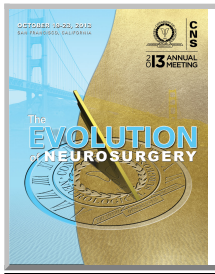


# The Utility of Dual-Energy Computed Tomographic Angiography for the Evaluation of Brain Aneurysms after Surgical Clipping: A Prospective Study

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**Objective:**

The purpose of this prospective study was to compare a novel dual-energy CTA method for the postoperative assessment of clipped brain aneurysms to detect potential aneurysm remnants and patency of the parent artery, with the current gold-standard imaging modality, catheter-based digital subtraction angiography (DSA).

**Methods**

Between January 2011 and October 2012, patients who underwent microsurgical cerebral aneurysm repair were prospectively evaluated after surgery by both dual-energy CTA and conventional DSA. The CTA was performed using a novel dual-energy method with single source and fast kilovoltage switching (Gemstone spectral). DSA was performed using biplanar cerebral angiography. Patient data was prospectively collected. An experienced neuroradiologist and neurosurgeon, who were blinded to the original radiological results, reviewed the images. Image parameters assessed included degree of artifact, presence of residual aneurysm and patency of parent artery.

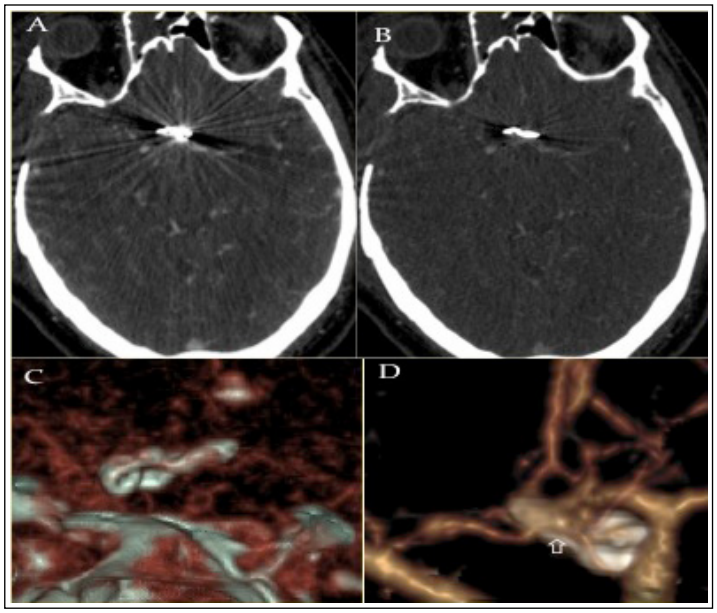


**Fig 1.**

A-Gemstone CTA Post- OP (with Kev of 135)
B-Gemstone CTA Post- OP after artifact reduction
C-3D Gemstone CTA Post-OP (with Kev of 135)
D-3D Gemstone CTA (with Kev of 60 and artifact reduction), showing small remnant.

**Results**

Fourteen patients with 15 clipped aneurysms were enrolled in this study. Six aneurysms were ruptured and 9 aneurysms were unruptured. On DSA, 8 out of 15 aneurysms (53%) had a remnant after clipping and all of these remnants were <2 mm in size except one. Of these 8 DSA Confirmed remnants, only 3 were detected by CTA. For the detection of an aneurysm remnant by CTA, test sensitivity and specificity was 37.5% and 100%, respectively. The associated positive and negative predictive values were 100% and 50%, respectively. However, CTA was 100% sensitive and 77% specific to detect parent vessel compromise, with associated positive and negative predictive values of 60% and 100%, respectively.

**Conclusions**

For the detection of parent vessel compromise after surgical clipping, dual-energy CTA is highly sensitive but it may underestimate the presence of a small aneurysm remnant. These preliminary results suggest that dual-energy CTA may be a promising non-invasive alternative to conventional invasive catheter-based angiography in selected cases for the evaluation of clipped brain aneurysms.

**Learning Objectives:**

These preliminary results suggest that dual energy CTA may be a promising non-invasive alternative to conventional invasive Catheter-based angiography in selected cases for the evaluation of clipped brain aneurysms.

**References:**

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