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Emergency medicine updates: Acute appendicitis in the adult patient

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ABSTRACT

Introduction: Acute appendicitis is a condition commonly seen in the emergency department (ED). Therefore, it is important for emergency medicine clinicians to be aware of the current evidence regarding the diagnosis and management of this disease.
Objective: This paper evaluates key evidence-based updates concerning appendicitis in the adult patient for the emergency clinician.
Discussion: Acute appendicitis can present with a variety of signs and symptoms in adults, and no single history or examination finding can exclude the diagnosis of appendicitis. The presence of right lower quadrant pain or tenderness, migrating pain, Rovsing's sign, psoas sign, and obturator sign are suggestive of the diagnosis. A combination of normal white blood cell count, neutrophil distribution, and c-reactive protein suggest appendicitis is less likely. Several risk stratification tools are available, including the original and modified Alvarado score, the Appendicitis Inflammatory Response (AIR) score, the Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA) score, and the Adult Appendicitis Score (AAS). Current evidence and guidelines suggest the AIR, AAS, and RIPASA have the highest diagnostic accuracy. Patients determined to be low risk on these scores may not require further diagnostic evaluation when used with shared decision-making. Patients who are not low risk warrant further investigation. A variety of imaging tests are available, including computed tomography (CT), ultrasound (US), and magnetic resonance imaging (MRI). US or CT may be used as the first-line imaging modality in adults. US and MRI are the recommended imaging tests in pregnant females. All patients with acute appendicitis should receive surgical consultation, and antibiotics should be administered. Evidence suggests that non-operative management with antibiotics alone may be safe in select patients with uncomplicated appendicitis, particularly those without appendicolith. Surgical intervention is recommended in pregnancy.
Conclusions: An understanding of literature updates can improve the ED care of patients with appendicitis.

1. Introduction

Abdominal pain is a common chief complaint in the emergency department (ED) setting, and right lower quadrant pain accounts for up to 50 % of these visits [1-10]. Appendicitis is the most common surgical pathology causing right lower quadrant pain in the United States, and it is the most common abdominal surgical emergency worldwide [3-10]. The lifetime risk of appendicitis is 9 % for males and 7 % for females, with the highest risk between 15 and 30 years [4,11]. Perforation may occur in 16–40 %, with higher rates in pediatric and elderly patients [3,5]. In those without perforation, the mortality rate is 0.07–0.7 %, though this increases up to 8 % in those with perforation [3,8,10-12].

There have been multiple advances in recent years concerning the diagnostic evaluation and management of adult patients with appendicitis. The following questions will highlight several key updates in the diagnosis and management of appendicitis in the adult patient, but this paper is not intended to serve as a review of the condition in its entirety.

2. Discussion

2.1. What findings on history and physical examination are most suggestive of appendicitis?

The most common presenting symptom is abdominal pain, with one study finding 99 % of adult patients had abdominal pain, followed by nausea (81.7 %), anorexia (72.4 %), emesis (67.7 %), fever (44.9 %), and chills (27.3 %) [3,4,8,13,14]. A previous systematic review found right lower quadrant (RLQ) pain was the most frequent symptom (positive

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likelihood ratio [LR+] 7.31–8.46 and negative likelihood ratio [LR-] 0–0.28), followed by pain migration (LR+ 3.18, LR- 0.50), and pain prior to vomiting (LR+ 2.76) [14]. This study found that other findings including no similar previous pain (LR+ 1.50, LR- 0.32), anorexia (LR+ 1.27, LR- 0.64), vomiting (LR+ 0.92, LR- 1.12), and nausea (LR+ 0.69–1.20, LR- 0.70-0.84) were not strongly associated [14]. More recent studies suggest that commonly discussed findings have only moderate sensitivity and specificity. Anorexia has a sensitivity 58–91 % and specificity 37–40 % [3,4,8,13,14]. Nausea or vomiting has a sensitivity of 40–72 % and specificity 45–69 % [3,4,8,13,14]. Diarrhea has a sensitivity of 9–24 % and specificity of 58–65 % [13-17].

