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Modified Hygienic Epitec System Abutment for Magnetic Retention of Orbital Prostheses

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Abstract

Maintenance of healthy periimplant soft tissue is a significant problem for orbital prosthesis wearers. Two female patients with orbital defects after malignant tumor resection were treated using custom-made retentive components of an individual magnet for an Epitec System orbital prosthesis. Freestanding hygienic retentive components for an individual magnet were fabricated. An abutment replica was trimmed and modified, and using pattern resin, a magnetic keeper was cast and soldered to the abutment. The patients could maintain good hygiene and healthy periimplant soft tissue. This type of freestanding retentive component may be advantageous for the hygiene maintenance of periimplant soft tissue.

The prosthetic restoration of facial defects is often indicated despite progress in reconstructive surgery. Facial prostheses may be more advantageous than reconstructive intervention for patients in poor overall health and for large defects following surgical resection of tumors. Traditional means of fixation of facial prostheses include engagement of hard and soft tissue undercuts, attachment of the prosthesis to eyeglass frames, and use of skin adhesives.[1] The introduction of osseointegrated implants greatly improved the support, stability, and retention of facial prostheses;[1–4] however, available bone at the defect site is often not sufficient for placement of implants.

While screw-shaped or cylindrical implants are typical osseointegration systems, an alternative plate-like system is also available.[1] The Epitec System consists of a 3D carrier-plate, which is fixed by means of short bone screws to a site where sufficient bone is available.[1] This 3D carrier-plate contains screw inserts, into which posts of varying length are affixed.[1]

Maintenance of healthy periimplant soft tissue is a significant problem with the use of skin-penetrating implants. There appears to be direct correlation between the level of hygiene compliance and soft tissue reactions.[5,6] The amount of debris on the abutments has been reported to be much higher in orbital defects than the amount around implants placed in other facial defects.[5] Monocular vision and the associated decrease in depth perception may reduce patients' ability to visualize their defects, manipulate hygiene aids, and assess the quality of their hygiene.[5,6] It is difficult for patients with an orbital prosthesis to maintain adequate implant hygiene. Orbital sites are the most difficult for patients to clean and have the highest rates of periimplant tissue reaction.[5] It is recommended that the orbital implants should be placed in patients who understand that these implants require meticulous hygiene maintenance and that long-term success rates may be low, particularly in irradiated orbital defects.[5] Hygiene maintenance is considered more demanding for a plate-like implant system.[1] To simplify hygiene procedures, a custom-made freestanding magnetic retentive abutment was fabricated.

Clinical reports

Two female patients (56 and 71 years old) were referred to the Department of Oral and Maxillofacial Surgery, Kyoto University, for evaluation and treatment of orbital exenteration defects. The patients had undergone orbital exenteration to remove malignant neoplasms. Stage I implant surgery was performed under general anesthesia. An incision was made in the orbit and the 3D carrier-plate (Epitec System, Leibinger, Freiburg, Germany) was inserted. The 3D carrier-plate was bent and optimally adapted to the bony surface. All screw holes not necessary for screw fixation to the bone were covered with "sleeping screws." The plate was fixed with bone screws to the infraorbital rim. Three months after the first operation, two sleeping screws were removed and two implant posts (5 and 6 mm) were

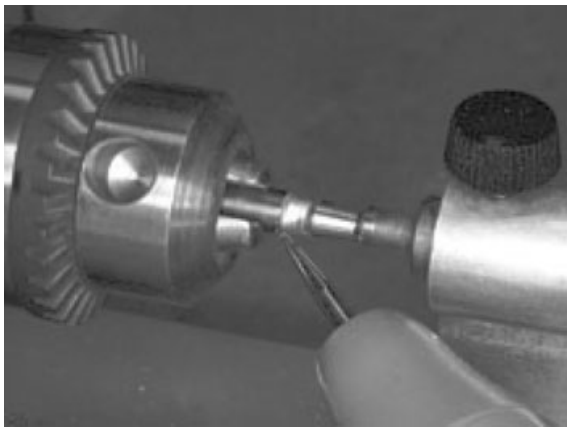

Figure 1 Abutment replica was trimmed with lathe.

