Replacement of Congenitally Missing Lateral Incisor Using a Metal-Free, Resin-Bonded Fixed Partial Denture: Case Report

Umut Cakan, *DDS, PhD;* **Burak Demiralp,** *DDS, PhD;* **Muge Aksu,** *DDS, PhD;* **Tulin Taner,** *DDS, PhD*

"Clinical Showcase" is a series of pictorial essays that focus on the technical art of clinical dentistry. The section features step-by-step case demonstrations of clinical problems encountered in dental practice. If you would like to contribute to this section, contact editor-in-chief Dr. John O'Keefe at jokeefe@cda-adc.ca.

Congenital absence of a maxillary lateral incisor occurs in many patients, and the treatment of young adults with this problem is a challenge for both prosthodontists and orthodontists. Common treatment alternatives are distalization of the canine tooth or fabrication of a conventional 3-unit fixed partial denture (FPD), a single-tooth, implant-supported crown restoration or a resin-bonded fixed partial denture (RBFPD).[1-4]

This case report describes the indications for an RBFPD, preparation of the abutment tooth and the clinical procedures for its fabrication. The technique described here represents a conservative, esthetically pleasing and rapid solution to the problem of a congenitally missing maxillary lateral incisor when implant placement and/or guided bone regeneration techniques are not feasible because of financial, social or time restrictions.

Case Report

A 22-year-old woman with congenital absence of the maxillary left lateral incisor was referred to our clinic. A clinical examination revealed that the maxillary left permanent canine had undergone ectopic eruption and the deciduous canine had not exfoliated (**Fig. 1**). The periodontium of the intact abutment teeth was healthy, and the patient had no prior history of orthodontic treatment. The maxillary first molars were in Class I relationship on both sides.

Crowding of the teeth was minimal in both the upper and lower arches (**Fig. 2**), so treatment without extraction of any permanent teeth was planned. To establish adequate guided occlusion for the canine teeth and to achieve a more symmetric and esthetic anterior appearance, extraction of the remaining deciduous canine, distalization of the left permanent canine into its proper position and

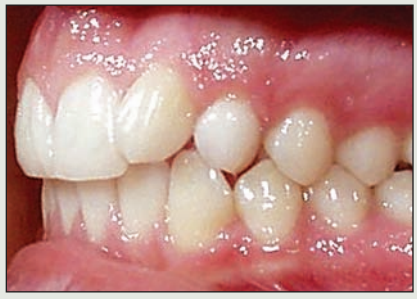

Figure 1: Ectopic eruption of the maxillary left permanent canine and non-exfoliated deciduous canine in a 22-year-old woman with congenital absence of the maxillary left lateral incisor.

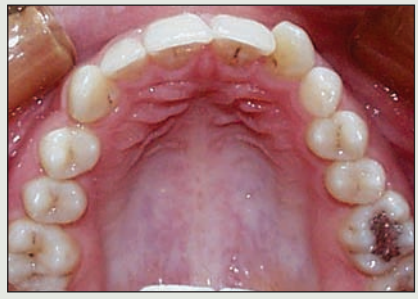

Figure 2: Crowding of the teeth was minimal in the upper and lower arches.

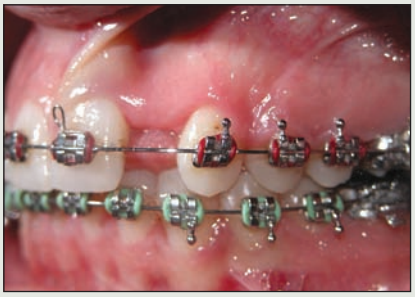

Figure 3: After extraction of the remaining deciduous tooth, the upper canine was retracted with a force of 150 g by fixed orthodontic appliances.

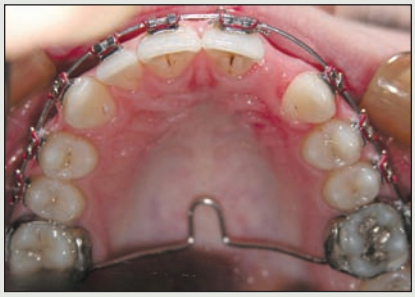

Figure 4: The dimensions of the buccal and palatal bones and the height of the alveolar ridge were sufficient for the planned treatment.

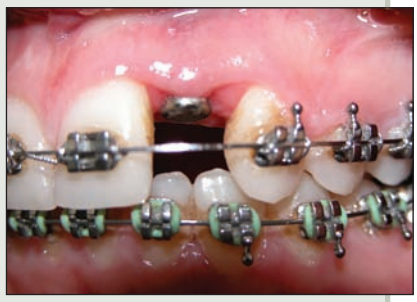

Figure 5: Implant site after healing period.

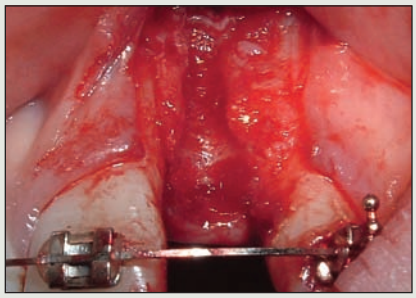

Figure 6: Implant site after removal of the implant.

