

Acute appendicitis Review: Clinical Assessment, Pathophysiology, Complications and Management

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ABSTRACT:

One of the most typical causes of sudden abdominal pain in adults and kids is appendicitis, which has a lifetime risk of 8.6% in men and 6.7% in women. During pregnancy, it is the most frequent nonobstetric surgical emergency. The diagnosis of acute appendicitis is aided by information obtained from the history, physical examination, and laboratory tests. The greatest symptoms to rule out acute appendicitis in adults include right lower quadrant pain, abdominal stiffness, and periumbilical pain radiating to the right lower quadrant. The most consistent indicators of acute appendicitis in children include reduced or absent bowel movements, a positive psoas sign, a positive obturator sign, and a positive Rovsing's sign. Acute appendicitis is typically treated with an appendectomy performed either by open laparotomy or laparoscopy. In some individuals, however, intravenous antibiotics may be the primary line of treatment. Opioid, nonsteroidal anti-inflammatory, and paracetamol pain management should be prioritised since they prevent needless or delayed action. In 17%–32% of individuals with acute appendicitis, perforation might result in sepsis. Longer symptom duration prior to surgical intervention increases risk. To lower morbidity and mortality from perforation in patients with moderate- to high-risk conditions, prompt surgical consultation is necessary.

Keywords: Acute appendicitis, appendectomy, pathophysiology, treatment of acute appendicitis.

Introduction:

An inflammation of the vermiform appendix is known as appendicitis.(1)The most prevalent cause of urgent abdominal surgery is acute appendicitis. The peak incidence occurs in people between the ages of 10 and 19, and the lifetime risk is between 7 and 8%.When there is a ruptured appendix, untreated appendicitis can cause an abscess, peritonitis, sepsis, and even death. About 80% of instances of appendicitis are simple appendicitis (also known as localised appendicitis), which is generally treated with an immediate appendectomy.(2)Adults with right lower quadrant pain, abdominal stiffness, and periumbilical discomfort radiating to the right lower quadrant are most likely to have acute appendicitis. But missing or diminished bowel noises in youngsters The most accurate tests for diagnosing acute appendicitis are the obturator sign and a positive Rovsing sign. There is a unique population of microorganisms in the appendix compared to the rest of the gastrointestinal system. The appendix is thought to behave as a microbial reservoir, perhaps serving as a source of new colonic bacterial species.(3)16 s ribosomal RNA sequencing of appendiceal specimens from paediatric appendicitis cases found an increased abundance of anaerobic bacteria from the phylum Fusobacteria and a decreased abundance of Bacteroides species, in agreement with what has been reported in adult specimens, despite the fact that the role of microbiota in the pathogenesis of appendicitis is unclear. It would need more extensive research to confirm these findings, but identifying persistent microorganisms might help doctors choose the best antibiotics to treat complex appendicitis or abscess development.(4)Strong epidemiological data exists to support the idea that perforated and non-perforated appendicitis are distinct diseases with different aetiologies. People with When symptoms were short-lived, the infiltrate was mostly neutrophilic; however, when symptoms lasted longer, the infiltrate turned predominately lymphocytic with signs of granulation tissue. The conclusion that a mixed infiltration of lymphocytes and eosinophils marks the remission stage of acute appendicitis is supported by these data. Additionally revealed, fibrous adhesion development and scarring of the appendix wall are consistent with the resolution of a prior appendicitis event. The so-called "appendicitis" that typically affects elderly persons manifests as perforation without or with minimal inflammation. In contrast to situations involving young people, when the perforation results from the progression of an

inflammation with severe infection, in these instances, an ischemic appendix perforates.(5)An appendix abscess is characterised by a painful mass, swinging pyrexia, tachycardia, and leucocytosis in the patient. Although it may be pelvic, the abscess is typically seen in the lateral portion of the right iliac fossa; a rectal examination can help identify a pelvic collection. Ultrasonography or computed tomography scanning can reveal the abscess, and percutaneous radiological drainage may be performed. And further benefit of open drainage is that it enables appendectomies.(6)Appendectomy is one of the most often carried out surgeries because the lifetime risk of acute appendicitis is just about 7%. Accurate preoperative diagnosis has historically been difficult for surgeons at all levels, given typical presentations only occur in around 60% of patients. To decrease the negative appendectomy rate (NAR), a number of imaging techniques, biochemical indicators, and grading systems have been developed. Regarding their regular usage, there is yet ongoing debate. Certain unexpected or atypical lesions of the appendix may call for additional clinical attention or follow-up, even if research is currently being done on how to increase diagnostic accuracy,(9)

How do patients present with acute appendicitis: Both appendicitis that is left untreated and appendectomies that remove a healthy appendix can result in severe morbidity and mortality. The patient's history, physical examination, and laboratory results don't predict anything very well on their own, but when they are combined, they have a significantly better diagnostic value. Since symptoms of acute appendicitis can resemble those of dysmenorrhea, ovulation, or pathologies like ovarian torsion, ectopic pregnancy, and pelvic inflammatory disease, the differential diagnosis is most broad in premenopausal women. When there is a communication barrier, such as a language barrier, or when a patient is extremely young, has dementia, a mental health disease, or has learning difficulties, the diagnosis is more challenging. A collateral history of these patients withdrawing, being less active, or having a decreased oral intake will raise the index of suspicion.(7)

