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ANALYSIS OF TENSIONS IN RADIO FIXATION PLATE BY THE FINITE ELEMENT METHOD.

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Summary: The purpose of this study was to determine and evaluate the tensions generated in models of fixation of intra-articular fractures of the distal extremity of the volar plate with two bolt lengths (Unicortical and bicortical), through static simulation, using the Method of finite elements. The Matrix SmartLock ™ system was used as the model of the implant to be studied, two models were prepared in synthetic bones, simulating the intra-articular fracture of the distal human radio. The first model, the plate is fixed with long bolts, in order to transfer the opposite cortical (Bicortical Locking Screws Ø2,7 mm x 24,0 mm). The second model was prepared with the plate fixed with flying screws, with 75% length of the first model, in order not to fix in the cortical opposite the plate (Unicortical Locking Screws Ø2,7 mm x 18,0 mm). Synthetic models of human radios were purchased from Sawbone ™, they are fourth-generation, suitable for biomechanical testing. According to the manufacturer the density resembles the bones of a woman of 60 years, which is the age of highest prevalence of distal radius fractures. It was carried out the survey of the geometric and mechanical properties of the radio, plate and screws of the fixation system. For analysis, a loading of compression was applied to the carpal articular face of the radio. After the simulations were carried out the comparisons of the maximum and minimum tensions generated by the uni and bicortical screws in the radius and the equivalent voltage of Von Mises in the plate and screws. The validation of the models use the MEF were performed by comparing the deformation obtained in the mechanical compression test. The differences found, with higher values obtained in the MEF, were 11.5% for the unicortical and 37.7% for the bicortical. After the validation of the models, it was possible observe, there is no great difference in the maximum and minimum principal stress observed in the two models and for the von Mises equivalent stresses observed in the plates and screws, it was verified that the higher tensions occur in the region of the screws.