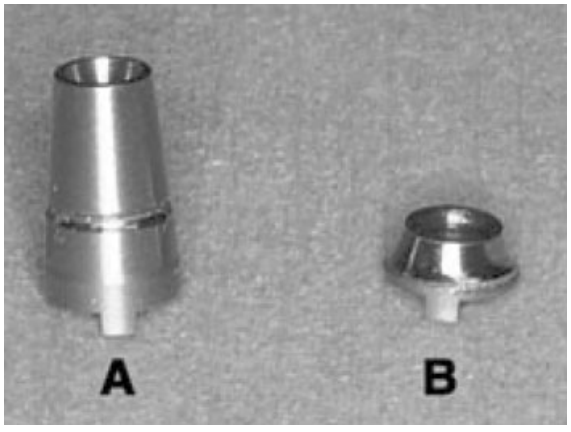

Figure 2 Abutment replicas before (A) and after (B) trimming.

inserted. Following healing of the periimplant soft tissues, secondary abutments were anchored onto the posts for fixation of the prosthesis.

After approximately 4 weeks, impressions were made, and a master cast was produced. An abutment replica (Epitec System) was trimmed using a lathe (Proxxon Mini Wood Lathe No. 28140, Kiso Power Tool, Osaka, Japan) (Figs 1 and 2). A stainless steel screw and a nut were screwed in the lathed abutment and trimmed with the lathe (Fig 3). An abutment part using gold-palladium-silver alloy was cast (Prime Cast, Morita, Tokyo, Japan) from a resin pattern with autopolymerizing resin (Pattern Resin, GC, Tokyo, Japan) on the lathed abutment (Fig 4). The cast component and the abutment were soldered

Figure 3 Lathed stainless nut and screw in abutment.

Figure 4 Resin pattern for abutment part.

Figure 5 Cast component and abutment were soldered.

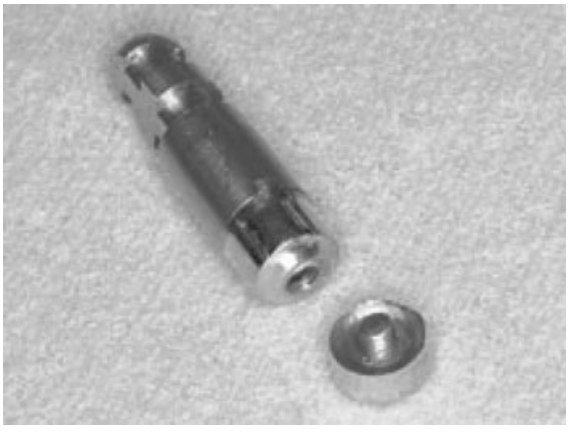

Figure 6 Stainless magnet keeper and custom abutment.

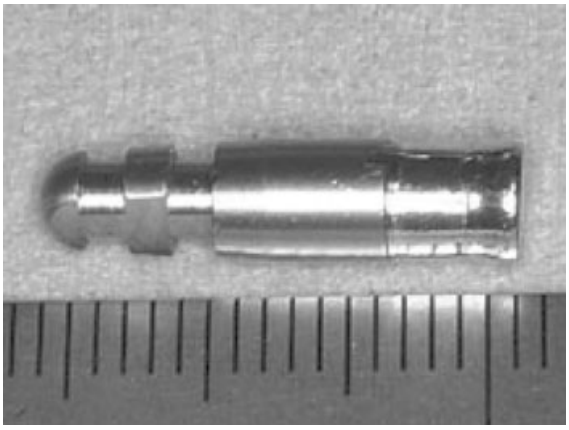

Figure 7 Completed custom abutment with magnet keeper tightened into position.

with gold solder and polished (Fig 5). On the component, a stainless magnetic keeper for a magnet (Hyper Slim Magnet 4513, Morita) was cast from the resin pattern on the abutment (Figs 6 and 7). Figure 8 shows the completed magnet abutment in position in the orbital defect. A wax sculpting that included the globe and surrounding lid contours was developed. The orbital prostheses were fabricated using a polysiloxane material (Factor II, Lakeside, AZ) (Figs 9 and 10).

