

RENAL ARTERY US PROTOCOL

PURPOSE:

- To evaluate the renal arteries for stenosis.

INDICATIONS:

- Evaluation of patients with hypertension, particularly when there is a moderate to high suspicion of renovascular hypertension (for example, uncontrolled hypertension despite optimal therapy, hypertension with progressive decline in renal function, progressive decline in renal function associated with ACE inhibition therapy, abrupt onset of hypertension).
- Follow-up of patients with known renovascular disease who have undergone renal artery stents placement or other renal artery intervention or have a known unilateral stenosis with concern for a stenosis in the contralateral kidney.
- Evaluation of an abdominal or flank bruit.
- Evaluation of a suspected vascular abnormality such as an aneurysm, pseudoaneurysm, arteriovenous malformation or arteriovenous fistula.
- Evaluation of renal insufficiency in a patient at risk for renovascular disease.
- Evaluation of renal artery blood flow in patients with known aortic dissection, trauma or other abnormalities that may compromise blood flow to the kidneys.
- Evaluation of discrepant renal size.

EQUIPMENT:

- 3-5 MHz curve probe

PATIENT PREPARATION & ASSESSMENT:

- The patient should be NPO after midnight or 6-8 hours prior to examination.
- Introduce yourself to the patient.
- Verify patient identity via two patient identifiers (name and date of birth) per hospital policy.
- Explain the examination, its purpose and how long it will take.
- Answer any questions the patient may have regarding the examination.
- Obtain patient history including symptoms, signs, risk factors and other relevant history.

GENERAL GUIDELINES:

- Optimize equipment gain and display settings with respect to depth, dynamic range and focal zones while imaging vessels.
- Add color Doppler to supplement grayscale images with proper color scale to demonstrate areas of high flow and color aliasing.
- Use power Doppler to validate low flow states or occlusions.
- Set spectral Doppler gains to allow a spectral window and optimized to reduce artifacts.
- Cursor sample size will be small and positioned parallel to the vessel wall and/or direction of blood flow.

- A spectral Doppler angle of 45-60 degrees or less will be used to measure velocities. Note exceptions to these angles on the technologist worksheet.
- Send the measurements screenshot page if your machine is capable.
- For focal lesions (masses, cysts, nodules, lymph nodes, fibroids) obtain split-screen images of the lesion without calibers, with calibers and with Color Doppler.
- Any deviations from the standard protocol and any limitations to the examination should be documented on the technologist worksheet for future reference and for repeatability in follow-up studies.

DOCUMENTATION:

Aorta

- Document longitudinal spectral Doppler image with PSV measurement in the mid abdominal aorta between the origin of the SMA and the renal arteries.

Right Kidney (Grayscale)

- Document longitudinal images of the following (scanning lateral to medial):
 - Lateral (cortex only)
 - Lateral (cortex & sinus)
 - Mid without and with maximal length measurement (normal 9-13 cm) and one with color Doppler flow
 - Medial (cortex & sinus)
 - Medial (cortex only)
- Document transverse images of the following (scanning superior to inferior):
 - Superior (cortex only)
 - Superior (cortex & sinus)
 - Mid without and with maximal AP and TR measurements
 - Inferior (cortex & sinus)
 - Inferior (cortex only)
- Document an image with part of the kidney and part of the liver together to compare echogenicity (kidney should be equal to or less than a normal liver)
- Note any hydronephrosis, cyst, mass or stone. If there are multiple cysts, measure the largest of the simple cysts and any complex cysts. If there are multiple stones, measure the largest one.
- If hydronephrosis is present, assess urinary bladder for bilateral renal jets (up to 5 minutes) and assess for post void change in severity of hydronephrosis.

Right Kidney (color and spectral Doppler)

- Document transverse and longitudinal color Doppler images in the proximal, mid and distal aspects of the main renal artery.
- Document longitudinal spectral Doppler waveforms in the proximal, mid and distal aspects of the main renal artery with measurement of PSV, resistive indices and acceleration times in all three arterial segments.
- Document longitudinal spectral Doppler waveforms and resistive indices of the upper pole, interpolar and lower pole segmental arteries. Use a 0-degree Doppler angle (only for segmental arteries).
- Document transverse and longitudinal color Doppler and longitudinal spectral Doppler images of the renal vein.
- Findings suggestive of renal artery stenosis: main renal artery PSV >180-200 cm/sec, renal:aorta PSV ratio >3.5, acceleration time >70 msec (i.e. tardus parvus waveform) and difference in resistive indices between right and left of greater than 0.05-0.07.
- Normal resistive index 0.5-0.7, borderline 0.7-0.8, elevated >0.8, low <0.5.

Left Kidney (Grayscale and color and spectral Doppler)

- Image same as for the right kidney.
- Document an image with part of the kidney and part of the spleen together to compare echogenicity (kidney should be less than spleen).

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