

Vascular CT Protocols

V 1D: Chest and abdominal CT angiogram (aortic dissection protocol)

V 1T: Chest CT angiogram (aortic trauma protocol)

V 2: Abdominal and pelvis CT angiogram (aortic aneurysm protocol)

V 2S: Abdominal and pelvis CT angiogram (aortic stent graft followup)

V 3: Abdominal aorta and bilateral iliofemoral lower extremity runoff CT angiogram

V 4: Upper extremity CT angiogram

V 5: Abdominal CT angiogram

V6: Abdominal and pelvis CT angiogram (breast reconstruction surgery protocol)

V7V: Venogram Abdomen / Pelvis

V8V: Venogram Pelvis

V9V: Venogram Upper Extremity

V10V: Venogram Lower Extremity

V11V: Venogram Chest

V12VS: Vasculitis protocol (Chest / Abdomen / Pelvis)

V 1D: Chest and abdominal CT angiogram (aortic dissection protocol)

Indications: chest pain, differences in upper extremity blood pressures.

Contrast parameters	1) None 2) 100 mL @ 4 mL/sec,
Region of scan	Lung apices to iliac crests
Scan delay	1) NA 2) Care Bolus at diaphragmatic aorta; peak + 5 sec
Detector collimation	1) 16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm 2) 16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm
Slice thickness	1) 5 mm axials 2) 3 mm axials. 3 mm 3-D MIP oblique sagittal and coronal reformats, and/or 3-D VRT reformats
Filming	B30f kernel B70f kernel (lung bases)

Comments:

- Siemens ThorAngioVol package

V 1T: Chest CT angiogram (aortic trauma protocol)

Indications: blunt chest trauma, abnormal CXR.

Contrast parameters	100 mL @ 4 mL/sec
Region of scan	Lung apices to posterior lung bases
Scan delay	20 mL Care Bolus at diaphragmatic aorta; peak + 3 sec
Detector collimation	16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm
Slice thickness	3 mm axials; 3 mm 3-D MIP oblique sagittal reformats through aortic arch, and/or 3-D VRT reformats
Filming	B30f kernel B70f kernel for lung bases

Comments:

- Siemens ThorAngioVol package

V 2: Abdominal and pelvis CT angiogram (aortic aneurysm protocol)

Indications: characterize aortic abdominal aneurysms prior to planned repair.

Contrast parameters	100 mL @ 4 mL/sec
Region of scan	Diaphragm to symphysis
Scan delay	Care Bolus at mid-aorta (not in aneurysm); peak + 5 sec
Detector collimation	16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm
Slice thickness	3 mm axials; 3 mm 3-D coronal/sagittal MIP and/or VRT reformats
Filming	B30f kernel B70f kernel for lung bases

Comments:

- Siemens BodyAngioRoutine or BodyAngioFast package
- For unstable patients with suspected ruptured AAA, perform protocol A4 instead (no IV contrast).
- Region of scan can vary, depending on superior extent of aneurysm.

V2S: Abdominal and pelvis CT angiogram (aortic stent graft followup)

Indications: assess for endoleaks after AAA stent graft placement.

Contrast parameters	1) None 2) 100 mL @ 4 mL/sec
Region of scan	Diaphragm to symphysis
Scan delay	1) NA 2) Care Bolus at mid-aorta; peak minus 1 sec 3) 120 seconds
Detector collimation	16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm
Slice thickness	1) 3 mm axials 2) 3 mm axials; 3 mm 3-D sagittal/coronal MIP and/or VRT reformats. 3) 3 mm axials
Filming	B30f kernel B70f kernel for lung bases

Comments:

- Siemens BodyAngioRoutine or BodyAngioFast package

V 3: Abdominal aorta and bilateral iliofemoral lower extremity runoff CT angiogram

Indications: peripheral vascular disease, claudication.

