Tomographic and volumetric evaluation of alveolar socket preservation using dPTFE intentionally exposed in oral cavity

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Abstract

Background

Several approaches are performed for the alveolar ridge preservation technique. But there is still no standard technique or biomaterial.

Aim/Hypothesis

This study evaluated the influence of dPTFE membranes to preserve the alveolar ridge after tooth extraction and immediate implant placement.

Materials and Methods

A total of 68 subjects were divided in 2 groups: Control group (n=34 subjects) - tooth extraction, implant placement and gap filled with xenograft, and Test group (n=34 subjects) - tooth extraction, implant placement, gap filled with xenograft, covered with a dPTFE (Critéria, São Paulo - Brazil). The tomography radiographs were taken before and 12 months after surgery. The width of keratinized mucosa as well as the alveolar ridge alterations were measured for both groups and the volumetric changes of the alveolar ridge measured by the software Geomagic Control X (3D Systems – South Carolina - USA).

Results

The alveolar width alteration was lower for the test group ($p < 0.05$). Volumetric analysis was higher bone loss for the control group. The volumetric changes were 16.75 and 6.58% for control and test group respectively ($p < 0.05$). Keratinized tissue width increased approximately 7.28mm around implants of test group.

Conclusions and Clinical Implications

Within the limits of this study, the use of dPTFE membranes associated with xenograft use of clinical results of immediate dental implant placement, after 12 months follow-up.

Methods and Materials

Sixty-eight subjects were divided into two groups: The control group (n=34) performed dental extraction and placement of an immediate implant, gap filled with xenograft material (Fig. 2 a, b, c) and the test group (n=34) performed dental extraction and immediate implant placement and gap filled with xenograft and the socket was covered by a dPTFE membrane (Criteria, São Paulo - Brazil) (Fig. 3 a, b, c). Cone beam tomography radiographs were done before and 12 months after surgery. DICOM images were converted to .STL files using Invesalious software (Renato Archer Information Technology Center - Ministry of Science and Technology of Brazil) (Fig. 4) and were performed as an intersection of alveolar ridge volumes with Geomagic Control X software (3D Systems - Carolina South - USA) (Fig. 5). The volumetric contraction of the alveolar crest and the keratinized mucosal width were measured for both groups.

Figure 2 a, b, c. Control group

Figure 3 a, b, c. Test group

Figure 4. DICOM images to .STL files at Invesalious software

Figure 5. Intersection of volumes at Geomagic Control X software

Results

The changes in alveolar ridge width was significantly smaller in the test group ($p < 0.05$). Volumetric analysis showed greater loss of total alveolar ridge volume in the control group, even with the bone graft procedure. The volumetric contraction was 16.75 for the control group and 6.58% for the test group ($p < 0.05$). The width of keratinized tissue increased an average 7.28 mm on the test group.

Conclusion

Within the limits of this study, the d-PTFE membrane resulted in a lower volumetric bone contraction of the alveolar sockets. In addition, provided a better regeneration of the keratinized mucosa around the implants on the test group.

References

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Background and Aim

Several techniques are performed to preserve the alveolar ridge after a tooth extraction. However, dPTFE membranes have shown very promising results. This study evaluated the influence of dPTFE membranes on alveolar ridge preservation and immediate implant placement (Fig. 1 a, b).

Figure 1 a, b. dPTFE membranes to preservation alveolar