

Fabrication of an Implant-Supported Orbital Prosthesis with Bar-Magnetic Attachment: A Clinical Report

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Abstract

Implant-supported craniofacial prostheses are made to restore defective areas in the face and cranium. This clinical report describes a technique for fabrication of an orbital prosthesis with three adjacent implants in the left lateral orbital rim of a 60-year-old woman. Selection of appropriate attachment system (individual magnetic abutments versus bar-clip attachment) for implant-supported orbital prostheses depends upon the position of implants. Bar-magnetic attachment has been selected as the retention mechanism in the present case.

Keywords: Dental Implant; Ocular Prosthesis; Magnetics; Innovative Therapy; Prosthesis Retention

Journal of Dentistry, Tehran University of Medical Sciences, Tehran, Iran (2015; Vol. 12, No. 12)

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Received: 15 June 2015

Accepted: 3 November 2015

INTRODUCTION

Since the introduction of extra-oral implants in reconstruction of craniofacial defects, achieving proper prosthesis retention has become more promising [1]. Implant-supported prosthesis could minimize or eliminate the problems associated with conventional prostheses. These problems include ulceration of hard and/or soft tissues used for retention, lack of retention due to prosthesis movement, and tissue irritation caused by adhesives [2]. The ideal position and number of implants for restoring orbital defects would be three non-linear implants in lateral, supraorbital, and infra-orbital rims [3]. However, such implant arrangement is not

always conceivable considering the extension of the defect, and bone quality and quantity of defect's walls [4]. Two of the most common retention systems used in reconstruction of orbital defects include freestanding abutments with magnetic retention and bar-clip retention [3]. Magnetic abutments are more common because they resolve the potential problems associated with bar-clip attachment including difficulty in insertion and removal of prosthesis by the patient, difficulty in regular hygiene measurements, and rigidity of the attachment resulting in implant overloading [3,5]. However, magnetic attachment might not provide sufficient retention if implants have been placed adjacently.

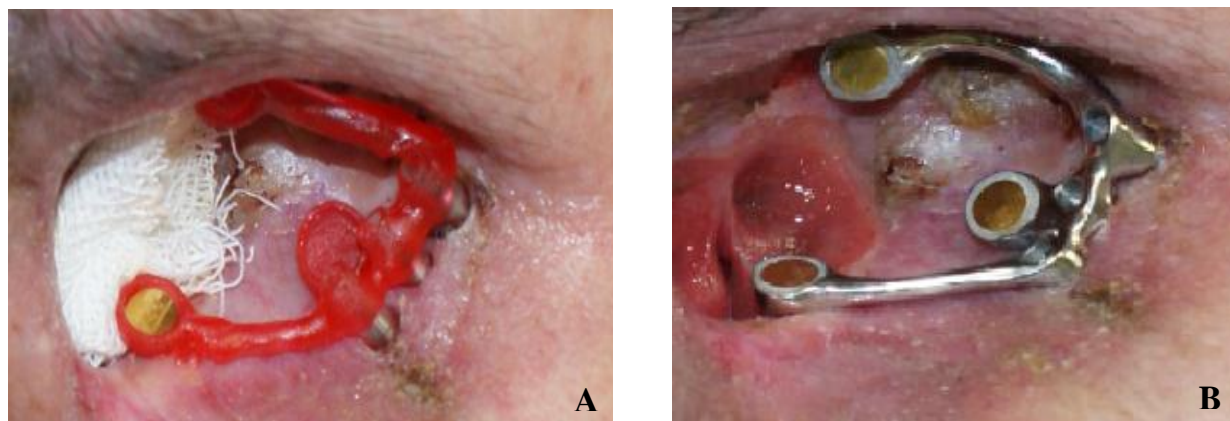


Fig. 1. Acrylic resin pattern of bar containing indentations for magnets (A), Try-in of metal bar on the implants with magnet keepers in place (B).

