

# MANDIBULAR CONNECTIVE TISSUE PEDICLE FLAPS IN IMPLANT DENTISTRY: REPORT OF THREE CASES

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An increase in soft tissues and alveolar bone in the anterior mandibular area between the canines is necessary to achieve a good esthetic result. The present article describes a technique for gaining bone volume and soft tissue to cover bone defects that would otherwise compromise the final result of prosthetic implant restoration in the anterior mandible. Three patients with anterior mandibular atrophy caused by loss of the mandibular incisors are presented. Particulate autologous bone grafting, the raising of a pediculate connective tissue flap to increase soft tissue, and implant placement were carried out simultaneously. After 2 years of follow-up, the implants were in good clinical and radiologic condition. The problem of atrophy and the lack of soft tissue were thus solved, and an acceptable esthetic outcome was achieved in a single surgical intervention.

**Key Words:** dental implants, pediculate flap, bone graft

## INTRODUCTION

**B**one and soft tissue loss in the anterior sector is a very frequent problem that complicates implant placement in a suitable position and compromises esthetic results.<sup>1</sup> Insufficient or only very thin mucosa is often available for augmentation of large transverse or vertical bone defects.<sup>2</sup> In such situations, soft tissue dehiscences and bone or implant exposure may result. Appropriate soft tissue closure represents a critical factor in the success of preprosthetic surgery as well as implant placement, especially when simultaneous peri-implant bone augmentation is performed. In addition to the simple closure of soft tissues, their thickness

and positioning relative to the implants or remaining teeth are important with respect to the esthetic outcome.

A new technique for the management of soft tissues in the mandibular incisor area is described to increase the soft tissue volume and achieve vertical bone augmentation that would improve the final result of prostheses on implants. This study describes 3 clinical cases in which, following implant placement, particulate autologous bone grafting was carried out to increase bone volume, and a pediculate connective tissue flap was raised to increase soft tissue volume and secure effective closure.

## CLINICAL CASES

### Case 1

A 37-year-old woman without disease antecedents of interest and with the absence of all 4 mandibular incisors because of periodontal disease requested implant treatment. Clinical and orthopantomographic studies identified significant bone atrophy in the mandibular incisor zone (Figure 1a and b).

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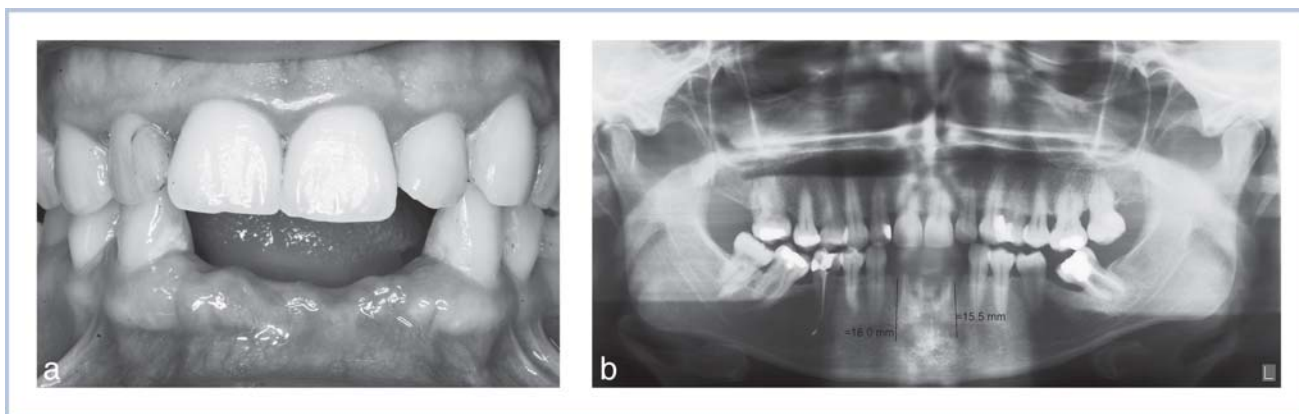


FIGURE 1. (Case 1) (a) Clinical image showing significant bone atrophy in the mandibular incisor zone. (b) Preoperative radiograph.

