

Three-dimensional reconstruction of the morphological changes of the post-extraction sites using Confocal Laser Scanning Microscopy (CLSM).

A García-Herraiz¹, R Leiva-García², FJ Silvestre¹, A Cañigral-Ortiz¹, J García-Antón².

1. Unidad de Pacientes Especiales. Departamento de Estomatología. Universidad de Valencia. Gascó Oliag 1. 46010 Valencia. Spain.
2. Ingeniería Electroquímica y Corrosión (IEC). Departamento de Ingeniería Química y Nuclear. Universidad Politécnica de Valencia. Camino de Vera s/n. 46022 Valencia. Spain.

jpgarciaa@iqn.upv.es

Keywords: Confocal Laser Scanning Microscopy, 3D reconstruction, Post-extraction site.

One of the treatments widely used in dentistry is tooth extraction. When the tooth is extracted, the alveolar process undergoes atrophy, due to the loss of its function [1]. The remodelling process causes changes in alveolar profiles. These changes are fundamental in dental treatment planning and success as the aesthetics of prosthetic restorations depends on them. Soft tissues of post-extraction sockets can be studied using the Confocal Laser Scanning Microscopy (CLSM) technique, while they cannot be observed by Computer Tomography (CT). Moreover, CLSM is a non-invasive and non-damaging technique and absolutely harmless for the patient. The aim of this study was to get three-dimensional reconstructions of images obtained using the CLSM technique to determine the pattern of the alveolar remodelling process.

After tooth extraction, a silicone print of the post-extraction site was taken. The silicone print was emptied with plaster to obtain the study cast. New silicone prints were taken to assess contour changes at one and three months after tooth extraction [2]. The study of the post-extraction site was carried out by the CLSM technique. The system used was the OLS3100-USS, LEXT model (Olympus®). Three-dimensional reconstruction was performed using SigmaPlot® software (Systat Software Inc., USA), overlapping the profiles obtained at baseline, one and three months after tooth extraction in a single image. Sections along the post-extraction site were obtained to compare the profiles at baseline, one and three months after tooth extraction.

Results of study casts scanning at baseline, one and three months after tooth extraction, with CLSM are well-detailed images of post-extraction areas. The overlapping of three-dimensional reconstructions of one of the post-extraction sites is shown in Figure 1. Figure 2 shows the transversal section corresponding to the value 11000 in the Y axis. The alveolar thickness and height were greater at baseline than at one and three months after tooth extraction. No changes were observed in alveolar thickness comparing one and three months after tooth extraction. In contrast, the alveolar height increased at three months after tooth extraction due to the healing of the post-extraction socket. Figure 3 shows the longitudinal section corresponding to the value 6800 in the X axis. This section shows the decrease in mesio-distal distance at the expense of the distal tooth to the edentulous space.

In conclusion, CLSM is a non-invasive, harmless and valid method for measuring the dimensional changes in post-extraction socket. This technique with the computer processing of the data allows the three-dimensional reconstruction of the post-extraction changes. Through the overlapping of the three-dimensional images could be known the pattern of alveolar remodelling process [3].

References

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- [3] We wish to express our gratitude to MEC (AP2008-01653), to FEDER, to the Generalitat Valenciana for their help in the CLSM acquisition (MY08/ISIRM/S/100), and to Dr. Asunción Jaime for her translation assistance.

