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ORAL PRESENTATION ***Research Article***

Biomechanical Considerations of The Combined Cement- and Screw-Retained Implant-Supported Zirconia Crowns: A 3D-FEA

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Abstract

Introduction: In prosthetic dentistry, dental implants are a popular and effective way to replace missing teeth. In implant-supported fixed dental restorations, there are two prosthetic fixation options: screw-retained or cement-retained. Although both treatment options can be used predictably, they each have their own advantages, disadvantages, and limitations. Aim of this study is to evaluate the biomechanical features of hybrid cement-screw retained prosthesis system by using the 3D finite element method.

Materials and Methods: Three 3-dimensional CAD model of a single dental implant and their screw-retained, cement-retained, and cement-screw-retained implant-supported zirconium-based crowns with their components were constructed. An average occlusal force of 100 N were applied in an oblique (45º) direction buccolingually and mesiodistally (distal fossa area 1 mm2). Then the values of the stresses generated in the prosthesis, abutment, implant, and supporting alveolar bone were calculated using 3-dimensional finite element analysis.

Results: Stresses were greater in cement-retained than screw-retained and cement-screw-retained. The amount of stress in the cement- and screw-retained system was cement and screw system.

Discussion: Within the limitations of the investigation, it was determined that retention system changes affected the force distribution.

Conclusion: The obtained results could prove useful for implantologists. Although in vitro mechanical tests are valuable aids in the comparison of restoration properties, data obtained from these studies are useful for comparative purposes only, and direct extrapolation to the clinical situation should be made with caution and supported with long-term clinical studies.

Keywords: The Combined Cement- and Screw-Retained Implant-Supported, 3-dimensional finite element analysis, zirconia crowns.