"Feathering": Vertebral Artery Pseudostenosis with Elliptical Centric Contrast-Enhanced MR Angiography

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Purpose
To describe the "feathering" artifact associated with elliptical centric contrast-enhanced MR angiography that occasionally results in poor visualization of the vertebral arteries.

Materials & Methods
Elliptical centric contrast-enhanced MR angiography is a well-established, reliable technique commonly used to image the carotid and vertebral arteries. In many practices, this noninvasive technique has replaced conventional angiography prior to carotid endarterectomy. Typical imaging parameters include a gradient-echo sequence with a 22 x 15 cm field of view coronal slab, 48 sections, 6.6/1.4 TR/TE 45° flip angle, 256 x 224 matrix with an imaging time of 52 seconds. Frequently, reconstruction is performed with zero filling in all three directions yielding 96 1.2-1.4 mm thick sections with a 0.6-0.7 mm overlap and a 512 x 512 display matrix.

Results
Elliptical centric contrast-enhanced MR angiography is a robust clinical tool that offers high quality images of the carotid and vertebral arteries with lumen filling characteristics that makes it physiologically analogous to conventional angiography. Occasionally, there is poor visualization or pseudostenosis of a vertebral artery. This most frequently occurs when imaging a small vertebral artery associated with adjacent small arterial or venous channels. Rapid change of contrast during the early portion of k-space sampling in these small vessels results in an oscillating pattern of high and low signal intensity in the image. When these small vessels are numerous, the resulting interference pattern can obscure the vertebral artery. This most frequently occurs when an exam has considerable venous signal, such as occurs with late triggering. Review of source and axial reformatted images demonstrates a pattern of signal oscillations surrounding these small vessels. When adjacent to a vertebral artery this results in signal distortion and apparent loss of lumen.

Conclusion
Pseudostenosis or "feathering" artifact of the vertebral arteries is an occasional artifact
seen with elliptical centric contrast-enhanced MR angiography. Patency of the vertebral arteries can be confirmed by 2D time-of-flight imaging, and by review of the source and axial reformatted contrast-enhanced images. Recognition of this artifact allows appropriate evaluation of the vertebral arteries.

References

*The authors of this work have indicated that they will be discussing/presenting Omniscan for MR angiography. Omniscan is made by Nycomed, Inc.*