Braz J Otorhinolaryngol.
2013;79(2):185-9.

DOI: 10.5935/1808-8694.20130033

ORIGINAL ARTICLE

BJORL.org

Extraoral implants in irradiated pacients

Joaquim Augusto Piras de Oliveira[1], Márcio Abrahão[2], Luciano Lauria Dib[3]

Keywords:
osseointegration;
prostheses and
implants;
radiotherapy.

Abstract

The aim of this study is to analyze the success of extraoral osseointegrated implants used to support and contain prosthesis designed to rehabilitate craniofacial deformities.

Method: This study was based on the retrospective assessment of charts from 59 patients submitted to cancer surgery and who received 164 extraoral implants to contain facial prosthesis.

Results: Among 164 implants, 42 were fixed in previously irradiated regions. Eight of the implants did not have osseointegration; and from these, 2 were fixed in irradiated bone. The result show 116 (95.1%) successfully osseointegrated implants in non-irradiated sites. The success rate among 42 implants fixed in previously irradiated bones was 40 (95.3%) osseointegrated implants.

Conclusion: The use of extraoral craniofacial implants represents a safe and effective approach to treat facial deformities as a support for the rehabilitation prosthesis. Radiotherapy treatment does not prevent osseointegration.

[1] MSc in Sciences - DDS.
[2] Full Professor of Head and Neck Surgery - Department of Otorhinolaryngology - Federal University of São Paulo - UNIFESP.
[3] Full Professor of Semiology - Paulista University - UNIP.
Federal University of São Paulo - UNIFESP.
Send correspondence to: Joaquim Augusto Piras de Oliveira. Av. José Galante, nº 671, apto. 51. Vila Suzana. São Paulo - SP. Brazil. CEP: 05642-001.
Paper submitted to the BJORL-SGP (Publishing Management System - Brazilian Journal of Otorhinolaryngology) on June 28, 2012;
and accepted on December 14, 2012. cod. 9300.

INTRODUCTION

In the past, materials found in nature, such as clay, wood, horn and animal skin, gold and silver, were all used in attempts to restore facial loss of substance. After the industrial revolution, in mid-18th century, new materials started to be created and some, such as paper, paraffin, plastics, acrylic and finally, silicone, started to be utilized in the prosthetic reconstruction of facial mutilations[1]. The prosthesis were glued to the face or supported in eyeglasses frames.

Before 1969, time when Bränemark's papers were published, there were attempts to use implants crossing the skin and fixing to bones - yielding very negative results - they were rejected by infection within a maximum time of 3 months[2].

The clinical need of permanent percutaneous links is found not only to retain the prostheses, but it is also used in nephrology, cardiology, neurology, urology, otorhinolaryngology, orthopedic surgery, plastic reconstructive surgery, and in many other clinical disciplines. This clearly depicts the universal need to develop and establish a permanent percutaneous anchor[3].

This opportunity came up in 1965, with the studies from Prof. P. I. Brånemark, who was unable to remove from the bony structure of dogs a titanium capsule used to support a magnification lens used to observe blood circulation. Apparently, such capsule made a single bond with the bone. Soon after, Brånemark started a new line of research, which led to the revolutionary concepts of osseointegration, which spread to different fields of medicine and dentistry. Research in dentistry started in 1965, and it was published in 1969 on osseointegrated titanium implants, aimed at replacing dental elements and allowed for a stable fixation on the bony structures of the maxillary teeth, crossing the gum. In 1977, after following clinical trials for 12 years, the osseointegration concept was accepted by medical authorities in Sweden. In this same year, the concept was extrapolated to other regions of the face, with the implant crossing the skin and enabling an excellent method to anchor auditory devices and facial prostheses. The first clinical case was done in a hearing loss individual, used to anchor an external hearing aid. In 1979, a second case served as anchor for the prosthetic ear of and individual who had lost his ear pinna because of a tumor ressection[4,5]. In 1995, the concept of facial prosthesis anchoring was also accepted by the American FDA (*Food and Drug Administration).*

However, with the advent of osseointegration, a number of limitations to its use cropped up during the first years of its applications. Individuals with diabetes mellitus, osteoporosis and, especially, irradiated patients, started to be advised against the implant. Radiotherapy was originally considered a contraindication to installing osseointegrated dental implants, as per published in the 1988 consensus[6]. Concerned with the secondary effects that radiation causes to the maxillary teeth in doses higher than 55 Gy, especially osteonecrosis, the same concern was automatically transferred to the extraoral implants[7].

Although the risk of osteoradionecrosis contraindicates the use of implants as a means of support treatment for prosthesis, the benefit they bring about for patient rehabilitation is huge and cannot be downplayed. Of the losses in irradiated patients, the craniofacial regions are the most affected: frontal bone 50%; zygoma 20%; temporal bone 8%[8].

The poor situation of the bony structure, usually modified by irradiation effects, may difficult osseointegration. The minimum trauma caused during bone perforation to place the implant can be a triggering factor for the onset of osteoradionecrosis, when carried out near the radiotherapy sessions. Notwithstanding, these effects may be overcome by increasing the contact of the bony structures with the surface implants. Originally, the extraoral implant had a smooth and ground surface, which along time was modified by the need to increase contact between the bone and the implant. These changes were based on acid blasting, anodization, implant design changes, with the aim of enlarging its external area. The radiotherapy effect and the osteoporosis in elderly patients are mentioned as the main causes of implant failure. The study of 631 implants installed on 107 irradiated individuals, within a 25-year period, compared to a control group, showed that implant failure rates are higher after previous radiotherapy. High failure rates happen after high doses of radiotherapy, or a long time after the irradiation. The cranial regions most affected by radiotherapy were the frontal bone, the zygoma, mandible and maxilla. The lowest failure rates were found in the maxilla[9].

Notwithstanding, hyperbaric oxygenation (HBO) is advised in order to avoid post-radiotherapy osteoradionecrosis[10]. Studies carried out in the University of Götemburg showed that hyperbaric oxygen increases angiogenesis and metabolism, acting as a growth factor and bone tissue renovation. From the clinical standpoint, HBO enables a better implant osseointegration in irradiated bones; protection against osteoradionecrosis; surgical complication reduction and healing increase in irradiated tissues.

In a case review study which happened before 1968, there were osteoradionecrosis rates (ORN) of 11.8%, compared to 5.4% after 1968. Such difference is associated with the fact that many radiotherapy units exchanged their orthovoltage devices for megavoltage and supervoltage in this period. Summaries from this last decade point to a 2.1% of osteoradionecrosis rate in previously irradiated patients. At the same time, dentists and radiotherapies became more aware as to radiotherapy secondary risks,