Surgery was performed under local anesthesia (4% articaine with adrenalin 1:200 000). A semicircular incision at the bottom of the vestibule was carried out (Figure 2a and b), and a partial-thickness flap was raised up to the bone ridge (Figure 3a and b), where a second longitudinal incision was made. Following detachment, a pediculate “mucosal flap” on the apical zone and a full-thickness flap at the base of the flap were obtained. Two Defcon TSA Avantblast-surface implants were placed (4.1 mm wide and 16 mm long; Implants, Barcelona, Spain) (Figure 4a and b). Posteriorly, a second incision was made from the most apical vestibular zone of the semicircular incision up to the bone of the apical vestibular zone of the incisors to raise another pediculate partial-thickness connective tissue flap or “periosteal flap” (Figure 5a and b). Above the alveolar bone ridge, autologous bone obtained from the drilled implant sites was placed; this was then covered with a collagenous membrane (BioGide, Geistlich Pharma, Wolhusen, Switzerland) (Figure 6). The free end of the pediculate connective tissue flap was sutured to the free end of the “mucosal flap,” which was then folded onto itself to achieve tissue closure (Figure 7a and b). Finally, the vestibular incision zone was sutured to the periosteum (Figure 8a and b). Amoxicillin was prescribed (500 mg 3 times a day for 7 days), along with ibuprofen (600 mg 3 times a day for 4 days) and a 0.2% chlorhexidine rinse (3 times a day for 7 days). A week after surgery, the sutures were removed (Figure 9).

During the osseointegration period, a provisional adhesive fixed prosthesis was placed. Three months

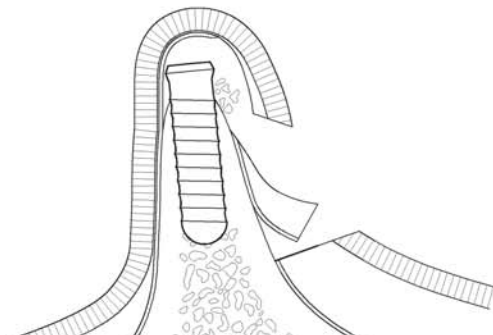
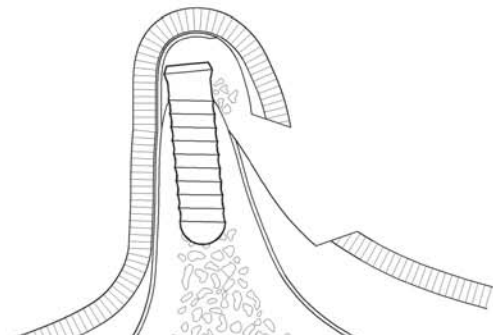
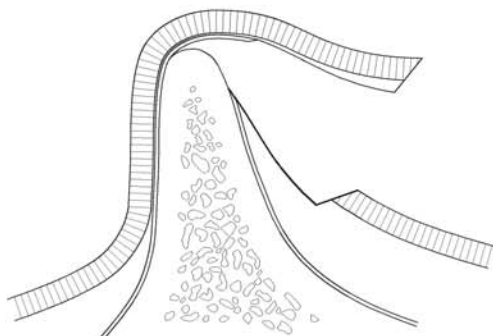
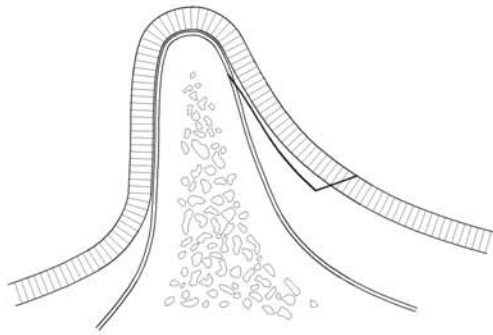
later, in a second surgical intervention, the attached gingiva was displaced slightly toward the buccal. A cemented fixed prosthesis with 4 crowns was fitted over the implants, yielding an acceptable esthetic outcome and good radiographic adaptation. After 1 year of follow-up, appropriate soft tissue conditions were present, the implants were clinically stable, no signs of infection were apparent, and there was less than 1.0 mm of radiographic peri-implant bone loss (Figures 10 and 11).

