

Development of an image-based modeling system to investigate evolution of the morphological changes of an abdominal aortic aneurysm

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The aim of the paper is to develop an image-based modeling system with interactive graphical user interface in order to quantify three-dimensional vascular geometry and to evaluate temporal changes of geometry over time. The present system consists of three components: segmentations of arterial lumen and stent-graft, extraction of arterial lumen centerline, and measurements of stent-graft length, curvature and torsion along the centerline. The system has been applied to medical images, in which the stent-graft of abdominal aortic aneurysm resulted in migration after the surgery. Geometric modeling is performed for CT images of pre-operation and post-operation of four different time periods. The changes in the vascular geometry have been found and the curvature at the position of approximately 50mm above the right iliac arterial bifurcation increased from 0.016 to 0.045 (mm^{-1}). The results show that the curvature near the migration changes over time.

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