University of Zurich[UZH]

Center of Dental Medicine

Randomised, controlled clinical trial of lateral ridge augmentation using xenogenic block grafts loaded with recombinant human bone morphogenetic protein-2 or autogenous bone blocks

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Objectives

To test whether or not, for primary bone augmentation, the use of a xenogenic bone block loaded with rhBMP-2 results in similar bone quantity and quality compared to an autogenous bone block and to evaluate patient morbidity following the surgical procedure with the two treatment modalities.

Materials & Methods

24 patients requiring implant therapy for the reconstruction of 1 to 4 missing teeth and insufficient bone volume for implant placement were randomly assigned to receive one out of two treatment modalities. In the test group (test), a xenogenic block loaded with rhBMP-2 was used, whereas in the control group (control), an autogenous bone block in combination with xenogenic bone particles was applied.

Both augmented sites were covered with a native collagen membrane. Bone quantity was evaluated at baseline (prior to augmentation), after augmentation, and at 4 months by measuring the horizontal ridge width with a caliper. Biopsies were obtained at 4 months and histologically evaluated. Patients' perception/acceptance was measured at suture removal (visual analogue scale VAS 0-100, 100 reflecting the highest morbidity).

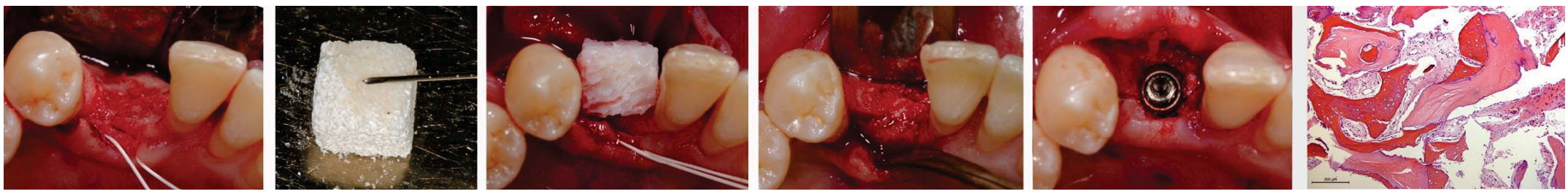


Fig.1a: Test group (University of Zurich)

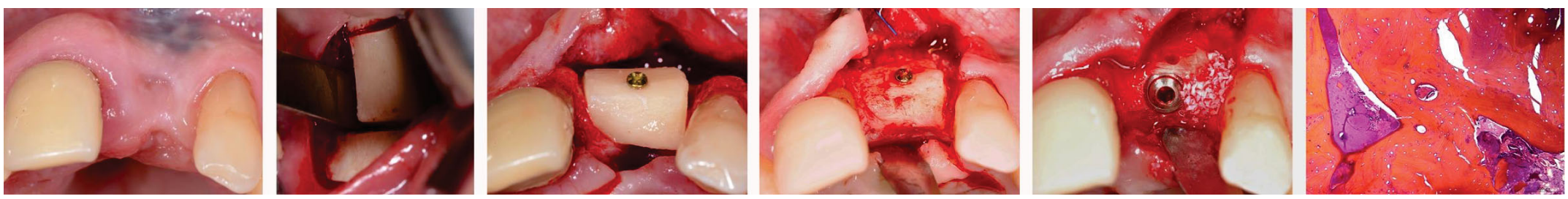
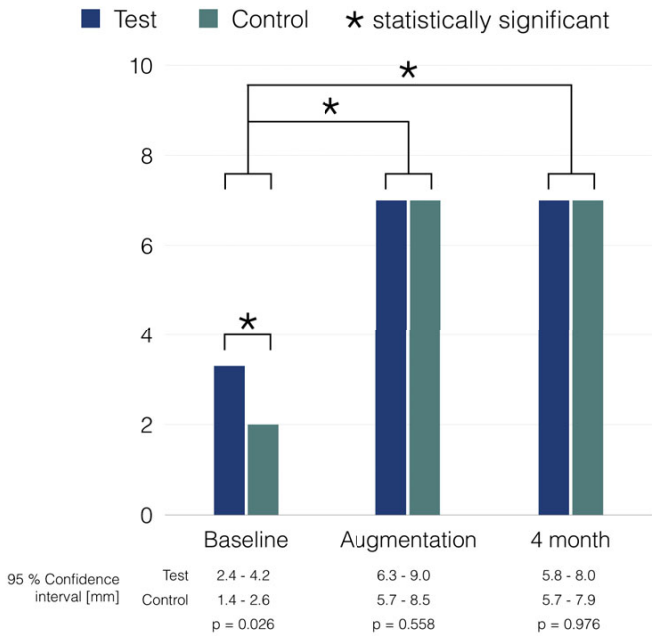