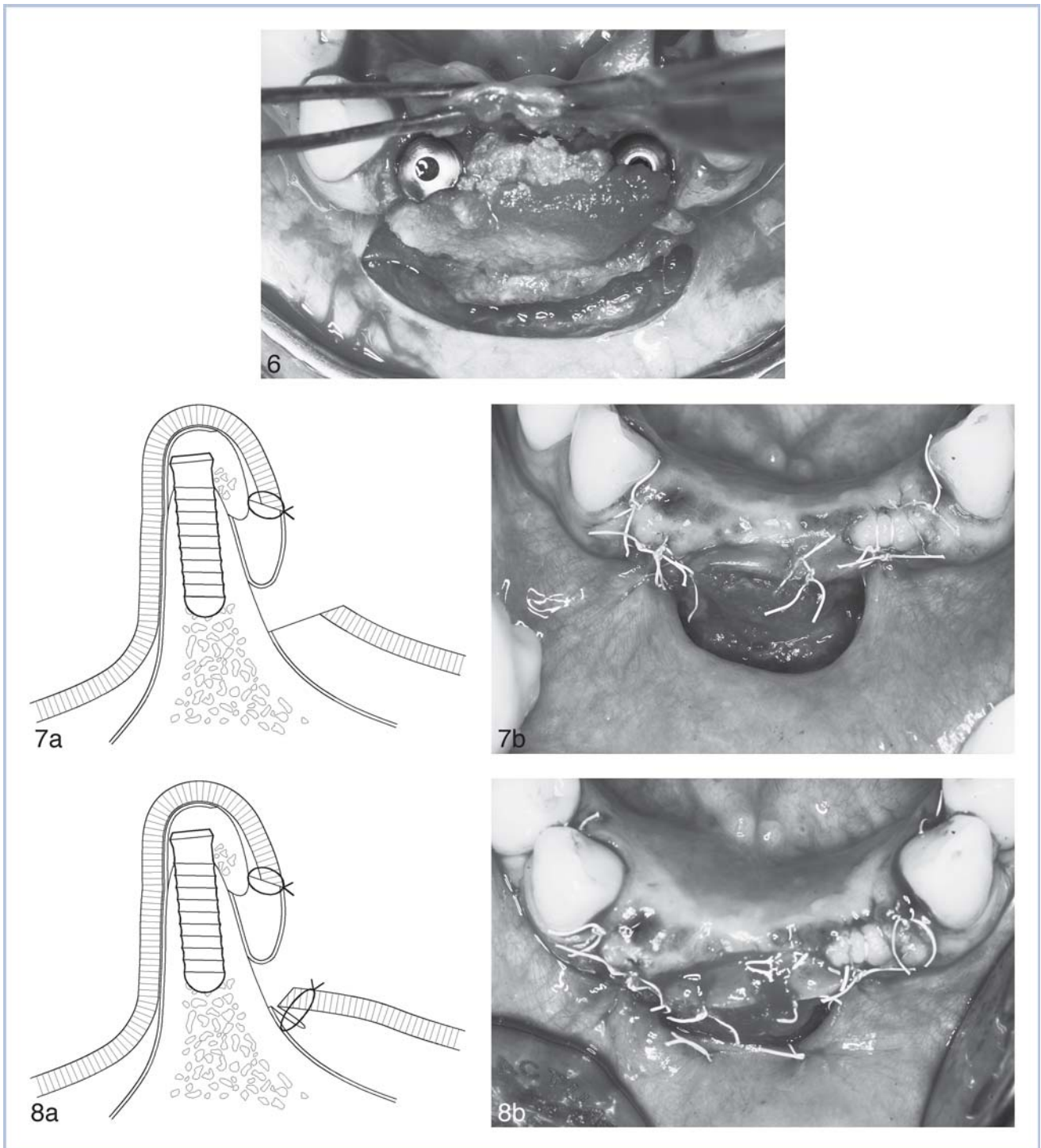
### Case 2

A 34-year-old, systemically healthy woman who had lost her mandibular incisors because of periodontal disease presented for restoration with an implant-supported prosthesis.