Examination findings classically associated with appendicitis include tenderness at McBurney's point (maximal tenderness 3–5 cm from the anterior superior iliac spine [ASIS] on a line from the ASIS to the umbilicus), Rovsing's sign (RLQ pain with palpation of the left lower quadrant), psoas sign (RLQ pain with passive right hip extension or with flexion of the hip against resistance if the appendix is lying on the psoas), and obturator sign (flexion of the right hip and knee followed by internal rotation causes RLQ pain if the appendix lies on the right obturator internus). McBurney's point tenderness has a sensitivity of 50–96 % and specificity 75–86 %, with Rovsing's sign sensitivity 22–68 % and specificity 58–96 %, psoas sign sensitivity 13–42 % and specificity 79–97 %, and obturator sign sensitivity 8 % and specificity 94 % [15-17]. Abdominal rigidity (LR+ 3.76, LR- 0.82), rebound tenderness (LR+ 1.10–6.30, LR- 0-0.86), and psoas sign (LR+ 2.38, LR- 0.90) slightly increase the likelihood of appendicitis [14]. However, fever (LR+ 1.94, LR- 0.58) and guarding (LR+ 1.65–1.78, LR- 0-0.54) are not reliable based on meta-analysis data [14].

Appendicitis is less likely to present with typical signs and symptoms in pregnant or elderly patients. Appendicitis is the most common non-obstetric surgical emergency during pregnancy, and pregnant patients are less likely to present with classic findings [18,19]. As the uterus enlarges during pregnancy, the abdominal wall expands and is no longer in close proximity to the appendix. The appendix also moves cephalad. As a result, pain may occur in the right flank or right upper quadrant (particularly in the late second or third trimester of pregnancy) [18,19]. In elderly patients, appendicitis is more likely to be complicated or present with perforation (18–70 % of cases) [12]. Elderly patients are also less likely to present with fever and RLQ pain, and they may not develop evidence of peritonitis in the setting of perforation [12,20,21]. This is due to several factors, including lower basal thermoregulatory temperature and thermoregulatory response, reduced pain perception with loss of spinal afferent innervation, and decreased abdominal wall musculature [12,20,21].

Based on current literature, there is no single historical or physical examination finding that can exclude the diagnosis of appendicitis, though the presence of pain or tenderness in the RLQ, migrating pain, McBurney's point tenderness, Rovsing's sign, psoas sign, and obturator sign are suggestive. The absence of any one of these should not be used to exclude the diagnosis. Pregnant and elderly patients more commonly present with atypical signs and symptoms. Pregnant patients may present with right upper quadrant pain, and elderly patients are less likely to have fever and RLQ pain.

2.2. What is the utility of laboratory testing?

Laboratory testing is commonly obtained in the evaluation for suspected appendicitis, and the majority of guidelines recommend obtaining a complete blood count and chemistry testing, as well as a pregnancy test in reproductive-aged females [3,9,10]. Over 70 % of patients will demonstrate leukocytosis with neutrophil predominance, with leukocytosis demonstrating a sensitivity over 83 % and neutrophil predominance a sensitivity over 85 % [16,22-26]. Significant leukocytosis ($> 15 \times 10^9$/L) and neutrophilic predominance are more common in the setting of perforation [22-26]. C-reactive protein (CRP) is an acute phase reactant, and studies suggest the sensitivity for diagnosing appendicitis with an elevated CRP is over 75 % using a threshold of 1.7 mg/dL [22]. However, the specificities for these tests are poor, each ranging between 25 and 63 % [23,24]. A 2006 study found that elevated white blood cell count (WBC) had a specificity of 31.9 %, elevated neutrophil percentage a specificity of 33.1 %, and elevated CRP a specificity of 26.1 % [23]. The use of these laboratory markers in combination is of greater utility, with a sensitivity of over 95 % when all three are elevated [4,23,24,27]. Of note, leukocytosis typically occurs within the first 12 h of symptom development, while CRP elevates within 12–24 h and peaks within 48 h [3,4,23,24,27]. Importantly, there is currently no clearly defined CRP threshold that may be used to definitively diagnose or exclude appendicitis. While urinary tract infection (UTI) should be considered in patients with symptoms consistent with UTI, up to 40 % of patients with appendicitis demonstrate leukocytes on urinalysis [28]. Thus, a urinalysis should only be obtained if the patient's symptoms are consistent with UTI, and clinicians should avoid diagnosing UTI based upon urinalysis alone.