Contrast parameters	5 mL/sec for 5 sec, then by 3-4mL/sec for 40 sec. OR 5mL/sec for 5 sec, then 3-4mL/sec for 30 sec, followed by 30 mL saline flush
Region of scan	1) T12 to feet; position patient feet-first and supine 2) Optional delays: patella to feet
Scan delay	Care Bolus at mid-aorta; peak + 0 sec
Detector collimation	16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm
Slice thickness	5 mm and 2 mm axials from T12 to feet 1 mm coronal & sagittal 3-D MIP, and/or 3-D VRT reformats both with and without adjacent bony structures.
Filming	B30f kernel

Comments:

- Siemens AngioRunoff package
- Increase injection rates for patients > 90 kg.
- Perform optional delayed sequence if there is inadequate distal lower extremity contrast opacification on initial scans.

V 4: Upper extremity CT angiogram

Indications: acute ischemia.

Contrast parameters	5mL/sec for 5 sec, then 3 mL/sec for 30 sec. OR 5 mL/sec for 5 sec, then 3 mL/sec for 25 sec, then 30 mL saline flush
Region of scan	1) Aortic arch to fingertips (symptomatic side only); place arm overhead if possible. 2) Optional delays: elbow to fingers
Scan delay	Care Bolus at aortic arch; peak + 0 sec
Detector collimation	16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm
Slice thickness	2.0 and 5.0 mm axials 1 mm 3-D coronal & sagittal MIP, and/or 3-D VRT reformats with and without bony structures.
Filming	B30f kernel

Comments:

- Siemens AngioRunoff package
- Perform optional delayed sequence if there is inadequate distal upper extremity contrast opacification on initial scans.

V 5: Abdominal CT angiogram

Indications: renovascular hypertension, mesenteric arteries.

Contrast parameters	100 mL @ 4 mL/sec
Region of scan	Diaphragm to iliac crests
Scan delay	Care Bolus at mid-aorta; peak + 0 sec
Detector collimation	16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm
Slice thickness	5 mm and 2 mm axials 1 mm 3-D coronal and sagittal MIP, and/or 3-D VRT reformats.
Filming	B30f kernel B70f kernel for lung bases.

Comments:

- Siemens BodyAngioRoutine package
- Perform coronal MPR for renal artery evaluation; sagittal MPR for mesenteric artery evaluation.

V6: Abdomen and pelvis CT angiogram (breast reconstruction surgery protocol)

Indications: planning for reconstructive breast surgery.

Contrast parameters	100 mL @ 4mL/sec
Region of scan	Lesser femoral trochanters to diaphragm (bottom to top).
Scan delay	Care Bolus at level of acetabulum, ROI in right external iliac artery; peak + 7 sec
Detector collimation	16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm
Slice thickness	5 mm and 1.0 mm axials 1.0 mm 3-D coronal and sagittal MIP through anterior abdominal wall, and 3-D VRT skin surface reformats.
Filming	B20 smooth kernel

Comments:

- 3 mm beam collimation; 120 kVp, 200 mA; pitch 1.15, rotation time 0.5 s.

V7V: Abdominal and pelvis CT angiogram (Venogram option)

Indications: to assess venous anatomy, determine venous patency & delineate collateral circulation. Must be approved by covering radiologist.

Contrast parameters	150 mL or (2mL/kg BW) @ 3mL/sec, 30 mL saline bolus @ 3mL/sec preferred
Region of scan	Diaphragm to Symphysis
Scan delay	120 seconds
Detector collimation	16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm
Slice thickness	2.0 mm axials; 10 mm MIP at 5mm interval (coronal / sagittal reformats) and 2.0 mm MIP at 2 mm interval (coronal / sagittal reformats)
Filming	Br38 -mediastinum (2mm axial, coronal, & sag; 10 x 5coronal & sag MIP's -soft tissue), BR39-lung (5mm axial)

Comments:

- A kernel of BR59 or lower must be selected when using iMAR metal reduction software

V8V: Pelvis CT angiogram (Venogram option)

Indications: to assess venous anatomy, determine venous patency & delineate collateral circulation. Pelvic congestion syndrome. Must be approved by covering radiologist.

