Contour neurovascular system

The Contour Neurovascular System (Cerus Endovascular, Fremont, CA, USA) is one of the latest Intrasaccular flow disruption devices and it was originally intended for treatment of wide-neck bifurcation aneurysms.

Metal artifacts limit magnetic resonance imaging (MRI) accessibility after implantation. The purpose of this in vitro study was to evaluate non-invasive imaging alternatives to digital subtraction angiography (DSA).

Material and methods: Three aneurysms of patients originally treated with CNS were three-dimensional (3D)-printed (one at the basilar tip and two at the middle cerebral artery bifurcation). CNS devices were implanted under fluoroscopic control into the 3D models. Post-implantation two-dimensional-DSA, flat panel computed tomography angiography (CTA), MRI, and spectral CTA were performed.

Results: Time of flight angiography and T1 weighted sequences showed large susceptibility artifacts at the detachment zone of the devices. A thin-sliced T2 weighted sequence in cross-sectional orientation to the aneurysm allowed visualization of the aneurysm dome, but the aneurysm neck and parent vessel could not be assessed. Focused spectral CTA, especially a 40 keV reconstruction with a metal artifact reduction algorithm (orthopedic metal artifact reduction (OMAR)), showed only minor artifacts at the detachment zone. This approach achieved a very similar result to DSA and flat panel computed tomography, enabling the assessment of the device structure, aneurysm perfusion, and parent vessel perfusion.

Discussion and conclusion: For non-invasive follow-up of CNS, focused 40 keV CTA with OMAR seems to be a valuable option. MRI can be valuable for larger aneurysms to assess the aneurysm dome, but was not suitable for evaluating the parent vessels and aneurysm neck after CNS implantation in this study [1)].

1)
Madjidyar J, Pravdivtseva M, Hensler J, Jansen O, Larsen N, Wodarg F. Non-invasive follow-up for intracranial aneurysms treated with contour neurovascular system-comparison of digital subtraction angiography (DSA) to magnetic resonance imaging (MRI) and spectral computed tomography angiography (CTA) in vitro. Interv Neuroradiol. 2024 Sep 2:15910199241277907. doi: 10.1177/15910199241277907. Epub ahead of print. PMID: 39219551.