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CLINICAL REPORT

Use of an esthetic overdenture as an alternative treatment in a patient with bilateral cleft lip and palate

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ABSTRACT

Stable occlusion and a pleasing esthetic appearance are often difficult to achieve in patients with congenital defects and severe midfacial deficiencies. Conventional therapy, such as orthodontic treatment followed by orthognathic surgery, is often not sufficient to fully correct the dental and esthetic problems. An interdisciplinary approach for these patients should include prosthodontic treatment that will assist in establishing a harmonious occlusion and improve facial appearance. This clinical report describes the interdisciplinary approach for a young patient with a history of bilateral cleft lip and palate, spina bifida, hydrocephalus, and ventriculoperitoneal shunt. The patient was treated with conventional orthodontic treatment and orthognathic surgery that failed to fully correct the malocclusion. A removable overlay prosthesis made of crystallized acetyl resin was used to reestablish esthetics and create a stable occlusion. (J Prosthet Dent 2019;121:200-5)

Patients with cleft lip and palate often present with several complicating factors, such as maxillary hypoplasia that results in severe midface deficiency, decreased vertical dimension, anterior and/or posterior cross-articulation, several missing and malposed anterior and posterior teeth, unfavorable soft tissues, and a tense upper lip.[1] Dental treatment planning for these patients involves the collaboration of multiple disciplines, including orthodontics to help achieve a stable occlusion and orthognathic surgery to correct the facial deformity.[2-4] The possibility of relapse after the surgery is high in patients who require more than 10 mm of advancement[5] because the presence of scar tissue in the palate and the upper lip can restrict the surgical movement of the maxilla and cause retrusion to the preadvanced position.[6,7] Posterior pharyngeal flaps from previous surgeries and occlusal disharmonies also contribute to the risk of relapse.[7,8] Distraction osteogenesis has been used as an alternative to conventional surgery to correct the anterior-posterior deficiency[9] in such patients. Frequently, prosthodontic therapy is needed to help establish a pleasant smile and an acceptable facial appearance, both of which are crucial in the full psychosocial development of patients with cleft lip and palate who are usually introverted.[10,11]

For patients with cleft lip and palate, prosthodontic treatment alternatives vary from fixed dental restorations[1,9,12] to removable dental prostheses. They include

Figure 1. Full face, frontal view, before treatment.

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Figure 2. A, Intraoral view of teeth in centric occlusion before treatment. B, Occlusal view of maxillary arch before treatment.

those supported by the remaining natural dentition, a combination using both teeth and implants, or only dental implants.[13-15] Superstructures supported by telescopic crowns,[1,12,16] swing-lock attachments,[17] or dual-path removable partial denture prostheses[18,19] have also been used for the oral rehabilitation of these patients. Recent changes in technologies and materials have allowed the introduction of new prosthesis designs for the rehabilitation of complex situations in such a way that oral hygiene is facilitated and limited finances are accommodated.

This clinical report describes the multidisciplinary treatment of a young patient with a complete bilateral cleft lip and palate and his prosthodontic rehabilitation with a removable overdenture made of crystallized acetyl resin. This overdenture restored the facial appearance of the teeth providing a pleasing smile and allowed the establishment of a stable occlusion.

CLINICAL REPORT

A 15-year-old boy with a history of a complete bilateral cleft lip and palate and spina bifida, ventriculoperitoneal shunt, and hydrocephalus presented for treatment at the Augusta University Craniofacial Center, The Dental College of Georgia (Fig. 1). The patient had a Goslon Yardstick IV, skeletal class III malocclusion showing severe maxillary hypoplasia with dolichocephalic facial type, and cleft alveolar defect Bergland type IV bilaterally. He presented with an Angle class III subdivision right malocclusion, maxillary central incisors severely retroclined, congenitally missing maxillary lateral incisors and the mandibular left second premolar, and over-retained primary mandibular central incisor and mandibular left primary second molar. Anterior reverse articulation with severe crowding in the mandibular arch and bilateral transposition (canine premolar) in the maxillary arch were also present (Fig. 2).

