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Comparison of stresses generated in two different types of bone surrounding implants on an edentulous mandible with the use of different biomaterials for immediate provisional prosthesis -A Finite Element Analysis

By

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ABSTRACT

Statement of Problem:

The method in which stresses are passed to the surrounding bone is an important component in the success or failure of a dental implant. This is determined by the kind of stress, bone-implant interaction, implant surface form and features, and the quality and quantity of surrounding bone.

Objectives:

The purpose of this study was to to analyze and compare the stresses generated in two different types of bone surrounding implants on an edentulous mandible using principles of all on four concept with the use of different biomaterials for immediate provisional prosthesis.

Materials and Methodology:

3-D finite element models were prepared comprising of simulations for human edentulous mandible with cortical bone cover and homogenous D2 and D3 type of cancellous bone underlying it, mucosa and tapered thread internal hex bone level 4 implants with an immediate provisional prosthesis overlying the assembly. The models differed in the type of immediate provisional prosthesis used. Numerical equivalents for material properties of two different biomaterials were used as obtained from literature to simulate them. Solid models were made in a three-dimensional design software and then transferred to FEM software ANSYS.

Results:

The von Mises stress values were slightly higher in PMMA than in GO reinforced PMMA in the peri implant area of distal implants at the implant abutment junction. The von Mises stress values were also higher in the D3 bone compared to the D2 bone.

Conclusion:

Within the limitations of the study, there was no much significant difference to be found with the use of Graphene Oxide and additional research is required.

Keywords: Graphene oxide, PMMA, D2, D3, immediate prosthesis, All on Four, FEA.