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Case report

Prosthetic Functional Rehabilitation Following Resection of an Oral Malignoma – A Case Report

Abstract

Tumor surgery in the orofacial region frequently requires resection of major parts of the jawbone and the adjacent facial and pharyngeal soft tissue resulting in large-scale hard and soft tissue defects. Consequences of such defects may include masticatory dysfunction, speech disturbances and swallowing problems as well as significant aesthetic impairment for the patients concerned. Thus, comprehensive therapy with reconstruction of the missing tissue and subsequent prosthetic rehabilitation is of major importance for restoring and improving the tumor patient's quality of life. The case reported illustrates the stepwise prosthetic rehabilitation of masticatory function in a patient after radiochemotherapy and surgical treatment of a squamous cell carcinoma in the right retromolar trigone (T4N2bM0) with neck dissection, hemimandibulectomy and mandibular reconstruction with titanium plate and pectoralis major flap.

Introduction

Treatment of orofacial tumors commonly requires partial resection of the mandibular bone potentially affecting mandibular functionality [1]. For such interventions, soft tissue and muscle tissue may also need to be sacrificed frequently involving significant impairment: facial asymmetry, mandibular deviation, masticatory dysfunction, speech disturbances and swallowing difficulties as well as considerable aesthetic impairment [2,3]. The extent of the remaining deformity will essentially depend on the type of surgery having been used, the number of residual teeth, the extent of the impairment of lingual function and the extent of the damage and injury of motor and sensory nerve endings [2]. The tractive force of the contralateral muscles will cause a slanted deviation of the mandible with loss of regular occlusion [4].

Mandibular reconstruction and subsequent prosthetic rehabilitation is intended to provide for a stable intermaxillary relation with improvement of oral functions as well as aesthetics [4,5]. Principally, mandibular defects may be reconstructed using alloplastic material (e.g. titanium plate), non-vascularized or vascularized autologous tissue or a combination of the same [4]. Microvascular free osteocutaneous flaps have been described as gold standard in literature with the free fibular transplant being considered as the clear favorite choice [6,7].

Full and complete rehabilitation of masticatory function may only be achieved by a final prosthetic restoration. Selection of the prosthetic restoration will be depend on the intraoral environment, in particular the number of residual teeth or the teeth worth preserving, and the condition of the potential denture support. Implant-borne restorations will also be used quite commonly, e.g. in cases of edentulousness. However, for irradiated tumor patients it must be considered, that the risk of osteoradionecrosis will be increased [3].

Case Report

At the age of 52 years, patient F.K., heavy smoker under medication for high blood pressure (Enac Hexal 20mg), underwent treatment for a squamous cell carcinoma in the right retromolar trigone (T4N2bM0) at the University Clinic of Oral and Maxillofacial Surgery of the Vienna General Hospital. Following preoperative radiochemotherapy (with cisplatin/5-FU and radiation dose of 45 Gy in 20 fractions) radical tumor surgery with neck dissection, hemimandibulectomy and mandibular reconstruction with titanium plate and pectoralis flap was performed in September 2006. One year later, the patient underwent surgical transection of the hardened supraclavicular muscle chords.

After treatment of his oral carcinoma the patient suffered from mouth dryness and difficulties with eating and chewing as a result of the limited lingual mobility and loss of stable

dentition with only five residual teeth in lower left quadrant (Figure 1–4). The patient's mandible showed a certain lateral right-sided curvature with impairment of facial contours and symmetry (Figure 5). In the year 2009, the patient presented at the Vienna University Dental Clinic, Department of Prosthetics, with the request for a full restoration of dentition.

Upon comprehensive dental assessment and evaluation the precise and detailed course of treatment was planned. For restoring a stable intermaxillary relation and occlusion fully prosthetic rehabilitation using removable dentures in both jaws was planned.

Initially, teeth not worth preserving (#3, #4, #14, #15, #17 and #18) were extracted. Subsequently, the full residual dentition was subjected to appropriate endodontic pretreatment on account of periapical inflammation and/or profound caries and then underwent treatment with cast posts (Figure 6).

In the maxilla, the anterior tooth gap (#9) was restored with a bridge supported by teeth #8 and #10 made of gold alloy with ceramic veneering (Porta Geo Ti, Wieland) and the two terminal gaps were restored with a clasp-tooth-crown-supported metal frame denture of a chrome-cobalt alloy (Figure 7). In the mandible, a telescope metal frame denture with shortened row of teeth on the resection side was manufactured (Figure 8). This was to ensure a stable intermaxillary relation and occlusion for the patient (Figures 9,10).

The detailed course of treatment has been illustrated in Figures 11–20. Dental technician Christian Hollitsch provided the appropriate dental technology.

Discussion

Surgical treatment of tumor lesions in the oral cavity (tongue, floor of the mouth, alveolar ridge, oropharynx) will frequently be associated with an unfavorable setting for the anchorage of prosthetic restorations [3]. The primary problems mostly involve disturbed function of tongue and facial muscles, cicatricial pull, restricted mouth opening, mandibular deviation and facial asymmetry as well as major reduction of the so-called neutral zone.