Based on the available evidence, laboratory tests such as WBC and inflammatory markers in isolation should not be used to exclude the diagnosis. However, the combination of normal WBC, normal neutrophil distribution, and normal CRP suggest appendicitis is less likely.

2.3. What is the diagnostic utility of risk stratification tools?

There are a variety of diagnostic scoring systems available, which seek to determine the need for further evaluation. These include the original and modified Alvarado score (Tables 1 and 2), the Appendicitis Inflammatory Response (AIR) score (Table 3), the Adult Appendicitis Score (AAS) (Table 4), and the Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA) score (Table 5) [3,9,25,26,29-36]. The modified Alvarado removes leukocyte left shift from the original score, with one study demonstrating that Alvarado score of 9–10 had sensitivity of 88 % and specificity of 100 %, while those with a score of 7–8 had sensitivity of 63 % and specificity of 68 %. The modified Alvarado score of 9–10 had sensitivity of 96 % and specificity of 100 %, and those with a score of 7–8 had sensitivity of 77 % and specificity of 86 % [33]. All scores incorporate components of the history, physical examination, and laboratory testing to determine patients in whom imaging is recommended. The two most commonly utilized scores include the Alvarado, introduced in 1986, and AIR, introduced in 2008 [3,9].

A 2025 meta-analysis of 26 studies (15,699 participants) found the AIR score was more accurate than the Alvarado score, with an area under the receiver operating characteristic (AUROC) curve of 0.86 (95 % CI 0.83 to 0.88) for all patients with appendicitis and 0.93 (95 % CI 0.91 to 0.96) for complicated appendicitis, while the Alvarado score demonstrated AUROC of 0.79 (95 % CI 0.76 to 0.81) for all patients and 0.88 (95 % CI 0.82 to 0.95) for advanced cases [26]. At >3 points, the sensitivity of the AIR score was 0.95 (95 % CI 0.90 to 0.97) for all patients with appendicitis and 0.99 (95 % 0.97 to 0.99) for those with advanced appendicitis. At >8 points, the specificity of the AIR score was 0.98

Table 1
Alvarado score.

Variable	Points
Tenderness in RLQ	2
Temperature ≥ 99.1 °F or 37.3 °C	1
Rebound tenderness	1
Migratory RLQ pain	1
Anorexia	1
Nausea or vomiting	1
WBC count $>10 \times 10^9$/L	2
Leukocyte left shift (>75 % neutrophils)	1
Interpretation	
0–4 = Appendicitis unlikely	
5–6 = Possible acute appendicitis	
7–8 = Probable acute appendicitis	
≥9 = Very probably acute appendicitis	

Table 2
Modified alvarado score.

Variable	Points
Migratory RLQ pain	1
Anorexia	1
Nausea or vomiting	1
Tenderness in RLQ	2
Rebound tenderness	1
Temperature ≥ 102.9 °F (37.5 °C)	1
WBC count >10 × 10^9/L	2
Interpretation	
<3 = Appendicitis unlikely	
≥4 = Further evaluation recommended	

(95 % CI 0.97 to 0.99) for all patients with appendicitis and 0.99 (95 % CI 0.97 to 0.99) for those with advanced appendicitis [26]. A meta-analysis of 33 articles comparing the Alvarado score and RIPASA score found the hierarchical summary receiver operating curve (HSROC) model for the Alvarado score had a summary sensitivity of 0.72 (95 % CI 0.66 to 0.77) and a summary specificity of 0.77 (95 % CI 0.70 to 0.82) [34]. For the RIPASA score, the HSROC model demonstrated a summary sensitivity of 0.95 (95 % CI 0.92 to 0.97) and a summary specificity of 0.71 (95 % CI 0.60 to 0.80) [43].

