Aesthetical Reconstruction of an Anterior Tooth in an Alveolar Cleft Site: A Case Report and 3-Year Follow-up Findings

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INTRODUCTION

Approximately one in every 500 to 800 newborns has an associated cleft of the lip, alveolus, and palate (CLAP). To restore the anatomy and integrity of the arch, primary and secondary bone grafting are widely performed in patients aged 8 to 11 years.1,2 When the palatal defect is naturally or surgically closed with palatal mucosa and bone, integrity is established in the perinatal period, and bone grafting may not be necessary for prosthetic treatment, even though an alveolar bone cleft still exists. However, when the dimensions of the recipient site are considered inadequate for the aesthetical reconstitution of an anterior tooth with a dental implant, bone grafting is desirable.3 In such a case, an autologous bone graft from the iliac crest is normally utilized at the cleft site prior to implant placement.4 To date, there have been limited reports concerning the necessity of autologous bone grafting and less invasive bone grafting using only bone substitute with implant placement at a cleft site during prosthetic rehabilitation.5,6 Thus, in this report, we present a clinical case of bone grafting with only bone substitute at a cleft site followed by implant restitution where integrity of the jaw was achieved.

CASE REPORT

A 35-year-old woman with an alveolar cleft on the left side was referred to our implant clinic in July 2006 for restitution of a maxillary central incisor that had functioned as an abutment tooth of a bridge restoring the adjacent lateral incisor, which was congenitally missing. The central incisor had been extracted because of root fracture. As shown in Figure 1, the mesiodistal length of the edentulous space was too wide for single-implant restitution, and orthodontic treatment was performed in which the canine was relocated to replace the missing lateral incisor and the palate was laterally widened for dental arch expansion. In December 2008, the patient visited the clinic; 3-dimensional computerized tomography was performed for diagnosis and planning for the next surgical procedure. The image analysis revealed a palatal cleft where the implant installation was anticipated at the central incisor position. Further, the 3-dimensional shape of the edentulous bone around the cleft was narrowed, beam-like, and isolated from the piform aperture because of the large palatal defect, as shown in Figure 2. In February 2009, a Ø3.5 mm × 10 mm NobelReplace Groovy NP implant (Nobel Biocare, Gothenburg, Sweden) was installed according to the manufacturer’s protocol. Care was taken during surgery to ensure that the fixture could be impacted and stabilized in the thin bone. Hydroxyapatite particles (Calcitite, Hakuho, Tokyo, Japan) were placed on the labial surface of the marginal bone for ridge augmentation. Decortication was contraindicated because the host bone was too thin. Because the labial mucosa was furrowed and contracted, as shown in Figure 2, a mucoperiosteal flap was formed by extension of a relaxing incision. The ablated flap was dislodged anteriorly by the augmented bone surface, and the furrowed contracture of the labial mucosa was planarized 1 month after surgery. Six months after surgery, in August 2009, reentry was performed by a punching-out procedure to retain the gingival shape, and a provisional restoration was installed on the implant. Postsurgical monitoring continued to ensure that the fixture was amply osseointegrated. The labio-palatal thickness was well retained (Figure 3), and the emergence profile of the provisional restoration was adjusted on several occasions to improve the gingival form. In May 2010, the fixture impression for the final prosthesis was taken. Consequently, the abutment was tightened to 35 Ncm with a screwdriver and the final crown was cemented onto the abutment in September 2010. There have been no major problems in a follow-up period of 3 years. As a result of the improvement of the vertical dimension by orthodontic treatment, the wrinkle-improving around the mouth was found as shown in Figure 4, and the esthetics of the anterior region have been significantly improved (Figure 5), together with the patient’s quality of life.

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DISCUSSION

The volume of the host bone and the gingival thickness are important factors in aesthetical reconstructions; this is also applicable to compromised and complex jaws with CLAP. At nongrafted alveolar cleft sites in adult patients, the bone volume tends to be anatomically insufficient and the gingival mucosa relatively thick; therefore, the mucosa can be extended by a relaxing incision. Thick and extendable gingival mucosa may facilitate coverage of an augmented alveolar ridge. In addition, a low lip line in a postoperatively contracted cleft lip is advantageous when the marginal scallop of the gingiva is not

**FIGURE 1.** External appearance of the repaired cleft lip. Frontal view (a), and lateral view (b). Palatal view of the edentulous space before orthodontic treatment (c). Frontal and lateral views of the anterior region show a furrowed gingival shape caused by the alveolar cleft on the left side (d–f). Panoramic radiograph before extraction of #9 (g) and after extraction (h). Computerized tomography images of alveolar bone (i, j).
identical to that of the opposite side. If the dental arch is corrected and the edentulous space becomes appropriate for subsequent prostheses, bone substitute alone or a lesser amount, if any, of autologous bone may provide an esthetic reconstruction for implant placement together with management of the thick and extendable soft tissue.

There are several case reports and systematic reviews concerning bone grafting and other factors that influence implant survival in an alveolar cleft.\textsuperscript{8–10} In a clinical article published in 2005,\textsuperscript{3} the authors concluded that longer implants had significantly better survival rates, whereas other parameters such as age, gender, and implant diameter and surface...
characteristics had no significant effects on implant survival. In another report in 2012,\textsuperscript{6} the authors evaluated the esthetical outcome at an alveolar cleft site after implant restitution and mentioned that the patient was satisfied with the result. Although esthetical recovery is restricted in cleft patients, oral health-related quality of life should be improved on a par with that in normal patients. On the basis of the results of the present case and the previous literatures, we believe that implant restitution is appropriate, even in cases of alveolar cleft. In this case, the aesthetics was successfully improved and the patient was satisfied with the result of the reconstruction. Thus, the necessity of preoperative bone grafting in implant restitution appears to depend on the shape of the residual bone and thickness of the gingival mucosa.

**ABBREVIATION**

CLAP: cleft of the lip alveolus, and palate

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**REFERENCES**


