

Guided Surgery for Implant in a Patient Undergoing Radiotherapy in Head and Neck

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Cirurgia Guiada para Instalação de Implantes em Paciente Submetido à Radioterapia em Região de Cabeça e Pescoço

Cirugía Guiada para la Colocación de Implantes en Pacientes Sometidos a Radioterapia en la Región de la Cabeza y el Cuello

Vivian Palata Viola¹; Victor Tieghi Neto²; Fábio Luiz Coracin³; Paulo Sérgio da Silva Santos⁴

ABSTRACT

Introduction: The use of osseointegrated implants for the rehabilitation of patients with difficulty fitting conventional prostheses is becoming more frequent every day. A great eligible group for rehabilitation with this modality are patients treated for head and neck cancer (HNC). Irradiation in the region of HN may be limiting for implants, but there are evidences in the literature of techniques and planning favorable to the procedure in this group of patients. Less traumatic techniques for interventions in the oral cavity should be evaluated, and surgical guides for implant placement may be allies in these procedures. **Case report:** A 64-year-old female patient, treated with surgery, chemotherapy and radiotherapy in the oral cavity for a squamous cell carcinoma (SCC) in the tongue and, in a second moment, diagnosed and treated with surgery for SCC in the region of the left maxillary alveolar ridge by means of hemipalatectomy, needed rehabilitation with osseointegrated implants in the region where she had been primarily treated with radiation. The implant placement surgery was then planned and performed using guided technology so that minimal trauma to the oral structures could occur. **Conclusion:** The surgical procedure was successfully performed, and the patient is now waiting for the osseointegration period for posterior prosthetic rehabilitation.

Key word: head and neck neoplasms; carcinoma, squamous cell/radiotherapy; dental implantation; mouth rehabilitation; osseointegration.

RESUMO

Introdução: O uso dos implantes osseointegrados para reabilitação de pacientes com dificuldade de adaptação de próteses convencionais mostrase mais frequente a cada dia. Um grande grupo candidato à reabilitação com essa modalidade são os pacientes tratados para as neoplasias de cabeça e pescoço (CP). A irradiação na região de CP pode ser limitante para a instalação de implantes, porém a literatura apresenta evidências de técnicas e planejamentos favoráveis ao procedimento nesse grupo de pacientes. As técnicas menos traumáticas para intervenções na cavidade oral devem ser avaliadas, e os guias cirúrgicos para colocação de implantes podem ser aliados nesses procedimentos. **Relato do caso:** Paciente do sexo feminino, 64 anos, tratada com cirurgia, quimioterapia e radioterapia em cavidade oral para um carcinoma espinocelular (CEC) em língua e, em um segundo momento, diagnosticada e tratada com cirurgia para CEC em região de rebordo alveolar maxilar esquerdo por meio de hemipalatectomia, necessitava de reabilitação com implantes osseointegrados na região onde havia sido tratada com radiação primariamente. Realizou-se a cirurgia de colocação dos implantes com a tecnologia guiada para acarretar o mínimo trauma às estruturas bucais. **Conclusão:** O procedimento cirúrgico foi executado com sucesso. Atualmente, aguarda-se o período de osseointegração para a posterior reabilitação protética.

Palavras-chave: neoplasias de cabeça e pescoço; carcinoma de células escamosas/radioterapia; implantação dentária; reabilitação bucal; osseointegração.

RESUMEN

Introducción: El uso de implantes osteointegrados para la rehabilitación de pacientes con dificultades de adaptación de las prótesis convencionales es cada vez más frecuente. Un gran grupo de candidatos a la rehabilitación con esta modalidad son los pacientes tratados por neoplasias de cabeza y cuello (CC). La irradiação en la región del CC puede ser limitante para la instalación del implante, sin embargo, la literatura presenta evidencias de técnicas y planificación favorables al procedimiento en este grupo de pacientes. Deben evaluarse técnicas menos traumáticas para las intervenciones en la cavidad oral, y las guías quirúrgicas para la colocación de implantes pueden ser un aliado en estos procedimientos. **Caso clínico:** Paciente de 64 años, mujer, tratada con cirugía, quimioterapia y radioterapia en la cavidad oral por un carcinoma de células escamosas (CCE) en la lengua y en un segundo momento diagnosticada y tratada con cirugía por CCE en la región de la cresta alveolar maxilar izquierda mediante hemipalatectomía, necesitó rehabilitación con implantes osteointegrados en la región donde había sido tratada principalmente con radiación. La cirugía de colocación de implantes se realizó con tecnología guiada para causar el menor traumatismo en las estructuras orales. **Conclusión:** La intervención quirúrgica se llevó a cabo con éxito. Actualmente se espera el periodo de osteointegración para la posterior rehabilitación protésica.

