Minimizing movement of an orbital prosthesis retained by an obturator prosthesis

Karin Wieselmann-Penkner, MD, DDS, PhD,[a] Gerwin Arnetzl, MD, DDS, PhD,[b] Wolfgang Mayer,[c] and Rudolph Bratschko, MD, DDS, PhD[d]
Faculty of Dentistry, University of Graz, Graz, Austria

This article describes a procedure in which an obturator with an integrated spring-loaded rewinding device retains an orbital prosthesis. This system minimizes movement of the orbital prosthesis during mastication and thus prevents adhesive failure. (J Prosthet Dent 2004;91:188-90.)

Radical maxillectomy frequently leads to extended defects in hard and soft tissues that result in a connection between the oral and nasal cavities.[1-3] If the defect cannot be surgically reconstructed, an obturator prosthesis may be necessary to remedy dysfunction in mastication, deglutition, and speech. For minor defects, enlargement of the base of the prosthesis is generally sufficient.[1,2] Resections that affect more than one third of the maxilla usually require an effective extension into the defect to provide support and stability since the remaining alveolus is insufficient.[1,2] A 1-piece or sectional obturator prosthesis can serve these needs well.

The situation becomes more difficult, however, when there is an open connection to the orbit and the patient needs an orbital prosthesis in addition to the obturator. If the orbital prosthesis cannot be retained by osseointegrated implants, it may be fastened to the spectacle frame or fixed with adhesive systems.[4,5] With few or missing undercuts, however, mimic motion and sneezing can cause adhesive failure.[6] Thus, the orbital prosthesis may be attached to the obturator with magnets or buttons. Due to the missing orbital bone and the extended area of attachment between the obturator and orbital prosthesis, however, the obturator may lose vertical support and stability, and the attached orbital prosthesis may move during mastication, resulting in failure of the adhesive and compromising the marginal integrity of the prosthesis.[6]

This article describes a procedure in which an obturator with an integrated spring-loaded rewinding device retains an orbital prosthesis. This system minimizes movement of the orbital prosthesis during mastication and thus prevents adhesive failure.

TECHNIQUE

1. Fabricate a lightweight, closed, hollow obturator partial denture prosthesis from heat-processed acrylic resin (Palaxpress; Heraeus Kulzer, Wehrheim, Germany) in the usual manner.[3,7] Clinically verify the accuracy of fit after the prosthesis has been worn for a few days, and make necessary corrections.
2. Make an impression of the entire orbital defect with silicone impression material (Epiform-Flex; Dreve-Dentamid GmbH, Unna, Germany). Pour hard dental stone (Suprastone; Kerr GmbH,

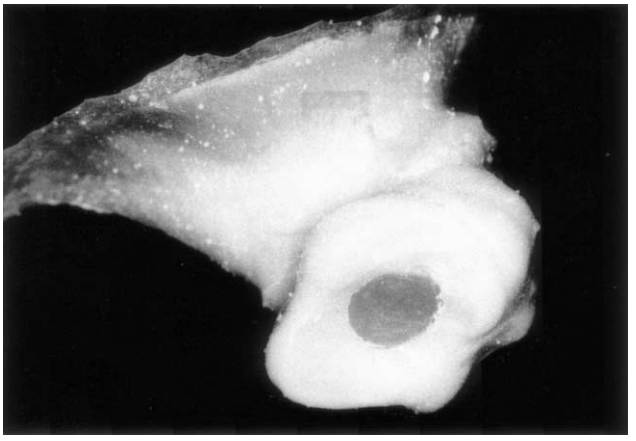

Fig. 1. Orbital prosthesis.

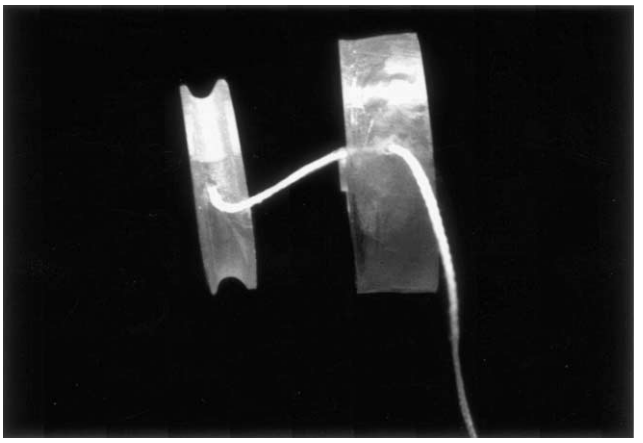

Fig. 2. Inner case with groove in circumference of outer edge for nylon string and outer case with hole in rim for nylon string.

