JCP DIGEST 08

Selected from Journal of Clinical Periodontology VOLUME 45/2018

Scientific release from the EFP

EFP European Federation of Periodontology

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study

# Autogenous tooth roots as bone-block grafts

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J Clin Periodontol. 2018; 45: 996-1004.

Summarised from original article, "Efficacy of autogenous tooth roots for lateral alveolar-ridge augmentation and staged implant placement: a prospective controlled clinical study", with kind permission from Wiley Online Library.



*JCP Digest 08, published by the EFP in March 2019.*

## RELEVANT BACKGROUND

Several studies have shown that extracted teeth have structural and biological potential to support the regeneration of osseous defects. This is especially true for dentin, which presents a similar composition to bone.

Recent animal studies investigated the efficacy of extracted tooth roots (TR) for lateral alveolar-ridge augmentation and two-stage implant placement. Most of those studies used roots that had been separated from upper premolars that were either healthy, endodontically treated, non-infected, or periodontally diseased. They were used as block grafts at chronic-type horizontal alveolar-ridge (0-wall) defects; while cortical autogenous bone (AB) blocks harvested from the retromolar area served as controls.

Results did not show any statistically significant differences between groups regarding histological, immunohistochemical, and microcomputed tomographic analyses. A gradual replacement resorption of both TR and AB grafts was noticed.

These results were confirmed by a human case report. Indeed, at clinical re-entry, the transplanted root was homogeneously incorporated at the former defect site. The gain in ridge width amounted to 4.5mm and allowed a successful implant placement. The results may justify further investigation of this treatment concept.

## AIMS

The aim of this prospective clinical study was to evaluate the efficacy of autogenous TR and AB blocks for lateral alveolar-ridge augmentation and two-stage implant placement.

## MATERIALS AND METHODS

This study was a prospective controlled clinical monocentre study.

Patients in need of implant therapy and lateral ridge augmentation were allocated to parallel groups receiving either healthy autogenous tooth roots (TR) or cortical autogenous bone blocks (AB). A sample size of 15 patients was calculated per group.

Patients had to have insufficient bone-ridge width at the recipient site for implant placement, but sufficient bone height and healthy oral mucosa.

Exclusion criteria were: general contraindications for surgical treatments; inflammatory and autoimmune disease of the oral cavity; uncontrolled diabetes (HbA1c >7%); history of malignancy requiring chemotherapy or radiotherapy; previous immunosuppressant, bisphosphonate, or high-dose corticosteroid therapy; smokers; and pregnant or lactating women.

Mucoperiosteal flaps were elevated to expose the target sites. In the TR group, a second mucoperiosteal flap was elevated to surgically remove the wisdom tooth, which was then adapted to the defect area. In the AB group, a monocortical block graft was harvested from the retromolar region.

Radiographs were taken before and after alveolar-ridge augmentation and implant placement.

The primary endpoint was sufficient clinical width (CW) of the alveolar ridge for placement of an adequately dimensioned dental implant, without the need for a secondary grafting at 26 weeks after surgery in either group.

CW was assessed immediately before (CWb) and after (CWa) augmentation, and during re-entry at 26 weeks (CW26).

Secondary endpoints were assessments of gain in ridge width, graft resorption, soft-tissue dehiscence, and wound infections.

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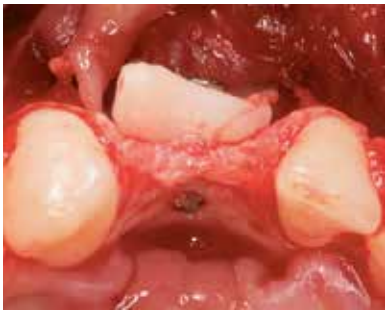

**Fig. 1:** Graft positioning and adaptation using an osteosynthesis screw. No further contour augmentation was provided.

**Fig. 2:** Shaped and pre-drilled AB block to match the size and configuration of the defect site.

**Fig. 3:** AB and TR grafts were left to heal in a submerged position and suture removal was accomplished at Visit 3.

## results

- In all patients of both TR (15/15) and AB groups (15/15), CW26 allowed for a successful placement of an adequately dimensioned titanium implant (diameter: 4.1mm). Mean CW26 values were 10.06 ± 1.85mm (median: 11.0; 95% CI: 9.03; 11.09) in the TR and 9.2 ± 2.09mm (median: 8.50; 95% CI: 8.04; 10.35) in the AB group, respectively, with no statistically significant difference between groups (p = 0.241).
- Mean CWa and mean CWb values were not significantly different between groups (p = 0.955 and p = 0.164, respectively). Graft thickness (GT) was also comparable in both groups (p = 0.22), with 5.66 ± 1.75mm (median: 5.0; 95% CI: 4.69; 6.64) in the TR and 4.96 ± 1.75mm (median: 5.0; 95% CI: 4.24; 5.68) in the AB group. A significant positive correlation between CWg and GT values was found.
- The CWg value in the TR group was significantly higher (5.53 ± 1.88mm; median: 5.00; 95% CI: 4.48; 6.57) than AB (3.93 ± 1.41mm; median: 4.00; 95% CI: 3.15; 4.71), while RT graft resorption was significantly lower (0.13 ± 0.97mm; median: 0.00; 95% CI: -0.4; 0.67) when compared with the AB group (1.03 ± 1.15mm; median: 1.50; 95% CI: 0.39; 1.67), p = 0.014 and p = 0.029, respectively.
- Finally, AB grafts were frequently associated with a moderate to pronounced graft resorption at the outer surface whereas the peripheral contour of TR grafts was usually well preserved.

### LIMITATIONS

- There was no description of the characteristics of the studied population.
- No randomisation was applied.
- A difference was found between groups regarding the intervention site.
- Despite the sample-size calculation, the small number of subjects reduces the ability to draw definitive conclusions regarding the primary outcome.

### CONCLUSIONS

- TR were as efficient as AB for bone augmentation of horizontal defects, allowing two-stage implant placement.
- TR grafts showed less crestal resorption and more ridge-width gain compared to the AB grafts at 26 weeks.
- TR graft remodelling and implant survival should be assessed in long-term longitudinal studies.

### IMPACT

- TR may be considered as a therapeutic alternative to AB block grafts for horizontal bone augmentation.

links

**LINK TO ORIGINAL JCP ARTICLE:**

https://www.onlinelibrary.wiley.com/doi/10.1111/jcpe.12977

Access through EFP members' page log-in: http://www.efp.org/members/jcp.