Immediate Placement of Implants and Appliance in an Irradiated Patient: A Case Study

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ABSTRACT

Purpose: The purpose of this study was to evaluate the immediate placement of implants and appliance using hyperbaric oxygenation on a 45-year-old male with a history of sqaumous cell carcinoma of the floor of the mouth.

Materials: Five Nobel Biocare implants between the mental foamina were used along with a course of pre- and postsurgical hyperbaric oxygenation.

Results: After 39 months, the patient is symptom free and shows no signs of rejection.

Conclusion: Using an accepted hyperbaric oxygenation protocol when placing and restoring immediate implants in this patient resulted in a successful treatment outcome.

KEY WORDS: implant, immediate loading, hyperbaric oxygenation, Gy, carcinoma

Studies of implants placed in irradiated bone have been published without agreement whether hyperbaric oxygen (HBO) therapy is a necessary adjunct to implant placement.[1–3] However, successful extraction of mandibular teeth in a radiation field, immediate placement of implants, and immediate temporary loading of an irradiated patient have not been reported in the literature.

CASE REPORT

Case Study

A 45-year-old white male presented for dental treatment with a previous history of squamous cell carcinoma of the floor of the mouth, pharynx, and tongue on the right side. History of smoking and exposure to asbestos during employment were noted. Subsequent to radiation treatment, the patient underwent a partial resection of the floor of the mouth and tongue, neck dissection, and radiation therapy with a dose of 65 Gy 5 years prior to proposed implant treatment. This dosimetry placed the patient at risk of spontaneous osteoradionecrosis (ORN) or ORN induced by insult.[4,5] The patient was free of disease 5 years following excision of cancerous tissue and radiation therapy; xerostomia caused by radiation exposure rendered the patient's mandibular dentition unrestorable. Granstrom's[6] review of the literature with regard to placing implants in irradiated patients suggests a significant risk of failure in American Heart Association levels 3 to 5 and National Cancer Institute levels 2 to 3ii without HBO. A high risk of implant failures was also noted by Granstrom[7] in the mandible. The patient requested and was treatment planned for immediate placement of implants and immediate loading according to a worst-case scenario in anticipation of infection and ORN requiring preoperative HBO therapy.[8] The patient's willingness to accept the cost of HBO as a procedure that would increase the chance of survival of the implants made the decision moot. The patient's anterior maxillary dentition was intact with the exception of missing #10 (Figure 1). The maxillary treatment plan called for the missing maxillary teeth to be restored with a removable partial denture.

Preoperative tests included complete blood count, chest X-ray, International Normalization Ratio, electrocardiogram, and standard physical examination. Prior to implant placement, the patient underwent 20 90-minute

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Figure 1 Radiograph prior to surgery.

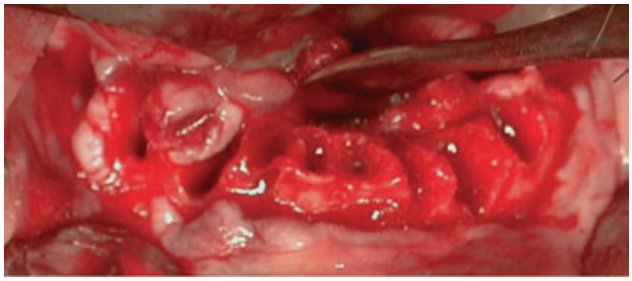

Figure 2 Extraction of mandibular teeth prior to bone recontouring.

Figure 3 Temporary immediate appliance in place.

Figure 4 Maxillary removable partial denture.

Figure 5 Implant healing after 3 months at final impression appointment.

preoperative hyperbaric treatments followed by 10 post-operative treatments at 2.4 atm, according to the Myers, Marx protocol.[8] Prior to surgery, an immediate mandibular denture was fabricated, preserving the vertical dimension and to use as a temporary hybrid mandibular denture. The patient was taken to the operating room, intubated nasally, and given intervenous clindomycin 900 mg antibiotic therapy. Hopeless mandibular teeth were extracted (Figure 2), sockets were thoroughly curetted, and the patient underwent alveoloplasty to remove sharp and/or excess bone. The bone was ramped to 6 mm horizontally to facilitate implant placement. Five 4.3 × 13 mm Replace® Select (Nobel Biocare, Inc., Yorba Linda, CA, USA) root-form implants with TiUnite™ surfaces were placed 5 mm anterior to the mental foramen following bilateral dissection of mental nerves and mid-crestal incision[9] (see Figure 2). Temporary abutments were placed on the five implants and a temporary acrylic hybrid denture replacing teeth #19, 20, 21, 22, 23, 24, 25, 26, 27, 28, and 29 was placed with screw retention[9] (Figure 3). A maxillary removable partial denture was placed at this time to facilitate posterior support (Figure 4).

