

AbstractID: 4919 Title: Effect of projection angles used in Multi-View Reconstruction (MVR) using images from a microangiographic (MA) detector and an image-intensifier (II) system

**Purpose:** The sensitivity of a new 3D Multi-View Reconstruction (MVR) angiography technique to the projection angles used is evaluated by comparing 3D centerlines calculated from combinations of three projections acquired from two imaging systems with that from micro-Cone Beam CT ( $\mu$ CBCT), which is taken as truth.

**Method and Materials:** A 3D centerline of a contrast-filled carotid vessel phantom was reconstructed from image data acquired using a custom-made  $\mu$ CBCT system with a microangiographic (MA) detector (45  $\mu$ m pixels, 4.5 cm field-of-view (FOV)). Projection images of the same phantom were also acquired using the MA and an image intensifier (II) detector system (120  $\mu$ m pixels, 4.5 in FOV) on a C-arm x-ray unit. The MVR technique was used to compute 3D centerlines for 12 combinations of projection angles. Each 3D MVR centerline was aligned with the  $\mu$ CBCT "true" 3D centerline using a Procrustes technique, and a root-mean-square (RMS) deviation was calculated.

**Results:** The average RMS deviation for the MA-MVR centerlines is 25  $\mu$ m with a standard deviation of 3  $\mu$ m over the 12 different projection-angle combinations, whereas the average RMS deviation for the II-MVR centerlines is 41  $\mu$ m with a standard deviation of 4  $\mu$ m over these same combinations. The RMS deviation as a percent of the internal vessel diameter, 0.75 mm, is 3.3% for the MA and 5.5% for the II and appears to be independent of view selection.

**Conclusion:** For the MVR technique, the improved resolution of the MA resulted in improved centerline determination compared to the II system. For both detectors, the selection of a particular projection set had little effect on the RMS centerline deviation. The low RMS deviations for both detectors indicate that the MVR technique can provide accurate 3D centerlines.

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