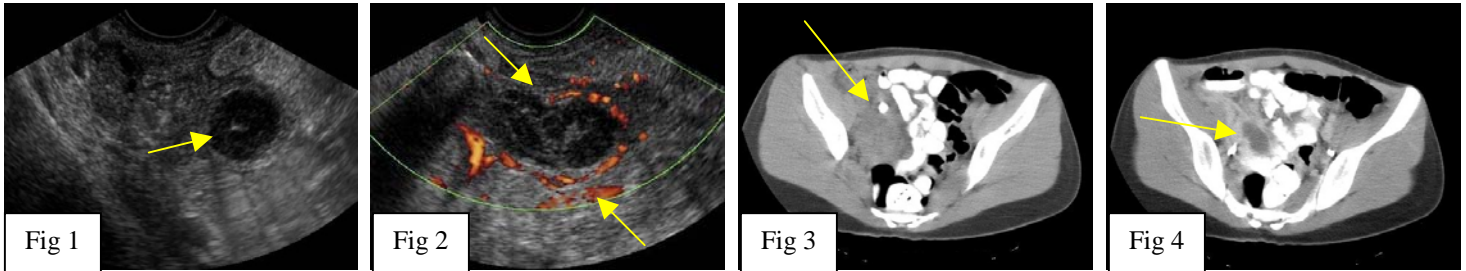


## Value of IV Contrast: Imaging in Suspected Appendicitis



**Clinical Presentation:** A 19-year-old female presented to a local emergency department after the rapid onset of vague right lower quadrant abdominal pain. At this outside facility, oral contrast CT scan and pelvic ultrasound yielded some free fluid, but otherwise essentially unremarkable findings. The patient was discharged home with pain medication for what was believed to be an ovarian cyst. Three days later, the patient presented to her primary care physician with the continued complaint of RLQ pain. The patient was sent to AIC for additional imaging.

**Imaging Findings:** Pelvic ultrasound revealed a thick-walled hypoechoic mass within the right adnexa with a 1.2cm echogenic structure within it (Fig 1). Doppler imaging of the same structure demonstrated peripheral hypervascularity consistent with inflammatory hyperemia (Fig 2). Subsequent CT scan revealed a 1.3 cm calcified appendicolith (Fig 3) and significant surrounding inflammatory material including a 4.5 x 2.5 cm abscess in the right hemipelvis (Fig 4).

**Diagnosis and Treatment:** These findings are consistent with a ruptured appendix and secondary abscess formation. Appendicitis carries a 7-9% lifetime risk in the United States with the peak incidence in the second decade of life. A faecolith, lymphoid hyperplasia, or other source of luminal obstruction results in appendicitis. After the initial obstructing event, continued secretion of mucous in the appendix elevates the intraluminal pressure. Eventually, this increased intraluminal pressure results in vascular compromise and eventual tissue ischemia. Treatment consists of laparoscopic or open appendectomy. Approximately 250,000 appendectomies are performed each year in the US. Delay of this procedure can result in perforation and abscess formation, and in some cases peritonitis and death.

**Other Causes of RLQ Pain:** The differential diagnosis for RLQ varies with the patient's age and sex, but includes colitis, diverticulitis, small bowel obstruction, intussusception, Crohn disease, ovarian torsion, and pelvic inflammatory disease.

**Imaging in Suspected Acute Appendicitis:** In the absence of an appendicolith, plain film radiography is of little value. Graded compression ultrasound can be used in some patients, but has a highly variable sensitivity. This examination is performed by gradually pressing the transducer over the right lower quadrant, thereby displacing bowel loops and minimizing the distance between the transducer and the appendix. CT scan of the abdomen and pelvis with **oral and IV contrast** approaches near 100% sensitivity. At AIC, our abdomen/pelvis CT protocol consists of three image sets on our multislice helical CT scanner: **pre IV contrast, post IV contrast arterio-venous phase and post IV contrast delayed phase**. One image set is obtained with oral contrast only with two additional image sets (with precise 3mm cuts) obtained with oral and IV contrast. Oral contrast, and in some cases rectal contrast, is given prior to the exam to opacify the small bowel. IV contrast is given during the exam to highlight organ and tissue findings. In this case, it proved to be crucial in enhancing and fully visualizing the previously unidentified ruptured appendix and abscess (Fig 4).

For more information regarding the above or any other questions, please give us a call at any one of our three locations.

*Ray Hashemi, MD*

Ray H. Hashemi, M.D., Ph.D.  
Director