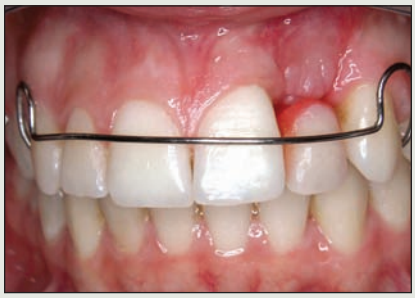

Figure 7: Four months after bone grafting, bone volume was insufficient to allow an implant-supported all-ceramic crown.

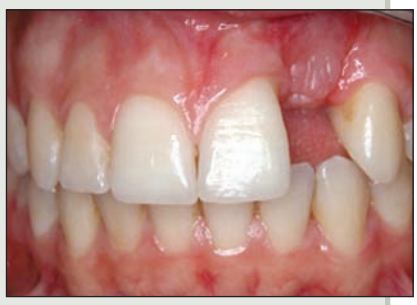

Figure 8: Although gingival contours were sufficient for implant placement, surgery would have been needed to augment bone volume. The patient chose an all-ceramic resin-bonded fixed partial denture instead.

placement of an implant-supported all-ceramic crown in the position of the missing lateral incisor were planned.

After extraction of the deciduous canine, the brackets were bonded for distalization of the left permanent canine, which was retracted with a force of 150 g by fixed orthodontic appliances (**Fig. 3**). As soon as retraction of the maxillary canine had been achieved, the angulations of the maxillary left central incisor and left canine were adjusted to avoid any contact between the implant and the roots of these 2 teeth.

When the orthodontic treatment was completed, the patient was referred back to the prosthodontist to determine the final appearance of the lateral incisor implant. The dimensions of the buccal and palatal bones and the height of the alveolar ridge were sufficient for the planned treatment (**Fig. 4**). A Swissplus implant measuring 3.7 × 10 mm (Zimmer Dental, Carlsbad, Calif.) was then placed in the lateral incisor region.

During healing of the implant site, the brackets were kept in place without the application of any force. The patient experienced no inflammation, pain or discomfort during the healing period (**Fig. 5**). Three months after placement of the implant, the patient was again referred to the prosthodontist. While the crown was being fabricated, it was discovered that the expected bony integration had not been achieved, and the implant was removed. The whole buccal wall of the implant had been resorbed, and there was 3 mm of resorption around the implant. After removal of the implant (**Fig. 6**), the defect area was restored with hydroxyapatite graft material (Unilab Surgibone, Mississauga, Ont.) and a bioresorbable barrier matrix (Epi-Guide, Curasan, Kleinostheim, Germany).

Four months after the bone grafting, an appointment was scheduled for placement of another implant. However, the bone volume at that time was insufficient to fulfill the patient's esthetic expectations for an implant-supported all-

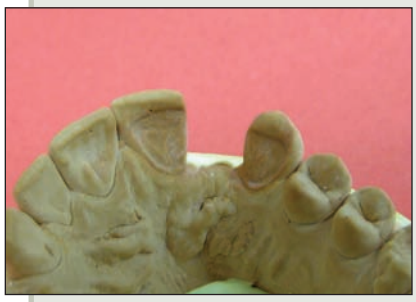

Figure 9: A complete arch impression was made with a silicone impression material.

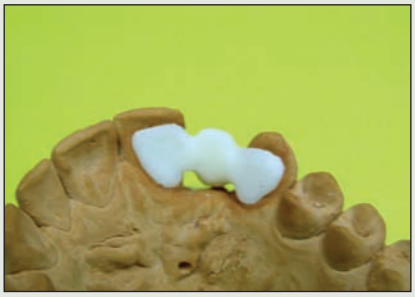

Figure 10: The IPS Empress 2 substructure for the resin-bonded fixed partial denture was fabricated.

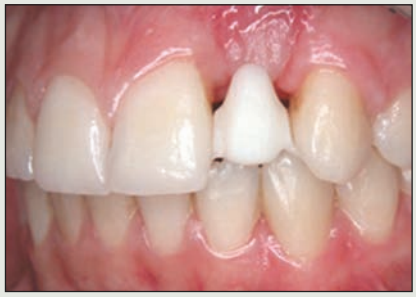

Figure 11: Initial trial insertion.

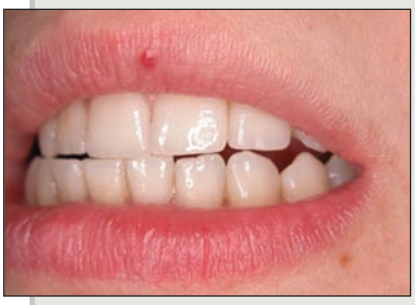

Figure 12: Second trial insertion.

