

## 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:**

Siegel, Marilyn, (2002). Pediatric Sonography. Philadelphia, PA: Lippincott Williams and Wilkins.

**REVISION HISTORY:**

|                          |                                       |   |  |
|--------------------------|---------------------------------------|---|--|
| <b>SUBMITTED BY:</b>     | <b>C. LaQuin Oliver, BA<br/>RDMS,</b> | <b>Title: Ultrasound Manager<br/>Dallas</b> |  |
| <b>APPROVED BY:</b>      | <b>Dr. Neil Fernandes</b>             | <b>Director of Ultrasound</b>               |  |
|                          |                                       |   |  |
| <b>APPROVAL DATE:</b>    | <i>2/24/2023</i>                      |   |  |
| <b>REVIEW DATE(S):</b>   | <i>2/17/2023</i>                      |   |  |
| <b>REVISION DATE(S):</b> | <i>2/17/2023</i>                      | <b>Brief Summary</b>                        |  |