The *Journal of Trauma and Acute Care Surgery* Emergency General Surgery Algorithms Work Group states that the Alvarado score may be used to assist in determining the need for confirmatory imaging, while the AIR score demonstrates the highest sensitivity and specificity [9]. The World Society of Emergency Surgery (WSES) recommends the use of clinical scores to exclude acute appendicitis and identify intermediate-risk patients needing imaging [3]. These guidelines recommend against using the Alvarado score to confirm the diagnosis, as it is not specific enough to diagnose acute appendicitis and is unreliable in differentiating uncomplicated from complicated appendicitis in elderly patients, and the score is less sensitive in patients with human immunodeficiency virus [3]. The WSES guidelines recommend using either the AIR or AAS score as clinical predictors of appendicitis, as they demonstrate the best clinical performance with the highest discriminating power in adults with suspected acute appendicitis [3]. The AIR and AAS scores also reduce negative appendectomy rates in low-risk patients and reduce the need for imaging and admission in low- and intermediate-risk patients [3]. The WSES states that patients less than 40 years with high risk of appendicitis based on these scores warrant surgical consultation, as imaging may be avoided prior to diagnostic/therapeutic laparoscopy [3].

Table 3
AIR score.

Variable	Points
Vomiting	1
Right iliac fossa pain	1
Rebound tenderness	None = 0
	Light = 1
	Medium = 2
	Strong = 3
Temperature ≥ 101.3 °F (38.5 °C)	1
Polymorphonuclear leukocytes	<70 % = 0
	70–84 % = 1
	≥85 % = 2
WBC count, ×10^9/L	<10 = 0
	10.0–14.9 = 1
	≥15 = 2
CRP (mg/L)	<10 = 0
	10–49 = 1
	≥50 = 2
Interpretation	
<4 = Low: outpatient follow-up	
5–8 = Indeterminant: in-hospital active observation	
≥9 = High: Surgical exploration	

Table 4
Adult appendicitis score.

Variable	Points
Pain in RLQ	2
Pain relocation	2
RLQ tenderness	Women aged 16–49 years = 1
	All others = 3
Guarding	Mild = 2
	Moderate/severe = 4
WBC count, ×10^9/L	≥7.2 and < 10.9 = 1
	≥10.9 and < 14.0 = 2
	≥14.0 = 3
Neutrophil proportion, %	≥62 and < 75 = 2
	≥75 and < 83 = 3
	≥83 = 4
CRP (mg/L) for symptoms <24 h	>4 and < 11 = 2
	>11 and < 25 = 3
	>25 and < 83 = 5
	≥83 = 1
CRP (mg/L) for symptoms >24 h	≥12 and < 53 = 2
	≥53 and < 152 = 2
	≥152 = 1
Interpretation	
1–4 = Low: observation or discharge	
5–10 = Intermediate: consider further imaging	
11–15 = High: surgery or further imaging	

Based on the current evidence, the AIR, AAS, and RIPASA likely have the highest clinical accuracy, and in younger (< 40 years) low-risk patients, they may be used with shared decision-making to reduce the need for imaging. Several guidelines also support their use. In those with scores who are not low risk, further diagnostic evaluation is recommended, and in those at high-risk based on clinical scores, surgical consultation is recommended.

2.4. What imaging is recommended?

A variety of imaging modalities are available for diagnosis of appendicitis, including computed tomography (CT), ultrasound (US), and magnetic resonance imaging (MRI) [3,37]. The American College of Radiology (ACR) Appropriateness Criteria states that CT abdomen and pelvis with intravenous (IV) contrast is the recommended initial imaging for patients with RLQ pain, fever, and leukocytosis in the context of suspected appendicitis, whereas it is usually appropriate for patients

Table 5
RIPASA score.

Variable	Points
Sex	Female = 0.5
	Male = 1
Age	≤40 = 1
	>40 = 0.5
Foreign national	1
Right iliac fossa pain	0.5
Migratory pain to the right iliac fossa	0.5
Anorexia	1
Nausea or vomiting	1
Duration of symptoms	≤48 h = 1
	>48 h = 0.5
Right iliac fossa tenderness	1
Guarding	2
Rebound tenderness	1
Rovsing sign	2
Temperature between 37 and 39 °C	2
Elevated WBC	1
Negative urinalysis (no blood, WBCs, bacteria)	1
Interpretation	
<5 = Appendicitis unlikely	
5–7 = Low probability of appendicitis; observe and repeat score or consider further evaluation	
7.5–11 = High probability of appendicitis; consult surgery specialist	
≥12 = Definite acute appendicitis	