Subsequent to the surgery, the patient underwent 10 90-minute HBO treatments of 2.4 atm.[2] The patient was recalled on a weekly basis for 3 months

Figure 6 Completed case 39 months after surgery.

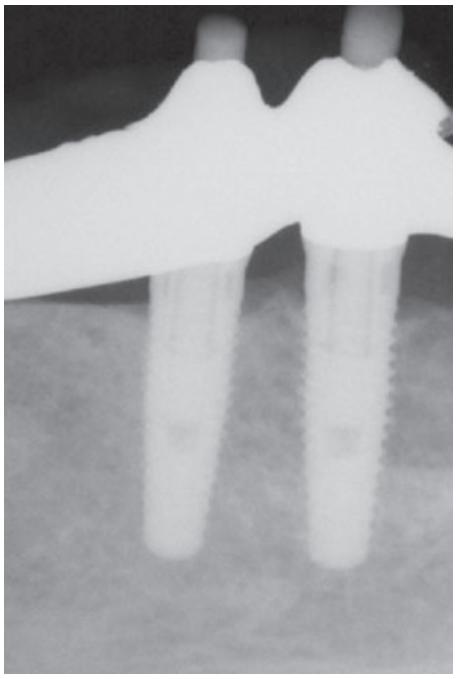

Figure 7 Lower right implants 45 months after surgery.

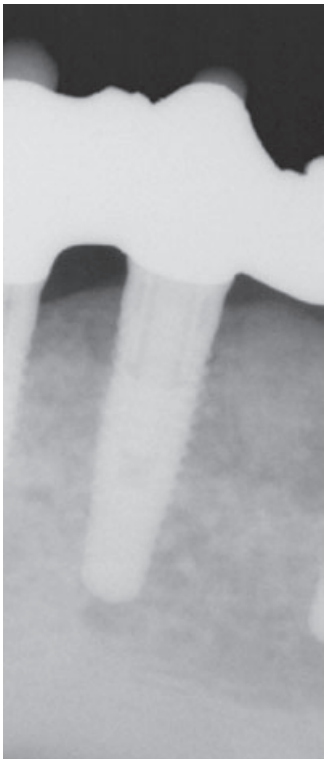

Figure 9 Implant number 4, 45 months after surgery.

postsurgery. At 3 months, the tissue was pink and attached with no evidence of ORN. An impression was taken of the mandibular implants and a definitive mandibular hybrid denture was fabricated and inserted (Figure 5).

Recall procedures of 3-month intervals for the first year with 6-month intervals afterward. After 45 months, the patient remains free of ORN and complications of implant and removable partial denture treatment (Figure 6). Figures 7–10 illustrate the implant bone apposition after 45 months.

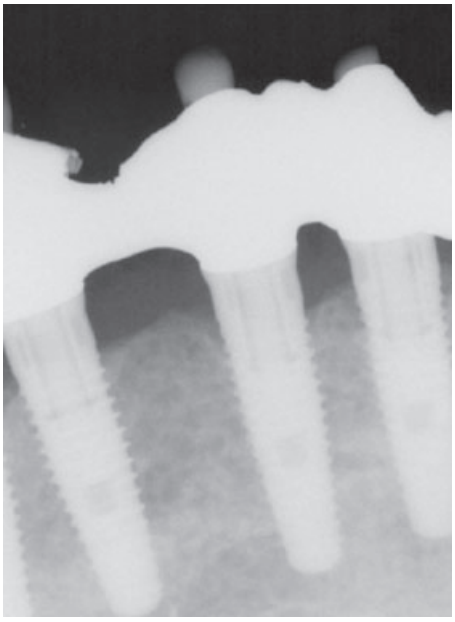

Figure 8 Implant numbers 2 and 3, 45 months after surgery.

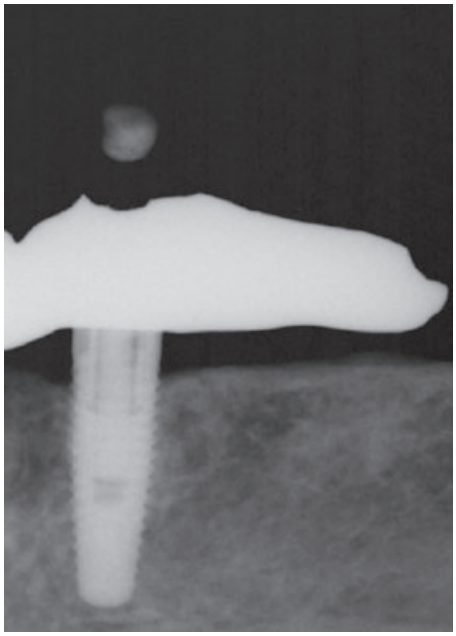

Figure 10 Implant number 5, 45 months after surgery.

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