

AbstractID: 1818 Title: Optimization of 3D Data obtained from Multiple View Angiograms.

Three-dimensional (3D) vessel data from CTA or MRA are not always available prior to or during endovascular interventional procedures, whereas multiple 2D projection angiograms often are. Therefore, we are developing methods for combining vessel data from multiple 2D angiographic views obtained during interventional procedures to provide 3D vessel data during these procedures.

Multiple projection views of vessel trees are obtained. Vessel regions to be analyzed are selected. One of the 2D images is selected as a common image. Initial pairwise imaging geometry relationships are calculated from the gantry information, and 3D vessel centerlines are calculated using pairwise epipolar constraints. The imaging geometries of each of the other views (relative to that of the common image) are then iteratively refined so as to minimize the differences between all pairwise calculated 3D vessel centerlines, and an average centerline is calculated. In this study, only the magnification and the y image coordinate of the origin were varied. The technique was evaluated using multiple (5) projection views of a carotid phantom.

The SD of the centerline points about the average was calculated and averaged along the centerline. The initial average SD of 0.3 cm was improved to 0.15 cm by refinement of the gantry-based imaging geometry. Average magnification corrections and y shifts were 0.4% and 0.18 cm.

These results indicate that use of vessel information from multiple views allows optimization of 3D vessel centerlines and refinement of initial gantry-based imaging geometries.

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