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## Dental Implant Treatment for a Patient with Bilateral Cleft Lip and Palate

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## Abstract

Dental reconstruction in the cleft space is difficult in some patients with cleft lip and palate because of oronasal fistulas. Most of these patients receive a particle cancellous bone marrow (PCBM) graft to close the alveolar cleft, and secondary bone grafting is also required. Treatment options for the alveolar cleft including fixed or removable prostheses require the preparation of healthy teeth and are associated with functional or social difficulties. Recently, the effectiveness of dental implant treatment for cleft lip and palate patients has been reported. However, there have been few reports on the use of this treatment in bilateral cleft lip and palate patients. We report the case of a patient who had bilateral cleft lip and palate and was missing both lateral incisors. She received dental implant treatment after a PCBM graft and ramus bone onlay grafting (RBOG). A 34-month postoperative course was uneventful.

**KEYWORDS:** dental implant, cleft lip and palate, dental reconstruction

Case Report

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Dental reconstruction in the cleft space is difficult in some patients with cleft lip and palate because of oronasal fistulas. Most of these patients receive a particle cancellous bone marrow (PCBM) graft to close the alveolar cleft, and secondary bone grafting is also required. Treatment options for the alveolar cleft including fixed or removable prostheses require the preparation of healthy teeth and are associated with functional or social difficulties. Recently, the effectiveness of dental implant treatment for cleft lip and palate patients has been reported. However, there have been few reports on the use of this treatment in bilateral cleft lip and palate patients. We report the case of a patient who had bilateral cleft lip and palate and was missing both lateral incisors. She received dental implant treatment after a PCBM graft and ramus bone onlay grafting (RBOG). A 34-month postoperative course was uneventful.

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Dental rehabilitation of patients with alveolar cleft is very challenging. These patients require bone grafting not only to achieve sufficient osseous support for functionally loaded implants, but also to achieve an appropriate alveolar bone height for esthetic prostheses. There have been few reports regarding dental implant treatment for patients with bilateral cleft lip and palate. Secondary bone grafting in alveolar clefts is a well-established procedure performed to close the oronasal fistula, allow teeth to erupt in the cleft lesion, provide bony support for the teeth adjacent to the cleft, stabilize the premaxillary

segment of bilateral cases and create support for the alar base. After bone grafting in the alveolar cleft, conventional prostheses such as removable partial endosseous dentures or dental bridges are used for dental reconstruction in such cases. Functional, esthetic and social problems are associated with these treatments. Dental implant insertion into the reconstructed alveolus gives functional stimulation to the grafted bone and can prevent resorption of the grafted bone [1]. Recently, several researchers reported the efficacy of dental implant treatment after the repair of alveolar clefts with secondary bone grafting [2–5]. In this study we report the treatment of a bilateral cleft lip and palate patient using dental implants.

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### Case Report

A woman aged 20 years and 1 month with bilateral cleft lip and palate (BCLP) was referred to our clinic for repair of bilateral cleft and palate and dental reconstruction. Both of her lateral incisors were missing (Fig. 1A, 2A). She had undergone orthodontic treatment since she was 11 years old. The alveolar clefts were grafted with particle cancellous bone marrow (PCBM) taken from the ilium (Fig. 1B, 2B). She preferred dental implant treatment for her congenital missing bilateral incisors. Radiography revealed that the alveolar bone height was insufficient for placing implants. Therefore, ramus bone onlay grafting (RBOG) was performed to increase the bilateral alveolar bone bridges when the patient was 25

years old (Fig. 1C). Five months after RBOG, 10-mm-long Branemark system implants (Nobel Biocare, Tokyo, Japan) were installed on both sides. Eight months after the implant placement, the abutment was connected, and provisional restoration was fixed. Eighteen months after the implant placement, final prosthetic rehabilitation was completed. A 34-month follow-up of the implants revealed no clinical or radiographic signs of implant failure, and the final prosthesis was stable (Fig. 1D, 2C, 2D).