Palabras clave: neoplasias de cabeza y cuello; carcinoma de células escamosas/radioterapia; implantación dental; rehabilitación bucal; oseointegración.

¹Hospital de Câncer de Barretos, Departamento de Odontologia. Barretos (SP), Brazil. Universidade de São Paulo (USP), Faculdade de Odontologia de Bauru (FOB). Bauru (SP), Brazil. E-mail: vivianpviola@usp.br. Orcid iD: <https://orcid.org/0000-0002-1267-1712>

^{2,3}Hospital de Câncer de Barretos, Departamento de Odontologia. Barretos (SP), Brazil. E-mails: tieghineto@gmail.com; fabio.coracin@gmail.com. Orcid iD: <https://orcid.org/0000-0002-0097-0045>; Orcid iD: <https://orcid.org/0000-0002-0108-6593>

⁴USP/FOB. Bauru (SP), Brazil. E-mail: paulosss@fob.usp.br. Orcid iD: <https://orcid.org/0000-0002-0674-3759>

Corresponding author: Vivian Palata Viola. Avenida Altair da Silva Bonfim, 1321 – Jardim Soares. Barretos (SP), Brazil. CEP 14784-372. E-mail: vivianpviola@gmail.com



INTRODUCTION

The utilization of dental implants in patients with difficulties of fitting conventional prostheses is being more frequent for allowing better stability between bones and mucosa. An important group of eligible individuals to rehabilitation with this modality are those treated for malignant neoplasms of head and neck where there are evidences that less than 20% achieve satisfactory rehabilitation with conventional prostheses¹⁻⁴. The methods of treatment they are submitted to can limit the adaptation to conventional prostheses, leading to overload of soft tissues and risks of great damages to the oral cavity¹. The mutilating effect of surgeries associated with adjuvant techniques, chemotherapy and/or radiotherapy can cause alterations of the essential functions^{2,4,5} and chronic and acute side effects as change of masticatory muscle, mucositis, dysgeusia, radiation-related caries, hyposalivation and osteoradionecrosis^{1,2,4,6}.

The criteria to select eligible participants to receive osseointegrated implants should be thorough. Compromised health and systemic diseases in general are listed as contraindications for the conventional method to place implants⁷. Radiotherapy is considered a relative contraindication and involves criteria for its indication as modality of rehabilitating treatment because can impact the success rate of dental implants in the head and neck area^{2,4,7-9}. The literature describes great success rate of osseointegration and survival in implants installed in regions irradiated with lower than 4500 cGy up to 5000 cGy^{3,10,11} doses.

Less traumatic techniques to place implants might be associated with high odds of osseointegration. Guided computer-based and 3D technologies can be allies because allow the surgery to be as less traumatic as possible to bones and soft tissues with more accurate and predictable results and less post-surgical complications^{2,7,12,13}. They are also indicated for placement of implants in difficult regions¹⁴.

The objective of the present article is to report a clinical case of oral rehabilitation utilizing osseointegrated implants with guided surgery in patient submitted to antineoplastic treatment with surgery, chemotherapy and radiotherapy.

CASE REPORT

Female patient, 64-years-old, treated in 2006 with surgery, chemotherapy and radiotherapy for epidermoid carcinoma at the tongue, staging T2N1M0. She was submitted to left pelveglossectomy followed by suprahyoid muscles cervical emptying and chemotherapy.

Chemotherapy treatment included two cycles of cisplatin every 21 days.

