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Comparative study between two different implant designs supporting maxillary overdentures: Finite element analysis (FEA)

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Objective: The objectives of this study were to assess the effect of different implant designs and distribution on stresses transmitted to the supporting structures of maxillary overdentures

Methods: Two finite element models were constructed for V-shaped edentulous maxilla. In the first model; 6 mini-implants of 2.4 mm in diameter and 13 mm in length were placed in the anterior maxilla. In the second model 4 mini-implants of 2.4 mm in diameter and 13 mm in length were placed in the anterior region and 2 wider implants of 6 mm in diameter and 8 mm in length were placed in the posterior region. A loading force of 100 N was applied unilaterally and bilaterally in vertical and oblique direction on the first molar area. Stresses around the implants were estimated by linear static analysis.

Results: The second model showed better results as it reduces stresses exerted on the supporting bone of the maxilla when compared to model one because the wide diameter implants were close to the applied load and received the maximum exerted stress than supporting bone. Both implant designs showed acceptable stress distribution within the physiological limits on the bone.

Conclusions: Maxillary overdenture supported by 4 mini-implants in the anterior region and 2 wider implants in posterior region may result in reducing the stresses exerted on the supporting bone when compared to 6 mini implants in anterior V shaped maxillary arch.

Biography

Asmaa Nabil Elboraey has completed her PhD in Removable Prosthodontics in September 2013 from Faculty of Dentistry, Ain Shams University. Currently, she is a Researcher of Prosthodontics at Fixed and Removable Prosthodontic Department, Oral and Dental Research Division, National Research Center, Egypt. Her academic positions include: Internship in Faculty of Dentistry, Ain Shams University, Egypt (2003-2004); Specialist in National Research Centre, Egypt, 2005-2009; Assistant Researcher in Fixed and Removable Prosthodontics Department, Oral and Dental Research Division, National Research Center, August 2010; and Researcher in Fixed and Removable Prosthodontics Department, Oral and Dental Research Division, National Research Center, February 2014 to till date.

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