### Discussion

Although many reports have demonstrated excellent results with dental implants histologically, radiographically and clinically [6-8], few have examined

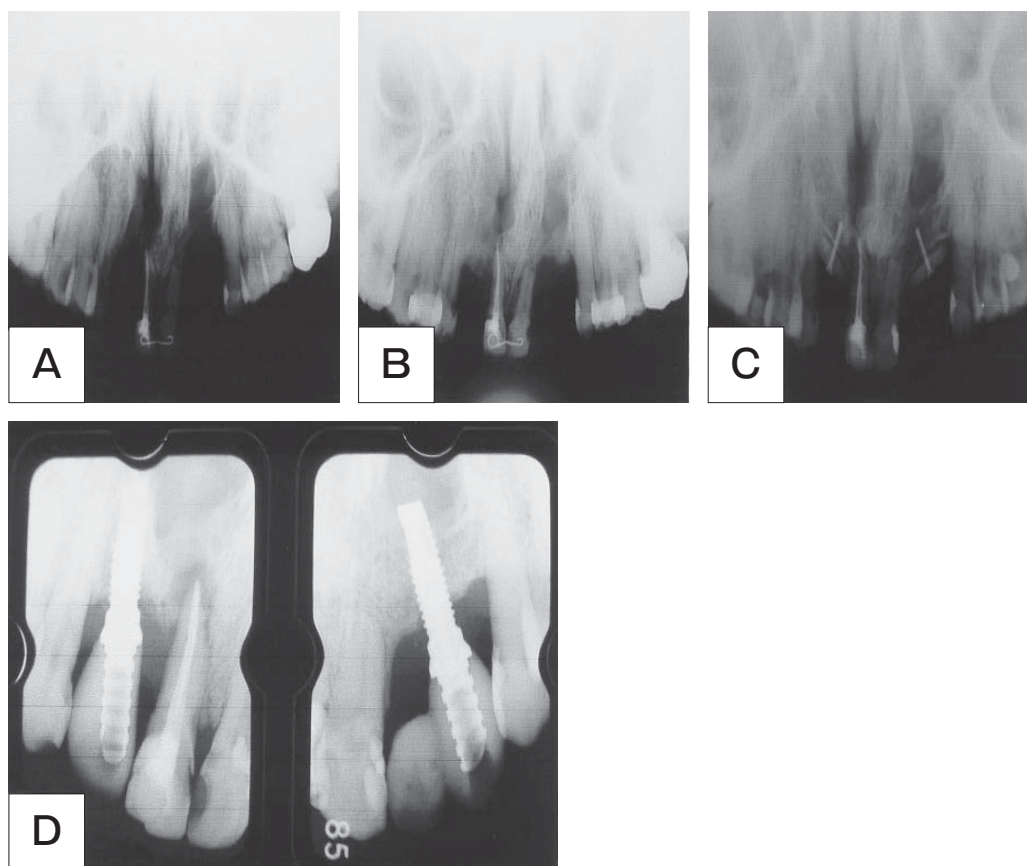


Fig. 1 A series of radiograph pictures of the patient. **A**, Radiograph before alveolar graft. Bilateral alveolar clefts are seen; **B**, Radiograph after autogenous particle cancellous bone marrow (PCBM) grafting to alveolar cleft; **C**, Radiograph after mandibular ramus onlay graft (RBOG); **D**, Radiograph of prosthesis at 2 years after implant installment. The radiolucent area of the right incisor is a periapical lesion, which is not related to the implant surgery.

the results of implant treatment in cleft lip and palate patients, especially those with bilateral cleft lip and palate [9, 10]. In contrast to unilateral cleft lip and palate, an important difficulty with bilateral cleft lip and palate is the fixation of the premaxilla bone after bone grafting. Insufficient bone fixation causes subsequent resorption of the grafted bone. As a result, the volume of the alveolar height becomes insufficient, and a larger volume of the graft bone is required. A second difficulty is that the soft tissue becomes quite tough due to the postoperative development of scar tissue, making complete closure of the gingival flap after vertical bone augmentation difficult [11]. Sufficient volume and quality of alveolar bone are required for successful implant treatment. Usually PCBM is grafted to close the alveolar cleft, but the vertical bone height achieved with this graft is not suf-

ficient. Therefore, secondary bone grafting using the chin or mandibular ramus bone is needed for dental implant placement.

