

# PROSTHODONTIC CLOSURE OF PALATAL FISTULA WITH OSSEOINTEGRATED IMPLANTS AND ONLAY BONE GRAFTS — CASE REPORT —

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## ABSTRACT

A case treated with onlay bone grafting and simultaneous osseointegrated implant insertion is reported. The patient had an oronasal fistula in the center of the premaxillary region due to failed repair of a bilateral cleft palate. Four fixtures were inserted with onlay bone grafting of the maxillary alveolar ridge. Twelve months postsurgery, one fixture was lost as a result of severe bone resorption around the fixture, but three fixtures integrated strongly.

We constructed an overdenture stabilized with ball attachments connected to the implants 13 months after the first operation. Speech and masticatory function improved remarkably with closure of the fistula and good fixation of the denture.

Key Words: Osseointegrated implant, Onlay bone graft, Cleft lip and palate, Palatal fistula

## INTRODUCTION

Osseointegrated implants introduced by Breine and Brånemark<sup>1)</sup> made possible the reconstruction of the occlusion in edentulous patients. However, patients with severely atrophied maxillary alveolar processes remain difficult to treat by conventional implant procedures because of the insufficient alveolar bone. Jensen et al.<sup>2)</sup> and Sailer<sup>3)</sup> have reported new methods for inserting endosseous implants in the totally atrophic maxilla by bone grafting into the maxillary sinus and nasal floor. However, their surgical procedure employs Le Fort I osteotomy or opening of the maxillary sinus to insert the grafted bone. Brånemark and co-workers<sup>4)</sup> earlier reported the "immediate-placement graft technique." By this procedure a bone graft from the iliac crest is adapted to the recipient site and fixed on the residual maxillary alveolar ridge with implants without osteotomy of the maxilla or opening of the sinus.

In this paper, a case with a residual fistula due to bilateral complete cleft palate and with a severely resorbed maxillary ridge is reported.

## CASE REPORT

The patient was a 27-year-old man with advanced caries and periodontitis of the maxillary teeth. On the right side of the maxilla, root abscesses of the molar teeth and periapical infections were observed, and poor oral hygiene was noted. The patient had complete bilateral cleft palate

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and had been treated with palatoplasty 25 years earlier; however, in the central part of the anterior palate, a fistula approximately 10 mm in diameter remained. Speech function was marked by severe hypernasality, and regurgitation of food debris into the nasal cavity was noted. The teeth and infected cysts were removed and antibiotic treatment was prescribed for five days.

Two months after the removal of teeth and abscess, the maxillary alveolar ridge was examined with conventional radiography and three-dimensional computed tomography (3DCT) to determine the exact shape of the maxilla. According to the 3DCT analysis, there was severe atrophy of the maxillary alveolus with some bony defects in the right-molar and left-premolar regions representing extensions of the maxillary sinus (Fig. 1). In the premaxilla, bilateral residual alveolar clefts were present in addition to the fistula.

Treatment was planned as follows:

- 1) The simultaneous insertion of four osseointegrated titanium Brånemark implants in the premolar area bilaterally with onlay bone grafting using iliac bone (Fig. 2).



Fig. 1. Three-dimensional computed tomography (3DCT) of the maxilla: Severely atrophic maxilla with bony defects of the alveolar ridge representing alveolar extension of the maxillary sinus.

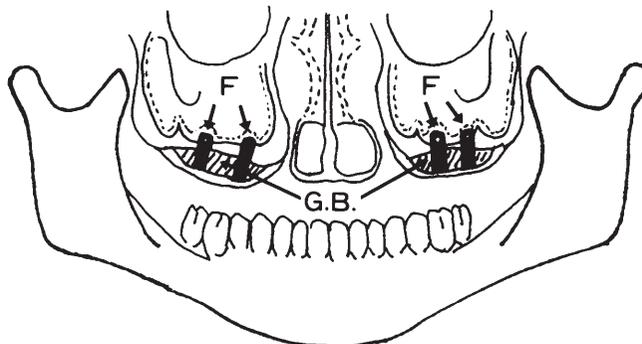


Fig. 2. Diagram of the procedure. Four Brånemark implants were inserted in the premolar regions of the maxilla with onlay bone grafting. (F: fixture, G.B.: grafted bone)

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2) Occlusal reconstruction and obturation of the fistula with an overdenture stabilized by the implants.