with isolated RLQ pain [37]. In those with RLQ with or without fever and leukocytosis, CT abdomen and pelvis without contrast, US, and MRI may also be appropriate [37]. However, in pregnant women with suspected appendicitis, US abdomen or MRI abdomen and pelvis without IV contrast is usually appropriate, while US pelvis, CT abdomen and pelvis with IV contrast, and CT abdomen and pelvis without contrast may be appropriate [37]. These recommendations are based on the high sensitivity, specificity, and diagnostic yield of CT for appendicitis and other etiologies which may require invasive management. The Society of American Gastrointestinal and Endoscopic Surgeons (SAGE) guidelines state that US is a reasonable first line study due to its low cost and lack of radiation, though CT and MRI are the most definitive modalities [10].

CT is a reliable imaging modality for diagnosis based on the literature. Meta-analysis data suggest sensitivity of 96 % and specificity over 93 % for CT with IV contrast [38]. While the first line imaging modality per the ACR is CT with IV contrast, CT without IV contrast is also accurate. A systematic review of 7 studies found CT without contrast had a sensitivity of 92.7 % and specificity 96.1 % [39]. A 2019 Cochrane review found CT without IV contrast had a sensitivity of 91 % and specificity of 93 % [38]. Data also suggest oral and rectal contrast do not improve diagnostic yield, and thus they are not recommended [38,40,41]. A Cochrane review found a sensitivity of 89 % for CT with oral contrast [38]. Low-radiation protocols have also been evaluated (2–4 mSv versus 8–10 mSv) [38,42]. A single-center study evaluating 879 patients found no difference with low-dose versus standard-dose CT groups in sensitivity and specificity (94.5 % vs. 95.0 % and 93.3 % vs. 93.8 %, respectively) for diagnosis of appendicitis [42]. The OPTICAP trial found a low-dose protocol with IV contrast was not inferior for diagnostic accuracy compared to standard-dose protocol, though with lower radiation dose [43], and a Cochrane review found similar sensitivity and specificity for low-dose and standard-dose CT (94 % versus 95 %) [38]. CT findings include an enlarged appendix (≥ 8–9 mm outer-to-outer diameter) with occluded lumen, periappendiceal fat stranding, wall thickening (> 3 mm), wall enhancement, and appendicolith (Fig. 1) [37,44,45].

Graded compression US has been evaluated for use in adults and is the first-line modality in pregnant women. It demonstrates a sensitivity ranging between 21 and 96 % and specificity 71–98 % [46-57]. Rates of appendix non-visualization vary between 34 and 71 %, with indeterminate rates as high as 85 % [52,53,58-60]. However, standardized results reporting has demonstrated improved US reliability for diagnosis of appendicitis [60]. US is more likely to visualize the appendix in men, body mass index <22 mg/kg^2, and pain index >6 [50,52]. Findings include noncompressible appendix with wall thickness > 6 mm, pain over the appendix with compression, hyperechoic appendicolith, increased echogenicity of periappendiceal fat, and fluid in the RLQ (Fig. 2) [46-57].

MRI is a third-line imaging modality in most patients. This test is primarily used in pregnant women if US is unavailable or equivocal, but MRI may also be used as a first-line imaging modality if available [61,62]. The primary finding is a fluid-filled, enlarged appendix (>7 mm) (Fig. 3). Sensitivity and specificity in adults with appendicitis are 85–98 % and 97–99 %, respectively, for experienced radiologists, though these are lower in less experienced readers (77–89 % and 79–83 %, respectively) [63-69]. The non-diagnostic rate can also be significant with MRI (20–40 %) [63-69]. In pregnant patients, sensitivity ranges between 89 and 100 % and specificity 93–99 % [70-75]. Of note, the imaging time is longer for MRI than CT [66].

