth consisted of acrylic material, and the lower RPD included a metal occlusal surface to compensate for the insufficient space between the upper and lower arches. Then the upper and lower dentures were delivered, although it should be noted that the esthetics were inevitably compromised in this case (Fig. 7).

Commonly, dental care for patients with NPC must be commenced before the initiation of cancer therapy; however, in the case of this patient, who had already been through radiation and chemotherapy, post-treatment support and management, which included maintenance visits at 3-month intervals, oral

hygiene instruction, and the application of moisturizing mouth gel and fluoride, had to be provided by the patient's dentists.

Discussion

For an NPC patient, pre-radiotherapy consultation in a dental department is typically necessary. Those teeth which can be saved should be restored before the patient undergoes radiation therapy, and the preventive extraction of those teeth which are too difficult to treat or which impair oral hygiene maintenance should also be performed prior to radiation therapy^{1, 2}. Furthermore, post-radiation instruction is also very important.

In this case, we did not want to plan a treatment that would be too complicated and difficult given the patient's already highly compromised condition. A restricted interarch

space at the posterior edentulous ridge is a result of long-term loss of the posterior teeth that leads to the extrusion of opposing teeth and/or wear on the remaining natural teeth³⁻⁶. A casting metal occlusion and metal denture base may be indicated when the opposing dentition is in close approximation to the edentulous alveolar ridge, especially if the use of a conventional removable partial denture with a resin denture base and acrylic resin teeth is precluded⁷. In this case, in consideration of the difficulty of any future relining or rebasing of a metal denture base, the patient's denture mainly employed resin denture base and metal mesh to facilitate future repair.

A metal occlusal scheme has the advantages of the inherent physical properties of metal, such as wear and fracture resistance; however, its disadvantages include compromised esthetics, the increased weight of the prosthesis, wear on opposing teeth, difficulty in occlusal adjustment, and the need to mount a refractory cast in an articulator to develop occlusion, among others⁸. However, the patient was satisfied with his mastication ability, which was significantly improved, and the results showed that the applied denture designs are effective and suitable for patients with a reduced interarch distance.

Reference

1. Singh, N, C Scully, and S Joyston-Bechal. Oral complications of cancer therapies: prevention and management. *Clin Oncol (R Coll Radiol)*, 1996; 8:15-24.
2. Epstein, JB, S Emerton, R Lunn, N Le, and FL Wong. Pretreatment assessment and dental management of patients with nasopharyngeal carcinoma. *Oral Oncol*, 1999; 35:33-9.
3. Maxymiw, WG, LM Rothney, and SB Sutcliffe. Reduction in the incidence of postradiation dental complications in cancer patients by continuous quality improvement techniques. *Can J Oncol*, 1994; 4:233-7.
4. Epstein, JB, BC McBride, P Stevenson-Moore, H Merilees, and J Spinelli. The efficacy of chlorhexidine gel in reduction of *Streptococcus mutans* and *Lactobacillus* species in patients treated with radiation therapy. *Oral Surg Oral Med Oral Pathol*, 1991; 71:172-8.
5. Lee, AW, JC Lin, and WT Ng. Current management of nasopharyngeal cancer. *Semin Radiat Oncol*, 2012; 22:233-44.
6. Mackie, AM, JB Epstein, JS Wu, and P Stevenson-Moore. Nasopharyngeal carcinoma: the role of the dentist in assessment, early diagnosis and care before and after cancer therapy. *Oral Oncol*, 2000; 36:397-403.
7. Epstein, JB and C Scully. The role of saliva in oral health and the causes and effects of xerostomia. *J Can Dent Assoc*, 1992; 58:217-21.
8. Tung, MS and FC Eichmiller. Dental applications of amorphous calcium phosphates. *J Clin Dent*, 1999; 10:1-6.
9. Epstein, JB, MM Freilich, and ND Le. Risk factors for oropharyngeal candidiasis in patients who receive radiation therapy for malignant conditions of the head and neck. *Oral Surg Oral Med Oral Pathol*, 1993; 76:169-74.
10. Bataglion, C, TH Hotta, W Matsumoto, and CV Ruellas. Reestablishment of occlusion through overlay removable partial dentures: a case report. *Braz Dent J*, 2012; 23:72-4.
11. Ganddini, MR, M Al-Mardini, GN Graser, and D Almog. Maxillary and mandibular overlay removable partial dentures for the restoration of worn teeth. *J Prosthet Dent*, 2004; 91:210-4.
12. Yavuz, A, OB Agrali, ZL Caliskan, D Turkyaydin, A Sertgoz, and B Kuru. Multidisciplinary treatment approach in a patient with history of nasopharyngeal carcinoma. *Case Rep Dent*, 2014. 2014, Article ID : 918461 DOI: 10.1155/2014/918461.
13. Patel, MB and S Bencharit. A treatment protocol for restoring occlusal vertical dimension using an overlay removable partial denture as an alternative to extensive fixed restorations: a clinical report. *Open Dent J*, 2009; 3:213-8.
14. Kumar, S, A Arora, and R Yadav. An alternative treatment of occlusal wear: cast metal occlusal surface. *Indian J Dent Res*, 2012; 23:279-82.
15. Perezous, LF, GC Stevenson, CM Flaitz, ME Goldschmidt, RL Engelmeier, and CM Nichols. The effect of complete dentures with a metal palate on candida species growth in HIV-infected patients. *J Prosthodont*, 2006; 15:306-15.
16. Wakabayashi, N, H Mizutani, and M Ai. All-cast-titanium removable partial denture for a patient with a severely reduced interarch distance: a case report. *Quintessence Int*, 1997; 28:173-6.