The procedure was performed under local anesthesia (4% articaine with adrenalin 1:200 000). A semicircular incision was made from the mesial of the left canine, descending to the vestibular fundus, and extending to the mesial of the right canine. A partial-thickness mucosal flap was raised superiorly to the top of the alveolar ridge. Incision of the periosteum was then carried out from canine to canine at the top of the ridge. Thus, a partial-thickness flap was obtained at the margin and a full-thickness flap was obtained at the base of the flap. Two Defcon TSA Avantblast-surface implants were placed (4.1 mm wide and 13 mm long; Implants). Autologous particulate bone from the drill holes was added between the implants, and the sites were then

FIGURES 2-5. Case 1. FIGURE 2. A semicircular incision at the bottom of the vestibule was carried out from the mesial of the left canine, extending to the vestibular fundus and to the mesial of the right canine. FIGURE 3. A partial-thickness flap was obtained at the margin, with a full-thickness flap on the base of the free mucosa flap. FIGURE 4. Two implants were placed. FIGURE 5. A new incision was made from the most apical vestibular zone of the semicircular incision to the bone of the apical vestibular zone of the mandibular incisor, yielding a second connective tissue flap.

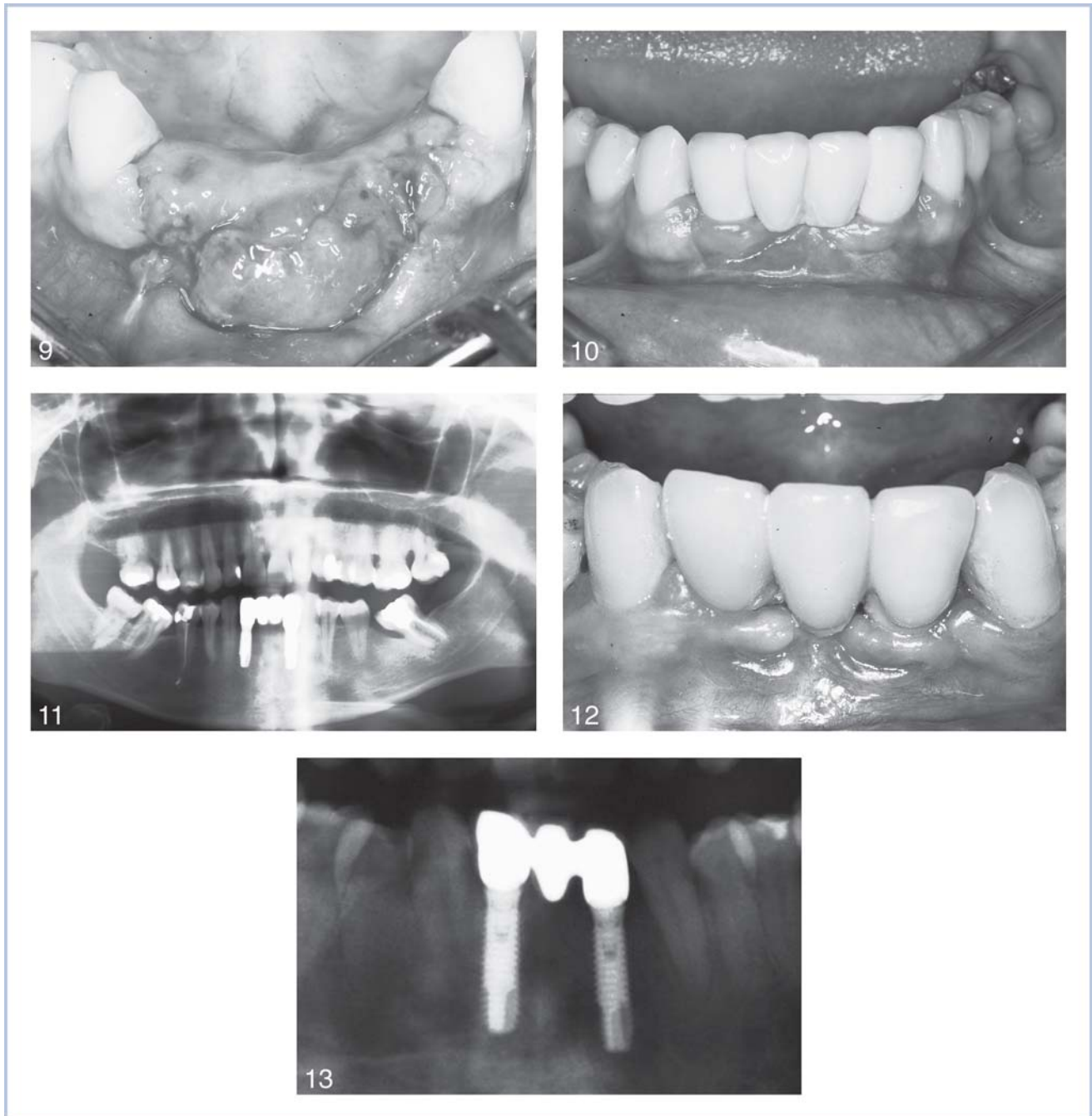




FIGURES 6-8. Case 1. FIGURE 6. Above the alveolar bone ridge, autologous bone obtained from the drilled implant sites was placed; the area was then covered with a collagenous membrane. FIGURE 7a and b. The vertex of the connective tissue flap was sutured to the vertex of the first pediculate flap, which was folded onto itself to achieve tissue closure. FIGURE 8a and b. The edge of the first flap was sutured to the base of the pediculate connective tissue flap.

covered with a collagenous membrane (BioGide, Geistlich Pharma). A new incision was made from the most apical vestibular zone of the semicircular incision to the bone of the apical vestibular zone of