While the ACR recommends CT with IV contrast as the first-line imaging modality in adults with RLQ abdominal pain or for suspected appendicitis, the WSES recommends incorporating clinician pre-image likelihood of appendicitis in conjunction with scoring systems [3,37]. They state that in intermediate risk patients based on AIR/AAS/Alvarado score, US is an appropriate first-line imaging test. If the patient has persisting right iliac fossa pain, cross-sectional imaging is recommended per the WSES [3]. The WSES also recommends low-dose CT with IV contrast in those with suspected appendicitis when clinically appropriate. For MRI, the WSES guidelines state that while this modality is sensitive and specific for appendicitis during pregnancy, a negative or inconclusive MRI should not be used to exclude the diagnosis if the clinician has high clinical suspicion [3]. In patients with concern for complicated appendicitis (e.g., perforation, phlegmon, abscess) or elderly patients, CT with IV contrast is recommended.

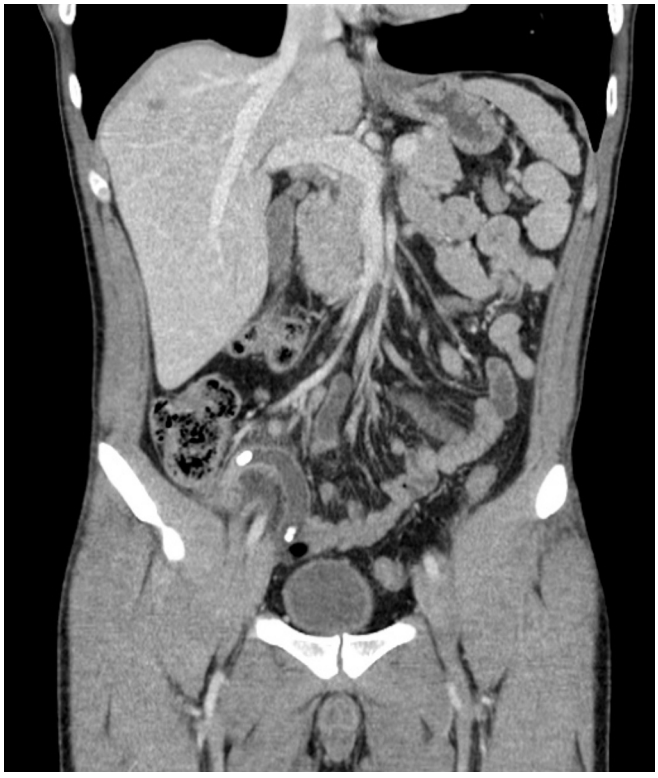

Fig. 1. CT demonstrating appendicitis: distended appendix with an enhancing wall, two appendicoliths, and stranding in the periappendiceal fat. Case courtesy of David Cuete, Radiopaedia.org, rID: 27049.

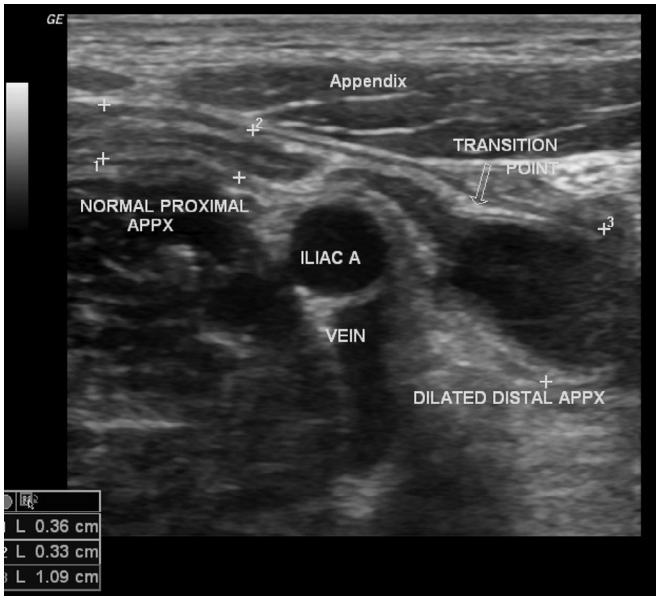

Fig. 2. US demonstrating acute appendicitis with a dilated and edematous appendiceal wall. Case courtesy of Maulik S Patel, Radiopaedia.org, rID: 13043.

