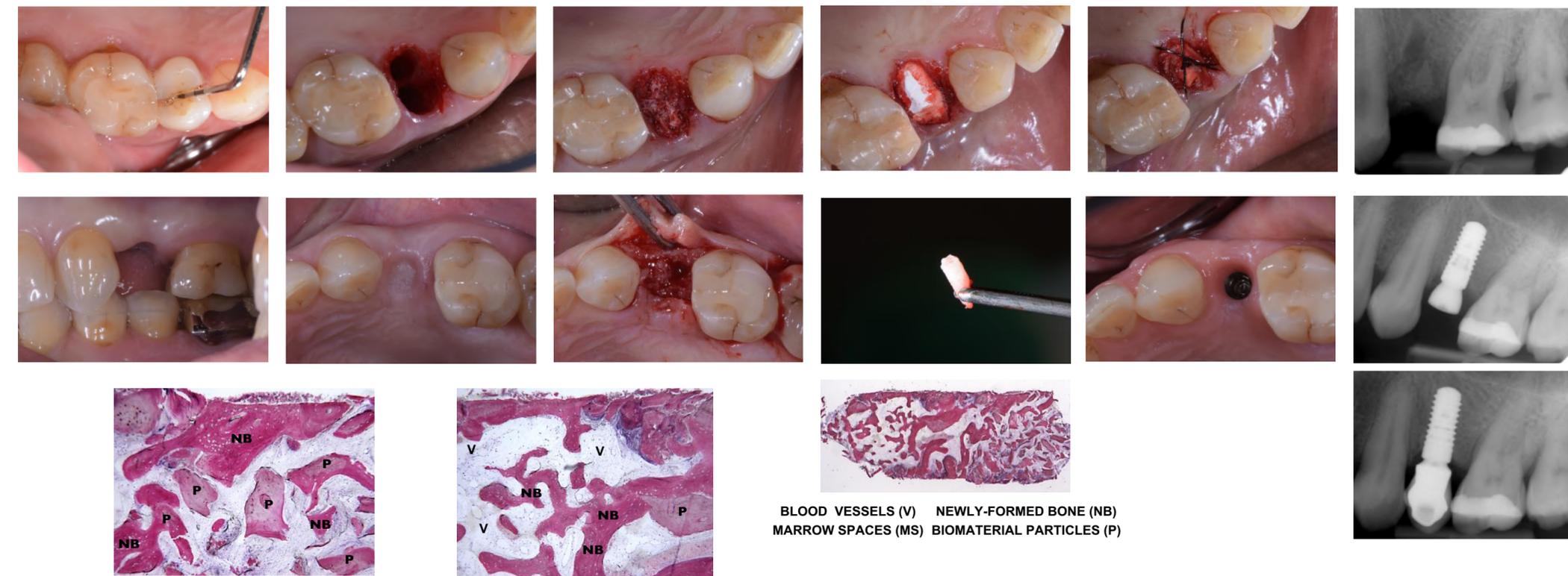


Histologic outcomes of ridge preservation with an allograft in humans: A single cohort prospective study

A Barone*[°], N A Valente*, E Di Donna*, A Perez*, S. Chatelain*, V Perrotti[§], G Iezzi[§]

*Unit of Oral Surgery and Implantology, University of Geneva, Switzerland. [°]Unit of Implantology, University of Pisa, Italy

[§]School of Dental Medicine, University of Chieti, Italy.



Background: After tooth extraction the alveolar ridge undergoes considerable volumetric and qualitative changes. A volumetric decrease between 35% and 60% is expected without any treatment of extraction sockets. Alveolar Ridge Preservation strives for controlling the ridge changes after tooth extraction. Regardless of biomaterial used and of technique performed, this procedure cannot fully counteract tissue changes after tooth extraction.

Aim/Hypothesis: The primary aim of this study was to evaluate the histologic outcomes 3 months after ridge preservation performed with an allograft and a flapless technique in compromised sockets. The secondary aims were to evaluate the need for GBR and the clinical dimensional changes at implant placement.