[a]Assistant Professor, Department of Prosthodontics.
[b]Assistant Professor, Department of Prosthodontics.
[c]Anaplastologist.
[d]Professor and Chairman, Department of Prosthodontics.

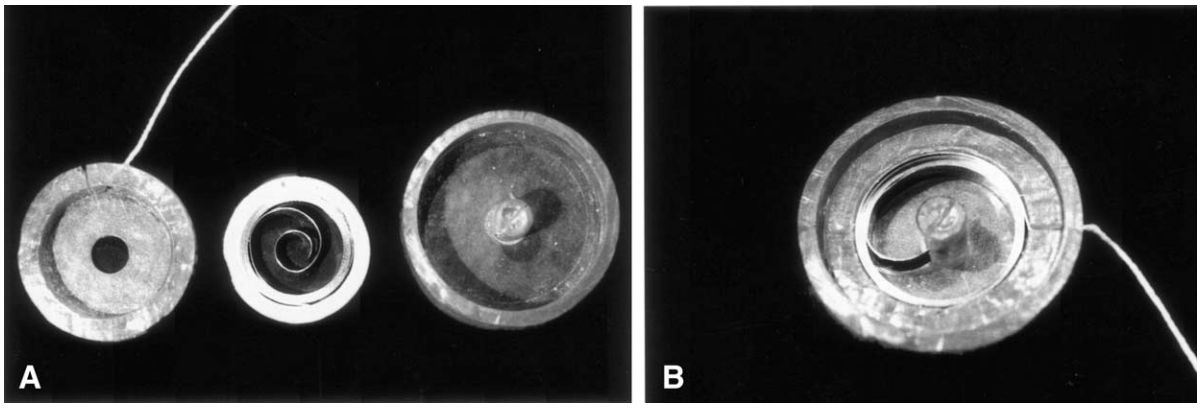

Fig. 3. A, Two acrylic resin cases, watch spring, and nylon string. **B,** Assembled spring-loaded device.

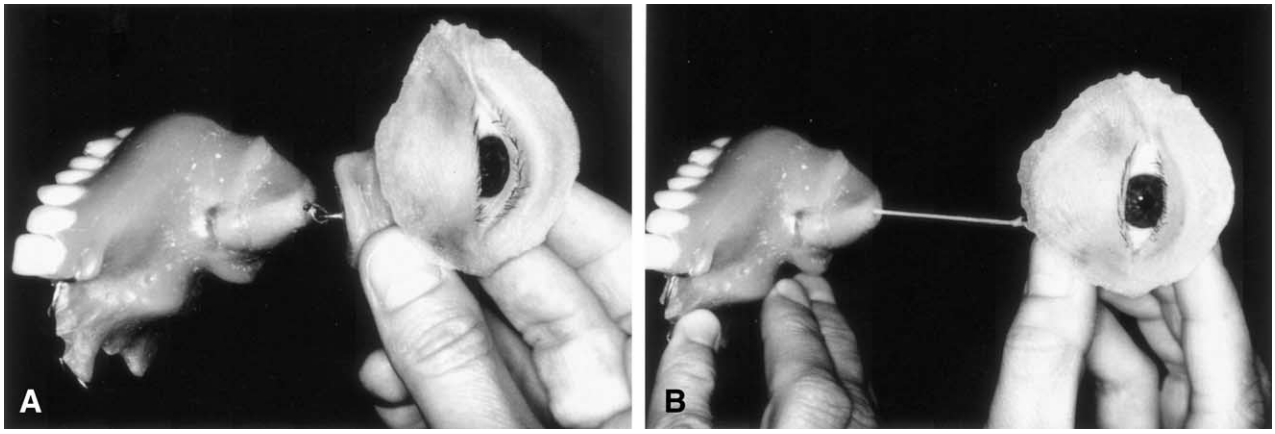

Fig. 4. A, Closed, hollow obturator prosthesis connected to orbital prosthesis by eye of string and wire sling. **B,** Obturator prosthesis with spring-loaded device, which allows for easy extraction of orbital prosthesis and, due to retaining effect of spring, holds prosthesis in place during movement.

Karlsruhe, Germany) into the impression for the definitive cast, fabricate a wax pattern of the orbital prosthesis, and complete the final sculpting after fitting it to the patient. If the orbital prosthesis is made of silicone, drill a hole into the center of the cast and insert a T-shaped resin pin (Pattern Resin; GC Corp, Tokyo, Japan) approximately 1 cm in length. Finally, invest the pattern in stone to form the mold, and fabricate the orbital prosthesis in the usual manner (Fig. 1).

