Case report

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Prosthetic rehabilitation involving the use of implants following a fibula free flap reconstruction in the treatment of Osteosarcoma of the maxilla: a case report

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Abstract

Introduction. Osteosarcoma is an aggressive primary bone tumor composed of connective tissue cells directly producing osteoid and bone. Prosthetic rehabilitations in post-oncological patients after bone reconstruction are not substantially different than those of patients affected by severe atrophy of upper or lower jaw after bone reconstruction. The treatment for patients with a malignant neoplasia of the oral cavity requires multidisciplinary approach by a team of different specialists that follow the patient through the phases of diagnosis, therapy and oral rehabilitation. Reconstructive surgery of jaws using vascularized free flap allows a significant gain of tissues that enables a successful final prosthetic rehabilitation. In fact main prosthetics difficulties result from lack of hard and soft tissues in affected area. Reconstructed patients have a greater ease of care management.

Case presentation. A 25-year-old Caucasian male was diagnosed with chondroblastic osteosarcoma of the pre-maxilla. The patient initially noticed the displacement of his maxillary incisors with progression into a definite swelling of the pre-maxillary a month later. Computerized Tomographic Scan and Radionuclide Bone Scan revealed the absence of both distant metastasis and regional nodal involvement. A biopsy and subsequent histopathology examination confirmed the lesion as being a chondroblastic type of osteosarcoma. The case study directed us to rehabilitate the patient by implant supported prosthesis consisting 3 different components: a titanium base screwed on implants, a titanium structure (primary structure) assembled on the base and a composite coatedstructure (secondary structure) that reproduced teeth and gum. At surgery, we proceeded placing 6 dental implants in 1.4, 1.3 1.2, 2.1, 2.2 and 2.4 positions. Contextually was performed a bone graft using particulate bone and collagen membranes.

Conclusion. Prosthetic rehabilitation in Maxillofacial Osteosarcoma treatment is an hard challenge for prosthodontist due to anatomic conditions of this kind of patients. Dental implants play a crucialrole in the therapy of patients affected by malignancies in the head-and-neck region. The goal of implant rehabilitationis to improve the quality of life of these patients by allowing proper retention of removable prostheses and a reduction in the load placed on vulnerable soft tissues.

Today prosthetically guided rehabilitation represents the main rehabilitation protocol in prosthodontics, especially in those oncological patients with relevant lost of tissues and modified anatomy. ***Clin Ter 2017; 168(6):e392-396. doi: 10.7417/CT.2017.2040***

Key words: *Osteosarcoma, Implantology, Prosthesis, Case report*

Introduction

Osteosarcoma (OS) is an aggressive primary bone tumor composed of connective tissue cells directly producing osteoid and bone (1,2). OS is the most common primary malignant bone tumor, and in the jaws represents up to 23% of total head and neck bone malignancies (3,4). Osteosarcomas of the jaws (OSJ) are, however, rare lesions, representing only 2 to 10% of all osteosarcomas (5-6). OS is the eighth-most common form of childhood cancer, comprising 2.4% of all malignancies in pediatric patients, and about 20% of all primary bone cancers.They have a male to female ratio of 1:1.

There are numerous variants of osteosarcoma of jaw bones, but these are generally classified into two types primary and secondary (8).

The diagnosis of osteosarcoma is based on recognition of osteoid production by tumor cells (9). Depending upon the predominant type of extracellular matrix present, osteosarcomas are categorized histopathologically into osteoblastic, chondroblastic, fibroblastic subtypes (10).

In chondroblastic osteosarcoma, tumor cells lie in the lacunae and form lobules. The center of the lobule has bony trabeculae producing a feathery appearance, and towards the periphery, the tumor becomes hypercellular. Most of the times, an area of atypical chondroid tissue is also seen with large chondrocytes (11).

Mardinger*et al*(14) reported the highest prevalence for chondroblastic osteosarcoma (42%), osteoblastic osteosarcoma being lesser (33%).

Despite sharing common histopathological features, Osteosarcoma of Jaw bones (OSJ) and Osteosarcoma of Long bones (OSL) are distinct biological entities (1).

The modern treatment protocol for OS is multimodal, consisting of preoperative chemotherapy followed by extensive surgery and postoperative chemotherapy (5,13,14). Drugs commonly used for chemotherapy are high-dose combinations of methotrexate, cisplatin, adriamycin, doxorubicin, and ifosfamide.The tumor is radio-resistant at standard doses, and radiotherapy plays no significant role (8,15).