the mandibular incisors, thus yielding a periosteal flap. The vertex of this flap was sutured to the vertex of the mucosal flap. A vestibuloplasty was then carried out. The edge of the mucosal flap was sutured to the



FIGURES 9–13. FIGURE 9. (Case 1) Good soft tissue closure was obtained. FIGURE 10. (Case 1) Clinical follow-up view 1 year after surgery. FIGURE 11. (Case 1) Radiologic control of the implants. FIGURE 12. (Case 2) Clinical image after prosthetic rehabilitation. FIGURE 13. (Case 2) Radiologic control of the implants.

periosteum, resulting in good soft tissue closure. Amoxicillin was prescribed (500 mg 3 times a day for 7 days), along with ibuprofen (600 mg 3 times a day for 4 days) and 0.2% chlorhexidine rinses.

During the osseointegration period, a provisional adhesive fixed prosthesis was placed. At a second surgical intervention, the attached gingiva was dis-

placed slightly toward the vestibular area. An acceptable esthetic result was achieved, with appropriate soft tissue adaptation (Figure 12). Two years later, the implants remained in good condition: they were clinically stable, the area showed no signs of infection, and there was less than 1.0 mm of radiographic peri-implant bone loss (Figure 13).

### Case 3

A 52-year-old man without disease antecedents of interest and with the mandibular central incisors and left lateral incisor absent because of periodontal disease requested implant treatment.

The same surgical procedure was performed as in cases 1 and 2. Two ITI implants (Straumann, Waldenburg, Switzerland) measuring 14 mm in length and 4.1 mm in diameter were placed. After 1 year of follow-up, there were appropriate soft tissue conditions, and the implants were clinically stable and showed no signs of infection. As in cases 1 and 2, there was less than 1.0 mm of radiographic peri-implant bone loss at the 12-month follow-up.