Figure 3. Full face, frontal view, before orthognathic surgery.

Presurgical orthodontic treatment involved extraction of the mandibular left primary second molar, mandibular right first premolar, and the over-retained primary mandibular central incisor. Expansion of the maxillary arch was performed with a quad-helix appliance. Maxillary and mandibular 0.022×0.028 inch slot, Roth prescription, fixed orthodontic appliances were bonded-banded on all the erupted teeth. The transposition was maintained with the maxillary premolar into the lateral incisor space. Orthodontic alignment and leveling of the maxillary and mandibular arches were performed with small-diameter nickel-titanium wires that provided continued light forces. Sequential increase in diameter was performed until a more rigid stainless steel wire (0.019×0.025 inch) was obtained to be used as a presurgical wire (Figs. 3, 4). The orthognathic procedure involved a LeFort I osteotomy for an asymmetric maxillary advancement of 10 mm on the right side and 3 mm on the left side. After surgery, the skeletal malocclusion was not fully corrected, but the patient declined a second orthognathic procedure. Completion of the orthodontic treatment involved class III elastics in combination with interproximal reduction to improve the result (Fig. 5).

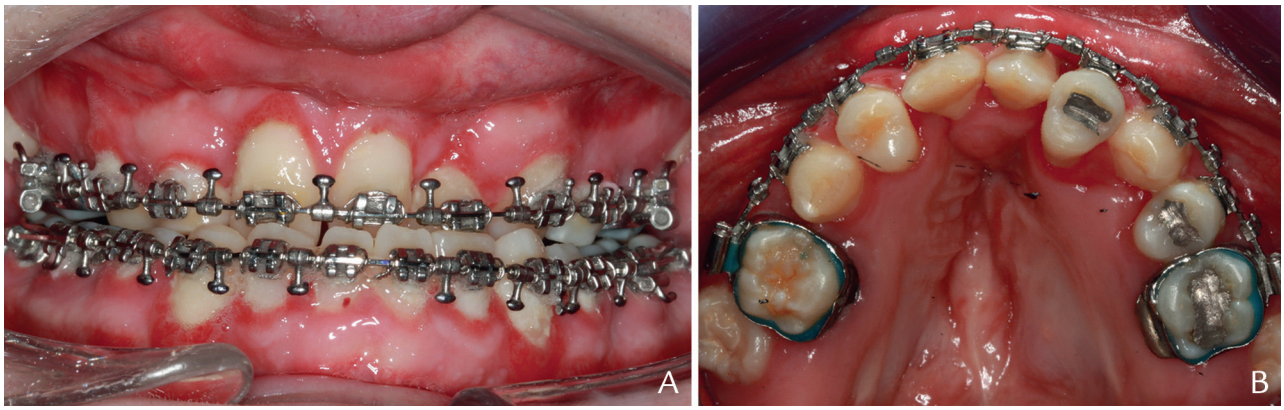

Figure 4. A, Intraoral view of teeth in centric occlusion before orthognathic surgery. B, Occlusal view of maxillary arch before orthognathic surgery.

Figure 5. Full face, frontal view, after orthodontic treatment.

Figure 6. Intraoral view of teeth in centric occlusion after orthodontic treatment.

Patients with complex medical conditions requiring attendance at multiple appointments and enduring several surgical procedures often ignore their dental health.[20] Because of the complexity of his treatment, this patient was in fixed orthodontic therapy for over 5 years. The patient was on a 3-month recall protocol for hygiene appointments, but home care was lacking, and generalized moderate gingivitis was present. Unfortunately, he lacked motivation and did not believe that anything else could be done to improve his smile, at least not the treatment that his family could afford.

