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# Investigation of the Multiaxial Pedicle Screw Tulip Design Using Finite Element Analysis

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**Abstract :** Pedicle screws are used to stabilize vertebrae and treat several types of spinal diseases and injuries. Multiaxial pedicle screws are a type of pedicle screw that increase surgical versatility, but they also increase design complexity. Failure of multiaxial pedicle screws caused by static loading, dynamic loading and fatigue can lead to irreparable damage to the patient. Inappropriate deformation of the multiaxial pedicle screw tulip can cause system failure. Investigation of deformation and stress in these tulips can be employed to optimize multiaxial pedicle screw design. The sensitivity of this matter necessitates precise analyzing and modeling of pedicle screws. In this work, three commercial multiaxial pedicle screw tulips and a newly designed tulip are investigated using finite element analysis. Employing video measuring machine (VMM), tulips are modeled. Afterwards, utilizing ANSYS, static analysis is performed on these models. In the end, stresses and displacements of the models are compared.

**Keywords :** pedicle screw, multiaxial pedicle screw, finite element analysis, static analysis
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