

Not just gas: Appendicitis in adults and kids

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Introduction

Inflammation of the vermiform appendix is one of the most common causes of acute abdomen worldwide. It occurs most commonly in ages 10-30. In children <5 years old, appendicitis is <5% incidence.

Forget what you learned in medical school. This condition can be *very difficult* to diagnose in patients without CT imaging. The presentation is extremely variable, especially children.

This guide will discuss clinical features, presentation, and diagnosis of appendicitis in adults and kids

Pathology

Initial inflammation (due to obstruction from fecalith, calculi, lymphoid hyperplasia, infection, tumors)

↓
Increase in intraluminal pressure along with bacterial overgrowth → necrosis and perforation

20% of patients have perforation in <24 hours of initial symptoms. 65% had perforation after 48 hours of symptoms.

Presentation in adults

RLQ abdominal pain with anorexia. The case of periumbilical pain that migrates to the RLQ only occurs about 50-60% of the time.

The location of the appendiceal tip is also important. The tip can be located anterior, retrocecal, or even RUQ (pregnancy). Atypical abdominal pain is not uncommon.

Fever is often late in presentation. A strong differential of other causes of fever should be present.

McBurney's Sign: point tenderness 2 inches from the ASIS on a straight line to the umbilicus. Sens and Spec range considerably (50-94%; 75-85% respectively).

Rovsing's Sign: tenderness with palpation of LLQ which can reflect peritoneal irritation. Once again, Sens and Spec vary (20-70%; 60-96% respectively).

Psoas Sign: RLQ pain with passive right hip extension. The sensitivity <40% is quite awful, the specificity is 80-97% *when done correctly*.

Obturator Sign: flexion of the patient's right hip and knee along with internal rotation of the right hip causes RLQ pain. Sens is 8% (not a typo), and Spec is 94%.

Diagnosis

Labs are not very helpful. Typically, CBC, CMP, pregnancy test and urine studies are ordered.

80% of patients have leukocytosis, but leukocytosis is nonspecific in most cases of disease as well. Sens and Spec of leukocytosis: 80 and 55% respectively.

Its presence does not necessarily suggest appendicitis, but its absence might help.

Modified Alvarado Score: Used to identify patients with low likelihood of appendicitis.

- | | |
|----------------------------|-----------------------------------|
| -Migratory RLQ pain (1 pt) | -Anorexia (1 pt) |
| -Nausea or vomiting (1 pt) | -RLQ tenderness (1 pt) |
| -Fever >99.5 (1 pt) | -Rebound tenderness in RLQ (1 pt) |
| -Leukocytosis (2 pts) | |

Max score 9. Scores <3 are unlikely to have appendicitis and should be evaluated for other causes.

The Alvarado does better at ruling "out" than ruling "in". A high score >7 does not mean the patient has appendicitis. 99% of patients had a score >4, only 80% of patients with a score >7 had it.

Best diagnostic test: CT abdomen and pelvis with contrast. It is the most accurate than the other modalities and the fastest to acquire.

Findings that suggest appendicitis:

- enlarged >6mm diameter with occluded lumen
- wall thickening >2 mm
- fat stranding along periappendix or wall enhancement
- Appendicolith (~25% of patients)

One of the biggest concerns is nonvisualization of the appendix (10-20% of cases). This decreases the likelihood of appendicitis but does not eliminate it.

Overall, Sens and Spec 95% and 96%, respectively.

US: preferred in children and pregnancy

Most accurate finding: appendiceal diameter >6 mm

Advantages: no radiation, no contrast. Unfortunately, the test is strongly dependent on patient body habitus, and operator experience.

Overall, Sens 85% and Spec 90%.

This test effectively rules in/out appendicitis if the appendix is visualized.

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MRI: most often used in pregnancy. Not well tolerated by patients as they are often in pain and have to lie on the table for >10 minutes for testing.

Plain radiographs have no role in diagnosis.

Physician gestalt has been found in multiple studies to be equal in performance to the Alvarado score.

Analgesia: there is often concern that analgesia will limit the surgeon's physical exam findings. Although there are no studies on the impact of analgesia on diagnosis, pain control has not been found to negatively impact overall care. Multiple studies where patients received IV morphine in the ED. Morphine was not associated with increased risk of perforation, negative appendectomy, or missed appendicitis.

What about the kids?!

Children have some of the same clinical features as noted above, however at much different rates. The absence of classic clinical features as noted above in the adult section is not sensitive or specific for excluding appendicitis.

-Lack of migration to RLQ (50% of patients), Absence of anorexia in 40%, no rebound tenderness in 50%. Wow, got to make it difficult don't you, pediatrics?

Neonates: appendicitis is rare. High mortality at 30%. Abdominal distention, vomiting, sepsis, anorexia. Huge overlap with necrotizing enterocolitis. These children typically look sick.

Children <5: uncommon. RLQ <50% of patients. Diffuse pain, fever, irritability, vomiting, grunting respirations, refusal to ambulate are all more common.

Children 5-12: frequent. Anorexia, vomiting, fever. RLQ pain and migration from periumbilical region is common. In most children they lie still, with one or both hips flexed. Not too uncomfortable unless they are disturbed. Abdominal pain can be elicited if child is asked to hop on one foot.

Children >12: mirrors adult findings as noted above.

CBC, CMP, urine studies, pregnancy test (in appropriate age and setting).

Leukocytosis: 96% of patients have it but has Sens and Spec of 70% and 80%, respectively.

Urine studies: pyuria can be seen up to 25% of patients. Its presence or absence alone should never be used to diagnose appendicitis.

Ultimately, patients with a clear alternative diagnosis present (pneumonia, UTI, pharyngitis) should undergo treatment for that condition first. For those whom it is difficult to exclude appendicitis, we divide patients into low, moderate, high risk groups.

Low risk: few clinical features, negative lab studies, no RLQ pain or RLQ pain but none with walking/jumping. Discharge with generous return precautions. If RLQ pain is present and distressing, re-eval by PCP in 24 hours is warranted.

Moderate risk: decent exam findings and some symptoms, often leukocytosis. US evaluation +/- surgery eval. +/- admission with repeat abdominal exams.

High risk: strong exam findings, +/- concern for perforation, leukocytosis. Call surgery.

Many clinical scoring systems have been developed, all are beyond the scope of this handout and all have limited ability to identify patients. No studies have evaluated their ability to improve diagnosis compared to gestalt. We do not routinely use them.

Management with antibiotics?

There is a lot of ongoing talk about using a nonoperative approach to appendicitis with antibiotic therapy and close follow up. It's all the rage in Europe apparently. This discussion is outside the scope of the review, and to date 6 trials have been published.

It's definitely worth investigating further, but in general this decision *will* be made in concert with a surgeon's evaluation. Surgery should *always* be called on cases of suspected or confirmed appendicitis.

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