

Application of the reverse torque on implant morse taper: study of stress generated in the bone structure characterized by different degrees of density – a finite element analysis

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Abstract

This study presented a finite element analysis of reverse-torque simulation in bone/implant system according different bone densities. The stress was changed according cortical bone thickness and internal implant structure with morse taper abutment.

Key words: finite element analysis, implant, bone.

Introduction

Among different factors, mechanical and biological connectors with type geometry Morse taper have better performance against hexagons¹. The initial bone density not only provides mechanical restraint of the implant during healing, but also enables the distribution and transmission of stresses (after healing) of the prosthesis to the bone / implant interface. The mechanical stress distribution occurs mainly where the bone contact with the implant. Factors such as the f contact with the bone, the elastic modulus and the axial stress distribution around the implant are all affected by bone density².

Thus, the aim of this study was assess the stress distributed to bone structure characterized by different degrees of density after application of the reverse torque on implant morse taper by finite element analysis.

Results and Discussion

In this study the von Mises stresses were calculated to evaluate the energy transfer from reverse-torque in morse taper dental implant, which was installed in bone structure with different geometry densities. The changes in bone densities resulted in different characteristics according the location and size of stress areas. These characteristics were similar in all simulations. However, the stress intensity increases gradually by the cortical bone thickness decrease and the cancellous bone porosity. It was also possible to observe in the apical regions of implant that the internal structure presented more intensity of stress, in special in D4 bone density. Description and discussion of the results.

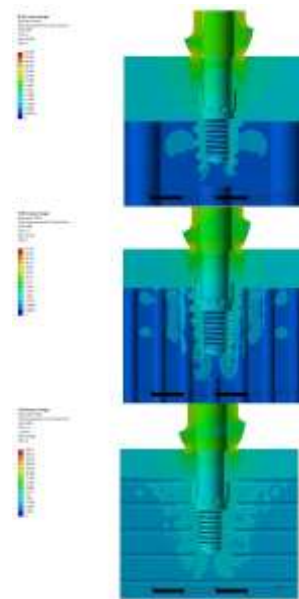


Image 1. The equivalent von Mises stress in bone-implant system according different bone densities.

Conclusions

The reserve-torque with morse taper connector resulted in more concentrated stress in the cortical bone and in the internal structure of implant, mainly at region close to the abutment connection. Moreover there was increase of stress intensity according the density changes.

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