The patients received hygiene instructions upon delivery of the orbital prostheses. Daily home care of the abutments and retentive components included mechanical debridement with a soft toothbrush and irrigation with warm water and Azunol Gargle Liquid (Nippon Shinyaku Co, Kyoto, Japan).

The patients were able to comfortably wear the prostheses and demonstrated excellent hygiene and periimplant soft tissue health. Corrosion of the magnets was not detected. Slight redness of the periabutment soft tissues was eventually present, but no infection was observed. The patients reported no complications, and the length of follow-up was 29 months in one patient and 41 months in the other. There was no implant failure in either patient.

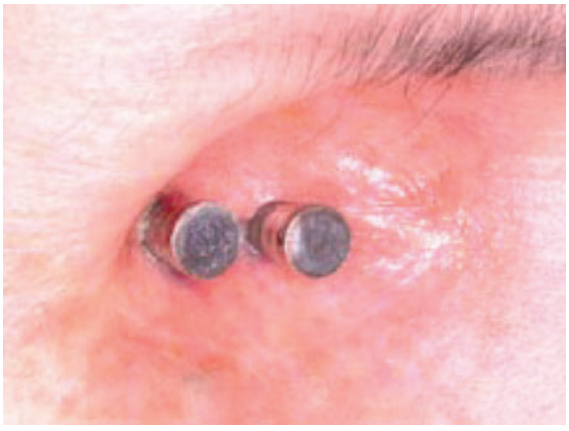

Figure 8 Retentive magnets components in right orbital defect 41 months after insertion.

Figure 9 Completed orbital prosthesis in place (Case 1).

Discussion

Hygienic retentive components for a plate-like, implant-retained orbital prosthesis were fabricated. The retentive components provided greater space to keep the restorative components within the confines of the prosthesis, greater restorative and placement flexibility, and better access for patient hygiene.

Figure 10 Completed orbital prosthesis in place (Case 2).

The type of retention used for an orbital prosthesis should be determined based on factors such as size and depth of the defect, position and number of implants, and loading situation. The available retentive systems include bar construction and retentive clips, individual magnets, and ball attachments. The magnetic retention system consists of a magnet cap, which is threaded onto the abutment, and a magnet placed into the tissue side of the prosthesis. The use of magnets to retain facial prostheses appears to have gained renewed interest. This is attributed in part to improved retention strength and reduced corrosion. Magnetic retention has been promoted for use with auricular, orbital, and nasal prostheses.[1] Magnetic retention leaves the implants lone standing, which is simpler for maintenance of hygiene; it has also been suggested that magnets result in less stress to the implant.[6] Freestanding abutments with magnetic retention are often employed in the orbit;[7,8] however, magnets are not part of the Epitec System and must be custom-made.

Osseointegrated implants are normally inserted in the supraorbital or infraorbital rims. On the other hand, the Epitec System can be shifted to a more favorable position by means of the 3D carrier-plate. The implants can be placed on the roof or floor of the orbit. From the standpoint of retention of the magnet and hygiene maintenance, the positioning of abutments on the roof or floor of the orbit may be more favorable as compared to the orbital rim.

In previous studies, implant success in orbital defects (35%)[5] was significantly lower than for auricular (100%)[9] or nasal (71%)[10] defects. The orbital soft tissue response to implants in that study was poorer than the response reported for auricular and nasal defects.[5,9,10] Thorough instruction about maintenance of hygiene is indispensable on every follow-up visit, until the patient can clean the periimplant soft tissue. Patients need to be compliant with homecare regimens and willing to return for follow-up visits. Patients also need to possess adequate dexterity to manipulate the prosthesis and carry out hygiene procedures.[1] Further careful follow-up will be required to determine the long-term efficacy and the risk of periimplantitis and implant failure.

Conclusion

A custom-made freestanding retentive component for an individual magnet was fabricated to make it easier for patients with a plate-like, implant-retained orbital prosthesis to carry out hygiene maintenance.

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