

MILLED BAR-SUPPORTED IMPLANT OVERDENTURE AFTER MANDIBULAR RESECTION: A CASE REPORT

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After surgical treatment for oral cancer, patients often are affected by disfigurements, thwarted function, and psychological and social problems. Prosthodontic rehabilitation has the aim of restoring function and esthetics. Implant-supported prosthodontic rehabilitation is useful for patients with compromised residual ridge anatomy, such as patients with oral cancer following treatment. This clinical report describes the rehabilitation of a patient after mandibular resection with a milled bar-supported implant overdenture. Overdenture achieves best hygienic maintenance, easy soft tissue follow-up, and low realization cost. This rehabilitation increased prosthesis retention and stability and improved oral conditions and the patient's quality of life.

Key Words: oncology, mandible, dental implant

INTRODUCTION

Oral tumors represent 2.5% of all malignant tumors.¹ Surgical therapy for oral tumors results in compromised residual alveolar ridge anatomy and function. Difficulties are more widespread when the mandible is involved, owing to the tongue.² Patients can be affected by face asymmetry, disfigurement, swallowing, speech impairment, and neuroapraxia³⁻⁵; they often have psychological and social problems.²⁻⁸ The aforementioned complications can be influenced also by radiotherapy.⁹

After tumor excision, hard and soft tissue defects can be corrected.² Sometimes, even after this treatment, it is not possible to rehabilitate patients with a conventional prosthesis.^{4,10,11} After their introduction into dental practice, titanium implant-supported prostheses had a favorable impact on the treatment of patients with adverse alveolar ridge anatomy¹²⁻¹⁴; implants made it possible to increase prosthesis

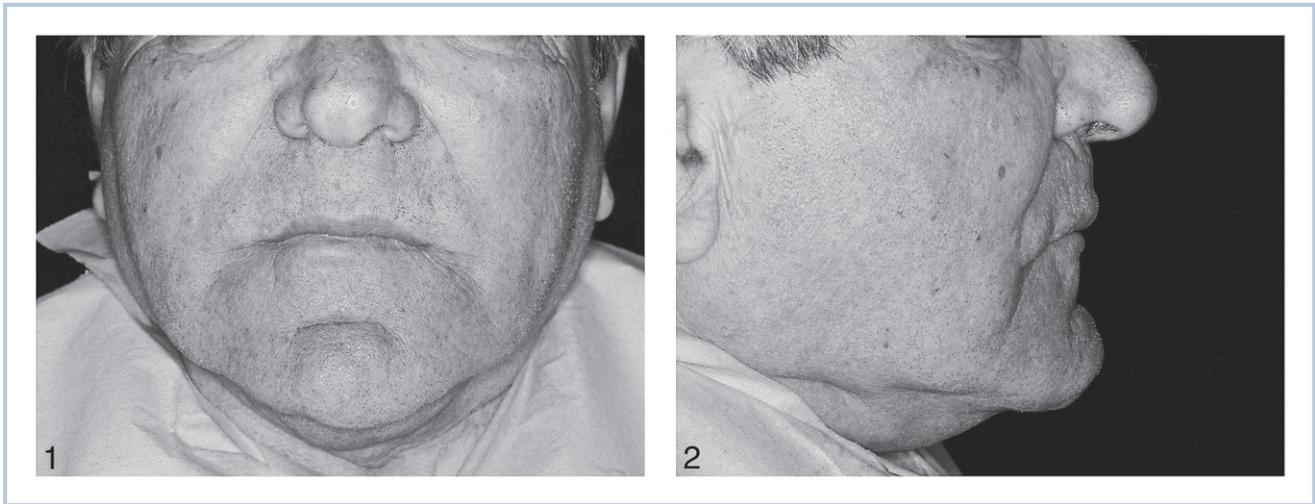
retention and stability, with positive psychological results (when compared with conventional prostheses).^{7,15-17} Also, oncologic patients after tumor excision have compromised ridge anatomy, and they need implants to enhance prosthesis stability. Today, the use of implant-supported prostheses (fixed or removable) is approved for patients after surgical therapy for oral tumors, and they have been shown to improve indirectly the patient's quality of life.^{2,18,19} Studies report success rates ranging between 64% and 100% for implants in patients with oral tumor; however, these numbers reflect implants positioned within bone grafts as well.^{7,20}

This clinical report describes the rehabilitation of a patient after mandibular resection with a milled bar-supported implant overdenture, with implants positioned in the residual mandibular ridge and avoidance of bone grafting.

CLINICAL REPORT

In September 2004, a 75-year-old man came to the School of Dentistry Clinical Building of the University of Ferrara (Italy). He came for evaluation of anterior postsurgical mandibular hard and soft tissue defects resulting from therapy for oral carcinoma received in

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FIGURES 1-2. FIGURE 1. Frontal aspect of patient before rehabilitation. FIGURE 2. Lateral aspect of patient before rehabilitation.

