Ultrasound- Appendix

PURPOSE:

To evaluate for acute appendicitis in the setting of abdominal and right lower quadrant pain

SCOPE:

Applies to all ultrasound Appendix evaluation studies performed at Imaging Services / Radiology

INDICATIONS:

- Signs or symptoms including fever and right lower quadrant pain with a clinical suspicion for appendicitis
- Abnormal lab values indicating potential appendicitis

CONTRAINDICATIONS:

No absolute contraindications

EQUIPMENT:

Linear array transducers:

EPIQ 7G L12-5. If patient is over BMI recommendations L12-3.

EPIQ 5G eL18-4. If patient is over BMI recommendations L12-3.

GE LOGIC E9 ML6-15.

IU22 L12-5. If patient is over BMI recommendations L9-3.

Curved array transducers:

EPIQ 7G C9-2 OR 2-5 MHz, to view the deeper pelvis or in larger patients for penetration

EPIQ 5G C9-2 OR 2-5 MHz, to view the deeper pelvis or in larger patients for penetration

GE LOGIC C1-5

IU22 C1-5

PATIENT PREPARATION:

- Optimally the patient should be NPO prior to study if able/applicable. However, non-fasting status should not delay performance of the ultrasound exam.

EXAMINATION:

GENERAL GUIDELINES:

A complete examination includes evaluation of the right lower quadrant, left lower quadrant, inferior right upper quadrant, periumbilical region, and deep pelvis. The appendix is **not always** found in the Right Lower Quadrant.

EXAM INITIATION:

- Introduce yourself to the patient (AIDET)
- Verify patient identify using patient name and DOB
- Explain Test
- Obtain patient history including symptoms.
- Enter and store data page
- Place patient in supine position.

TECHNIQUE CONSIDERATIONS:

- **Review any prior imaging exams that are available, making note of any abnormalities that require further evaluation and that could confirm appendix presence and localize its position.**
- Use graded compression, looking for a blind-ended tubular structure in the right lower quadrant.
- Localize the iliac vessels in the right lower quadrant in the transverse plane. Sometimes the appendix may lie just anterior to the iliac artery, extending from the cecum to the medial aspect of the iliac vessels.
- Use constant downward pressure starting at the iliacs with movement cephalad. Use a "knead the dough" technique during compression to push the small bowel out of the way.
- Work your way up from iliac vessels to the cecum and ultimately to the lower pole of the kidney and lower liver edge. If the appendix is not located in the RLQ move to locate it in different areas.
- Asking the patient to localize the point of maximal tenderness may assist in localization.
- It may take 3-4 sweeps from the iliac vessels upward to the lower pole of the kidney/liver edge to ultimately visualize the appendix.
- If the appendix is not visualized using above maneuvers, search for a retrocecal appendix by taking a lateral approach just superior to the right iliac wing and pressing downward and medially. Label these images "lateral." Turning the patient left lateral decubitus may assist to get an adequate view into the retrocecal region.
- On compression images, use split screen image, labeled without and with compression. Label appendix and use arrows when needed.
- Obtain compression ~10s cine loop of the largest portion of appendix seen in transverse
- Label the appendix and regions of the appendix seen: **proximal, mid** and **distal.** If you are confident that the tip is visualized label it as **tip.**
- Take images with and without color and power Doppler, looking for hyperemia.
- Measure the compressed appendix at site of maximum diameter on transverse images, from outer to outer margins of wall. Normal appendix measures < 6 mm.

- Evaluate for the presence of an appendicolith.
- Image the inferior right upper quadrant, left lower quadrant, periumbilical area and pelvis. Document and label at least one image for each of these regions.
- Used curved transducer to visualize the deeper regions, especially in the pelvis looking for fluid/abscess collections or in large patient for deeper penetration. Regions to evaluate: lateral right lower quadrant, right lower quadrant, pelvis, left lower quadrant, posterior bladder to show spine.
- Document any secondary findings including:
    a) Free fluid
    b) Loculated fluid collections
    c) Extraluminal air droplets
    d) Echogenic/hyperemic mesentery/ inflammatory changes
- Entire scan should last a minimum of 15 minutes and include attempts with multiple probes before determining that the appendix is not visualized.

DOCUMENTATION:

- **Right Lower Quadrant:**
    - Transverse images: Right lower quadrant
        - Graded compression right lower quadrant: split screen without and with compression
        - Include with and without color and power Doppler images
        - Measure the **compressed** appendix at site maximum diameter on transverse image, from outer to outer margins of wall.
        - Take multiple views from the level of the external iliac vessels upward to the lower pole of the right kidney and liver edge.
        - Evaluate for fecalith/appendicolith. Document and label appendicolith if present.
        - Document any secondary findings including:
            a. Free fluid
            b. Loculated fluid collections
            c. Extraluminal air droplets
            d. Echogenic/hyperemic mesentery/ inflammatory changes
            e. Rebound tenderness
    - Longitudinal images:
        - Obtain labeled compressed longitudinal appendix images throughout its course and measure point of **maximal outer diameter**
        - Cine: Transverse compression images at the **maximal outer diameter**: label as compression. Use arrows to point to appendix when needed.
- Cine
    - Transverse compression images at the **maximal outer diameter**: label as compression. Use arrows to point to appendix when needed.
    - Sweep through entire length and width of appendix if seen.
- Inferior right upper quadrant
- Left lower quadrant

- Periumbilical area
- Pelvis

PROCESSING:

- Export all images to PACS
- Review examination images in PACS
- Document relevant history and impressions in primordial.
- Present images to Radiologist

APPENDIX:

- **Sonographic criteria for appendicitis:**

  Primary

  - Tubular blind ending structure with size ≥6 mm on compression images
  - Non-compressible
  - Loss of stratification

  Secondary/ancillary findings:

  - Appendicolith
  - Hyperemia "ring of fire"
  - Peri-appendiceal fluid collections/perforation
  - Peri-appendiceal hyperechoic fat
  - Lacks peristalsis

REFERENCES:

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

REVISION HISTORY:

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REVIEW DATE(S):			
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