There are many differential diagnoses for acute low abdominal pain in a reproductive-age female.

GI Cause

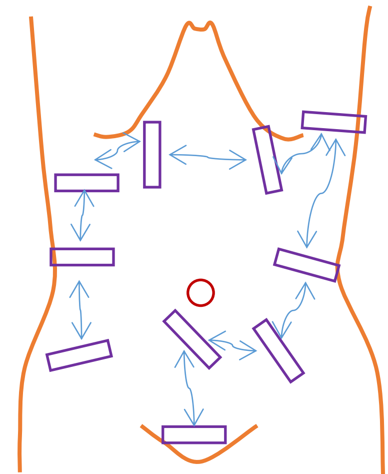
- **Appendicitis, Diverticular disease, Bowel inflammation**, obstruction, Mesenteric adenitis

GU Cause

- Urolithiasis, Cystitis/pyelonephritis

Gynecologic Cause

- Menstrual-related pain, **Ovarian cysts, Rupture of ovarian cysts,** Threatened abortion, Ectopic pregnancy, Endometriosis, Adenomyosis, **Pelvic inflammatory disease, Adnexal torsion,** Placental abruption, Uterine rupture



I. Ultrasound diagnosis method of acute appendicitis

   A. 5-7MHz Curved array → 10-12MHz Linear array

   B. Identify fecal material in ascending colon

   C. Trace ascending colon caudally

   D. Seek out cecal base

   E. Identify thin tubular bowel with blind end

   F. Differentiate appendix from terminal ileum, iliac vessels

   G. Compare with max. tender point, Graded compression technique, **Left oblique lateral decubitus position**.

II. Ultrasound finding of acute appendicitis (*Insights Imaging* 2016;7:255–63)

Real-time US signs of acute appendicitis	
Direct signs	Indirect signs
Non-compressibility of the appendix	Free fluid surrounding appendix
Perforation: appendix might be compressible	
Diameter of the appendix > 6 mm	Local abscess formation
Single wall thickness ≥ 3 mm	Increased echogenicity of local mesenteric fat
Target sign:	Enlarged local mesenteric lymph nodes
Hypoechoic fluid-filled lumen	
Hyperechoic mucosa/submucosa	
Hypoechoic muscularis layer	
Appendicolith: hyperechoic with posterior shadowing	Thickening of the peritoneum
Colour Doppler and contrast-enhanced US:	Signs of secondary small bowel obstruction
Hypervascularity in early stages of AA	
Hypo- to avascularity in abscess and necrosis	

A. For good quality five studies comparing CT and US in same population, CT was more sensitive (88.4% vs. 76%) and a bit more specific (90.4% vs. 89.4%) than US. (Ka A-K et al. 2007 *Saudi Med J*)

B. Negative predictive value of 86.4% (671/777) in appendix-non-visualized pediatric ultrasound (US) examinations. (Cohen B. et al. 2015 *J Pediatr Surg)*

C. On short-interval CT after pediatric and adult non-diagnostic US, appendicitis was revealed in 16.4% (52/318); important alternative diagnoses were revealed in 5.0% (16/318). (Shah BR et al. 2014 *J Ultrasound Med.*)

III. Ultrasound diagnosis of acute appendicitis-mimickers

A. Diverticulitis: bright outpouching bowel with perilesional infiltration, thickened bowel wall >4mm, abscess

B. Inflammatory bowel disease: Ileocecal valve, terminal ileum and right-sided colonic wall thickening in Crohn's disease

C. Infectious enterocolitis

D. Mesenteric adenitis: ≥3 tender lymph nodes of short-axis diameter ≥5 mm clustered in right lower quadrant

E. Ovarian cysts (hemorrhagic or non-hemorrhagic, ruptured or un-ruptured):

F. Ovarian torsion: Congestive enlargement (>4 cm) of ovary, peripherally displaced follicles with hyperechoic central stroma, Whirlpool sign of twisted vascular pedicle.

G. PID: Ascitic fluid or non-specific thickening, Increased vascularity of endometrium, Thickened/dilated fallopian tubes