Grafting Autologous Cortical Bone in Regenerative Therapy: Preliminary Histological Evidence

Ugo Consolo*, Vittorio Ferrr**, Ferdinando D’Avenia***, Davide Zaffe****

Introduction
Autologous bone is still held to be the best grafting material in regenerative therapy. Recent introral harvesting devices (Micro- and Safecraper® curve) allow a fair quantity of cortical bone to be taken with minimal postoperative morbidity.

Objective: The authors present preliminary histological evidence of ridge augmentation with pre-implant GBR, Sinus Grafting (SG) and bone preservation techniques in post-extraction sites (PES) using only 100% autologous cortical bone grafts harvested intraorally.

Materials and methods
14 patients: 6 male, 8 female (aged between 27 and 65 years) received an autologous cortical bone graft. These were 4 SGs, 5 GBRs with non-resorbable membranes in e-PTFE and 5 PES.

Special manual bone scalpsels (Micros and Safecraper® curve – META – Reggio Emilia, Italy), equipped with an internal collection chamber, were used to harvest autologous cortical bone from surgically convenient introral sites: the oblique external ridge, the cortical palatal vault and the retromolar fossa of the maxilla. The donor site was selected so as to minimize post-operative discomfort for the patient.

During the second stage surgery a biopsy was taken of the re-sorted very rapidly and thus requires further intervention or the addition of slow-absorption support material.

Results and observations
At 3 months, the GBR biopsies, almost all the grafted autologous cortical bone was surrounded by newly-formed bone on which lines of osteoblasts were depositing. Osteoclasts, positive to TRAP, were scarce or absent. The grafted cortical bone could be easily distinguished from the recently formed bone and generally appeared osteocytes, although in more than one patient live osteocytes were found within fragments of grafted autologous bone.

In the 5-month SG biopsies and the 9-month GBR biopsies the appearance of the grafted cortical bone was clearly distinguishable from the newly-formed bone, from which it was separated by reverse lines. Even after 9 months from implantation, in some of the biopsies, the grafted bone contained live bone cells populating many of its lacunae. At 9 months after the inevitable resorption of the grafted bone, no erosive activity of the newly-formed bone and of the grafted tissue was visible. All treated sites were perfectly healed and the implant therapy was completed successfully according to Albeckner’s criteria.

Conclusions
Autologous cortical bone harvested using manual instrumentation has an ideal structure for grafting, giving it characteristic curvy form, preserving cellular vitality. The cortical bone used in ridge augmentation procedures shows excellent integration and limited resorption activity at 9 months initial remodelling activity was present. In the treatment of large post-extraction sites (PES), in GBR and in Sinus Grafting (SG), the fragments of cortical bone harvested using Micros and Safecraper® curve and curve devices appear to be an excellent filling material, unlike cancellous bone which, when grafted, is resorbed very rapidly and thus requires further intervention or the addition of slow-absorption support material.