After completion of the orthodontic treatment, the patient received vacuum-formed clear orthodontic retainers, and the periodontal condition was reevaluated and treated where applicable. Monthly dental cleanings and educating the patient about proper home care were performed during the ensuing 3 months. This reduced the inflammation, and the gingival tissue returned to a healthier state. Restorative treatment included composite resin restorations on the occlusal surfaces of the mandibular left third molar and right first molar.

Prosthodontic rehabilitation was focused on improving the patient's occlusion and esthetics. Posterior teeth were missing some occlusal contacts. In the anterior area, the central incisors were in an end-to-end articulation. On the right side, the teeth had positive horizontal overlap, and on the left, the premolar (in the position of the lateral tooth) and the canine were in an anterior reverse articulation, whereas the posterior teeth had a normal horizontal relationship (Fig. 6).

Finances were limited at that time, but the goal was to provide a definitive restoration that was affordable and would at the same time enhance his smile and improve his self-esteem. With the patient's consent, a removable overdenture made of crystallized acetyl resin was designed and fabricated. This treatment option is known as removable veneers (Snap-On Smile; DenMat Holdings LLC). This resin allows minimal thickness (0.5 mm) without compromising the strength of the appliance and can be used for short or long term with adequate home care. It is a noninvasive

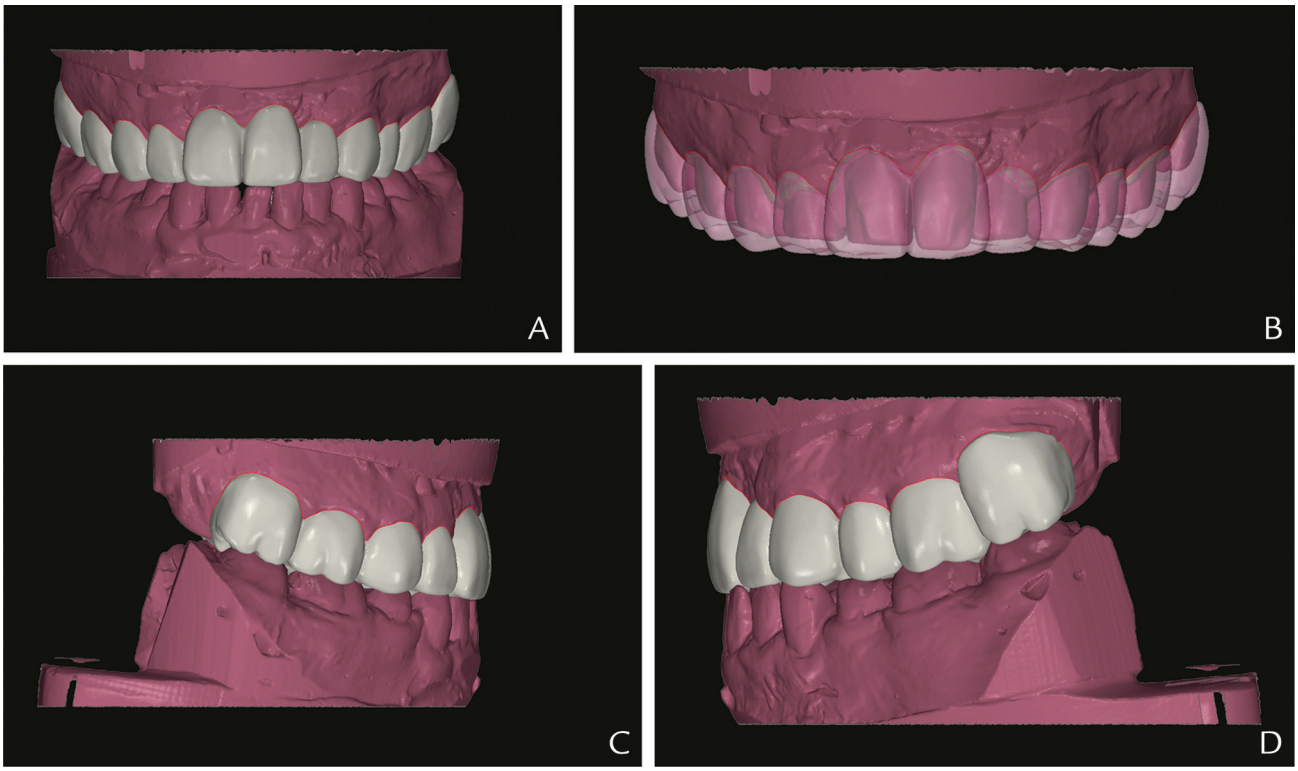

Figure 7. Digital design of esthetic overdenture. A, Frontal view, centric occlusion. B, Translucent view of underlying natural dentition. C, Right side view, centric occlusion. D, Left side view, centric occlusion.

alternative because it does not require tooth preparations or any bonding procedures. The esthetic overdenture uses the natural teeth as abutments because the tooth undercuts provide the retention.