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Prosthetic rehabilitations in post-oncological patients after bone reconstruction are not substantially different than those of patients affected by severe atrophy of upper or lower jaw after bone reconstruction (16). The treatment for patients with a malignant neoplasia of the oral cavity requires the cooperation of a team of different specialists that follow the patient through the phases of diagnosis, therapy and oral rehabilitation (17).

Reconstructive surgery of jaws using vascularized free flap allows a significant gain of tissues thaten ables a successful final prosthetic rehabilitation. In fact main prosthetics difficulties result from lack of hard and soft tissues in affected area. Reconstructed patients have a greater ease of care management.

In 2014, Department of Maxillofacial Surgery of the Umberto I Polyclinic treats 210 cases of head and neck tumors which OS represent 5% of incidence. The aim of this work is to describe a significant prosthetic rehabilitation of a patient affected by chondroblastic osteosarcoma of pre-maxilla.

Case report

A 25-year-old Caucasian male was diagnosed with chondroblastic osteosarcoma of the pre-maxilla (Fig. 1). The patient noticed the displacement of the upper incisors and after a month appeared a swelling of the premaxilla. CT and radionuclide bone scan were performed and distant metastasis and regional pathological lymph nodes were not detected. The CT showed a lesion with bone density overtoothno.1.1 with externalization in the soft tissues over tooth no. 2.1 (Fig. 2). The biopsy diagnosed a chondroblastic osteosarcoma. The grown of the lesion caused the deformation of the upper lip. After diagnosis the patient began chemotherapy of 4 months of duration.

The patient received three cycles of neoadjuvant chemotherapy based on cisplatin (100mg/m2 day1) ifosfamide (2000 mg/m2 days 2-3-4) with Mesna (500 mg/m2 days1-3), epirubicin (90mg/m2 day1). Use of growth factors has been allowed. During treatment the patient did not experienced high grade or unexpected toxicities.

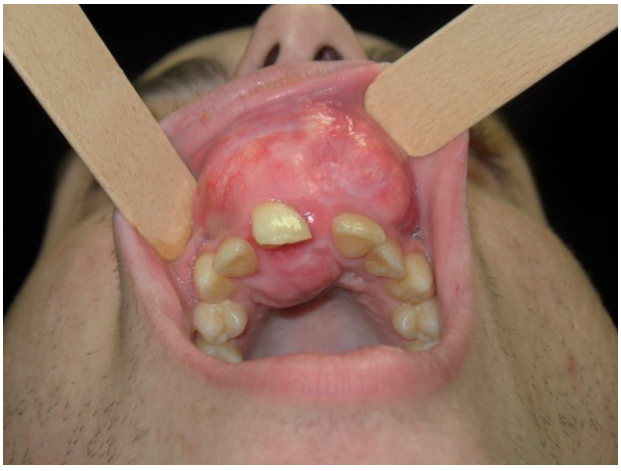


Fig.1. Osteosarcoma in premaxilla area

Fig. 2. Computed tomography images obtained prior to the operation

The tumor was completely removed along with a wide margin of healthy tissue around the tumor.

In agreement with tumor necrosis rate, the patient was considered fair/good responder and adjuvant treatment was carried out.

At surgery teeth no.1.5 and 2.4 were extracted and was performed the removal of the lesion and the reconstruction of the area by fibula free flap. Two years later the patient began prosthetic rehabilitation (Fig.3,4). Follow-up was

Fig. 3. Clinical situation after surgery

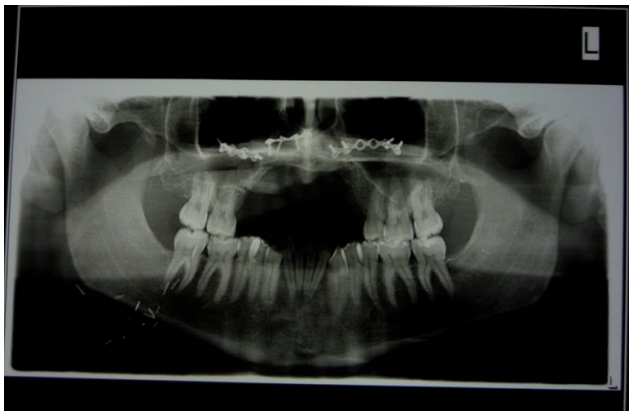


Fig. 4. Panoramic radiograph after surgery

Fig. 5. Resin removable partial denture

performed according to NCCN (National Comprehensive Cancer Network) guidelines. The follow-up at two years reveals no local recurrence and the patient was disease free and so he began prosthetic rehabilitation.

