Effect of argon plasma on onlay xenograft incorporation and remodeling – preliminar histomorphometric results

Costa MM¹, Silva ER¹, Balan VF¹, Godoy EP¹, Medeiros LK¹, Xavier SP¹

Faculty of Dentistry of Ribeirao Preto, University of Sao Paulo, Brazil

Abstract

The objective of this study was to evaluate graft incorporation and remodeling processes of xenograft bone block (XBB) used for mandibular lateral bone augmentation through histomorphometric analysis.

Ten adult New Zealand male white rabbits were used in this split mouth randomized study. On the test side of the mandible, XBB (Osteobiol®) was submitted to argon plasma treatment, before fixation to the recipient bed while the control did not receive any treatment. Both sides were covered with a collagen membrane Bio-Gide. Biopsies were taken for each period (20 days and 60 days) and the specimens underwent histomorphometric evaluation. After dehydration, specimens were included in resin (LR White® hard grid resin). A system cutting-grinding (Exakt ®) was used to obtain two sections of about 100-150 µm of width. Then, the sections were ground to 50-60 µm using a gridding machine. All histomorphometric measurements were performed by a well trained-examiner. The percentages of new bone were 6.7 ± 2.6 % (control) vs 9.6 ± 5.2 % (plasma) in 20 days and 18.4% ± 7.9 % (control) vs 13.9 ± 3.5% (plasma) in 60 days. The percentages of residual graft were 25.6 ± 4.0 % (control) vs 29.8 ± 7.8 % (plasma) in 20 days and 27.4 ± 3.0 % (control) vs 21.1 ± 3.3% (plasma) in 60 days. These findings indicated that argon plasma does not improve new bone formation in XBBs used for mandibular lateral augmentation.

Background and Aim

XBB has been used as an alternative to autogenous bone block in oral implantology. However, up to date there is no information about the effect of argon plasma on its histomorphometric behavior.

The objective of this study was to evaluate graft incorporation and remodeling processes of XBB used for mandibular lateral bone augmentation through histomorphometric analysis.

Methods and Materials

10 Rabbits - New Zealand
Age: 5-6 months
This Split mouth randomized study

GROUP 1
5 animals - 20 days

GROUP 2
5 animals - 60 days

TEST SIDE - XBB (Osteobiol®, Tecnooss, Turim, Italy) was submitted to argon plasma treatment (10 W, 1 bar, 12 min, Plasma R, Sweden and Martina, Padova, Italy)

CONTROL SIDE - control did not receive any treatment.

Both sides were covered with a porcine collagen membrane (Bio-Gide®, Geistlich, Wolhusen, Switzerland).

Figure 1: Surgical procedure. A: Recipient bed perforation. B: Transoperative view of xenograft bone block immediately after fixation. C: Porcine collagenous membrane used for covering bone blocks.

Figure 2: A point-counting procedure was used to determine the tissue composition. A grid consisting of 80 squares was superposed to the image of histological slides.

Results

All histomorphometric measurements were performed by a trained-examiner.

Figure 3 - Histological sections were stained with Toluidine Blue and Alizarin Red, magnification x16. A: Control Side - 20 days. B: Test Side - 20 days. C: Control Side - 60 days. D: Test Side - 60 days.

Graph 1. Percentage of new bone. *(p>0,05)

Graph 2. Percentage of residual graft. *(p>0,05)

Conclusion

These findings indicated that argon plasma does not improve new bone formation in XBBs used for mandibular lateral augmentation. Further studies using a larger sample are required to evaluate properly the influence of argon plasma on xenografts.

References

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