2002. He did not receive radiotherapy. He reported lip and chin paresthesias without motor deficits, a mild difficulty in speech, and an inability to use his conventional prosthesis because of instability and extreme pressure on soft tissue.

Facial examination revealed vertical and horizontal deficiencies with loss of the vertical occlusion dimension (Figures 1 and 2). Oral examination showed mandibular and maxillary total edentulism, with keratinized tissue and an alveolar ridge defect of the mandibular anterior region (Figure 3). The patient did not undergo reconstructive surgery of the hard or soft tissues, during tumor resection or after.

With consideration of the patient's health and expectations, an implant-supported overdenture with two individual milled bars and a titanium framework was planned as a rehabilitative option for the mandible (reported to be more suitable than a fixed prosthesis for patients with oral tumor).^{3,4} Overdenture advantages include improved hygienic maintenance of the resin body and implants, easy soft tissue examination for tumor follow-up, and low production and management costs.^{3,4}

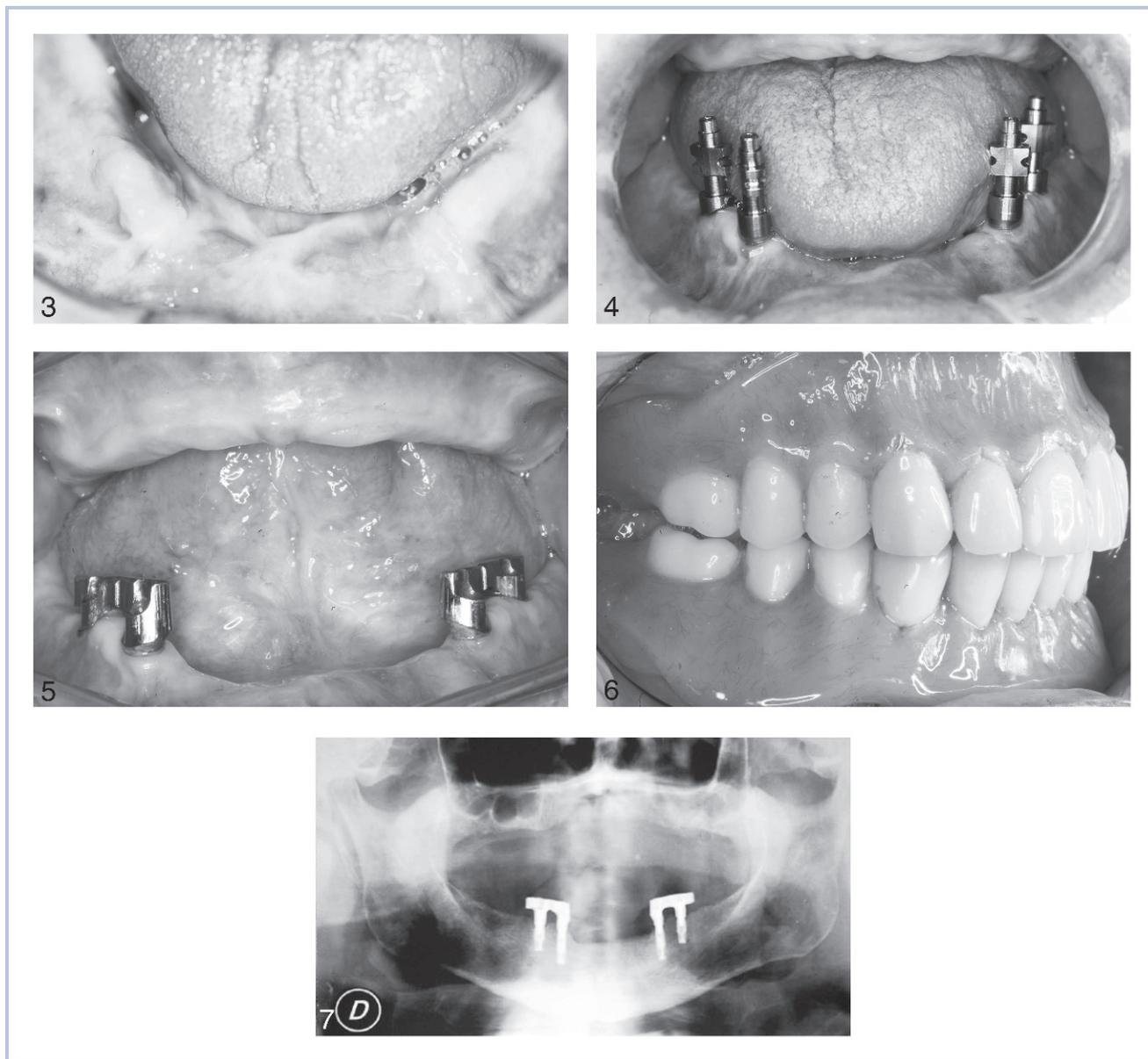
After a radiologic study of the right and left residual mandibular alveolar ridges, four MK III TiUnite implants (Nobel Biocare, Goteborg, Sweden) were inserted (two on each side) with a submerged technique; implants positioned in the right and left areas were 3.75 mm in diameter and 10 and 11 mm in length. Long-term rehabilitation success and patient comfort are influenced by the presence of a stable mucous marginal barrier around the implants.²¹ Submerged technique was chosen to achieve the best keratinized tissue healing. After 4 months, healing abutments were connected.