Clinical assessment: Less than half of presentations had the typical pattern of central pain spreading to the right iliac fossa and being accompanied by nausea, vomiting, and anorexia. The most typical symptom is abdominal pain. Movements like coughing and driving on uneven surfaces can make localised peritonism more painful. Additionally, patients may describe any symptom consistent with sepsis or a history of feeling generally ill, weak, cold, and clammy. According to a meta-analysis of clinical appendicitis presentations, migratory pain is the symptom most strongly linked to an acute appendicitis diagnosis. Check the patient for any soreness, especially in the right iliac fossa. Local peritonism may be indicated by

guarding, rebound, or percussion discomfort. The chance of acute appendicitis is decreased (likelihood ratio: 0.24-0.39) if there are no symptoms of peritoneal irritation. Rovsing's sign (palpation in the left iliac fossa creating pain in the right iliac fossa) and the psoas sign (passive hip extension with the patient in left lateral position causing pain) have limited diagnostic value for acute appendicitis. If a patient has a right iliac fossa discomfort without any peritonism, normal blood test results, and a normal ultrasound scan.(7)

Investigations:

Analysis of Urine: In order to rule out pregnancy as the source of their symptoms, emphasise to premenopausal women the necessity of performing a urine pregnancy test (HCG level). An alternate diagnosis, such as urinary tract infection or renal colic, can also be suggested by urine analysis. However, because the urinary system and appendix are frequently in close proximity to one another, 40% of people with acute appendicitis will have leucocytes in their urine.

Blood tests: Appendicitis cannot be diagnosed using particular blood testing. Appendicitis is more probable (likelihood ratio 2.39–7.19) if there are higher levels of white blood cells, C reactive protein, granulocytes, or polymorphonuclear cells. It is less likely to be acute appendicitis (likelihood ratio: 0.24–0.39) if these values are normal.

Imaging: The highest probability of diagnosis, at the expense of ionising radiation, is provided by computed tomography (CT) with intravenous contrast. It should not be used during pregnancy and is generally not advised for people under the age of 18. Ultrasonography and magnetic resonance imaging are further possibilities for these populations. Imaging is dependent on how the region looks physically. Appendicitis will be more visible on any of the modalities the further advanced the inflammatory process.(7)

Diagnosis: There are two types of appendicitis: simple and complex. Acute appendicitis that does not exhibit clinical or radiographic indications of perforation (inflammatory mass, phlegmon, or abscess) is referred to as uncomplicated appendicitis. Appendiceal rupture with subsequent abscess or phlegmon production is the hallmark of complicated appendicitis. Men and elderly people are more likely to have complex appendicitis. 40 Having symptoms for more than 24 hours increases the chance of perforation; however, the process of going from

appendicitis to necrosis and perforation might take different amounts of time. The differential diagnosis should always include perforation since it might manifest in less than 24 hours following the beginning of symptoms. Imaging should be done when a diagnosis is questionable. Most often misdiagnosed conditions for young women of reproductive age with suspected appendicitis include pelvic inflammatory disease, gastroenteritis, stomach pain of unknown origin, urinary tract infection, burst ovarian follicle, and ectopic pregnancy.(10)

Pathophysiology: Although the appendix's significance in the immune system is likely due to the lymphatic tissue that covers it, its exact function is unknown. Although it is believed to be a vestigial organ in humans, the appendix has been shown to have important roles in the neuroendocrine and immune systems. The acute inflammation is classified as follows: Complex appendicitis is defined as an inflamed appendix without gangrene, perforation, or an abscess around the appendix; complicated appendicitis is defined as one of these conditions or the presence of periappendicular pus.(5) The observation that an appendicolith is found only in a minority of acute appendicitis patients and that an appendicolith can be found in appendices without inflammation has challenged the conventional wisdom that appendicitis is caused by bacterial infection and inflammation followed by luminal obstruction by an appendicolith. Although the proposed mechanism of pathogenesis for acute appendicitis continues to be luminal obstruction by an appendicolith, fibrous band, lymphoid hyperplasia, or even a caecal carcinoma as a precursor to inflammation, there is growing interest in viral infections that cause secondary bacterial infections as a possible trigger. From the resected infected appendices, a variety of aerobic and anaerobic bacteria, primarily *E. coli* and *Bacteroides* spp., have been identified. There has also been talk of blunt abdominal trauma followed by vascular compromise. Although no specific genes have yet been identified, the differences in acute appendicitis rates across various ethnic groups, geographical locations, and familial tendencies can be a sign of genetic susceptibility. Environmental aspects, diet, and their interplay with genetic elements that predispose a person to acute appendicitis are unknown. Acute appendicitis is the result of the interaction of these several elements, and it can be classified as either a simple disease or a complicated disease depending on macroscopic and microscopic appearances. Phlegmonous, non-perforated appendicitis can be attributed to simple appendicitis. Complex appendicitis often manifests as a gangrenous or perforated appendix with or without the development of an abscess.(8)