Maxillary and mandibular polyvinyl siloxane impressions were made using regular-set light- and heavy-body impression material (Imprint 3 VPS Impression material; 3M). An interocclusal record was made with a fast-setting PVS material (Blue Velvet Bite Registration Material; J. Morita). Photographs were made in different views, including frontal and lateral views of the patient in maximal intercuspal position, occlusal views of maxillary and mandibular arches, smile, patient at rest, and profile. Once the dental laboratory (DenMat Lab) received the records, the ideal occlusion was designed using special software, and a digital file was sent for approval (Fig. 7).

At the insertion appointment, after making minor adjustments using a disclosing medium (Pressure Indicator Paste; Keystone Industries) and a slow-speed acrylic resin trimming bur, occlusal contacts were evaluated and refined. The adjusted areas were polished with a polishing bristle brush. The patient was instructed on proper insertion and removal of the prosthesis to avoid distortion and to maintain adequate prosthesis care according to the manufacturer's recommendations (Figs. 8, 9). Because of the alignment of the teeth and the more superior and buccal position of the maxillary left molar, adaptation of the prosthesis was lacking around the cervical portion of the last 3 teeth on that side. However, the prosthesis was stable, and the retention was adequate. The postinsertion visits were scheduled at 24 hours, 1 week, and 2 weeks and at 1 and 6 months after insertion. The patient was placed on a 3-month recall schedule and was instructed to remove the appliance at night and use the clear orthodontic retainer when sleeping.

Figure 8. Full face, frontal view, after multidisciplinary treatment.

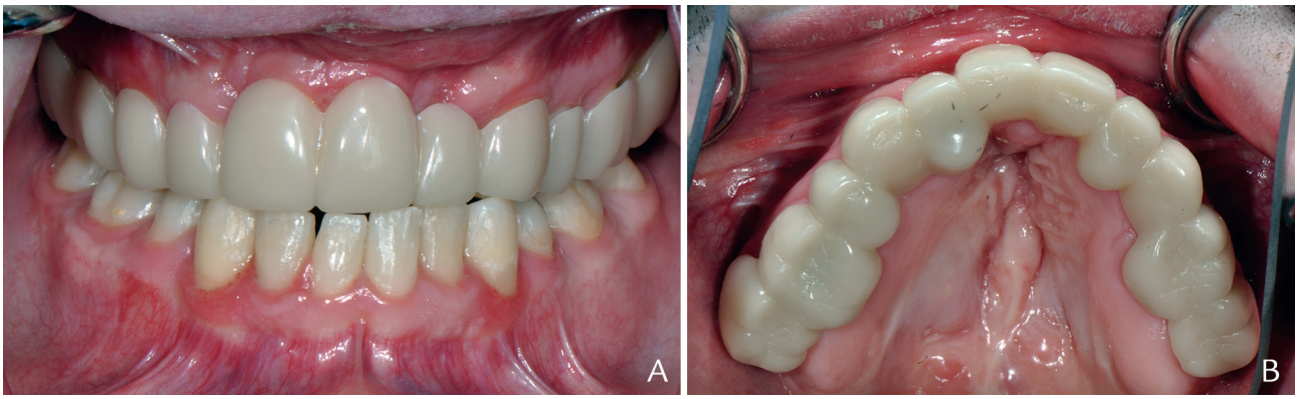

Figure 9. A, Intraoral view of teeth in centric occlusion with esthetic overdenture in place. B, Esthetic overdenture, occlusal view.

