Ultrasound- Renal Evaluation

PURPOSE:
To evaluate the kidney for diffuse and focal renal abnormalities including stones and masses; to evaluate the renal collecting systems for hydronephrosis. To evaluate the urinary bladder for urinary retention and bladder wall thickening, and intraluminal findings.

SCOPE:
Applies to all ultrasound renal studies performed at:
- All Children’s Health Systems of Texas Hospitals and Clinics, Imaging Services (CHST)

INDICATIONS:
- Increased creatinine or other findings of poor renal function
- Decreased urinary output
- Flank pain
- Hematuria
- Urinary Tract Infection
- Conditions associated with focal renal abnormalities
- Follow up of known renal abnormalities

CONTRAINDICATIONS:
- No absolute contraindications

EQUIPMENT:
Curvilinear transducer with a frequency range of 2-9MHz that allows for appropriate penetration and resolution of anatomy; depending on patient’s body habitus.

PATIENT PREPARATION:
- Patient should be well hydrated
- The patient should be kept from voiding 30 minutes prior to study.

EXAMINATION:

GENERAL GUIDELINES: A complete examination includes evaluation of both kidneys and bladder.

EXAM INITIATION: AIDET
- Introduce yourself to the patient
- Verify patient identity using patient name and DOB
- Explain test
- Obtain patient history including symptoms. Enter and store data page
- Place patient in supine, right lateral Decubitus or Left lateral decubitus position.
TECHNICAL CONSIDERATION:

- Review any prior imaging, making note of abnormalities or other findings requiring further evaluation.
- Renal echogenicity (in comparison to liver & spleen), cortex, pelvis, and the perirenal region should be assessed for abnormalities on real time survey. Abbreviated images including length measurements are included in this exam.
- Examine the right kidney from the anterolateral or direct lateral approach in the supine or LLD position with the liver as a sonographic window. A posterolateral approach with use of the LLD or prone position may be required.
- Examine the left kidney from a posterolateral or direct lateral approach in the RLD position with the spleen as a sonographic window. A posterior approach with the patient in the prone position may be required.
- Ensure both renal poles are clearly defined. An intercostal approach may be required for the upper poles. Midline approach may be useful in identifying the isthmus of a horseshoe kidney.
- Renal echogenicity should be assessed in comparison to the liver and spleen.
- Power angio should be documented over superior mid and inferior pole of kidney.
- Renal cortex, pelvis, and perirenal region should be assessed for abnormalities.
- Color Doppler at the renal pelvis helps distinguish blood vessels from dilated collecting system (calyces and pelvis, or hydronephrosis)
- Focal renal abnormalities should be documented with and without size measurements and color Doppler.
- Targeted cine sweeps are helpful in demonstrating subtle abnormalities, including cross-fused ectopic or horseshoe kidneys.
- If renal stones are suspected;
  - Optimize grayscale image to demonstrate shadowing:
    - Increase frequency range
    - Turn off Sono CT
    - Decrease XRES setting
    - Decrease dynamic range/compression
  - Use Color Doppler to demonstrate the twinkle artifact
    - Increase frequency range
    - Decrease Doppler scale while minimizing noise/artifact
- Bladder lumen and wall abnormalities should be noted. Focal abnormalities should be documented with and without size measurement and color Doppler.
- If hydronephrosis is found:
  - Evaluate distal ureters for dilation or obstruction within the bladder. Obtain bilateral ureteral jets.
  - Pre and post void imaging should be considered to document any persistent hydronephrosis and or bladder post void residual.
Document any bladder abnormalities such as wall thickening, dilated ureters, debris, urachal cysts, polyps, and/or masses.

- If a kidney is not identified, obtain survey images of that side of the abdomen to survey for an ectopic or pelvic kidney.

**DOCUMENTATION:**

**KIDNEYS:**

- Grayscale
- Longitudinal images (Annotated L-M)
  - Liver or Spleen with Kidney
  - Lateral Kidney
  - Mid kidney
  - Mid kidney with longitudinal measurement
  - Mid Kidney with Power Angio on all poles. Renal cortex (upper, mid, and lower pole) to identify segmental perfusion variations
  - Medial Kidney
- Transverse images (Annotated S-I):
  - Superior pole
  - Mid pole
  - Mid pole with color Doppler. Images of renal pelvis with and without Color Doppler to distinguish blood vessels from hydronephrosis.
  - Mid pole antero-posterior diameter of the renal pelvis
  - Inferior pole

**BLADDER:**

- Grayscale
- Longitudinal images (annotated R-L)
  - Lateral
  - Midline
  - Left
- Transverse images (annotate S-I)
  - Dome
  - Mid
  - Base
- Color Doppler
  - Right and left ureteral jets {minimum 2-minute wait time for visualization}
  - Images with and without color Doppler of focal abnormalities
- Cine sweeps of focal abnormalities if needed.
- Stationary cine images of mobile debris, if present
PROCESSING:

- Review examination images and data
- Export all images to PAC
- Document relevant history and study limitations
- End exam in Epic.

REFERENCES:


REVISION HISTORY:

<table>
<thead>
<tr>
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<tr>
<td>APPROVAL DATE</td>
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