

Surgical and Prosthetic Rehabilitation of Edentulous Adult Cleft Palate Patients by Dental Implants

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Abstract: Adult patients who did not receive proper treatment for cleft palate are challenging for clinicians in terms of prosthetic rehabilitation. Moreover, during the late stages of adulthood when patients become edentulous, prosthetic reconstruction becomes even more challenging. This clinical report describes the prosthetic rehabilitation of 2 edentulous geriatric patients with unrepaired cleft palate by placement of dental implants after closure of the oronasal communications.

Key Words: Adult cleft palate, implant, overdenture

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Prosthetic rehabilitation requires adequate hard- and soft-tissue support. This aspect is of particular importance when the relationship of various anatomic structures is considered after reconstructive surgery.¹

Patients who did not receive proper treatment for cleft palate (CP) have often several disorders in the dentofacial region. Typical problems created by unrepaired CP include immature and collapsed maxillary arch, dysphagia, hypernasal speech, compromised chewing ability, palate with scar tissue, resorbed alveolar ridges, loss of vestibular depth, and oronasal communication. In addition, during the later stages of life when patients become edentulous, those issues related with CP become troubling and more challenging in terms of prosthetic rehabilitation.^{2,3} Proper timing and planning of surgical reconstruction significantly reduce the functional and cosmetic disadvantages in CP patients. Ideally, management of CP patients should begin early. Typically, bony defects can be primarily closed in infancy, resulting in small residual oronasal fistulae if any, thus improving the quality of speech and avoiding rhinolalia. Concomitant reconstructive procedures and medical care provided by professional teams treat all aspects of CP patients before they enter adulthood. On the other hand, although their numbers are rare, adult patients with CP who have not received proper treatment are still present. Adult CP patients may require obturators or removable prosthesis for the restoration of form and function.⁴ However,

functional disturbances are still remarkable when using removable prosthesis in this patient population, particularly if the patient is nearly or completely edentulous.

Osseointegrated implants have proven reliable for the treatment of edentulous patients for 30 years.^{5,6} In the 1990s, implant applications were used to restore acquired and developmental craniofacial jaw defects. Recently, the application of implants for prosthetic restoration in patients with CP also has become a favorable option.^{7–9} There are few reports in the literature regarding the rehabilitation of elderly patients with unrepaired CP. The aim of this report was to describe the rehabilitation of 2 edentulous geriatric patients with CP using dental implant-supported overdentures.

CLINICAL REPORTS

Patient 1

A 62-year-old male patient was referred to the Department of Oral and Maxillofacial Surgery in Ankara University with complaints of rhinophonia and unilateral CP. The patient expressed problems regarding lack of retention of the maxillary complete denture. The oral examination of the patient revealed an oronasal communication with some scar tissues related with previous operation and unilateral deficiency in the right side of the palate (Fig. 1). Only right mandibular lateral and canine teeth were present. A treatment plan was made in accordance with the patient's demands.

Reconstruction of the oronasal communication was completed under general anesthesia. After 5 months of healing, 4 implants (Swissplus; Zimmer, Carlsbad, CA) were placed under local anesthesia. Four implants were placed in both upper lateral incisor and first premolar sites symmetrical in relation to the sagittal plane (Fig. 2). After 6 months of healing, a bar design was selected to retain the overdenture (Fig. 3). The desired shape of the bars was completed in wax, and they were positioned on the cast with the help of a surveyor (Cruise 440; Silfradent, S. Sofia, Italy). The trial placement of the bars was performed intraorally.

Prosthetic reconstruction was started with impressions of both maxilla and mandible, which were obtained by an irreversible hydrocolloid material, and then type III dental stone was used for the fabrication of diagnostic casts. The diagnostic casts were used for the fabrication of custom trays. The impression posts were placed onto the implants, and definitive impressions were made for the maxillary overdenture and mandibular removable partial denture (RPD) with custom trays. An elastomeric impression material (Impregum F; 3M Espe, St Paul, MN) was used for the maxillary impression, whereas an irreversible hydrocolloid impression material (Cavex CA37; Cavex Holland BV, Haarlem, the Netherlands) was used for the mandible. The analogs were screwed onto the impression copings, and the casts were poured with type IV dental stone (Bego Stone Plus; BEGO, Bremen, Germany). Autopolymerized acrylic resin bases with occlusal rims were fabricated, and centric relation record was obtained. The casts were mounted on a semiadjustable articulator.