The presence of implant in the defective area might complicate the usual impression-taking procedures used in fabrication of conventional craniofacial prostheses [6,7,8]. Accuracy of the impression is affected by defect shape, retention system, number, and divergence of the implants [9]. Moreover, Anatomical undercuts in the defect, and proximity or remoteness of the implants could complicate the impression-taking procedure [2,10,11]. Use of multiple trays, elastomeric impression materials, and dual impression technique have been suggested to overcome such problems [2, 12-14]. The purpose of this article was to present a case treated with an implant-supported prosthesis to reconstruct a relatively large orbital defect using three adjacent implants in the lateral orbital rim.

CLINICAL REPORT

A 60-year-old woman with a left orbital defect due to removal of periocular basal cell tumor was referred to the Implant Department of Tehran University of Medical Sciences, School of Dentistry, for prosthetic reconstruction of the eye. Three implants (Superline, Dentium, Seoul, South Korea), 8mm in length and 3.6mm in diameter were placed in the lateral rim of the orbit. Although the most suitable sites for orbital implants are

the superior and lateral rims, in the present case the implants have been placed adjacently, due to insufficient bone thickness in superior and inferior orbital rims [3]. The defect was relatively deep with undercuts in the medial wall which could complicate impression making. The preferred prosthesis design was an implant-supported prosthesis with a custom bar containing properly distributed magnetic components. The healing abutments were unscrewed and three hexed direct-casting abutments (Implantium, Dentium, Seoul, South Korea) with 4.5mm diameter were directly secured to the implants. The medial undercuts were blocked out, using a gauze pack to avoid the penetration of acrylic resin. An auto-polymerizing acrylic resin (pattern resin, GC, Tokyo, Japan) pattern was formed directly on the abutments in a manner that cobalt samarium (Co5Sm) magnets (Implantium, Dentium, Seoul, South Korea), with 5.5mm diameter and retention force of 700 gram could be placed at proper distances in the superior, inferior and lateral segments of the acrylic bar (Fig. 1). The acrylic resin bar was casted using base metal alloy (Aalba dent Inc.; Cordelia, C.A, USA) and the magnet keepers were cemented in corresponding sites with Panavia F 2.0 resin cement (Kuraray Medical Inc, Japan).

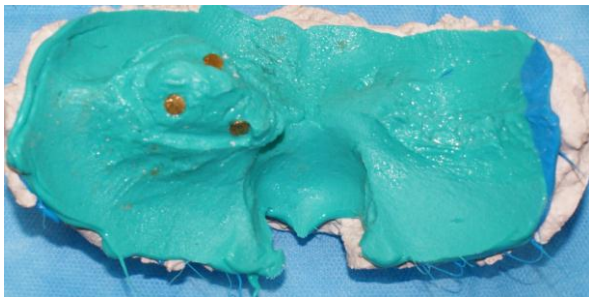


Fig. 2. Tissue side of the impression with picked-up magnets.

The bar magnet assembly was tried in the defect to ensure proper fitting. (Fig. 2). Afterwards, the space beneath the superstructure and also the undercuts in defect walls were blocked out with gauze packs. The final impression was made in order to pick up the magnets and simultaneously record the rest of the orbital defect. Light viscosity addition silicone (Panasil, Kettenbach, Germany) was used as the first layer to cover the entire defect as well as the intact side of the midface. Afterwards, regular viscosity addition silicone (Panasil, Kettenbach, Germany) was used over the light viscosity material to create mechanical retention projections for the gypsum layer (Herostone Vigodent Inc., Rio de Janeiro, RJ, Brazil) to improve impression's rigidity [2]. The impression (Fig. 3) was poured with type III dental stone (Herostone Vigodent Inc., Rio de Janeiro, RJ, Brazil) without implant or abutment analogues. The wax pattern of the orbit was formed containing an ocular prosthesis which simulated the properties of a healthy eye [6,7]. The pattern was tried on the patient and some

modifications were made to improve its esthetic and adaptation. The wax pattern was flaked according to orbital prosthesis fabrication principles [10]. The prosthesis was made of a combination of heat-cured acrylic resin for holding the magnets, and high-temperature vulcanizing silicone with internal/external staining and other characterizations of the skin, such as wrinkles, eye brow and eye lashes (Fig. 4, A). The final prosthesis was delivered to the patient (Fig. 4, B) and necessary home care instructions were provided such as removing the prosthesis during night, cleaning the eye defect with damp gauze, and the need for regular biannual follow-ups [6-9].