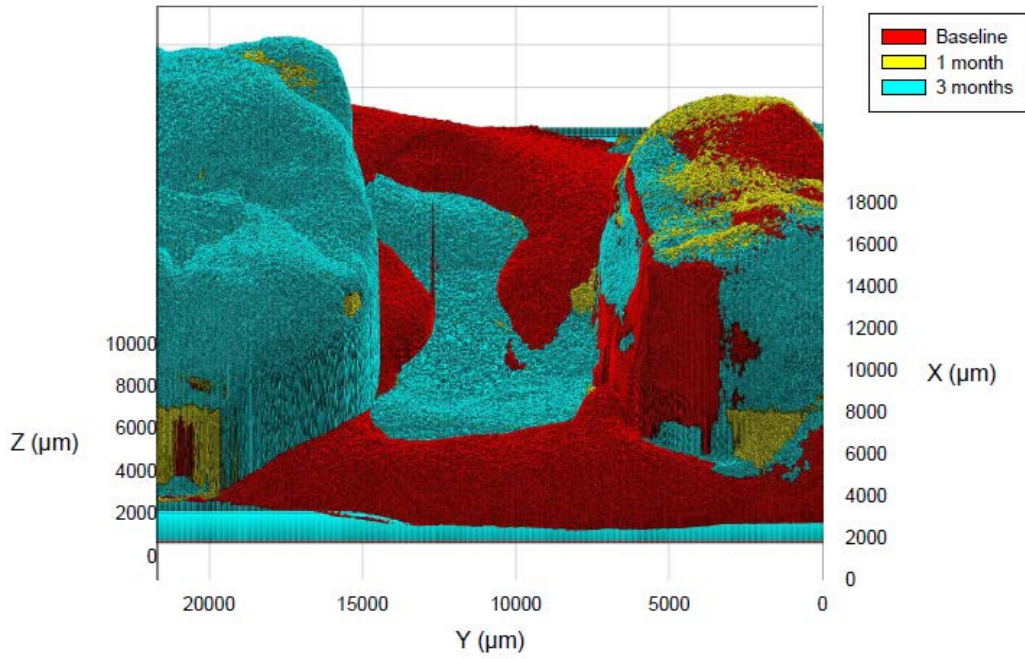


Figure 1. Overlapping of three-dimensional reconstructions of one of the post-extraction.

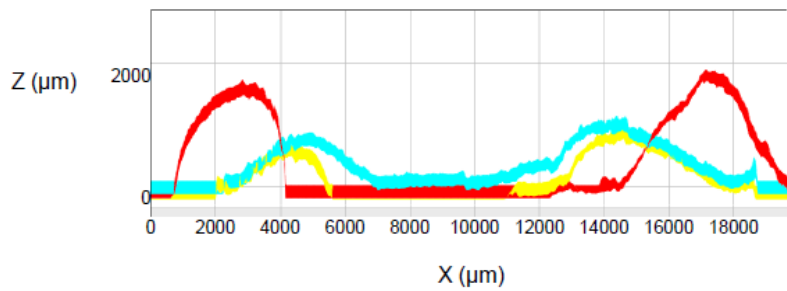


Figure 2. Transversal section with the profiles at baseline, one and three months after tooth extraction corresponding to the value 11000 in the Y axis.

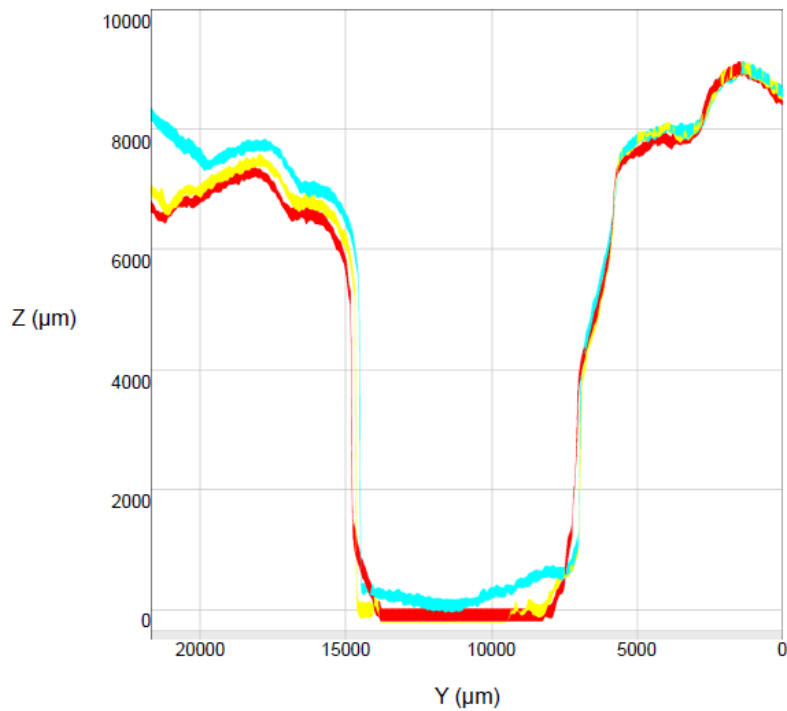


Figure 3. Longitudinal section with the profiles at baseline, one and three months after tooth extraction corresponding to the value 6800 in the X axis