The case study directed us to rehabilitate the patient by implant supported prosthesis consisting 3 different components: a titanium base screwed on implants, a titanium structure (primary structure) assembled on the base and a composite coated structure (secondary structure) that reproduced teeth and gum.

First a dental impression was taken using alginate to build a resin removable partial denture to rehabilitate the patient provisionally (Fig 5). This allowed us to manufacture a radiographic guide for prosthetically guided positioning of the dental implants (Fig. 6). The CT cone-beam taken with a guide allowed us to evaluate the quality and the amount of bone avaible and to plan the correct implant positioning and design. Radiographic examinations revealed presence of bone below the nose obtained through reconstruction surgery due to the need to achieve the greatest possible support for this area. So we plan to insert implants palate-buccal tilted to comply with the emergence profile of the patient.

Fig.6 - Radiographic guide

The same guide used for CT was modified to allow implants positioning during surgery.

At surgery, six "Zimmer Trabecular Metal" 3,7x11,5 mm implants were inserted in the pre-maxilla along with a bone graft using "Copios Cancellous Particulate Xenograft" and "Biomend CollagenMembranes"(Figs. 7,8).

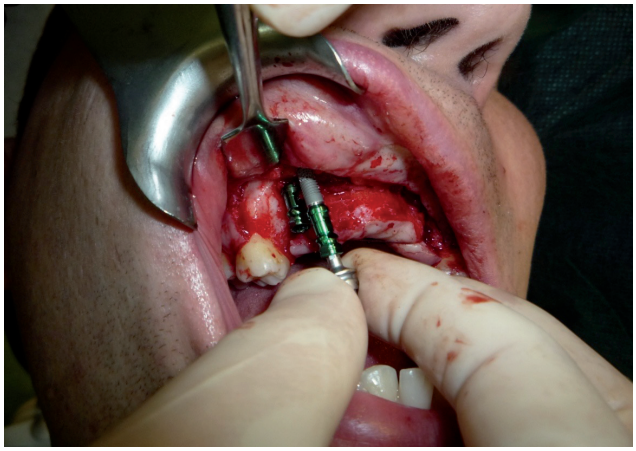
Resin removable partial denture was modified so that it not loaded on implants.

After 4 months we inserted healing screws and after 6 months we started testing metal structure and teeth (Figs.9,10,11).The entire dental treatment lasted 14 months; follow-up at one year was uneventful.

Discussion

In this paper we have described the prosthetic rehabilitation of a post-oncological patient.

Dental implants play a crucial role in the therapy of patients affected by malignancies in the head-and-neck region (22, 23).The goal of implant rehabilitation is to improve the quality of life of these patients by allowing proper retention of removable prostheses and a reduction in the load placed on vulnerable soft tissues (18).