### DISCUSSION

Loss of the mandibular incisors because of periodontal disease is a common problem that implies a loss of height and thickness of the mandibular anterior alveolar processes. Placement of implants to replace these missing teeth can result in very long mandibular incisor crowns, with an unsatisfactory esthetic result. Therefore, an increase in bone and soft tissue volume is required to improve the outcome in such situations. Many techniques, such as soft tissue management<sup>3-5</sup> around implants and bone grafts,<sup>6</sup> have been described to achieve an esthetic appearance in the anterior zone.

A new method was introduced for the treatment of anterior alveolar process defects. A periosteal tissue flap can alleviate many of the difficulties of similar techniques, such as resulting esthetic problems, problems with reduced coverage of surgical areas, and problems with closely covering neighboring teeth preventing the creation of esthetically pleasing papillae.<sup>2</sup> For preprosthetic bone augmentation, periosteoplasty has the potential to improve healing, reduce the incidence of dehiscence, and generally improve the success rate.<sup>2</sup> Moreover, pedicle grafting has a better prognosis than free grafts<sup>7</sup> because pedicle grafts are never entirely separated from the circulatory system. Certain specific factors are important for the prognosis of mucosal and connective tissue grafts: (1) the graft must be fixed securely in place, and (2) nutrition must be possible through the graft bed.<sup>8,9</sup>

In the present patients, the implants were placed and at the same time used as supports to obtain a tent-like space for filling with autologous particulate bone, thereby contributing to increased bone volume. The pediculate mucosal flap covered the frontal part of the alveolar process, while the periosteal flap afforded primary tissue closure, with an increase in the volume of soft tissue. Finally, a vestibuloplasty was performed to enlarge the vestibular fundus. The entire procedure was completed in a single surgical intervention.

### CONCLUSIONS

The presented procedure is easy to perform, appears to be safe in its application, and provides good esthetic results in situations of alveolar atrophy in a single surgical intervention.

### REFERENCES

1. Kaufman E, Wang PD. Localized vertical maxillary ridge augmentation using symphyseal bone cores: a technique and case report. *Int J Oral Maxillofac Implants.* 2003;18:293-298.
2. Triarca A, Minoretti R, Merli M, et al. Periosteoplasty for soft tissue closure and augmentation in preprosthetic surgery: a surgical report. *Int J Oral Maxillofac Implants.* 2001;16:851-856.
3. Mathews DP. Soft tissue management around implants in the esthetic zone. *Int J Periodontics Restorative Dent.* 2000;20:141-149.
4. Bianchi AE, Sanfilippo F. Single-tooth replacement by immediate implant and connective tissue graft: a 1-9 year clinical evaluation. *Clin Oral Implants Res.* 2004;15:269-277.
5. Goldstein M, Boyan BD, Schwartz Z. The palatal advanced flap: a pedicle flap for primary coverage of immediately placed implants. *Clin Oral Implants Res.* 2002;13:644-650.
6. Hernandez-Alfaro F, Fages CM, García E, Corchero G, Arranz C. Palatal core graft for alveolar reconstruction: a new donor site. *Int J Oral Maxillofac Implants.* 2005;20:777-783.
7. Rosenquist B. A comparison of various methods of soft tissue management following the immediate placement of implants into extraction sockets. *Int J Oral Maxillofac Implants.* 1997;12:43-51.
8. Khoury F, Hoppe A. The palatal subepithelial connective tissue flap method for soft tissue management to cover maxillary defects: a clinical report. *Int J Oral Maxillofac Implants.* 2000;15:415-418.
9. Khoury F, Hoppe A. Soft tissue management in oral implantology. A review of surgical techniques for shaping an esthetic and functional peri-implant soft tissue structure. *Quintessence Int.* 2000;31:483-499.