DISCUSSION

Establishing function and creating an esthetic appearance for a patient with bilateral cleft lip and palate is frequently a challenging experience. Usually these patients present complicating factors such as dental misalignment and skeletal malformation. Complicated situations invariably require the intervention of a multidisciplinary team, including prosthodontic treatment. With this patient, finances were limited, and a design that allowed easy care and patient hygiene was imperative.

Multiple designs of fixed[1,12] and removable[15,16] superstructures have been reported which involve fixed metal copings cemented on natural teeth that are susceptible to caries if the patient is not compliant with oral hygiene. The swing-lock attachment mechanism has also been advocated to retain a maxillary superstructure,[17] but the design does not allow easy cleaning. The prosthesis design used with this patient reestablished an acceptable occlusion and a pleasing smile. Polyvinyl siloxane impression material has dimensional stability and allows fine-detail reproduction, which was required for this patient because the records were sent to a specialized dental laboratory and were not processed immediately.

In this patient, the selected prosthesis design satisfied both functional and esthetic requirements. The patient was satisfied and motivated to maintain his hygiene and appearance. This fact was demonstrated during the 1-month and 6-month recall visits. The treatment provided is reversible, and alternative treatment options can still be pursued.

SUMMARY

This clinical report describes the interdisciplinary approach for a young patient with a history of bilateral cleft lip and palate, spina bifida, hydrocephalus, and ventriculoperitoneal shunt who was treated with conventional orthodontics and orthognathic surgery that failed to correct the malocclusion. An esthetic overdenture made of crystallized acetyl resin is presented which restored the facial appearance of the teeth for an esthetic result and also created a stable occlusion.

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Noteworthy Abstracts of the Current Literature

Dental shade matching and value discernment abilities of first-year dental students

Imbery TA, Tran D, Baechle MA, Hankle JL, Janus C
J Prosthodont 2018 Dec;27:821-7

Purpose. To determine if Farnsworth-Munsell 100 Hue Test, Perceptual Ability Test, gender, age, ethnicity, and time predict dental shade matching and value discernment in first-year dental students.

Material and methods. Farnsworth-Munsell 100 Hue Test was administered to 95 first-year-dental students beneath a Judge II booth (color temperature of 6500°K, and color rendering index of 90). Students also arranged 16 masked shade tabs from a Vita Classic shade guide by value (lightest to darkest) and matched together 16 pairs of masked shade tabs from two Vita Classic shade guides. Ethnicity, age, Perceptual Ability Test scores, gender, and time to complete the tests were recorded. Associations and correlations were investigated using chi-square, Tukey-Kramer HSD, standard least square, and multilinear regression ($p<0.05$).

Results. Total error scores on the Farnsworth-Munsell 100 Hue Test ranged from 0 to 144. Forty-eight students exhibited superior color acuity, 45 average, and two poor. The mean number of correct answers for matching shade tabs together was 11.6, and 6.1 for arranging the shade tabs by value. Females performed statistically better than males on the Farnsworth-Munsell 100 Hue Test and shade tab matching. Better color discrimination identified by lower total error scores on the Farnsworth-Munsell 100 Hue Test was directly correlated to greater ability to match shade tabs together. Perceptual Ability Test scores had slight significance. As the scores increased there was slightly better performance on the Farnsworth-Munsell 100 Hue Test. Older participants performed better than younger subjects on the value test. No other correlations were significant for any of the tests.

Conclusions. Females and individuals who performed better on the Farnsworth-Munsell 100 Hue Test have improved dental shade-matching ability.