Introduction – Spinal MR Angiography With A Focus On The Adamkiewicz Artery

This poster focuses on the image acquisition, identification, and precise reporting of the main feeder of the anterior spinal artery in the thoraco-lumbar segments. This feeder artery is also known as the Adamkiewicz artery (AKA), named after the neurologist Albert Wojciech Adamkiewicz, 1850 – 1921) or as the A. radiculomedullaris magna. The AKA branches off the posterior ramus of a posterior intercostal or lumbar artery, usually at a level between T5 to L2(1,2,3). At our institution, we have developed protocols for high-resolution 3T spinal MRA’s (both stady-state and first-pass) for patients with aortic aneurysms as a preoperative exam to help the cardiovascular surgeons prioritize which intercostal arteries are crucial for the perfusion of the anterior spinal artery and need to be inserted into the aortic graft. Spinal MRA has replaced CTA and DSA as the modality of choice for preoperative imaging of the spinal arterial supply in patients with aortic aneurysms at our institution.

Imaging Acquisition, Reading and Reporting

Images are acquired on a 3T scanner(1) using two 30-channel body coils. A T1 weighted, steady-state radial VIBE MRA with spectral fat saturation (TA = 10 min.) is acquired. Postprocessing includes curved coronal MPR reformations to provide the clinician with a better visualization.

Reading: The typical “hairpin” structure of the distal AKA is the first to be identified on coronal planes (figure 2e, top of the dark green arterial segment). Exploring the 3D MRA dataset in MPR mode on PACS, the AKA is back-traced proximally via the radiculomedullary artery (A. radiculomedullaris, green segments), the posterior ramus (Ramus posterior, yellow segment) and finally the intercostal artery (A. intercostalis posterior for thoracic or A. lumbalis for lumbar spine, accordingly, orange segment).

Reporting: As the position of the origin of the posterior intercostal or lumbar artery which ultimately feeds the AKA is the most important information for the clinician, the sequence of reporting of the arteries/segments is reversed as compared to the sequence in which they were identified on PACS.

1. The main tributary of the AKA branching off the aorta, the posterior intercostal/lumbar artery (left or right of the aorta) is specified, the adjacent vertebral body is named.
2. The course of the posterior ramus of the PIA is described.
3. The course of the radiculomedullary artery as it enters the dura and spinal canal is described, including the specific vertebral bodies.
4. The level at which the “hairpin” is localized is described, naming the adjacent vertebral bodies.
5. Description of anatomical variants of the AKA, including prominent veins which might be mistaken for the AKA.

Summary

High-resolution MRA of the spinal arteries can be achieved with excellent image quality using standard clinical equipment. Advantages of MRA over micro-invasive intra-arterial catheter-based angiography become evident with proper image acquisition, processing as well as focused reporting.

References

(4) Prisma and S Marks 3T MR scanners, and Syngonla software package, Siemens Healthineers, Erlangen, Germany.