Surgery was performed four months later.

A mucosal incision was made in the maxillary vestibule and the mucoperiosteal flaps were raised carefully without damaging the mucosa. The maxillary ridge was exposed and the crest of the ridge was flattened with a steel bar. Corticocancellous iliac bone pieces were harvested and shaped to fit the residual alveolar ridge as an onlay. Each piece of bone, measuring 10×20×5 mm, was fixed with two implants bilaterally (3.75 mm in diameter, 10 mm in length), which penetrated into the maxillary sinus. The small space between the maxillary ridge and the grafted bone was filled with fibrin glue. After insertion of the implants, the mucosal flaps were advanced over the grafted bone and sutured by mattress sutures. Ten days postsurgery, a provisional denture was fixed in place.

Fourteen days postsurgery, a 5 mm dehiscence of the suture line of the left side was noted, thus exposing the fixture head of two implants. However, as there was no sign of inflammation, no action was taken except that the patient was seen as an outpatient weekly and the area cleaned with saline sodium. Twelve months after the first operation, the mucosa overlying the fixture head was removed and connected to the abutments with the patient under local anesthesia. At that time, one implant in the anterior region of the right side had to be removed because it had not integrated, probably due to excessive loading by the provisional denture. However, three implants integrated strongly and the grafted bone surrounding the fixture was found to survive completely.

There was no sign of bone resorption (Fig. 3). One month after abutment connection, an overdenture was constructed using three retentive (ball type) attachments (Fig. 4).

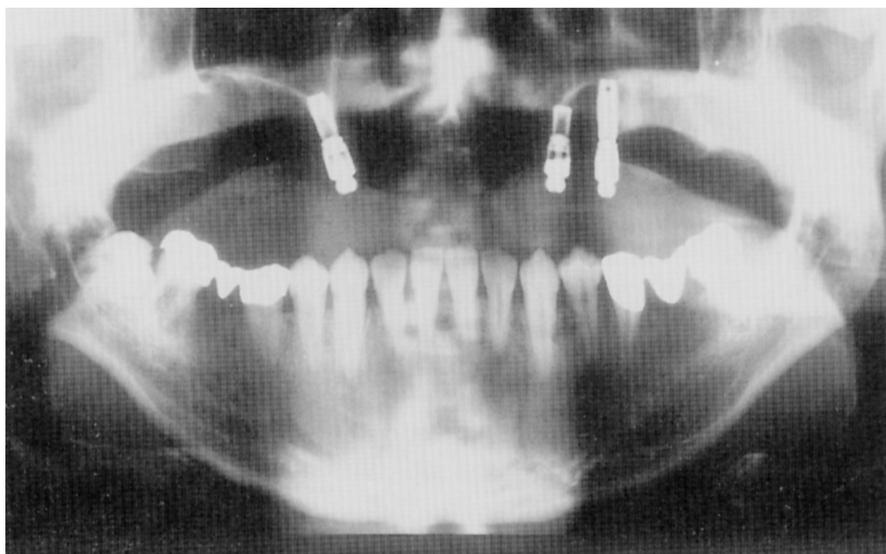


Fig. 3. Postoperative radiographic appearance after abutment connection. Three implants integrated well.

