

The Best Way to Diagnose and Treat Acute Strokes

RTS 4

Introduction to Strokes

A stroke is caused when the blood supply to the brain is completely cut off, or severely deteriorated.¹ Strokes are generally sorted into two categories: hemorrhagic and ischemic. A hemorrhage stroke is one that is caused by the rupture of a blood vessel. This can be caused by anything from hypertension to a traumatic accident. When the vessel ruptures, the oxygen-enriched blood being supplied to the brain tissue, is now spilling into the interstitial spaces. This prevents the tissue from receiving what it needs to survive. Ischemic strokes are caused when something occludes an artery. These clots can either be thrombotic or embolic. A thrombus is a clot that forms in an artery and stays where it is. An embolus is a clot that forms in a peripheral artery, but moves throughout the body until it finally gets stuck in a narrower blood vessel. Both of these severely limit blood flow to the brain, causing ischemia, a lack of oxygen to the tissues.

MRI Diagnostics

As far as diagnostic value the magnetic resonance angiogram (MRA) is an exam that is best suited for treatment planning. As it is a long exam, and a long screening process this is an exam usually ordered after the patient's vitals have stabilized. There are two types of MRA, one is contrast enhanced, the other is known as a time of flight sequence.⁸ This time of flight sequence is best suited for the evaluation of the Circle of Willis, while a contrasted MRA is usually ordered to look at the carotid arteries. Figure 1 illustrates a typical MRA circle of Willis scan.



Figure 1. MRA Circle of Willis¹

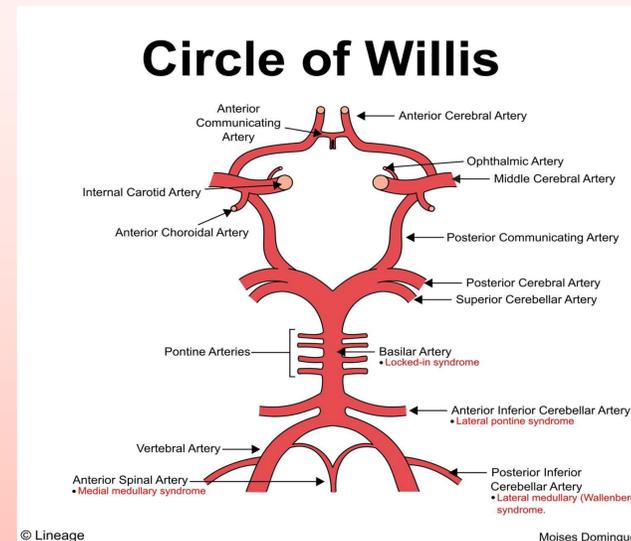


Figure 2. Circle of Willis model²

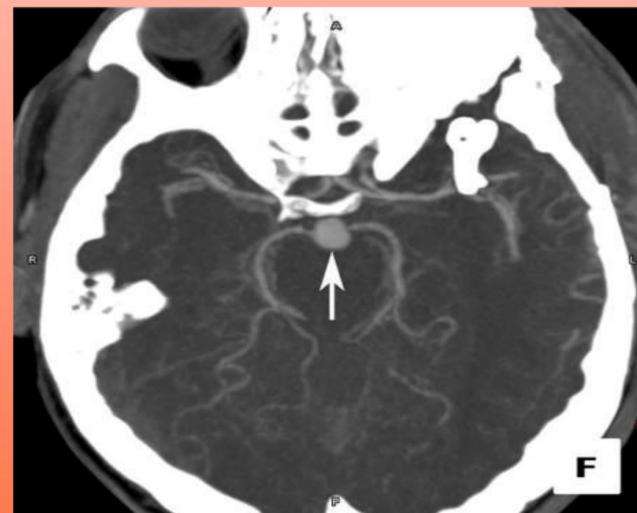


Figure 3. CTA Circle of Willis axial slices³



Figure 4. CTA Circle of Willis sagittal slices³

CT Diagnostics

Computed tomography (CT) exams are another very effective diagnostic method for patients showing stroke-like symptoms. This test requires a rapid bolus injection of iodine based contrast given intravenously. A patient's history should always be considered when giving any type of drug and CT contrast is no exception. There is always a chance the patient could be allergic, so being as thorough as possible is important. A CT angiogram of the head can be performed in about five minutes. This is the major upside that CT angiogram's have; a diagnostic conclusion can be reached fairly quickly. These images will show all sorts of different pathology related to a stroke. Figure 3 demonstrates a sagittal views of a contrast CT angiogram of the head, in the axial plane. Figure 4 Demonstrates the sagittal plane of this same exam.

References

1. Softways. MRI Sliders - Circle of Willis, Time of Flight, MIP - MR-TIP.com. [http://www.mr-tip.com/serv1.php?type=slider&slide=Circle of Willis%2C Time of Flight%2C MIP](http://www.mr-tip.com/serv1.php?type=slider&slide=Circle%20of%20Willis%20Time%20of%20Flight%20MIP). Accessed November 1, 2017.
2. Dominguez M. Circle of Willis. Circle of Willis - STEP1 Neurology - Step 1 - Medbullets.com. <https://www.mdbullets.com/step1-neurology/13022/circle-of-willis>. Accessed November 1, 2017.
3. Birenbaum D, Bancroft L, Felsberg G. Imaging in Acute Stroke. West JEM. 2011;12(1):67-76.