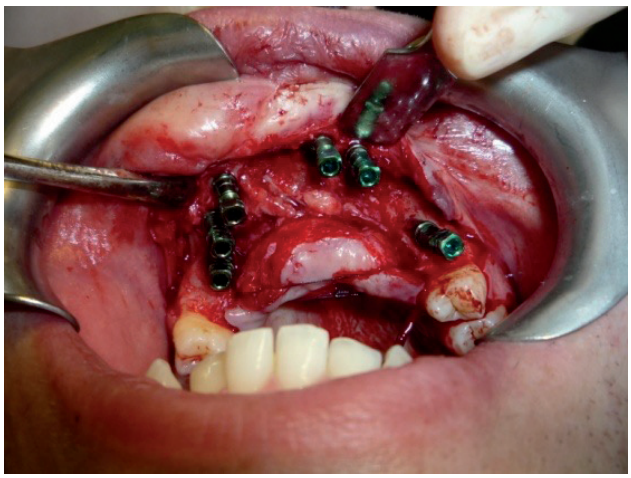


Fig.7-8. Implant positioning

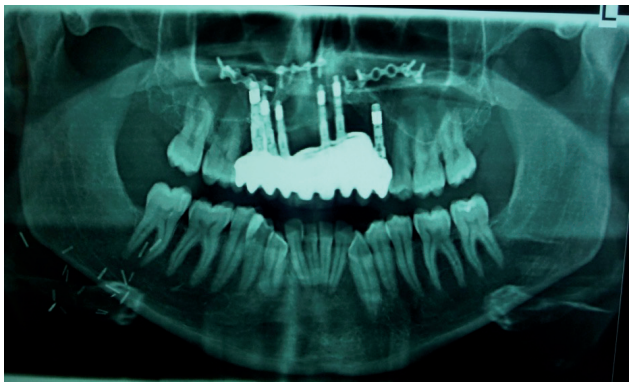


Fig. 9. Panoramic radiograph after implant placement

Fig. 10, 11. Completed prosthetic rehabilitation.

Free flaps are invaluable when extensive areas are resected.The fibular free flap offers remarkable advantages: good vascularization of the bone gives the possibility of performing multiple osteotomies, guaranteeing a more precise reconstruction;the length of the bone is well suited to large resections; the donor site shows low morbidity; it can be combined with cutaneous flaps; the high cortical content of the fibula allows a good osseointegration of the implants (19).

Surgeries aim in patients pating oral cancers result in anatomical distortion and subsequent prosthetic challenges that may be solved by prosthetically guided rehabilitation (24). In this case cancer involved premaxilla area and reconstructive surgery by fibula free flap was performed to give support to the nose and to the middle third of the face.

Then the study of the clinical case by removable resin prosthesis permits to establish the proper teeth position and desirable functional-aesthetic rehabilitation.

CT cone-beam permits to value bone quality and bone quantity to plan rehabilitation, so is important the manufacturing of a radiographic guide. This guide have to be inserted by the patient during the radiographic exam to allow the implants positioning planning.

Conclusion

Today prosthetically guided rehabilitation represents the main rehabilitation protocol in prosthodontics, especially in those oncological patients with relevant lost of tissues and modified anatomy.

Because of structures' modifications, a simple mobile prosthesis can show less efficiency. Fixedprosthesis are the best option, because they guarantee stability, reduce mucosal inflammation and properly restore functional, mechanical and aesthetic properties (20,21).

Prosthetically guided rehabilitation is preferable in all cases to obtain a successful result.

Abbreviations

OS, Osteosarcoma; CT, Computed Tomography

Declarations

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Availability of data and materials

The dataset of information is in this article. Parts of the list of references were searched in PubMed (http://www.ncbi.nlm.nih.gov/pubmed). We used Medical Subject Headings (MeSH) terms in our search of the databases. We searched the gray literature material that was not indexed in databases and that presented any relevance to the subject.

Authors' contributions

EB, SJ, AQ and VV were the consultants responsible for diagnosing and treating the patient and his clinical follow-up. They all reviewed the patient case and data, completed subsequent drafts of the manuscript, and were major contributors in writing the manuscript. All authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

Consent for publication

Written informed consent was obtained from our patient giving permission to publish this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Ethical approval

Ethical commission of University of Rome La Sapienza approved this work.

