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Vascular Ultrasound Protocol:
Renal Artery Duplex

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Last Review Date: Link to Last Review Date Table

List of Required Images

Evaluation includes abdominal aorta, IVC, main renal arteries and veins, segmental arteries and kidneys.

- **Kidneys**
  - Sagittal: Complete documentation with at least three gray scale images to include
    - Lateral
    - Mid with and without length measurement
    - Medial
  - Transverse: Complete documentation with at least three gray scale images to include:
    - Superior
    - Mid
    - Inferior
- **Aorta, IVC, Renal Veins**
  - Sagittal Aorta
    - Prox
    - Mid with and without AP measurement
    - Distal
  - Sagittal Aorta at the level of the renal arteries
    - Color and Spectral Doppler with Peak Systolic Velocity (PSV) to calculate Renal Aortic Ratio
  - Transverse Aorta
    - Mid with and without width measurement
  - Sagittal IVC
    - Color and Spectral Doppler to evaluate for patency
  - Sagittal Renal Veins
    - Color and Spectral Doppler to evaluate for patency
- **Renal Arteries**
  - Color and spectral Doppler with PSV's
    - Renal A. origin
    - RA prox
    - RA mid
    - RA distal
    - Acceleration Index (AI) at Renal Hilum with 0-degree angle correction
- **Intrarenal Arteries**
  - Spectral Doppler of the segmental or interlobar arteries with PSV and Resistive Indices.
    - Upper pole
    - Interpolar region

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- Lower pole

For general pathology, use the Pathology Protocol.

Additional Images for Renal Artery Stenosis Evaluation

- If any portion of the renal artery is duplicated, then evaluate and document both branches.
- Scan the entire length of the main renal artery along its long axis using optimized color Doppler. Inability to visualize the entire length or any part of the main renal artery should be documented on the worksheet.
- To measure the Acceleration Index at the hilum, attempt using a zero-degree angle; Preferred position is through the flank, while keeping probe parallel to vessel walls.
- For suspected stenosis or occlusion, include spectral Doppler waveforms and velocity measurements that are proximal, mid, and distal to the site of interrogation. Record the greatest peak systolic velocities. Document spectral broadening or turbulent flow.
- For evaluation of stents and/or grafts. include spectral Doppler interrogation with peak systolic velocities of the proximal artery (if possible), within the stent, and distal to the stent.
- Cines and appropriate stills for abnormal findings of any renal pathology or congenital renal malformation.

CRITERIA Main Renal Artery	
a. PSV < 180 cm/sec b. <3.5 renal-to-aortic ratio of peak systolic velocity c. AI < 291 cm/sec^2	Normal
CRITIERIA Branch/peripheral Renal Artery	
> 10 cm/s, less than 0.8 RI	Normal

Guidelines

- The study is generally performed of both kidneys. If not, the report should state the reason for unilateral study (e.g., evaluation of renal stent, known solitary kidney).
- A blood pressure reading does not need to be obtained
- Utilize supine and lateral decubitus positions.
- Use a 2-6 MHz curvilinear transducer.
- Use the lowest feasible angle of insonation, not to exceed 60 degrees.

Common Indications for Renal Artery Duplex Evaluation

The indications for renal artery duplex examinations include, but are not limited to: Hypertension • Sudden uncontrolled hypertension • Malignant hypertension • Aortoiliac atherosclerosis • Abdominal or flank bruit • Follow up renal vascular disease or intervention • Suspected aneurysm • Pseudoaneurysm • Arteriovenous malformation • Arteriovenous fistula • Renal insufficiency • Trauma • Dissection • Discrepant renal size