The term neutral zone defines the space in the oral cavity where the outward force of the lingual musculature is equal and balanced with the inward forces exerted by the buccinator and lip muscles. Removable partial prostheses manufactured



Figure 1: Initial x-ray.



Figure 2: Intraoral situation prior to prosthetic rehabilitation



Figure 3: Intraoral situation prior to prosthetic rehabilitation



Figure 4: Intraoral situation prior to prosthetic rehabilitation.



Figure 5: Extraoral image prior to treatment

under adequate consideration of the neutral zone (neutral zone technique) will ensure sufficient prosthetic stability and retention [8]. Case reports show that this technique will also be well suitable for the prosthetic rehabilitation in patients with partial mandibulectomy [8,9]. However, it must be noted that such patients are frequently reconstructed using muscle flaps, although these show a poor bearing capacity and will be unsuitable as denture support. In such cases, use of endosseous

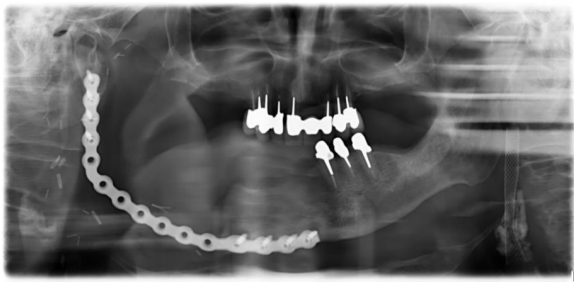


Figure 6: Post-treatment panoramic radiograph



Figure 7: Occlusal view of maxillary restoration.



Figure 8: Occlusal view of mandibular restoration



Figure 9: New prosthetic restoration in situ.



Figure 10: Facial appearance after prosthetic restoration



Figure 11: Telescopic abrasions of posts.



Figure 12: Telescopic abrasions of posts



Figure 13: Checkbite

implants will be the treatment of choice [10]. Available literature sources show that implant-supported restoration will essentially reduce the problems associated with prosthetic support and stability and decrease the pressure exerted on the subjacent soft tissue [3].

Radiotherapy will result in obliteration of small blood vessels and disorders of bone vitality. The bone will become increasingly susceptible to bacterial infections and, as a consequence, may develop osteoradionecrosis [4]. Under this setting, the risks and benefits of implantation should be carefully weighed. However, survival rates seen with implants



Figure 14: Aesthetic wax try-in



Figure 15: Try-in of primary telescopes prior to overimpression

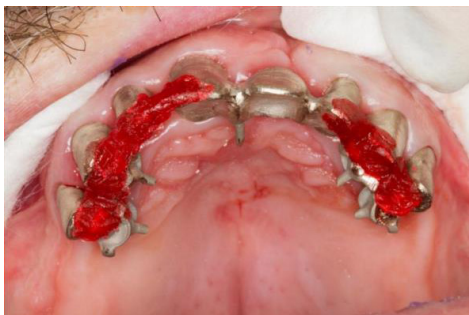


Figure 16: Try-in of cap and bridge framework: interlock with acrylic polymerization resin (Pattern Resin®)



Figure 17: Luted mandibular frame in model; marking of marginal finish between primary and secondary telescopes



Figure 18: Try-in of mandibular frame in mouth, seat verified using markings.



Figure 19: Inserted bridge or crowns (maxilla).

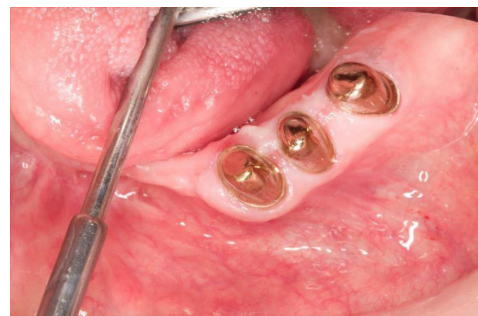


Figure 20: Cemented primary telescopes

in irradiated jaws are comparable to those of implants placed in the healthy jawbone [4].

In the case reported, the right lateral mandible resected was prosthetically restored using a telescopic hybrid denture providing for good prosthetic retention as a result of the friction of the telescope system [11]. For avoiding direct support of the denture on the pectoralis transplant and thus minimizing the risk of dehiscence, a shortened row of teeth was used on the resection side (to premolars) while dentition to the first molar on the contralateral side allowed regular articular support and the occlusal concept of canine guidance. The obvious drawback of this treatment concept certainly involves the uneven distribution of masticatory forces which are concentrated on the non-resected side. In addition, it will also involve a postoperative loss of proprioceptive sensation with uncoordinated and less precise mandibular movement and consequently reduced stability of occlusion on the resection side.

Regardless of the unilaterally shortened row of teeth,



essential improvement of oral functions could be achieved for the patient.

Even 6 years after prosthetic restoration the treatment results continue to provide for adequate stability.

Conclusion

Loss of jaw segments and of normal tissue anatomy as a result of the surgical treatment of oral tumors frequently represents a particular challenge in the functional masticatory rehabilitation of the patient. In some of the cases certain compromises may also need to be accepted.

Presence of residual dentition worth preserving in the resected mandible may provide for adequate denture support and potentially replace or at least delay a more intricate and time-consuming implant-supported rehabilitation.

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