Evaluation of three cements in the ability to fill the interior of the dental implant using computerized microtomography

Bruno Candeias¹; Adriano Schalins Correa¹; Daniel Afonso Hiramatsu²; Rejane Pedro¹; Eder Abreu Huttner¹
¹Facop, Brazil; ²Branemark Center, Brazil

Background: The microgap that exists in the interface of the components of 2 or 3 part implants has been the object of studies on their capacity of biological seal (bacterial, fungus...) and micronutrients in the saliva. In vivo studies have shown that the internally of 2 or 3-piece implant and prosthetic components are heavily contaminated with pathogenic bacteria from Peri-implant disease. This heavy contamination affects the external hexagon, Inner Hexagonal and Cone Morse prosthetic platforms. The limitation of prosthetic platforms, external hexagon internal hexagonal and cone morse in converting the mechanical seal into effective biological seal in vivo is a reality.

Aim/Hypothesis: We propose the investigation of 3 zinc oxide based cements with and without antimicrobial incorporation in the filling of the internal spaces of the implant Abutment.

Material and Methods: Ten implants (Conexão, Brazil) were used, prosthetic components suggested by the company. Of the implants used 5 were External Hexagon and 5 Morse Cone. All implants had the prosthetic screws tightened with a torque of 32 Ncm. Each screw abutment was initially tightened to 20 Ncm with a digital torque gauge to stabilize the abutment to the implant. The second torque, 32 Ncm, was applied 15 minutes after the initial torque. Subsequently, they were submitted to Micro-CT, being divided into 3 groups- Sealer Implant® Zinc Oxide (Group A) Sealer Implant® própolis Zinc Oxide and Propolis (B) Sealer Implant® Clorex Zinc Oxide and Chlorhexidine (C). All micro-CT scans were acquired on a Triumph multi-modality system (Gamma Medica, Northridge, CA) using the following sampling parameters- tube voltage 80 kVp, tube current 250 A, detector pixel size 50 m, focal spot size 50 m and a field-of-view of 59 or 93 mm. The spatial resolution was 39 and 28 m, and the radiation dose was 8.3 and 19.7 cGy for field-of-view of 93 and 59 mm, respectively.

Results: The results showed that in all analyzed parts without use of fillers both in the implants 2 or 3 pieces wide spaces inside the implant and abutments. Using the Image software, the internal spaces were quantified. In the Grupo Hexagono Externo it had an average value of 22% of internal space, in Cone Morse 2 pieces 18% and 3 pieces 18%. There was no statistically significant difference between the groups investigated in relation to the empty internal volume. In relation to filling capacity, the cements of Group A, B and C had similar results (P > 0.01).

Conclusions and Clinical Implications: This study on the filling capacity of the analyzed cements did not find a statistically significant difference between the analyzed groups. The mean filling level was 98% of the internal spaces, which demonstrates efficacy of the analyzed cements being an alternative of material in order to prevent the formation of microbioma and ecosystem within the implants.