Complications: Most of the complications of appendicitis are caused by appendiceal rupture. Age extremes (young and old), delayed presentation for medical care, and the appendix's concealed placement are factors that raise the incidence of perforation. A limited duration of in-hospital surveillance (less than six hours) in ambiguous situations does not raise the perforation rate and may raise diagnostic precision. Although the patient's symptoms may momentarily improve right after the appendix ruptures, the diagnosis of a ruptured appendix is typically simpler. If peritonitis generalises, the physical exam findings are increasingly prominent, advancing from a more diffuse right lower quadrant discomfort to a whole abdominal soreness. In the lower right quadrant, there can be an ill-defined mass. (10)

Special considerations: Despite the rarity of appendicitis in young children, it presents unique challenges for this age group. Young children are unable to provide a history, frequently have stomach discomfort for unrelated reasons, and may exhibit more vague signs and symptoms. These elements help explain why this group has a perforation rate that can reach 50%. By the fourth or fifth month of gestation, the appendix's position in pregnancy starts to change substantially. pregnant-related leukocytosis makes the WBC count less helpful, and common pregnant symptoms can resemble appendicitis. Although the probability of maternal death is minimal, the total foetal mortality rate ranges from 2 to 8.5 percent and can reach 35 percent in cases of perforation with generalised peritonitis. Appendectomy is the recommended course of action, just like in non-pregnant individuals. The death rates among elderly patients are the greatest. In the elderly, the normal signs and symptoms of appendicitis may be missing, decreased, or unusual, which increases the risk of perforation. A mortality rate of up to 5 percent or more is caused by more frequent perforation, an increase in the prevalence of various medical conditions, and a decrease in the body's ability to fight infection. (10)

Management:

PAIN MANAGEMENT: The use of opioids did not substantially raise the risk of postponed or unnecessary surgery in 862 adults and children with acute abdominal pain, according to a meta-analysis of nine randomised controlled studies. In addition to prescription opioids, individuals with suspected acute appendicitis should also be given paracetamol and nonsteroidal anti-inflammatory medicines to control their discomfort. According to a research that randomly assigned 107 patients with acute appendicitis to receive narcotics with

paracetamol against a placebo, pain management does not significantly raise the risk of delayed or inappropriate intervention or affect the Alvarado score.(3)

SURGERY: Acute appendicitis is often treated by appendectomy, which can be done either through laparoscopy or open laparotomy through a small incision in the right lower quadrant. Open and laparoscopic appendectomies in both children and adults were analysed in a recent meta-analysis for their varied outcomes. In comparison to an open laparotomy, a laparoscopic appendectomy had a reduced rate of wound infection, fewer postoperative problems, a shorter hospital stay, and a quicker return to normal activities.(3)

Nonsurgical treatment:Expanding research on non-operative care of uncomplicated acute appendicitis has been stimulated by the potential for discovering an effective treatment modality with improved complication profiles, lower cost, morbidity, and the prospect of avoiding needless surgery. In a study that examined appendectomy patient mortality, it was shockingly discovered that the standardised mortality ratio increased ninefold after a negative appendectomy with a discharge diagnosis of generalised abdominal pain as opposed to a 6.5-fold increased mortality after perforated appendicitis, highlighting the fact that appendectomy is not a procedure that is without risk.

For uncomplicated acute appendicitis, antibiotic therapy has been strongly advocated as a first treatment that is both effective and secure. Antibiotics and surgery are being compared in an increasing number of systematic reviews and meta-analyses in acute, uncomplicated appendicitis. Despite the fact that there are more of these papers, it is important to proceed cautiously when interpreting the findings because the included RCTs had various inclusion and exclusion criteria as well as different definitions of the outcomes, all of which may have contributed to the varied outcomes seen. In a meta-analysis based on protocol data, Svensson et al. found no appreciable difference in the treatment failure ratios between patients treated non-operatively and those treated surgically (defined as failure of non-operative treatment requiring appendectomy as well as incidence of negative appendectomies in those treated surgically). Additionally, they discovered that patients who were given conservative treatment experienced less problems. It's interesting to note that 73% of patients with suspected acute appendicitis who were treated conservatively did not require surgery either at the time of their initial hospitalisation or during the 1-year follow-up.

Conclusion: Although there is lymphatic tissue on the appendix, which implies it may play a part in the immune system, its function is not fully known. Most acute appendicitis patients are thought to have luminal blockage as their major pathogenic event. This notion has not been confirmed, despite being reasonable and probably accurate. The idea that perforated and non-perforated appendicitis are distinct conditions with different pathophysiology is one that is strongly supported by epidemiologic research. It is clear from the numerous research on acute appendicitis that the pathophysiology of this illness has not yet been elucidated. To fully comprehend this condition, which is still unexplained, further study is required. Globally, 96.5 to 100 adults per 100,000 suffer from acute appendicitis each year. Acute appendicitis is still treated with appendectomy as the first line of treatment, however in certain people with uncomplicated appendicitis, antibiotics are a better option than surgery.

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