3. Fabricate a spring-loaded rewinding device. For this purpose, make a round case 25 to 30 mm in diameter, with a rim 2 mm in width and 1 cm in height and a 5- × 7-mm round pin in the center of the case completely in wax. Next, fabricate a smaller inner case with a 4-mm–wide rim and a 5-mm–diameter hole in the center of the case. Fit it into the outer case, making sure that there is enough space for it to revolve, and cut a groove 2 to 3 mm in depth in the circumference of the outer edge (Fig. 2). This groove will accommodate a nylon string.
4. Invest the 2 wax case patterns (Novosil 1:1; Dentag, Bolzano, Italy). After extracting the molds, fill the forms with autopolymerizing acrylic resin (Pattern Resin; GC Corp). Finish the 2 cases, evaluating the movement between them as well as the availability of space for the nylon string.
5. Fix a nylon string approximately 15 to 20 cm in length to the inner case. Drill a hole in the rim of the outer case, pull the string through, and attach a wire-made eye (Remanium; Dentaurum, Ispringen, Germany) to it. Make a slit in the central pin, as well as in the rim of the inner case.
6. Take a 3.0-mm–thick, 0.2-mm–wide watch spring made of stainless steel (Nivaflex, Din 17224, No. 1.4310; Bergeon, Le Locle, Switzerland) and cut it to a length of 25 cm. Insert one end of the spring into the slit of the central pin. Wrap the spring around the

post and fix the other end of the spring in the slit of the inner rim with autopolymerizing acrylic resin. Rewind the nylon string and close the case with a lid of autopolymerizing acrylic resin (Pattern Resin; GC Corp) (Figs. 3 and 4).

7. Drill an opening in the orbital portion of the obturator, fit the case with the spring, and incorporate it with acrylic resin (Paladur; Heraeus Kulzer). If the case extends past the obturator, reduce the acrylic resin socket of the orbital prosthesis. Finally, insert a 1.1-mm wire sling (Remanium; Dentaurum) into the resin socket of the orbital prosthesis, and hook it into the eye of the obturator .

SUMMARY

A technique in which an orbital prosthesis is attached to an obturator by means of a spring-loaded rewinding device has been described. The main advantage of this procedure is that, because of the retaining effect of the spring, the orbital prosthesis stays in situ during various mimic movements as well as during sneezing. In contrast to magnetically retained sectional obturators, which are attached across larger areas, connecting the obturator and prosthesis exclusively via eye and hook avoids masticatory strain on the prosthesis and thus prevents adhesive failure. A further advantage of this method is its economical production, since expensive magnets are not needed.

REFERENCES

1. Aramany MA. Basic principles of obturator design for partially edentulous patients. Part II: design principles 1978 (classical article). J Prosthet Dent 2001;86:562-8.
2. Okay DJ, Genden E, Buchbinder D, Urken M. Prosthodontic guidelines for surgical reconstruction of the maxilla: a classification system of defects. J Prosthet Dent 2001;86:352-63.
3. Wang RR. Sectional prosthesis for total maxillectomy patients: a clinical report. J Prosthet Dent 1997;78:241-4.
4. McClelland RC. Facial prosthesis following radical maxillofacial surgery. J Prosthet Dent 1977;38:327-30.
5. Thomas KF. Prosthetic rehabilitation. London: Quintessence; 1994. p. 93-103.
6. Lemon JC, Chambers MS. Locking retentive attachment for an implant-retained auricular prosthesis. J Prosthet Dent 2002;87:336-8.
7. McAndrew KS, Rothenberger S, Minsley GE. An innovative investment method for the fabrication of a closed hollow obturator prosthesis. J Prosthet Dent 1998;80:129-32.

Reprint requests to:
Dr Karin Wieselmann-Penkner
Univ. Klinik für ZMK
Auenbruggerplatz 12
A-8036 Graz
AUSTRIA
Fax: (43)316-385-4064
E-mail: Karin.Wieselmann@kfunigraz.ac.at

0022-3913/$30.00

doi:10.1016/j.prosdent.2003.10.001

Noteworthy Abstracts of the Current Literature

Clinical classification of bone defects concerning the placement of dental implants
Carlo Tinti, Stefano Parma-Benfenati. *Int J Periodontics Restorative Dent* 2003;23:147-55.

The goal of this classification of bone defects related to dental implant placement is to help clinicians accurately discuss proposed treatment regimens and organize treatment for clinical correction. A further goal of this effort to categorize bone defects requiring bone augmentation for implant placement is to standardize terminology to allow for more accurate dental communication. The 5 most encountered categories of bony defects are described.—*Reprinted with permission of Quintessence Publishing*