Radiotherapy treatment was 2D-based with Cobalt 60 equipment at the floor of pelveglossectomy and cervical lymphatic chain with 34 sessions of 180 cGys, totaling 6120 cGys. The maxilla received a secondary radiation dose lower than the dose irradiated to the tumor core equivalent to less than 4000 cGys, mainly in the posterior region. Computed tomography was utilized to calculate the doses received in the anatomic structures to plan the dental procedure based in a mock 2D radiotherapy treatment in 2006 (Figure 1).

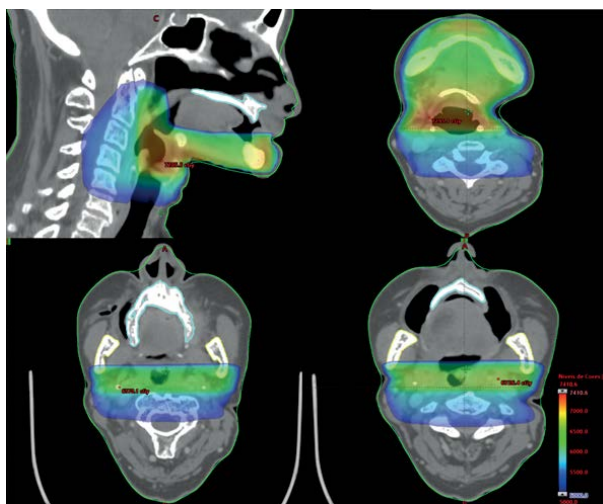


Figure 1. Anatomic structures and doses received

In 2020, she was diagnosed with a second primary tumor in the left upper alveolar ridge, an epidermoid carcinoma, staging T2N0M0. The therapeutic conduct was hemipalatectomy alone with exposure of the nasal cavity and maxillary sinus (Figure 3A). Primary closure with insertion of adipose corpuscle at the cheek was attempted but to no avail. The second surgical treatment for the first neoplasm in 2006 associated with doses of radiotherapy of 5000 cGys received at the temporomandibular region caused severe trismus and in the post-operation of 2020, nasoenteral tube was necessary. The Institutional Review Board of "Hospital de Amor" in Barretos approved the study, report number 5,375,103 (CAEE (submission for ethical review 56511122.0.0000.5437) in compliance with Resolution number 466/2012 of the National Health Council.

Before the surgery, an anatomic mold of the patient's oral cavity was taken to guide the preparation of a conventional palatal obturator plate placed after the surgical procedure, but the fitting was ill-adapted with flawed sealing of the nasal and oral cavity.

Three obturator plates were produced in a period of 45-60 days but with unsuccessful results. Therefore, it

was decided to plan the placement of a guided obturator plate surgery, modality overdenture.

Attempting to minimize the risk of a new failure and ensure the patient a better quality-of-life, a virtual plan (Figure 2) of the placement of four implants and a surgical guide were prepared to achieve improved adaptation with less traumatic procedures to the tissues.

Two 3.5 x 8.5 implants, brand BlackFix – Titanium Fix® were placed in the anterior region of the right maxilla (Figure 3B). The torque of implants locks was higher than 40N. It was not possible to place distal implants due to severe trismus, leaving no space for angulation and insertion of drills.

The prosthesis over the implants will be placed at the next visit of the patient.

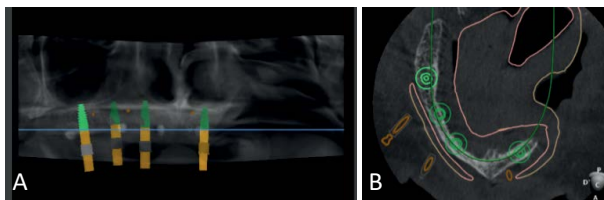


Figure 2. A) Planning of maxilla implants in panoramic reformattening view. B) Axial view of the positions plans of the implants

