

Fatigue Analysis of Cannulated Pedicle Screw

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Abstract:

A cannulated pedicle screw (CPS) is a typical type of bone screw used to implant into a vertebral in the medical field. The purpose of these screws is to treat lumbar (lumbosacral) spine trauma. The screw is used to form spinal fusion transpedicle screw devices. Although the CPS is made by high strength material, the fatigue failure is still happened by time. Nevertheless the detail investigation on fatigue life cycle of screw also is lacking. This is maybe due to difficulty to investigate it by experimental (in vivo) since it is involved with human life. However, this paper focus on investigation of CPS fatigue life cycle using finite element method (FEM) since it is considered as acceptable method for biomechanics. By using the Ansys software as finite element method software, we can properly estimate the life span of the CPS. Based on the FE simulation results obtained, we found that our FE model is capable to predict fatigue life of CPS since the FE von mises stress result of our model only 7.1% difference with previous research result. Based on the prediction by FEM, the CPS life cycle is up to 3.1 years if the continuous load 11000 N is applied on the CPS by the time. Although our FE model is proven has potential in assisting CPS design, however in the future fabrication of the CPS and further testing needs to be conducted in order to evaluate this finding experimentally.

Keywords: Cannulated Pedicle Screw, Finite Element Method, Fatigue Analysis, Life Cycle

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