Cleft palate with or without cleft lip is the most common malformation of the orofacial region that results from delayed cell migration during palate development.\(^1\)\(^2\) The etiology of cleft palate is thought to include endogenous factors such as genetic disorders and exogenous factors such as environmental teratogens that can cause congenital defects. The environmental factors include cigarette smoke, systemic corticosteroid treatment, drug and lead pollution, viral effects, and maternal malnutrition.\(^3\)\(^5\) Increasing maternal age may increase the risk for cleft palate.\(^5\)

Contemporary treatment concepts for cleft palate correction require early surgery at birth or in childhood. Speech and hearing functions can be improved by cleft closure before 2 years of age, because speech development in children from birth to 5 years of age is more rapid than that in any other phase of life.\(^7\)\(^9\) However, surgical treatment during the maxillary growth phase may result in residual ridge collapse followed by midface growth inhibition.\(^7\)\(^10\)

Although mandibular growth is generally normal in patients with a cleft palate, adolescent or adult patients who are not treated for cleft closure at the optimal time experience posterior reverse articulation, resulting from the collapse of the maxillary arch due to palatal muscle strain and scar retraction.\(^11\) The occlusal vertical dimension of these patients is consistent with that of individuals without clefts.\(^12\) However, the maxillary length decreases slightly because of anteroposterior growth defect, leaving the patients with insufficient facial support and a concave maxillary lip.\(^13\) Treatment options are arch expansion after residual ridge augmentation with autogenous graft from the iliac crest or tooth-supported or implant-supported partial fixed dental prostheses.\(^14\)\(^15\)

However, the closure of a cleft palate is more difficult in adults than in infants because of the wide cleft and irregular palate surface around the suture and the higher incidence of postoperative complications.\(^16\)

If the cleft area is not closed completely with surgery, partial removable dental prostheses can be used to replace missing teeth and to compensate for tissue deficiencies that interrupt the continuity of the dental arch; however, they rest on soft tissue and may cause irritation.\(^15\) In this instance, an overdenture supported entirely by the teeth may be a reasonable method of avoiding soft tissue injury in the cleft area. This
denture combines the advantages of the partial removable prosthesis and fixed dental prosthesis because it minimizes the vertical movement of the denture base during masticatory function, facilitates access for cleaning of the abutment teeth, and, by providing maxillary lip support, improves facial appearance.18-22

Although several attachments are available to enhance the retention of the denture,23 telescopic crowns are preferred, because they increase the retention and stability of the denture and the splinting effect and axial load distribution on the abutment teeth.18,22,24-26 Zirconia can be considered for the primary crown because it has low plaque accumulation, is biocompatible with soft tissues, allows the elimination of the metal margin, and has low fracture rates.19,20 Pellecchia et al20 discussed the advantages of using a partial fixed dental prosthesis retained with a zirconia primary coping after the surgical closure of the cleft lip and palate.

Retention of overdentures with telescopic crowns relates to the fit of the copings.21 An electroplated gold secondary coping is fabricated directly on the ceramic primary coping. This process ensures a precise fit of copings and a higher retention force than with cast copings because it eliminates the misfits that result from the impression, cast, and die systems.27,28 Retrospective studies on the use of ceramic and electroplated gold copings have reported long-term clinical survival rates.19,21 This clinical report presents the prosthetic rehabilitation of a patient with a unilateral cleft palate defect that surgical repair had not closed completely.

**CLINICAL REPORT**

A 19-year-old woman with a unilateral cleft palate applied to the Faculty of Dentistry of Istanbul University for prosthetic treatment. The patient had undergone surgical closure of the oronasal fistula and cleft palate with bone grafting from the iliac crest 1 year previously. Clinical examination found a wide alveolar defect, multiple missing teeth in the cleft region, and posterior unilateral left reverse articulation due to a narrow maxillary arch. The maxillary left first premolar had rotated approximately 90 degrees from the normal position and exhibited enamel defects caused by developmental abnormalities (Fig. 1). Preoperative panoramic radiography showed the oronasal fistula and showed that the maxillary incisors, maxillary right canine, and premolars were congenitally missing (Fig. 2).

All treatment options were discussed with the patient, including surgical and prosthetic treatments. The...
patient rejected an additional bone grafting procedure for the implant placement, because she did not want additional surgery. The overdenture that would be supported entirely by the teeth was required to prevent the denture movement and pressure on the cleft area and to replace missing hard and soft tissues. The zirconia primary and the electroplated gold secondary telescopic crowns were proposed because of their suitable biologic, esthetic, and mechanical properties. The patient accepted the proposed denture and retainer option, and informed consent was obtained.

The patient had mandibular anterior crowding resulting from insufficient arch space but declined an orthodontic appliance because of the lengthy treatment time. The lingually erupted mandibular left lateral incisor was extracted to relieve crowding without orthodontic appliances, creating a space for natural alignment and providing an improvement in the position of the incisors. The right maxillary first molar and both left maxillary premolars were prepared as parallel as possible to each other with axial walls close to parallel. The margin preparation was completed with a rounded shoulder finish line located subgingivally on all surfaces with a diamond rotary cutting instrument (G141, 014; Medin, a.s.) in a highspeed handpiece.

Impressions were made with polyvinyl siloxane material (Silagum; DMG ChemPharma Fabrik GmbH). The definitive cast was scanned by using software (DWOS; Dental Wings Inc) and a scanner (3Series; Yenadent, Yena Makina San Tic Ltd). The zirconia primary copings of 0.5-mm thickness and 4-degree taper were fabricated by a computer-aided design and computer-aided manufacturing (CAD/CAM) system (D43; Yenadent)
from a presintered zirconia block (VITA In-Ceram YZ; VITA Zahnfabrik) and were evaluated for fit intraorally (Fig. 3). Pure gold (DeguDent GmbH) secondary copings of 0.25-mm thickness were fabricated on the zirconia copings by direct electroplating with the Solaris system (DeguDent GmbH).

The zirconia primary copings were cemented to the abutment teeth with dual-polymerized self-adhesive resin (BisCem; Bisco Inc). The gold copings were placed on the zirconia copings (Fig. 4), and the denture framework cast with a Co-Cr alloy (Wironium; Bego, Herbst GmbH & Co KG) was evaluated for fit on the copings (Fig. 5). The framework was bonded intraorally to the gold copings with autopolymerizing adhesive resin (C&B Cement; Bisco). The definitive framework impression was made with the polyvinyl siloxane material (Silagum; DMG Chem-Pharma Fabrik GmbH) to fabricate a new definitive cast. The prosthesis was completed with veneering material (Solideo; Shofu Dental GmbH), acrylic resin denture teeth (Vitapan; VITA Zahnfabrik), and a heat-polymerized resin denture teeth (Vitapan; VITA (Solidex; Shofu Dental GmbH), acrylic resin (Rapid Simplified; Vertex Dental) (Fig. 6A-C).

The polished denture was inserted intraorally and evaluated for occlusion, retention, and stability. After oral hygiene instructions, the patient was recalled after 24 hours, 1 week, 1 month, 3 months, and 6 months for examination and cleaning of the denture. During the patient recall periods, no soft tissue injury, periodontal disease, or esthetic failures were observed, and the denture retention was satisfactory.

SUMMARY

This clinical report describes the prosthetic rehabilitation of a patient with a unilateral cleft palate that had not been closed completely with surgical repair. The tissue deficiencies that had interrupted the continuity of the maxillary dental arch were restored with the entirely tooth-supported overdenture. This denture improved the patient’s facial appearance, speech, and masticatory functions.

REFERENCES