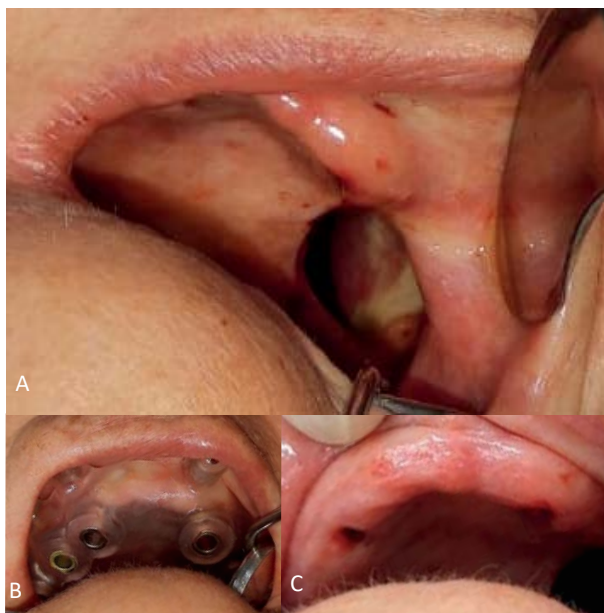


Figure 3: A) Posterior maxilla with buccosinusual/buccoconasal communication post tumor resection surgery; B) Adjustment of the surgical guide at the maxilla; C) Immediate post-operation after placement of two implants at the maxilla anterior region

DISCUSSION

The placement of implants in the region of the maxillary has become a robust modality of treatment,

most of all for the patients with technical limitations for conventional rehabilitations. Individuals treated for head and neck neoplasms belong to this group, but eligible criteria should be pondered to make the selection for treatment: type of treatment, total doses and precise location of radiotherapy received at the region of the bones of the face, current habits, oral hygiene, tobacco and alcohol use among others¹⁶.

The possible effect of radiotherapy is osteoradionecrosis, a long-term injury resulting from permanent lesion of osteoprogenitor cells and progressive gradual obliterating endarteritis with thrombosis of small blood vessels, fibrosis of the periosteum and mucosa and injuries of osteoblasts, osteocytes and fibroblasts. This is a factor that may lead to failed osseointegration¹⁷ but should not be considered as a counterindication.

The rehabilitation period is mandatory post oncologic treatment. Several authors showed the applicability of dental implants in irradiated patients, however, sound planning, study of the case and surgical technique are necessary^{8,12}. For this group of patients, the improvement of these techniques, of the technology of materials and planning and experience with clinical trials resulted in good outcomes¹¹.

Some factors may be accepted as criteria to plan the rehabilitation with osseointegrated implants in irradiated patients in the head and neck such as: region irradiated, dose of radiation received, duration of the treatment, time to place the implants, treatment of implants surface, selection of the anatomic site, habits of the patient, periodontal disease, post-treatment follow-up, among others. Best survival of the patients is contingent upon correct follow-up after the placement of the implants^{1,4-6,12,17}.

A waiting time from six to 14 months to begin the rehabilitation with dental implants post radiation treatment in the head and neck should be respected; after its placement, six months should be considered before load, but these periods are not yet well defined^{1,18}. In addition, the failure rate of osteointegration is greater in areas receiving high doses between 4500 and 5000 cGy of radiation^{1,6,17}.

Guided surgery is a technique to be utilized to preview and reduce the damages to the bone structures and soft tissues during implants placements which allows less invasive approaches¹⁵, with smaller flaps that, in some cases, aren't necessary, ensuring best angulation and parallelism and reducing surgery time^{7,13}.

After placement of osseointegrated implants in irradiated areas, it is essential to guide the patient about the necessity of follow-up and good habits to achieve better osseointegration⁵.

CONCLUSION

Osseointegrated implants rehabilitation in patients treated with radiation on bones of the face is a challenging procedure, but if well planned and allied to surgical techniques may avoid major damages to the tissues. The risk of osteoradionecrosis can be minimized by choosing areas which received lower than 4000 cGys doses and new surgical technologies as guided-computed surgeries. The odds of good prognosis depend on good planning involving analyzes of the irradiated anatomic structures, selection of the best patient-centered technique with clear benefits for rehabilitation with this modality of treatment.

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CONTRIBUTIONS

All the authors contributed substantially to the study design, acquisition, analysis and interpretation of the data, wording and critical review. They approved the final version to be published.

DECLARATION OF CONFLICT OF INTERESTS

There is no conflict of interests to declare.

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