# Long-term Clinical and Radiological Evaluation of Endosseous Implants in Nonvascularized Fibula Bone Grafts for the Reconstruction of the Severely Atrophied Alveolar Bone

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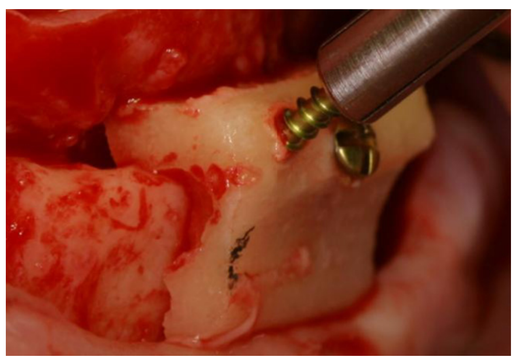
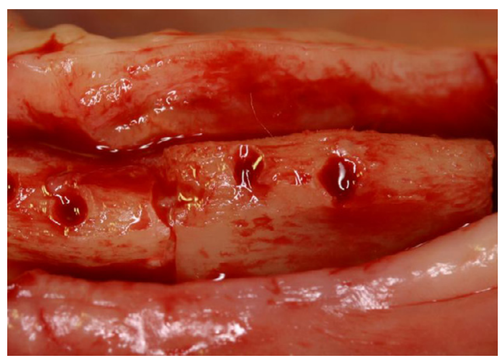
## Introduction-Objectives

The reconstruction of atrophied edentulous ridges and the prosthetic rehabilitation of patients presenting with such severe atrophy is still a challenge for clinicians. Among the various procedures suggested for the reconstruction is the use of avascular fibula bone grafts. The purpose of the present study was to assess long-term crestal bone level changes in avascular fibula bone grafts of the extremely atrophied maxilla and mandible. It was also considered whether this treatment results in adequate reconstruction and successful long-term functional rehabilitation of edentulous patients with severely atrophied jaws.

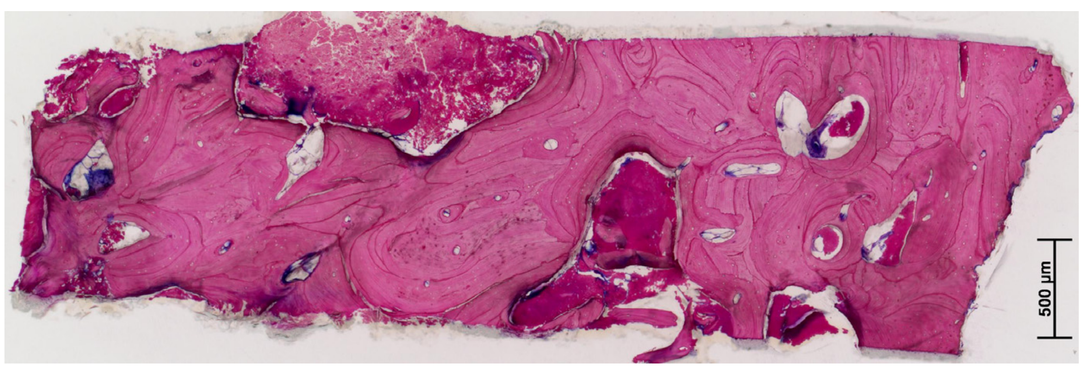
## Material and Methods

In our study 8 edentulous patients were included (8 women, average age 72 years ±7). The mean observation time was 95 months (range 73-135 months). All patients presented a Class VI atrophy according to the Cawood classification and had less than 5 mm residual bone volume. Grafting and implantation were performed either simultaneously (in 4 patients) or in a second procedure 3 months after the augmentation (in 4 patients). All patients were provided with a bar-retained denture. A total of 38 implants were placed (18 Camlog, 12 Sterioss and 8 Straumann). Postoperative evaluation included clinical and radiographic examinations which were conducted by two different evaluators to standardize the judgment. Clinical criteria included implant success (absence of pain, complaints, peri-implant infection and mobility) and crestal bone resorption. The radiographic evaluation aimed to quantify the resorptive changes and the measurements were performed using panoramic radiographs and Adobe Photoshop 7.0 (San Jose, CA) as described previously (1). The immediate postoperative height was fixed at 100 % and this was also the initial value for calculating the resorption rate over time at the mesial and distal site of the implant. Histologic specimens (Azur II and Pararosanilin staining) were obtained from one patient after 10 years with a trephine bur for the auxiliary placement of an implant.