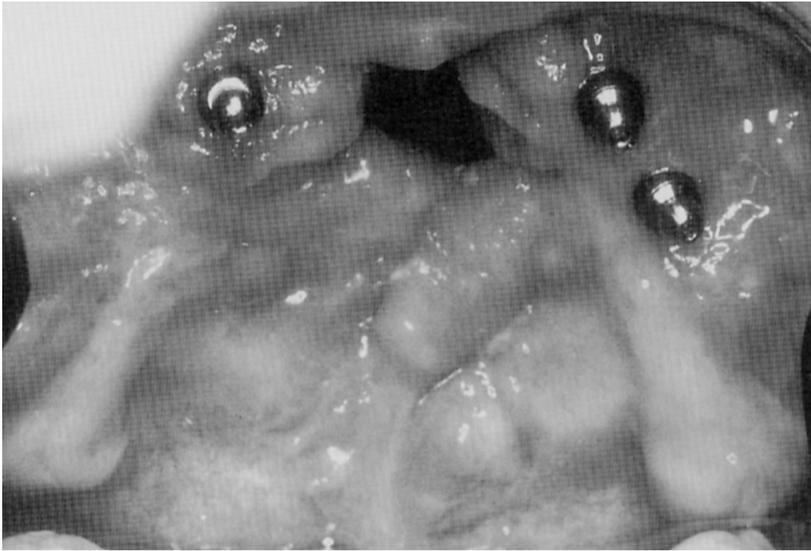


Fig. 4. Clinical appearance of the implants connected with ball attachments.



Fig. 5. The maxillary overdenture was attached to the three implants resulting in good denture stability.

The maxillary overdenture was attached to the fixtures by soft resin placed in the posterior region of the denture (Fig. 5). At the time of denture placement, bone loss to the two implants of the right side was noted on radiographic examination. Despite the bone loss, these implants were not mobile.

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After 34 months, all implants and the denture were functioning well and examination revealed soft tissue pockets of less than 2 mm surrounding the abutments, with no bleeding on probing. Speech function improved remarkably and was without nasality. Since the denture was well adapted, no food debris could pass through the fistula.

## DISCUSSION

Methods to close the palatal defect due to cleft palate as seen in this case include tongue flap grafting and palatal mucosal flap grafting. However, with a case like this where the maxillary alveolus and teeth are missing in addition to the presence of a palatal defect, use of the maxillofacial prostheses is more effective than surgical closure utilizing tissue grafting. By use of the denture and its base, occlusal reconstruction as well as closure of the palatal defect may be performed simultaneously. When there is scarcity of alveolar bone, rendering denture insertion difficult, it is seemed appropriate to reconstruct occlusion and to close the palatal defect at the same time by utilizing a maxillofacial denture after installation of anchors such as implants.

However, special attention not needed in regular dental implants is required when installation of implants in extremely atrophic alveolar bone is being considered. Bone grafting into the maxillary sinus and nasal floor has been recommended for augmentation of the atrophic alveolar ridge to permit insertion of implants<sup>2,3,5</sup>). In such a procedure, Le Fort I osteotomy or opening of the maxillary sinus need to be done. This may be a disadvantage to some patients because of the extensive surgery required. On the other hand, onlay bone grafting, as reported by Breine and Brånemark<sup>1</sup>), has the advantage, especially in the older patient, of allowing the insertion of an implant into a bone graft without maxillary osteotomy. Jensen et al.<sup>2</sup>), however, reported that the onlay bone grafting method had a tendency towards extensive resorption of grafted bone after simultaneous installation of implants.

Breine and Brånemark<sup>1</sup>) also reported that the resorption rate of the grafted bone may have been influenced by the insertion of a provisional denture as early as three to four weeks post-surgery. Jensen et al.<sup>2</sup>) also reported that excessive loading to the implants increased bone resorption. Overdentures stabilized by implants can be supported by both the mucosa and ball attachments. The stress to the implant itself is less than that to an implant-supported bridge. An overdenture prostheses may also be less expensive than a fixed implant-supported bridge, which requires more complex prosthetic restoration<sup>6,7</sup>). Sandwich augmentation techniques are being increasingly employed, according to current reports<sup>8,9</sup>). However, evidence shows that substantial resorption also occurs when fixtures are utilized as the support for a conventional bridge<sup>10</sup>).

Whichever method of bone grafting is employed, it is necessary to adequately envision the morphology of the alveolar bone which becomes the recipient site. In a case like this where a palatal defect is present, it is especially difficult to grasp the total image of the deformed bone on regular simple roentgenographs. We, therefore, performed three-dimensional CT analyses, which clarified the morphology of the recipient site as well as the size of the bone to be grafted.

Difficulty has been reported in obtaining adequate soft tissue coverage in most bone graft augmentation techniques. This problem can increase the risk of wound dehiscence, and may also be a decisive factor for graft and implant survival<sup>11</sup>). In our patient, a small dehiscence occurred resulting in exposure of the fixture head. However, the fixtures survived without loosening.

Further data, therefore, are necessary before onlay procedures with simultaneous implant insertion can be recommended for routine use.

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