Fig.1b: Control group (Medical University of Graz)

Results

Ridge width

The **median ridge width** in the test group (3.3 mm) was statistically significantly higher than in the control group (2.0 mm) at baseline (p=0.026). There was no statistically significant difference between the test group (7.0 mm) and the control group (7.0 mm) after augmentation (p=0.558) as well as at 4 months after augmentation, with median values of 7.0 mm for the test group and 7.0 mm for the control group (p=0.976).

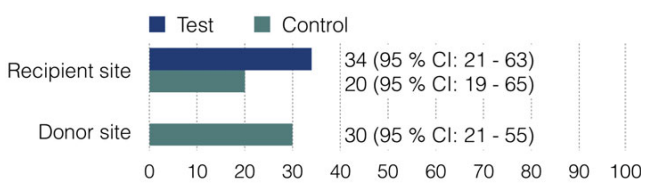


A statistically significant increase in **horizontal ridge width** was obtained with both treatment modalities between baseline and after augmentation (p<0.001) as well as between baseline and 4 months after augmentation (p<0.001). No statistically significant changes of the ridge width occurred during the 4-month follow-up (p=0.438). All implants could be placed at the originally planned position.

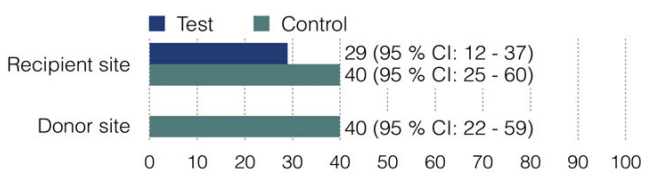
Patient-reported outcome measures (PROMs)

PROMs demonstrated similar values regarding **pain** after surgery as well as **swelling** for recipient and donor sites (control only).

The **median value for swelling** in the test group was 34 at recipient sites, compared to the control group with 20 at recipient and 30 at donor sites, reaching no statistical significance comparing recipient sites (p=0.995).



Median value for pain after surgery in the test group reached 29 at recipient sites, compared to the control group with 40 at recipient and 40 at donor sites, without statistical significance for recipient sites (p=0.083).



Histomorphometry

Histomorphometric data revealed statistically significantly more mineralised tissue (new bone, old bone, bone substitute) in the control group (74.2 %) compared to the test group (44.6 %) at 4 months (p=0.022). The control group had a lower median amount of non-mineralised tissue (8.0 %) compared to the test group (32.5 %).

Conclusion

Both treatment modalities were successful in regenerating bone to allow for dental implant placement at 4 months. Histologically, a higher amount of mineralised tissue was observed for the control group at 4 months. The use of a second surgical site in the control group tended to a higher patient morbidity compared to the test group, but did not reach statistical significance.

Acknowledgements

The study was supported by a grant from the Osteology Foundation, by Geistlich Pharma AG and Dentsply Implants.

The authors would like to thank Ms. Sonja Hitz for the preparation and analysis of the histological slides. The help of Ms. Gisela Müller for designing the poster is highly appreciated.

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