SUMMARY

The patient presented here has been treated with an implant-supported orbital prosthesis with bar-magnetic attachment. This retention mechanism might minimize the risk of mechanical overload on the implants compared to a conventional bar-clip attachment with cantilever arms. Despite the proximity of implants, the mentioned distribution of magnetic attachments has increased the retention through creating a tripod. Furthermore, since the acrylic resin pattern of the bar was made directly in the defective area, no implant or abutment analogues were used in final impression procedure. Prolonged chair-side time is a disadvantage of the stated method which could be justified considering the mentioned advantages.



Fig. 3. Tissue side of the prosthesis with three magnets (A), Delivery of the prosthesis (B)

REFERENCES

- 1- Wolfaardt J, Tjellström A, Parel SM, Wilkes GH. International perspective on treatment outcomes, in *Osseointegration in Craniofacial Reconstruction*. Chicago, Quintessence, 1998: 67–70.
- 2- Rilo B, Ferro I, Mora MJ, Santana U. A double-impression technique for craniofacial defects. *J Prosthet Dent*. 2005 Apr;93(4): 398-9.
- 3- Wolfaardt JF, Wilkes GH, Anderson JD. Craniofacial osseointegration: Prostodontic treatment, in *Clinical Maxillofacial Prosthetics*. Chicago, Quintessence, 2000: 291-4.
- 4- Ozcelik TB, Yilmaz B. Two-piece impression procedure for implant-retained orbital prostheses. *Int J Oral Maxillofac Implants*. 2012 Sep-Oct;27(5):93-5.
- 5- Thomas KF. Compromise in prosthetic treatment of orofacial defects: a clinical report. *J Prosthet Dent*. 1996 Aug;76(2):115-8.
- 6- Karakoca-Nemli S, Aydin C, Yilmaz H, Bal BT. A method for fabricating an implant-retained orbital prosthesis using the existing prosthesis. *J Prosthodont*. 2011 Oct;20(7):583-6.
- 7- Pruthi G, Jain V, Sikka S. A novel method for retention of an orbital prosthesis in a case with continuous maxillary and orbital defect. *J Indian Prosthodont Soc*. 2010 Jun;10(2):132-6.
- 8- Veerareddy C, Nair KC, Reddy GR. Simplified technique for orbital prosthesis fabrication: a clinical report. *J Prosthodont*. 2012 Oct;21(7):561-8.
- 9- Reisberg DJ, Habakuk SW. Orbital prosthesis, in *Osseointegration in Craniofacial Reconstruction*. Chicago, Quintessence, 1998: 245–58.
- 10- Karakoca S, Aydin C, Yilmaz H, Korkmaz T. An impression technique for implant-retained orbital prostheses. *J Prosthet Dent*. 2008 Jul;100(1):52-5
- 11- Ozcelik TB, Yilmaz B. Two-Piece Impression Procedure for Implant-Retained Orbital Prostheses, *Int J Oral Maxillofac Implants*. 2012 Sep-Oct;27(5):e93-5.
- 12- Salinas TJ, Penchas J, Prada-Valverde V, Guerra LR. A multiple tray technique for implant-retained orbital prostheses. *J Prosthet Dent*. 1995 Feb;73(2):158-61.
- 13- Coleman AJ, Schweiger JW, Urquiola J, Tompkins KA. A two-stage impression technique for custom facial prostheses. *J Prosthet Dent*. 1995 Apr;73(4):370-2.
- 14- Haug SP, Andres CJ. Fabrication of custom ocular prostheses, in *Clinical Maxillofacial Prosthetics*. Chicago, Quintessence, 2000: 266-76.