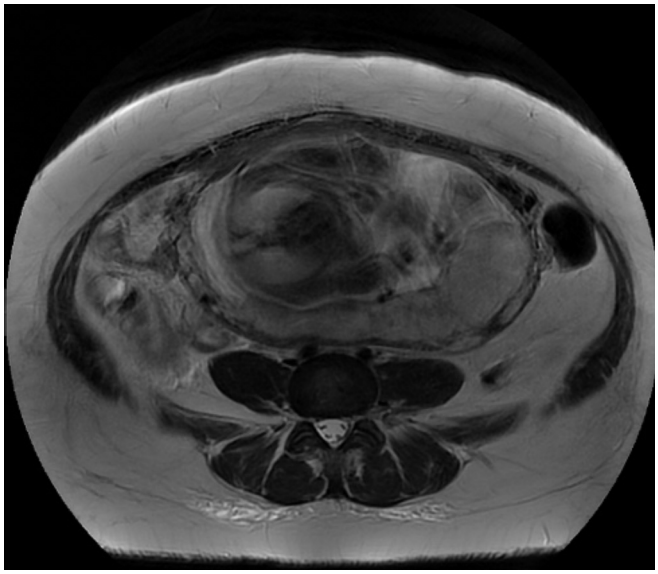

Fig. 3. MRI demonstrating acute appendicitis in pregnancy: intrauterine pregnancy with acute inflammatory mass present adjacent to the cecal pole, medially and posteriorly, with edema of the fat and a small volume of free fluid. Appendicoliths are present within the distended edematous appendix, with a small fluid collection immediately adjacent. Case courtesy of Vikas Shah, Radiopaedia.org, rID: 87388.

Based on the available data and guidelines, there are several imaging modalities that are appropriate for diagnosis. In patients who are well-appearing, US may be pursued as a first-line imaging test based on established guidelines. If US is unable to visualize the appendix or if the patient has evidence of sepsis, is elderly, or is critically ill, CT should be performed, preferably with IV contrast. Oral contrast should not be routinely utilized for diagnosis. US and MRI should be preferentially used in pregnant patients when available.

2.5. What patients may be treated with antibiotics alone, and who requires operative intervention?

All patients with acute appendicitis should receive surgical consultation, and IV antibiotics should be administered as soon as possible following the diagnosis of appendicitis (Table 6) [76]. Patients with stable perforation with phlegmon or abscess may be managed with IV antibiotics and image-guided drainage, as early appendectomy in these patients is associated with worse outcomes [3,9]. If the patient does not improve, appendectomy is warranted [77]. Recent literature suggests that appropriately selected patients with uncomplicated appendicitis may undergo non-operative management with antibiotics alone [78-87]. Uncomplicated appendicitis is typically defined as those without abscess, appendiceal gangrene, perforation, sepsis, or hemodynamic instability [78-87]. Six trials (2101 participants; 1050 receiving antibiotics and 1051 appendectomy) published between 2011 and 2021 were evaluated in a 2025 meta-analysis [87]. Authors found that within one year, 57 (5.4 %) of the 1050 patients receiving non-operative management with antibiotics alone experienced a complication, compared with 87 (8.3 %) of the 1051 patients receiving appendectomy, which was not statistically different (OR 0.49, 95 % CI 0.20 to 1.20) [87]. At one year, 33.9 % of the antibiotics alone group had undergone appendectomy. Those with appendicolith at preinterventional imaging undergoing antibiotics alone management had a higher rate of complications versus appendectomy (15.0 % versus 6.3 %; OR 2.82 [95 % CI 1.11 to 7.18]; risk difference 13.2 % [95 % CI 2.3 % to 24.2 %]). In patients randomized to antibiotics alone, 94 (48.7 %) of 193 patients with an appendicolith underwent appendectomy within one year, compared with 262 (30.6 %) of 857 patients without an appendicolith [87].

Table 6
IV antibiotics for appendicitis.