References

1. Kumaravelu C, Sathya Kumar D, Chakravarthy C, et al. J MaxillofacOralSurg. 2009 Sep;8(3):290-3. doi: 10.1007/s12663-009-0071-2. Epub 2009 Nov 21.
2. Huvos AG. Osteogenic sarcoma.in bone tumors: Diagnosis, treatment and prognosis, ed.2. Philadelphia, W.B.Saunders, 85–116.
3. Chindia ML, Swaleh SM, Godiah PM. Sarcomas of the head and neck at Kenyatta National Hospital. East Afr Med J. 2000; 77:256–9
4. Omololu AB, Ogunbiyi JO, Ogunlade SO, et al. Primary malignant bone tumour in a tropical African University teaching hospital. West Afr J Med 2002; 21:291–3
5. Amaral MB, Buchholz I, Freire-Maia B, et al. Advanced osteosarcoma of the maxilla: a case report. Med Oral Patol Oral Cir Bucal 2008; 13:E492–E495.
6. Jasnau S, Meyer U, Potratz J, et al. Coopera-tive Osteosarcoma Study Group COSS: Craniofacial osteosarcoma. Experience of the cooper-ative German-Austrian-Swiss osteosarcoma study group. Oral Oncol 2008; 44:286–294. doi: 10.1016/j.oraloncology.2007.03.001.
7. Kassir RR, Rassekh CH, Kinsella JB, et al. Osteosarcoma of the head and neck: meta-analysis of nonrandomized studies. Laryngoscope. 1997;107:56–61. doi: 10.1097/00005537-199701000-00013.
8. Rajendran R. Benign and Malignant tumors of the oral cavity. In: Rajendran R, Sivapathasundharam B, editors. Shafer's textbook of Oral Pathology. India: Elsevier, a Division of Reed Elsevier India Private Limited; 2006; 113–308
9. Schajowicz F. 2nd ed. Berlin: Springer-Verlag; 1993. Histological typing of bone tumours.
10. Frei C, Bornstein MM, Stauffer E, et al. Osteosarcoma of the maxilla and the max-illary sinus: A case report. Quintessence Int. 2004; 35:228–33
11. Neville BW, Damm DD, Allen CM, et al. Bone Pathology. In: Neville BW, Damm DD, Al-len CM, Bouquot JE, editors. Bone Pathology, editors. Oral and Maxilofacial Pathology. Phila-delphia: Saunders, an imprint of Elsevier; 2002. pp. 574–7.
12. Mardinger O, Givol N, Talmi YP, et al. Osteosarcoma of the jaw- The Chaim Sheba Medi-cal Center Experience. Oral Surg Oral Med Oral Path Oral RadiolEndod 2001; 91:445–51
13. Zarbo RJ, Carlson ER. Malignancies of the Jaws. In: Regezi JA, Sciubba JJ, Jordan RK, edi-tors. Oral Pathology. 5th ed. St. Louis: Saunders 2008; 315–21
14. Nielsen GP, Rosenberg AE. Update on bone forming tumors of the head and neck. Head Neck Pathol. 2007;1:87–93
15. Picci P. Osteosarcoma (Osteogenic sarcoma) Orphanet J Rare Dis. 2007; 2:6–10
16. Brauner E, Cassoni A, Battisti A, et al. Prosthetic rehabilitation in post-oncological patients: Report of two cases. AnnStomatol (Roma). 2010 Jan;1(1):19-25. Epub 2010 Jun 29.
17. Papi P, Jamshir S, Brauner E, et al. Evaluation of Highly PorousDentalImplants in PostablativeOral and MaxillofacialCancerPatients: A ProspectivePilotClinical Case Series Report.ImplantDent 2015 Oct; 24(5):631-7
18. Pompa G, Saccucci M, Di Carlo G, et al. Survival of dental implants in patients with oral cancer treated by surgery and radi-otherapy: a retrospective study.BMC Oral Health. 2015 Jan 20;15:5. doi: 10.1186/1472-6831-15-5.
19. Brauner E, Valentini V, Jamshir S, et al. Two clinical cases of prosthetical rehabilitation after a tumor of the upper maxilla. EurRevMedPharmacol Sci. 2012 Nov;16(13):1882-90
20. E. Brauner, S. Jamshir, G. Guarino, et al. Pleomorphic adenoma rehabilitative treatment in growing up patient: a 20-years follow-up. EurRevMe-dPharmacol Sci. 2016; Vol. 20 - N. 17: 3523-7
21. Pagnoni M1, Amodeo G, Fadda MT, et al. Juvenile i-diopathic/rheumatoid arthritis and orthognatic surgery without mandibular osteotomies in the remittent phase. J Craniofac Surg. 2013 Nov;24(6):1940-5
22. Brauner E, Pompa G, Quarato A, et al. Maxillofacial prosthesis in dentofacial traumas: a retrospective clinical study and introduction of new classification method. Biomed Res Int 2017 Biomed Res Int. 2017; 2017:8136878. doi: 10.1155/2017/8136878. Epub 2017 Feb 28
23. Pompa G, Brauner E, S Jamshir, et al. Quality of life in patients rehabilitated with palatal obturator without reconstruction versus fixed implant-prosthesis after reconstruction of maxillectomy defects. Journal of international dental and medical research 2017, 10:1, 2017
24. De Angelis F, Papi P, Mencio F, et al. Implant survival and success rates in patients with risk factors: results from a long-term retrospective study with a 10 to 18 years follow-up. Eur Rev Med Pharmacol Sci 2017; 21(3):433-7