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FIGURE 1. Patient 1 preoperative intraoral view.

A Co-Cr alloy (Degudent; Degudent GmbH, Hanau, Germany) was used for the fabrication of the maxillary bar and framework for mandibular RPD. The frameworks were intraorally evaluated in terms of fit and retention. Artificial teeth (Vita; Vita Zahnfabrik, Bad Sackingen, Germany) were arranged, and wax-up of dentures was performed. The wax try-in was performed intraorally, and fit, occlusion, and aesthetics were evaluated. The maxillary overdenture and mandibular RPD were processed with a heat-polymerized acrylic resin (Paladent 20; Heraeus Kulzer GmbH, Hanau, Germany). The titanium attachment was mounted into the maxillary overdenture during the molding procedures that were performed in the laboratory. Final occlusal adjustments were performed, and the connecting bar was screwed to the implants with a torque of 35 N. The dentures were placed, and the patient was given instruction regarding oral hygiene and maintenance of the dentures. Three-year postoperative examination revealed satisfactory hygiene and function (Figs. 4 and 5).

Patient 2

A 70-year-old male patient was referred to the Department of Oral and Maxillofacial Surgery in Ankara University. The patient's clinical and radiographic examination revealed complete edentulism except for an impacted mandibular right wisdom tooth with a unilateral CP, which had not been previously repaired (Figs. 6 and 7). The maxillary arch was deficient anteriorly. The patient's complaints were rhinolalia, discomfort in eating, and difficulty during mastication and speech. The patient did not have previous surgical CP repair and was wearing an obturator (Fig. 8). Surgical management of CP was done under general anesthesia. After 5 months of healing, 4 implants (Swissplus; Zimmer) were placed symmetrically to both

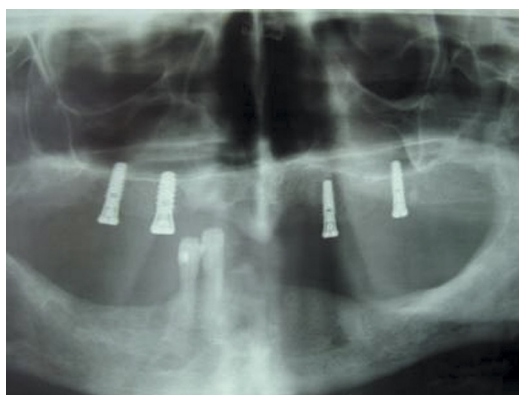


FIGURE 2. Preprosthetic panoramic radiograph of patient 1.



FIGURE 3. Intraoral view of interconnecting bars (patient 1).

premolar sites in the maxilla (Fig. 9). Bar-retained connectors were used as the attachment parts during the fabrication of the overdenture (Fig. 10). A complete denture was fabricated for the mandible. Similar prosthetic procedures that were performed for the previous patient were followed. The patient remained satisfied in the recall examinations (1–4 years) (Fig. 11).

DISCUSSION

The overall goals in the treatment of children with CP are functionally rehabilitated young adults, who can perform well in society. Rehabilitation goals include acceptable speech and appearance, as well as proper occlusion and masticatory function. Currently, teams of highly trained specialists are collaborating in the management of CP patients. Management of CP patients is initiated in early infancy and continues until the late teens or early adulthood.^{10,11} Dental specialists such as oral and maxillofacial surgeons and orthodontists start contributing to the treatment of CP patients at an early age. Prosthetic restoration of missing teeth generally starts at later stages if necessary.

Surgical repair in early life is considered a powerful determinant for the type and extent of the prosthodontic treatment that will be required. When an adult CP patient with no or improper treatment presents, reconstructive prosthodontic treatment with removable prostheses serves as an important element. Prosthetic treatment of the patients with unrepaired CP is a challenge and becomes even more challenging, especially when there are no teeth present to provide prosthetic retention. Obturator dentures are an option in unrepaired CP patients, but they are difficult for the patient to use. Retention of the obturator prosthesis is compromised because of its relatively massive and accordingly weighty



FIGURE 4. Intraoral view of definitive maxillary overdenture (patient 1).