Contrast parameters	150 mL or (2mL/kg BW) @ 3mL/sec, 30 mL saline bolus @ 3mL/sec preferred
Region of scan	Iliac crest to Symphysis
Scan delay	120 seconds
Detector collimation	16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm
Slice thickness	2.0 mm axials; 10 mm MIP at 5mm interval (coronal / sagittal reformats) and 2.0 mm MIP at 2 mm interval (coronal / sagittal reformats)
Filming	Br38 -mediastinum (2mm axial, coronal, & sag; 10 x 5coronal & sag MIP's -soft tissue), BR39-lung (5mm axial)

Comments:

- A kernel of BR59 or lower must be selected when using iMAR metal reduction software

V9V: Upper Extremity (Venogram option)

Indications: to assess venous anatomy, determine venous patency & delineate collateral circulation. Must be approved by covering radiologist. Ultrasound preferred modality.

Contrast parameters	150 mL or (2mL/kg BW) @ 3mL/sec, 30 mL saline bolus @ 3mL/sec preferred
Region of scan	Aortic arch to tips of fingers
Scan delay	70-80 seconds
Detector collimation	16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm
Slice thickness	2.0 mm axials; 1.0mm 3D coronal & sagittal MIP, and/or 3D VRT reformats with and without bony structures.
Filming	Br38 -abdomen (2mm axial; 1mm coronal & sagittal MIPs) optional VRT

Comments:

- IV must be placed in opposite arm
- A kernel of BR59 or lower must be selected when using iMAR metal reduction software

V10V: Lower Extremity (Venogram option)

Indications: to assess venous anatomy, determine venous patency & delineate collateral circulation. Must be approved by covering radiologist. Ultrasound preferred modality.

Contrast parameters	150 mL or (2mL/kg BW) @ 3mL/sec, 30 mL saline bolus @ 3mL/sec preferred
Region of scan	Iliac crest to toes
Scan delay	180 seconds
Detector collimation	16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm
Slice thickness	2.0 mm axials; 1.0mm 3D coronal & sagittal MIP, and/or 3D VRT reformats with and without bony structures.
Filming	Br38 -abdomen (2mm axial; 1mm coronal & sagittal MIPs) optional VRT

Comments:

- A kernel of BR59 or lower must be selected when using iMAR metal reduction software

V11V: Venogram Chest

Indications: to assess venous anatomy, determine venous patency & delineate collateral circulation. Must be approved by covering radiologist.

Contrast parameters	150 mL or (2mL/kg BW) @ 3mL/sec, 30 mL saline bolus @ 3mL/sec preferred
Region of scan	Lung apex to posterior costophrenic angles
Scan delay	60-90 seconds
Detector collimation	16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm
Slice thickness	1.0 mm, 5.0 mm, and 8 x 2.0 mm axials, 7mm coronal & sagittal reformats
Filming	Br38 -abdomen (2mm axial, coronal & sagittal; 10 x 5 mm coronal & sagittal MIP's. Br39 – very sharp (1 mm axial, and 8 x 2 mm axial MIP)

Comments:

- A kernel of BR59 or lower must be selected when using iMAR metal reduction software

V12VS: CT Vasculitis protocols (Chest / Abdomen / Pelvis)

Indications: Large-Vessel Inflammation

Contrast parameters	100 mL @ 4mL/sec (370 preferred), 30 mL saline bolus @ 3mL/sec preferred
Region of scan	Lung apices to symphysis
Scan delay	1) Care Bolus at diaphragmatic aorta; peak + 5 sec (100 HU trigger) 2) 60 seconds after completion of arterial scan
Detector collimation	Arterial: 16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm Venous: 16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm
Slice thickness	1.0 mm, 5.0 mm axials, 10 mm x 5 mm and 1 mm interval coronal & sagittal MIP reformats
Filming	Br38 -mediastinum (1mm axial and 5 mm, 1 mm coronal & sagittal; 10 x 5 mm coronal & sagittal MIP's) Br39 – lung (1 mm axial, and 8 x 2 mm axial MIP)

Comments:

- Protocolled with Vascular Radiologist

Venogram

Bolus of IV contrast at 3 cc/sec, 150 mL (or 2 mL/kg BW)

Empiric delay in scanning time depending on the area of interests:

Thoracic: 60-90 seconds

UE: 70-80 seconds

Abd/Pelvis: 110 seconds

LE : 180 seconds