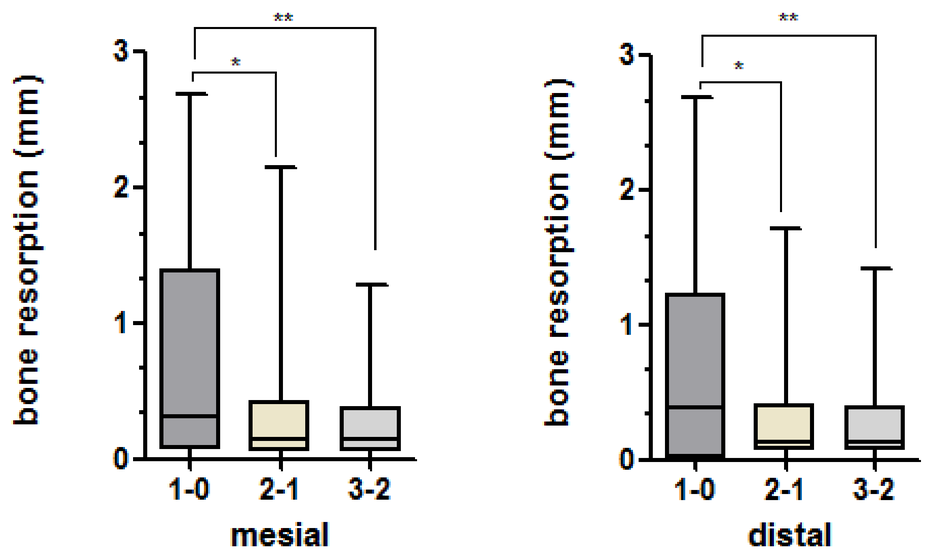
Fibula graft fixated with micro screw in Maxilla and after 3 months of revascularization, at the time of micro screw removal and implant placement.



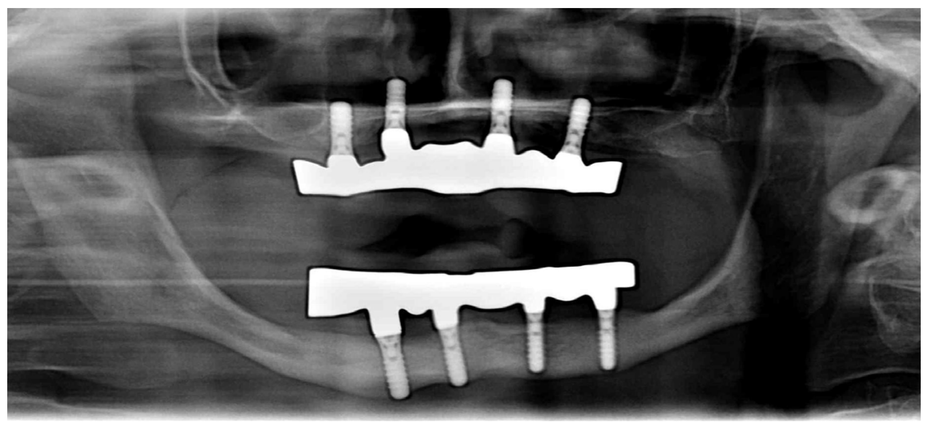

Histologic evaluation of the augmented fibula bone revealed a completely vascularized cortical bone with 95% of bone.

## Results

The grafting procedure was successfully performed in all patients and no regrafting was necessary. All implants were integrated, but one implant was lost 2 years after the abutment connection. All other implants fulfilled the Buser criteria, thus rendering to a success rate of 97 %. The mean bone resorption after the third radiographic control was 1.24 mm (range: 0.09 – 3.68 mm) for the mesial and 1.23 mm (range: 0 – 3.77 mm) for the distal site of each implant. The maximum bone resorption was seen at the time between the postoperative X-Ray and the first radiographic control (a year after the operation) and no significant resorption was measured thereafter as shown in the following graphs.




0: postoperative radiographic control
1: first radiographic control (1 year post OP)
2: second radiographic control (2-5 years post OP)
3: third radiographic control (6-11 years post OP)
(asteriks show significance)



Panoramic x-ray of a patient after 11 years.

## Discussion and Conclusions

In this clinical and radiographic evaluation, it was found that nonvascular fibula graft is a reliable material for augmentation procedures in atrophied edentulous ridges. The dental implants that integrated in the free autologous fibular bone grafts showed a stable crestal peri-implant bone level over a longer period of time.

## Bibliography

(1) Nelson et al.: Clinical Evaluation of endosseous implants in nonvascularized fibula bone grafts for reconstruction of the severely atrophied mandibular bone.
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