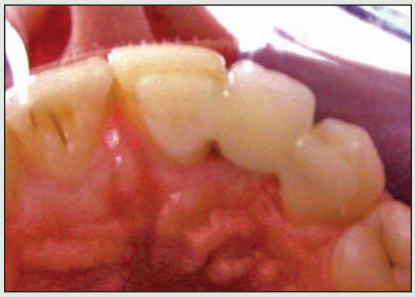

Figure 13: Surface conditioning procedures.

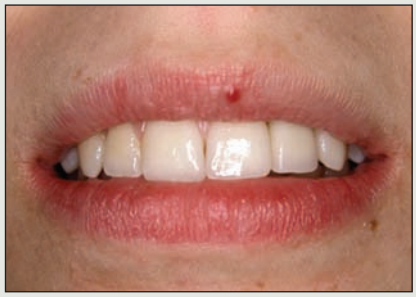

Figure 14: Appearance of the patient's anterior dentition at a recall visit 12 months after completion of the treatment.

ceramic crown (**Fig. 7**). Therefore, to increase the bone volume, autogenous block bone grafting was planned. This surgery would have been the third procedure and would have substantially lengthened the overall treatment time, but when the procedure was described to the patient, she was unwilling to proceed. The option of fabricating an RBFPD rather than an implant-supported prosthesis was presented. An all-ceramic RBFPD was selected as it would be more esthetically pleasing and more conservative than a metal RBFPD or an all-ceramic FPD without resin bonding (**Fig. 8**).

The tooth was reduced with flame-shaped, chamfer and shoulder diamond rotary cutting instruments. The palatal surfaces of the abutment teeth were reduced by about 0.7 mm, with a supragingival chamfer finish line about 1 mm from the tissue crest. The incisal extension of preparations on the abutment teeth was finished 2 mm below the incisal edge.

The proximal borders of the preparations were extended to the marginal ridges of the palatal fossae. All line and point angles were rounded. A complete arch impression was made with a silicone impression material (Speedex, Coltene/Whaledent, Cuyahoga Falls, Ohio), and a master cast was obtained (**Fig. 9**). The IPS Empress 2 substructure (Ivoclar-Williams, Amherst, N.Y.) was then fabricated (**Fig. 10**).

At the initial trial insertion, complete seating of the prosthesis, marginal adaptation of each retainer, tissue contact and form of the pontic, and occlusion were assessed (**Fig. 11**). Subsequently, premature contacts were eliminated and the shade of the pontic was determined and recorded. During application of the porcelain, only opaque porcelain and glaze were applied to the palatal surface of the prosthesis, to prevent overcontouring of the lingual wings.

Veneer porcelain was subsequently added to the pontic, the occlusal, lateral and anterior contacts on the abutment framework and pontic were eliminated, and a second trial evaluation was performed (**Fig. 12**). At this point, the patient gave her final approval.

The teeth were isolated with a rubber dam, and surface conditioning procedures were performed (**Fig. 13**). A dual-polymerizing resin luting agent

(Panavia F, Kuraray, Okayama, Japan) was used for cementation.

The patient returned for 4 routine recall visits over a 2-year period (**Fig. 14**). No clinical complications were observed. The patient reported that her esthetic and functional requirements had been fulfilled with this form of prosthetic rehabilitation.

Discussion

Improvements in all-ceramic restorative materials and systems now allow fabrication of metal-free, 3-unit RBFPDs in anterior areas and all-ceramic FPDs in premolar or molar single-pontic areas. Care must be taken to check the interocclusal relationship, anterior guidance and potential points of interference in lateral movements before fabrication of an RBFPD, to minimize the risk of decementation or failure of the restoration.[5]

For fabrication of the anterior bridgework, the all-ceramic IPS Empress 2 system was selected, because it uses a pressable leucite-reinforced glass ceramic, which results in tooth-coloured, metal-free restorations.[6] This type of ceramic combines strength and esthetics while offering light transmission and reflection comparable to that of natural teeth. Such new-generation ceramics combined with current adhesive techniques yield higher strength than older ceramics, and they provide satisfactory clinical performance.[7]

This case illustrates the use of all-ceramic RBFPDs in place of conventional metal–ceramic or all-ceramic FPDs or implant-supported single-crown restorations if there are restrictions related to bone volume, cost or treatment time.

THE AUTHORS

Dr. Cakan *is a prosthodontist in private practice in Istanbul, Turkey.*

Dr. Demiralp *is associate professor in the faculty of dentistry, department of periodontics, Hacettepe University, Ankara, Turkey.*

Dr. Aksu *is assistant professor in the faculty of dentistry, department of orthodontics, Hacettepe University, Ankara, Turkey.*

Dr. Taner *is professor in the faculty of dentistry, department of orthodontics, Hacettepe University, Ankara, Turkey.*

Correspondence to: *Dr. Burak Demiralp, Mithatpaşa Caddesi 62/8 Kızılay-Ankara, Turkey. Email: burakdemiralp@yahoo.com*

The authors have no declared financial interests in any company manufacturing the types of products mentioned in this article.

This article has been peer reviewed.

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