Mandibular and maxillary first impressions were performed with irreversible hydrocolloid (Hydrogum 5, Zhermack, Badia Polesine, Italy) and Schreinemakers trays (Schreinemakers System, US patent 5190457). Second impressions were taken with individual acrylic resin trays, to provide close contact with alveolar and peri-implant tissues. The mandibular tray was filled with wax (Moyco Beauty Pink Wax X Hard, Miltex Inc, York, Pa) in the anterior region, to avoid any compression of this scarred area. The mandibular impression was taken with an open resin tray, four copings (Nobel Biocare) (Figure 4) and polyether (Impregum, 3M Espes, St Paul, Minn). The maxillary impression was taken with zinc-eugenol oxide paste (Luralite, Kerr, Orange, Calif).

Two denture bases were done using diagnostic casts to clinically record vertical and horizontal dimensions (Candulor Instrument Set, Candulor, Wangen, Switzerland). Afterward, the anterior (TCR Resin FiosioSet, Candulor) and posterior teeth (Condyloform Resin Set, Candulor) were arranged on denture bases to test esthetics, phonetics, and mobility.

With cast analysis, the space was evaluated to construct two mandibular titanium milled bars (a bar on the right side and a bar on the left side) linked to the titanium framework with friction devices (Figure 5). Framework and bars were tested, and prosthetic bodies were molded. After clinical adjustments were made, the prosthesis was delivered to the patient with home hygiene instruction (Figure 6).

Traditionally, overdenture retention systems consist of different single attacks or bar attachments connecting two or more implants.^{22,23} In the clinical case examined, when defect position and width were considered, the single bar attachment was not viable.



FIGURES 3-7. FIGURE 3. Clinical aspect of intraoral mandibular anterior region (hard and soft tissue defect is visible). FIGURE 4. Coping transfer positioned over four implants for mandibular impression. FIGURE 5. Both milled titanium bars positioned over implants on each side. FIGURE 6. Maxillary and mandibular prosthesis. FIGURE 7. Radiographic control of bone height around implants after 30 months.

Two bars were constructed to avoid any compression of the anterior region and to make hygienic maintenance easier for the patient.²⁴ Two milled bars provided stability to the prosthetic body. The framework directly received implant support, and the bar's design was opposed to rotational and lateral prosthesis dislocation.²⁵⁻²⁷ The result was a very rigid structure.

Clinical controls were done after 7 and 14 days, and after 3 and 6 months. At 6 months, function, phonetic, and esthetic improvement was shown. Clinical controls were done after 12, 18, 24, and 30 months. Clinical examinations showed absence of

pain, swelling, soft tissue infection, or discomfort. Radiographs showed bone stability around the implants (Figure 7), according to the criteria in the literature on implant success. The patient was very happy and satisfied.

DISCUSSION AND CONCLUSIONS

After surgical therapy, patients with oral tumor can have disfigurement, compromised mastication, and swallowing and speech impairment, especially if the mandible is involved.

In the clinical case examined here, the wide area of tumor resection and the choice not to proceed with reconstructive surgery influenced the oral situation of the patient in a conclusive way.

Because of the defect present in this case, only a removable prosthesis with a wide resin body improved esthetics and phonetics. On the other hand, the wide loss of hard and soft tissues made it impossible to rehabilitate the patient with a conventional prosthesis because of excessive pressure on the anterior region and instability.

The best therapeutic choice in this and similar cases consists of an implant-supported overdenture. For this patient, insertion of implants in the residual alveolar ridge avoided further reconstructive surgery (making treatment less invasive), but implant dimension and position were restricted to the height and width of the residual ridge.

Four implants were placed and connected to two milled bars. Such a design provided a rigid anchorage system, resulting in reduced rotational movement and improved stability.^{26,28} This feature was considered particularly important for rehabilitating a patient with a large portion of mucosa that cannot be compressed. Furthermore, such a prosthesis shows a lower rate of prosthodontic complications (such as adjustment and matrix activation).^{28,29} Problems connected to bars have to be considered. Each milled bar needs a wide vertical height for construction (in this clinical case, it was present). Each implant occlusal loading is not predictable. Owing to these problems, 6 months of follow-up is needed to confirm rehabilitation success and osseointegration.

NOTE

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