

Vascular MR Protocols

- V 1: Pre- and post-contrast abdominal MR angiogram (renal protocol)
- V 2: Pre- and post-contrast abdominal MR angiogram (mesenteric protocol)
- V 3: Pre- and post-contrast abdomen, pelvis, and lower extremity MR angiogram
- V 4: Pre- and post-contrast chest MR angiogram (aortic arch protocol)
- V 5: Pre- and post-contrast chest and abdomen MR angiogram (aortic dissection protocol)
- V 6: Pre- and post-contrast upper extremity MR angiogram
- V7: Pre- and post-contrast pelvis MR venogram
- V8: Pre- and post-contrast chest MR angiogram (thoracic outlet syndrome protocol)

V 1: Pre- and post-contrast abdominal MR angiogram (renal protocol)

Indications: renovascular hypertension

Sequences:

- Axial tru-FISP (hepatic dome to iliac bifurcation)
- Coronal tru-FISP
- Coronal MRA (pre-, post-Gd, delayed)
- Post-Gd axial VIBE
- Rotating 3-D maximum-intensity-projection reformats

Optional black blood imaging for vasculitis:

- Axial T1 FSE: diaphragm through iliac crests
- Coronal T1 FSE: diaphragm through iliac crests
- Post-Gd axial double inversion recovery with fat saturation: diaphragm through iliac crests

Comments:

V 2: Pre- and post-contrast abdominal MR angiogram (mesenteric protocol)

Indications: intestinal ischemia

Sequences:

- Axial tru-FISP (liver to ischial tuberosities)
- Coronal tru-FISP
- Sagittal tru-FISP
- Sagittal MRA (pre-, post-Gd): abdomen/pelvis
- Rotating 3-D maximum-intensity-projection reformats

Optional black blood imaging for vasculitis:

- Axial T1 FSE: diaphragm through iliac crests
- Coronal T1 FSE: diaphragm through iliac crests
- Post-Gd axial double inversion recovery with fat saturation:
diaphragm through iliac crests

Comments:

V 3: Pre- and post-contrast abdomen, pelvis, and lower extremity MR angiogram

Indications: peripheral vascular disease, claudication, foot ulcers

Sequences:

- Axial tru-FISP (liver to ischial tuberosities)
- Coronal tru-FISP (liver to ischial tuberosities)
- Multi-station coronal MRA (pre-, post-Gd): abdomen/pelvis, thighs, and legs
- Rotating 3-D maximum-intensity-projection reformats

Comments:

- For MultiHance, 20 cc total of contrast.

Optional black blood imaging for vasculitis: with cardiac gating

- Axial T1 FSE: great vessels through diaphragm
- Coronal T1 FSE: great vessels through diaphragm
- Post-Gd axial double inversion recovery with fat saturation: great vessels through diaphragm

V 4: Pre- and post-contrast chest MR angiogram (aortic arch protocol)

Indications: aortic coarctation, stenosis or occlusion

Sequences:

- Axial tru-FISP: great vessels through diaphragm
- Coronal tru-FISP: great vessels through diaphragm
- Coronal MRA (pre-, post-Gd): thoracic aorta
- Rotating 3-D maximum-intensity-projection reformats

Optional black blood imaging for vasculitis: with cardiac gating

- Axial T1 FSE: great vessels through diaphragm
- Coronal T1 FSE: great vessels through diaphragm
- Post-Gd axial double inversion recovery with fat saturation: great vessels through diaphragm

Comments:

V 5: Pre- and post-contrast chest and abdomen MR angiogram (aortic dissection protocol)

Indications: assess extent of aortic dissection

Sequences:

- Axial tru-FISP: common carotids through diaphragm
- Coronal tru-FISP: aortic arch through iliac bifurcation
- Coronal 2-D FLASH: aortic arch through iliac bifurcation
- Oblique coronal (candy-cane) MRA (pre-, post-Gd)
- Rotating 3-D maximum-intensity-projection reformats
- Post-Gd axial 2-D FLASH with fat saturation: 10mm thickness, great vessels to iliac bifurcation

Comments:

- Coronal 2-D FLASH for T1 characterization of hematomas.

Optional black blood imaging for vasculitis: with cardiac gating

- Axial T1 FSE: great vessels through diaphragm
- Coronal T1 FSE: great vessels through diaphragm
- Post-Gd axial double inversion recovery with fat saturation: great vessels through diaphragm

V 6: Pre- and post-contrast upper extremity MR angiogram

Indications: arterial occlusion or stenosis

Sequences:

- Axial tru-FISP (affected shoulder to hand)
- Coronal tru-FISP (affected shoulder to hand)
- Coronal MRA (pre-, post-Gd): shoulder to hand
- Rotating 3-D maximum-intensity-projection reformats

Comments:

V 7: Pre- and post-contrast abdomen and/or pelvis MR venogram

Indications: iliac or IVC thrombus detection

Sequences:

- Coronal tru-FISP (diaphragm or iliac crests to symphysis)
- Axial tru-FISP (diaphragm or iliac vein confluence to symphysis)
- Coronal MRA (pre-, post-Gd): diaphragm or iliac vein confluence to symphysis. Arterial phase, 40 sec, 90 sec delayed phases.
- Rotating subtraction 3-D maximum-intensity-projection reformats (venous phase minus arterial phase)

Comments:

V 8: Pre- and post-contrast chest MR angiogram (thoracic outlet syndrome protocol)

Indications: suspected vascular thoracic outlet syndrome.

Sequences:

- Coronal HASTE: 5 mm slice thickness, no skip.
- Coronal 3D MRA (pre-, post-Gd): arterial & 90 sec delayed phases, with *bilateral arm abduction*. 20 mL IV contrast and 20 mL saline flush at 2 mL/s.
- Coronal and axial 3D VIBE.
- Coronal 3D MRA (pre-, post-Gd): arterial & 90 sec delayed phases, with *bilateral arms at side*. 15 mL IV contrast and 20 mL saline flush at 2 mL/s.

Comments:

- Coverage area: bottom of mandible through aortic arch.
- Inject IV contrast into the arm with no symptoms or less severe symptoms.