Materials and Methods: Twenty patients (mean age 61.5±5.9 years), who required a single tooth extraction and who had a compromised extraction socket, were enrolled in this prospective cohort study. The tooth extraction was flapless, the extraction sockets were grafted with an allograft (FDBA) (Maxgraft, Straumann) and covered with a collagen membrane (collprotect, Straumann). All the sites had a secondary soft tissue healing. After 3 months of healing all patients received an implant in an ideal prosthetic position. At implant placement bone biopsies for histologic analysis and linear clinical measurements were taken. The bone samples (n=20) were fixed in 10% neutral buffered formalin and dehydrated in an ascending series of alcohol rinses, and, subsequently, embedded in a glycolmethacrylate resin (Technovit 7200 VLC, Kulzer, Wehrheim, Germania). All specimens were sectioned along their longitudinal axis, were grounded down to 30 microns and stained with acid fuchsin and toluidine blue. Histologic and Histomorphometric evaluations were carried out.

Results : No post-grafting adverse events were observed and all sites healed uneventfully. The 20 implants were placed in 11 molar, 6 premolar and 3 incisal sites. All extraction sites had bone defects at the buccal and or palatal/lingual bone walls. All implants were placed in an ideal prosthetic position and two implants (maxillary incisor and premolar) required an additional augmentation procedures at the implant placement. The 2 additional augmentation procedures were performed with FDBA (Maxgraft, Straumann) and collagen membranes.

The crestal width changes were 2.3±0.7 mm, the width of keratinized tissue had an increase of 0.7±0.9mm. The histologic findings revealed that the graft particles were found close to the pre-existing bone and showed an evident remodeling process; in addition all particles were surrounded by newly formed bone.

It is worth noting that osteoblasts depositing osteoid matrix directly on the particle surface were observed in several fields. The marrow spaces were rich of small blood vessels that were close both to newly formed bone and residual graft particles. Histomorphometry showed that newly formed bone represented 27,3%, marrow spaces 51,6%, and residual graft material 20,1%.

Dependent Variables	Demographic Data
Patients (n)	20
Age (years) Mean ± SD Range	50.8±19.5 23.4 to 77.9
Sex (males)	45%
Smoking habit (yes)	15%
Reason for tooth extraction (fracture / groove / decay / endodontic)	10/2/6/2 55.6% / 5.5% / 33.4% / 5.5%
Implant position (incisive/premolar/molar)	15% / 30%/55%
Additional GBR at Implant Placement n. (%)	2 (10%)
Number of implants inserted	20

Discussion: The findings from this prospective single-cohort study showed that FDBA and collagen resorbable membrane- used to graft compromised fresh extraction sockets- were clinically effective. Three months after tooth extraction this procedure allowed an ideal implant prosthetic placement, an additional GBR procedure simultaneously with implant placement was required in 2 cases- the most challenging clinical situations. The histologic and histomorphometric outcomes showed a graft biomaterial able to be remodeled in a short time frame allowing the formation of a good amount of well-vascularized bone.

Clinical Relevance: The Ridge Preservation is an efficient procedure to control changes after tooth extraction and to allow prosthetically driven implant placement.

Practical Implications: Compromised extraction sockets could be successfully treated allowing implant placement after 3 months with the least invasive clinical approach.

Xenograft VS Extraction alone for Ridge Preservation after Tooth Extraction. A Clinical and Histomorphometric study. A Barone, N N Aldini, M Fini, R Giardino, J L Calvo and U Covani. JP 2008;79:1370-1377

Tissue changes of extraction sockets in humans: a comparison of spontaneous healing vs. ridge preservation with secondary soft tissue healing Barone A., Ricci M., Tonelli P., Santini S., Covani U. Clin Oral Implant Res 2013;24:1231-1237

Histological and Histomorphometric Evaluation of Primary versus Secondary Wound Healing during Ridge Preservation. A randomised controlled clinical trial. Barone, U. Covani, V. Borgia, A. Piattelli, M. Ricci and G. Iezzi. Clinical Oral Implant Res 2015;26:806-813

ST Chen and I Darby The relationship between facial bone wall defects and dimensional alterations of the ridge following flapless tooth extraction in the anterior maxilla. COIR 2017;28(8):931-937