The restoration of congenitally missing lateral incisors is challenging. With the advent of osseointegrated implants, clinicians are now able to offer patients a natural final appearance. However, long-term treatment planning; state-of-the-art orthodontic, surgical, and prosthetic techniques; and precise timing all are required to achieve treatment goals. In some situations, a change in the vertical position of the implant-supported crown, resulting in infraocclusion and an improper final implant position, has been reported.1-3 This change is a consequence of the 3-dimensional drifting process, a combination of resorptive and depository growth fields within the alveolar bone.4,5 Surgical implant repositioning, a technique similar to single-tooth osteotomies,6 has been presented as 1 method of correcting nonrestorable implants in adult patients.7 The use of this technique to correct an unesthetic implant position that resulted from unexpected postpubertal growth is described.

CLINICAL REPORT

An 18-year-old woman with a congenitally missing maxillary lateral incisor previously treated with a dental implant was evaluated for restorative treatment. Clinical and radiographic examinations revealed a well-integrated implant with a close relationship to the roots of the adjacent teeth. Stage I surgery had been performed when the patient was age 15 and growth was determined to have ceased. Stage II surgery was performed 6 months later. At stage II surgery, the implant position appeared to have a slightly labial inclination.

In the subsequent 2 years, a change in the vertical position of the implant-supported crown occurred, resulting in infraocclusion and an improper implant position. The patient experienced additional growth and attained a height of 1.83 m. A cast of the maxillary arch 2 years after the provisional was in place was available (Fig. 1) and demonstrated the difference in inclination between the implant-supported crown and adjacent teeth. A new provisional crown was made at that time to correct crown inclination. The implant soft tissue contour, however, remained unsatisfactory. The patient also had a high smile line, which exposed the unesthetic soft tissue contour (Fig. 2).

Under local anesthesia, a combined thickness semilunar incision was made in the buccal mucosa, and a
flap was elevated toward the palate. Two vertical osteotomies were made into cortical bone (Fig. 3). The osteotomies were performed with a thin fissure bur (700xL, Komet Brasseler, Lemgo, Germany) through the buccal and palatal cortex. With a thin osteotome, the cuts involving the medullary bone were completed. Two parallel horizontal osteotomies apical to the implant were performed with the bur on the palatal side. With the osteotome, a wedge of bone was removed apical to the implant. The implant and surrounding bone were mobilized, and a green stick fracture was obtained on the buccal plate. By pivoting on the buccal plate, the implant was repositioned in a more palatal position. The resulting buccal concavity was filled with hydroxyapatite (Biooss, Geistlicht Pharma Ag, Wolhusen, Switzerland) and covered with a resorbable barrier membrane (Resolut, W. L. Gore & Associates Inc, Flagstaff, Ariz.). The flap was sutured in a more coronal position with an interrupted suture (Gore Tex Suture, W. L. Gore & Associates Inc).

A provisional restoration was luted (Durelon, Espe Dental Ag, Seefeld, Germany) and bonded to the adjacent teeth with an adhesive technique (PQ1, Ultradent Products Inc, South Jordan, Utah). Routine antibiotic therapy (amoxicillin, 500 mg twice daily for 5 days) was given to the patient as a prophylactic measure. The patient was carefully instructed to avoid occluding on the provisional restoration, to brush properly, and to avoid flossing in the interproximal spaces. The suture was removed 1 week later (Fig. 4). After 6 weeks, the provisional restoration was removed to evaluate implant stability and re-luted. Four months after the provisional crown was initially placed, a definitive metal-ceramic crown was fabricated. A slight reduction of the buccal soft tissue was noted. A gold crown cast was fabricated with a buccal porcelain margin, which facilitated an esthetic tissue/margin region. The crown was luted with a resin cement (Panavia, Kuraray Co Ltd, Osaka, Japan) (Fig. 5).

**DISCUSSION**

The replacement of a congenitally missing lateral incisor is an esthetically demanding therapy. It requires the creation of a natural oral architecture surrounding the missing tooth as well as a prosthesis of correct form and shade. If treatment is incorrectly managed, the esthetic result may be compromised, especially for patients with a high smile line. Timing of stage I surgery is important for the achievement of a successful final result. Surgery should be performed after growth is completed. Chronologic age is not a reliable guide for implant placement because of a slight continuous eruption of the adjacent teeth after adolescence. Infraocclusion of implant-supported crowns has also been observed in adult patients. This phenomenon is usually considered a consequence of eruption of the adjacent teeth.1,2

In addition to eruption, vertical drifting, a 3-dimensional combination of resorptive and depository growth
fields within the alveolar bone, may occur. In relation to maxillary growth, the buccal surface of the maxilla is a resorptive surface, whereas the palate is a depository surface (Fig. 6, a). The combination of these growth fields inside and outside extraction sites plays a major role in the regulation of tooth inclination. If an implant is introduced before the end of growth in the anterior maxilla, the absence of growth fields at the implant–bone interface will cause the implant to drift progressively to the buccal surface (Fig. 6, b and c). Surgical repositioning of the implant to achieve a correct inclination therefore will require removing the wedge of bone apical to the implant (Fig. 6, d).

In the patient presented in this report, an improper implant position occurred as a consequence of unexpected growth. When a problem related to the proper positioning of an implant occurs, some amount of compromise should be expected in the prosthetic restoration. If the results of all prosthetic alternatives are unsatisfactory, 3 types of surgical options may be considered: the implant can be “put to sleep,” removed, or repositioned.

So-called “sleeping” implants can simplify difficult prosthetic management. This option is indicated when multiple implant restorations are involved. For the patient presented in this report, it would have been difficult to achieve a natural soft tissue appearance even after submerging the implant; moreover, this would have required the use of a conventional prosthesis (a resin-bonded fixed partial denture, for example). Implant removal can be performed with a trephine bur of appropriate dimension. However, this requires enough space around the implant to perform the osteotomy. In an esthetic area, it could require the removal of both buccal and palatal bone plates and thus create additional esthetic problems. Implant repositioning can be performed to allow restoration of implants with a compromised position. This technique is similar to single-tooth ostotomies. In this patient, rigid bone fixation of the small maxillary segment was not used, as its mobility was reduced by the green stick fracture on the buccal plate. The provisional crown was bonded to the adjacent teeth.

This procedure should not be used routinely if the segment is completely mobilized or if it is larger than 1 tooth, as lack of stability could severely affect the healing process. Soft tissue position should always be

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**Fig. 6.** Vertical drifting process regulates tooth position and inclination within alveolar bone during growth. Depository (+) and resorptive (−) growth fields act to maintain or modify proper tooth position in alveolar process during growth (a). Absence of growth fields at implant–bone interface allows implant drift labially (b, c). Palatal bone wedge can be removed to reposition implant and surrounding bone in correct inclination (d).
overcorrected, as some degree of relapse is to be expected in the following months (Figs. 4 and 5). Although some degree of asymmetry could still be detected in this patient, a more pleasing esthetic result was achieved (Figs. 2 and 5).

SUMMARY

The correction of an unesthetic implant position that resulted from unexpected postpubertal growth has been described. Surgical implant repositioning, a technique similar to single-tooth ostecotomies, was used. The implant and surrounding bone were mobilized, and a green stick fracture was made on the buccal plate. With pivoting on the buccal plate, the implant was repositioned in a more palatal position and restored. Although some degree of asymmetry could still be detected, a more pleasing esthetic result was achieved.

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REFERENCES


Reprint requests to:
DR CARLO E. POGGIO
PIAZZA VELASCA 5
20122 MILAN
ITALY
FAX: (39)02-7202-2844
E-MAIL: poggioc@tin.it

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