FIGURE 5. Frontal view of definitive dentures (patient 1).



FIGURE 8. The obturator that patient 2 used before implant application.



FIGURE 6. Preoperative panoramic radiograph of patient 2.



FIGURE 9. Panoramic radiograph after implant placement (patient 2).

structure. Moreover, border sealing of these dentures could be compromised because of an oral nasal opening. Tissue undercuts superior to the hard palate could be used for mechanical retention, but this is not always possible to accomplish without the use of a 2-piece obturator.¹²

There are few reports in the literature concerning the treatment of unrepaired CP in adults, particularly in recent years due to proper management.^{8,13} The patients in this report were at the ages of 62 and 70 years when they were referred to the Oral and Maxillofacial Surgery Clinic with unrepaired CP. To the best of the authors' knowledge, the second patient in this study is the oldest one reported in the literature. Initially, patients underwent reconstructive

surgery to close the oronasal fistula. After patients recovered from initial surgery, dental implants were inserted to support the maxillary denture. Dental implants played a key role to effectively support the maxillary denture. Otherwise, it was not possible to stabilize the denture, because of irregular soft-tissue borders created by the late reconstructive surgery patients underwent for prolonged CP. The surgical combination of reconstruction of CP and placement of dental implants has revealed a successful outcome for both patients. Dentures performed well in terms of stability and retention, which enabled both patients to function properly during mastication and speech. In addition, after successful reconstruction of the CP and



FIGURE 7. Patient 2 preprosthetic intraoral view.



FIGURE 10. Intraoral view of interconnecting bars (patient 2).

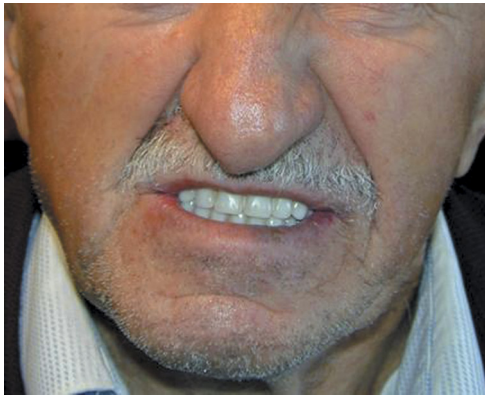


FIGURE 11. Frontal view of definitive dentures (patient 2).

closure of oronasal communication, patients reported improved and more comfortable eating.

Introduction of dental implants improved prosthesis retention, stability, and occlusal function in many patients, such as those with acquired and/or congenital defects (trauma, malignant tumors, CP).^{14–16} The number of dental implants that could be used to reconstruct the patient was limited to the quantity and quality of available bone. In particular cases, bone augmentation, bone grafting, and/or implant site development could be possible to acquire available bone. In other cases, if the number of implants was insufficient to support or retain the prosthesis entirely, an overdenture design could be used. Therefore, the prosthesis could also gain additional support, retention, and stability from the residual soft and hard tissues.¹⁷ Bars and stud attachments are the primary attachment systems compatible with most implant systems available.¹⁵ In cases where posterior maxilla provides better bone support compared with the anterior region, as in this CP defect case, parallel placement of 2 separate bars supported by dental implants could be used to the left and right posterior maxillary regions.¹⁸ Harrison¹² reported the placement of 4 implants (2 per side) into the posterior maxillae to stabilize and retain a complete maxillary overdenture. Similarly, in this report when irregular soft-tissue borders of maxillae for both patients were considered, placement of implants was deemed to be advantageous in terms of retention and stability of definitive dentures. The healthy segments of the maxillae were preferred to place the implants, which provided better stability for prosthetic loading.

CONCLUSIONS

Today's standard of care for CP patients minimizes the need for prosthetic treatment such as obturators or removable dentures. Even though it is rare, there are still some adult CP patients who are in need of proper prosthetic care. Restoration of mastication and aesthetic appearance by dentures are regarded as therapeutic goals in these patients who have congenital malformations. This provides the patient self-confidence and a better quality of life. In the presented cases, reconstructive surgery and the use of dental implants

improved prosthetic rehabilitation of the edentulous adult patients with CP.

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