



Mathematical modelling of the deformation of pedicle screws used in spinal surgery with Hounsfield unit values in computed tomography images

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Abstract

The aim of this study was to predict the deformity observed over time in pedicle screws titanium and alloys used as the gold standard in spinal surgery on preoperative CT images and to create a related mathematical function. A mathematical formulation was formed by considering the HU values obtained and the time elapsed between two CT shots. After the data collected on patient CT images are collected in Excel 2016, the regression formula and regression coefficient between the surgical time and HU data will be calculated. The input data are the mean HU values read from the vertebral corpus on axial, coronal and sagittal sections on prop CT images of the patient. With the help of mathematical models based on old patient data, the estimated time of screw deformity after spinal surgery can be seen on the application screen as output data. The relationship between bone electron density values obtained from all patients and the duration of surgery was calculated as Pearson correlation coefficient. The highest correlation was observed in axial sections. The lowest correlation between surgical operation time and cross-sectional HU was observed in sagittal sections. In our study, the software created by using prop CT images will allow the mathematical prediction of bone density and pedicle screw deformation and will guide the techniques used by the surgeon.

Biography

Hasan Emre Aydın has completed his PhD at the age of 30 years from Eskişehir Osmangazi University, Turkey. He is the director of Kutahya Health Sciences University, Turkey. He has over 70 publications that have been cited over 70 times, and his publication H-index is 6 and has been serving as an editorial board member of reputed Journals.



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