Initial antibiotics
● Ertapenem 1 g IV every 24 h ● Piperacillin-tazobactam 3.375 g IV every 6 h ● Metronidazole 500 mg IV every 8 h PLUS ceftriaxone 2 g IV every 24 h, cefazolin 2 g IV every 8 h, cefuroxime 1.5 g IV every 8 h, cefotaxime 2 g IV every 6 h, ciprofloxacin 400 mg IV every 12 h, OR levofloxacin 750 mg every 24 h

Several guidelines support non-operative management with antibiotics in those with uncomplicated appendicitis, including the *Journal of Trauma and Acute Care Surgery* Emergency General Surgery Work Group, American Association for the Surgery of Trauma (AAST), and the WSES [3,9,88]. However, the Eastern Association for the Surgery of Trauma does not make a recommendation for or against non-operative management with antibiotics-first therapy versus surgery for acute uncomplicated appendicitis due to limitations in current data [89]. The 2024 SAGE guidelines recommend that patients with uncomplicated and complicated appendicitis be managed operatively, rather than nonoperatively [10]. While the WSES recommends nonoperative management in uncomplicated appendicitis without appendicolith, the AAST states that a fecalith does not preclude nonoperative management, but the probability of requiring additional procedures is higher [3,88].

If selecting non-operative management with antibiotics, current guidelines recommend initial IV antibiotics, followed by a switch to oral antibiotics based on the individual patient condition [3]. Of note, much of the current literature utilized CT for diagnosis to confirm uncomplicated appendicitis, as well as a strategy of IV antibiotics for several days while admitted, followed by oral antibiotics for 7–10 days [3,90]. The APPAC II trial including 583 patients with uncomplicated appendicitis compared moxifloxacin 400 mg per os (PO) for 7 days versus ertapenem 1 g IV followed by levofloxacin 500 mg PO with metronidazole 500 mg PO three times per day for 5 days [91]. Seven days of oral moxifloxacin failed to demonstrate non-inferiority. A secondary analysis found a slightly higher appendectomy rate in those who received oral antibiotic monotherapy, and noninferiority could not be demonstrated [92].

Of note, a 2025 nested trial randomized patients with appendicitis but no perforation awaiting surgery to either receive or not receive antibiotics (until induction) [93]. Authors found similar rates of perforation (8.3 % versus 8.9 %; difference 0.6 %; 95 % CI -2 to 3.2), though the secondary outcome of surgical site infection rate was lower in the antibiotic group (14 of 887 [1.6 %]) versus the no-antibiotic group (28 of 886 [3.2 %]; absolute difference 1.6 percentage points; 95 % CI 0.2 to 3.0) [93]. Guidelines continue to recommend antibiotics following diagnosis of appendicitis [3,9].

Based on current evidence and guidelines, antibiotics should be administered following diagnosis of appendicitis. Non-operative management with antibiotics alone may be safe in select patients with uncomplicated appendicitis, particularly those without appendicolith. However, surgical consultation is recommended in all patients with appendicitis. Shared decision-making with the patient is also recommended, discussing the possibility of failure and development of complications [3]. Of note, based on the current therapy, non-operative management with antibiotics alone is not recommended in pregnant patients, as well as elderly patients who are appropriate for surgery [3,94].

3. Conclusions

There are a variety of updates in the evaluation and management of appendicitis in adults. RLQ pain or tenderness, migrating pain, Rovsing's sign, psoas sign, and obturator sign are suggestive of the diagnosis, but

no single finding in isolation can rule in or rule out the diagnosis. A combination of normal WBC, normal neutrophil distribution, and normal CRP suggest appendicitis is less likely. For risk scores, current evidence demonstrates the highest diagnostic accuracy with AIR, AAS, and RIPASA. US or CT with IV contrast may be appropriate for the first-line imaging modality in adults, though CT with IV contrast is recommended in those with concern for complication. During pregnancy, US and MRI are the recommended imaging tests. Treatment includes surgical consultation and antibiotics. Non-operative management with antibiotics alone may be safe in select patients with uncomplicated appendicitis with shared decision-making, though operative intervention is recommended in pregnancy.

CRediT authorship contribution statement

Brit Long: Writing – review & editing, Writing – original draft, Visualization, Validation, Resources, Conceptualization. **Michael Gottlieb:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Conceptualization.

Declaration of competing interest

None.
No AI program was used to construct this review.

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