

SEM and CLSM study on steam sterilization of equine bone blocks

Antonio Centofanti, Elena Filippini, Emanuele Magaudda, Roberto Lo Giudice, Giuseppe Lo Giudice

University of Messina, Department of Biomedical and Dental Sciences and Morphofunctional Imaging, Messina, Italia

Equine bone blocks are mainly used in bone regeneration technique if the bone volume is not sufficient to provide a long-term stability during prosthetic restorations [1]; this techniques is very useful also in post-traumatic and reconstructive interventions. Moreover, in order to realize a faithful shape of bone block, the shaping is performed by hand or using a Computer Numerical Control (CNC) milling machine [2]. The real problem for this technique is the realization of shape in a sterile ambient in order to avoid potential risk of transmission of bacteria, viruses and prions. On this basis, here we aim to evaluate if the steam sterilization could provide an useful sterilization of bone blocks and to estimate the possible variations in bone structure and in collagen organization after different steam sterilization cycles with traditional autoclave. For this, we obtained 16 samples from 2 blocks of equine bone. 1 sample was used as control, while other 15 samples were infected with a *Streptococcus faecalis* bacterial culture; these samples were divided in 3 groups (A, B, and C) and treated with different cycles of autoclave sterilization (Gr. A: 121°C, 1,16 bar for 20'; Gr. B: 134°C, 2,16 bar for 4'; Gr. C: 134°C, 2,16 bar for 3.30'). For each group, 2 samples were evaluated for the sterility, 3 samples were evaluated at S.E.M. and at confocal laser scanning microscope in order to evaluate possible morphological and collagen organization variations. Our observations at S.E.M. showed that no morphological variations were present in samples; while our findings obtained by confocal laser scanning microscope showed a more uniform and preserved organization of collagen in samples of group C. These results demonstrated that autoclave steam sterilization represents an indicate technique to obtain sterilization of equine bone blocks.

References

- [1] Jensen et al. (2009) Bone augmentation procedures in localized defects in the alveolar ridge: Clinical results with different bone grafts and bone-substitute materials. *Int J Oral Maxillofac Implants* 24:218-236.
- [2] Mangano et al. (2014) Maxillary ridge augmentation with custom-made CAD/CAM scaffolds. A 1-year prospective study on 10 patients. *J Oral Implantol* 40(5):561-569.

Key words

Bone, collagen I, biomaterials.