

Background Surgical knots are one of several structures which can fail during surgical repair. However, there is no universal agreement on the superiority (best/safest) of one particular surgical knot technique. Tensile testing of repaired soft tissue has been used to assess the efficacy of surgical knot tying techniques, however, few computational models exist. The purpose of this study was to create a validated biomechanical model to evaluate the effect of knot configuration on the mechanical performance of surgical sutures.

Methods Two sutures were tested experimentally to find the mechanical properties and strength. Single throw knots were also tested for strength. Finite element models were constructed of each configuration and correlation was established.

Results The finite element results are quantitatively and qualitatively consistent with experimental findings. The FE model stress concentrations are also consistent with published strength reductions. Model and experimental results are presented using as-manufactured No. 2 FiberWire as well as its core and jacket constituents separately.