In the present case, the patient had received a PCBM graft from the ilium to close the alveolar cleft prior to implant treatment and had required additional bone grafting to increase the alveolar height. We used the mandibular ramus bone to augment the alveolar height of the bony bridge of the alveolar cleft and closed the gingival flap with a widely extended tension-free flap to protect the exposed grafted bone. This intraoral bone-harvesting technique has been shown to be quite acceptable for the treatment of patients with alveolar ridge atrophy resulting from trauma, tumor resection and periodontal disease. Raghoebar *et al.* [12] reported a high success rate of 92% for dental implants with chin bone grafting. Jensen *et al.*

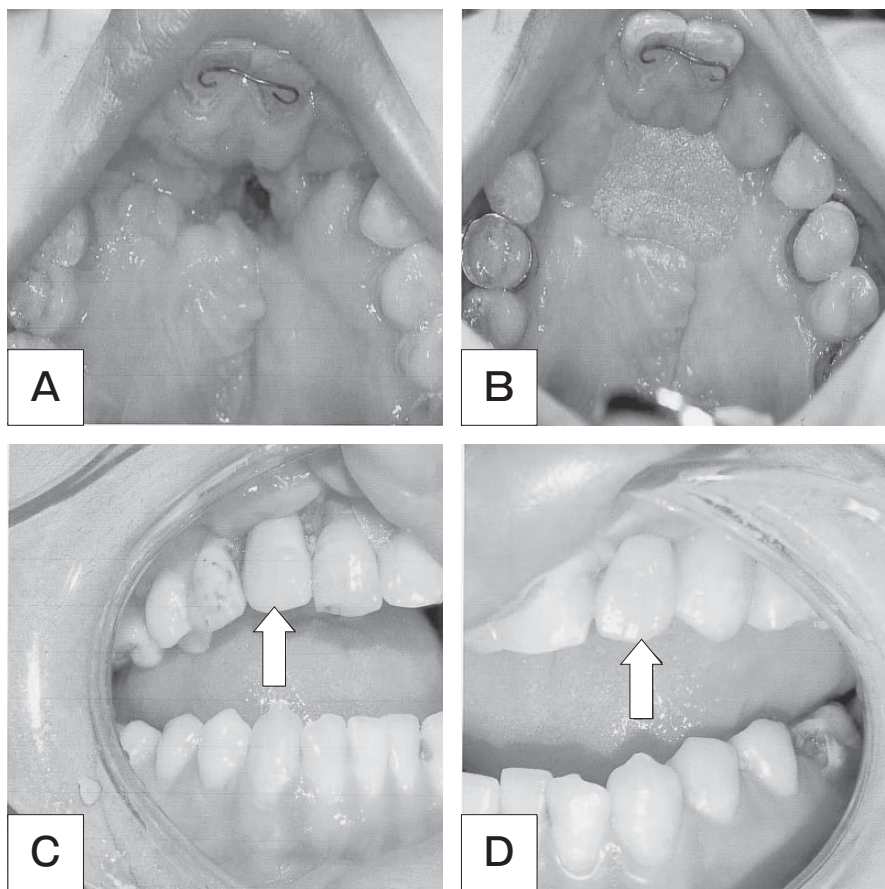


Fig. 2 Photograph of the intraoral findings. A, Occlusal view with bilateral alveolar clefts pre-treatment; B, Occlusal view after bone grafting and oronasal fistula closing; C and D, Intraoral view after final prosthetic rehabilitation.

[13] also reported a success rate of 95% for dental implants using autogenous bone graft harvested from the mandibular ramus. In a study involving 19 cleft lip and palate patients, Takahashi *et al.* [14] found that half of the patients required chin bone onlay grafting (CBOG) to increase the alveolar bone height for the placement of dental implants of adequate length. Buser *et al.* [15] reported the efficacy of the guided bone regeneration technique with a resorbable or non-resorbable membrane for the atrophied alveolar ridge. Zaffe *et al.* [16] suggested callus distraction to increase the bone height without bone grafting. Callus distraction enables not only hard tissue augmentation but also soft tissue augmentation [11]. Therefore, this technique is expected to achieve better results than the conventional onlay graft for cleft lip and palate patients. The combination of these options with autogenous bone grafting might bring more satisfactory results in the future.

We investigated the clinical outcome of endosseous implants installed in the bilateral alveolar cleft repaired with an autogenous PCBM graft. The results suggest that an additional bone graft (RBOG or CBOG) enables the dental implant not only in unilateral cleft lip and palate cases but also in bilateral cleft lip and palate cases. The advantages of this approach include rendering prostheses such as removable dentures or bridges unnecessary. That is, an acceptable esthetic outcome for the patient can be achieved. Also functional stimulation of the implant will limit resorption of the grafted bone.

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