

Behavior of Mandible-Implant Interface under Stress and Temperature

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INTRODUCTION: Dental implants function is to transfer load to surrounding biological tissues. Thus the primary functional design objective is to manage (dissipate and distribute) biomechanical loads in order to optimize the implant-supported prosthesis function.

METHOD: FEM study has been made by a numerical code, using the Finite Element Method. There was studied a new type dental implant in order to determine its peculiarity. The structure was blocked in the inferior side and the temperature variation was considered between 0 and 70 °C. The thermal load was applied in the screw head as well as the concentrated force.

RESULTS: Several graphs corresponding to an implant load with mastication force of about 717N and a temperature variation according with the oral cavity temperature. Evolution of stresses developed by temperature variation (0 and 70 °C – fig.1-2) and mastication force (fig.3-4) is presented for the main parts of the implant. Maximum stresses appear in the blunt superior side. This could be a problem for implant lifetime.

DISCUSSION & CONCLUSIONS: Temperature variations determine supplemental efforts that can be considered also in the study of optimum design for implants in order to eliminate the potential unwished effects induced by the temperature variations. This should be the initial phase that practicing dentist will use in order to identify the best implant type.

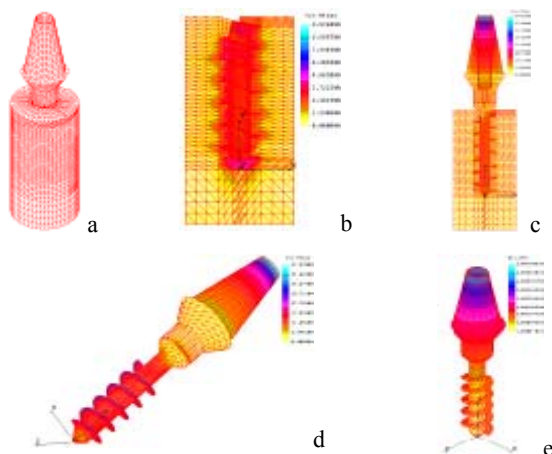


Fig. 1: The model (a) analyzed with temperature. The tension on mandible bone(b), mandible bone – implant (c) and screw assembly (d) at 0°C and displacement of screw assembly (e)

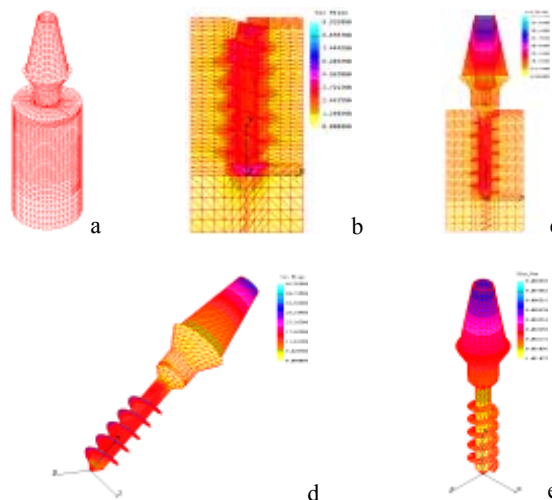


Fig. 2: The model (a) analyzed with temperature. The tension on the mandible bone(b), mandible bone – implant (c) and screw assembly (d) at 70°C and displacement of screw assembly (e)

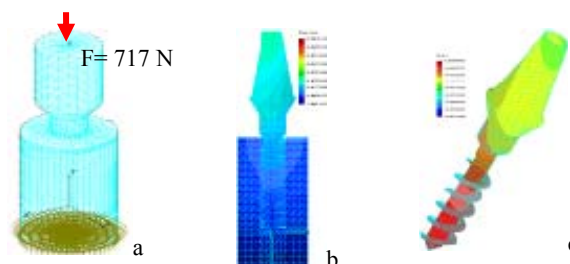


Fig. 3: Load and constrains of the model(a) Displacements on the mandible bone – implant (b) and screw assembly (c)

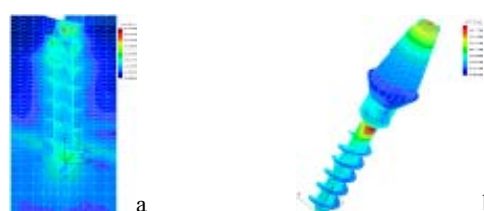


Fig. 3: Von Mises equivalent stress in bone(a) and screw assembly(b)

REFERENCES: ¹Ş. Sorohan, I.N. Constantinescu (2003), *Practica modelării și analiza cu element finit*, Editura POLITEHNICA Press, București, ²***. USER GUIDE, COSMOS/M, ³D. Slăvescu, D.D. Slăvescu, V. Rogojinaru (2006), *Implant dentar tip şurub, metodă de implantare și trusă instrumentar*, Romanian Patent no 120379B1, ⁴C.E. Misch (2005), *Dental Implant Prosthetics*. ELSEVIER MOSBY.