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The Thistle QA CEU No is: **MT-11/00142**.

Each attendee should claim **THREE** CEU points for completing this Quality Control Journal Club exercise, and retain a copy of the relevant Thistle QA Participation Certificate as proof of registration on a Thistle QA EQA.

CHEMISTRY LEGEND

March 2012

Acute Appendicitis

Surveys indicate that approximately 10% of persons in the United States and other Western countries develop appendicitis at some time. No age is immune, but the peak incidence is in the second and third decades, although lately a second smaller peak is appearing among elderly persons. Males are affected more often than females in a ratio of 1.5:1.

Pathogenesis

Appendiceal inflammation is associated with obstruction in 50% to 80% of cases, usually in the form of a fecalith and, less commonly, a gallstone, tumour, or ball of worms (*Oxyuriasis vermicularis*). With continued secretion of mucinous fluid, the build up of intraluminal pressure presumably is sufficient to cause collapse of the draining veins. Obstruction and ischemic injury then favour bacterial proliferation with additional inflammatory edema and exudation, further compromising the blood supply. Nevertheless, a significant minority of inflamed appendices have no demonstrable luminal obstruction, and the pathogenesis of the inflammation remains unknown.

Clinical Features

Acute appendicitis is either the easiest or the most difficult of abdominal diagnoses. The classic case is marked by (1) mild periumbilical discomfort, followed by (2) anorexia, nausea, and vomiting, soon associated with (3) right lower quadrant tenderness, which in the course of hours is transformed into (4) a deep constant ache or pain in the right lower quadrant. Fever and leucocytosis appear early in the course. Regrettably, a large number of cases are not classic. The condition can be remarkably silent, particularly in the aged, or can fail to reveal localizing right-sided lower quadrant signs, as when the appendix is retrocecal or when there is malrotation of the colon. Moreover, the following disorders may present many of the clinical features of acute appendicitis: (1) mesenteric lymphadenitis after a viral systemic infection, (2) gastroenteritis with mesenteric adenitis, (3) pelvic inflammatory disease with tubo-ovarian involvement, (4) rupture of an ovarian follicle at the time of ovulation, (5) ectopic pregnancy, (6) Meckel diverticulitis, and other conditions as well. Thus, with conventional diagnostic techniques (starting with physical examination), an accurate diagnosis of acute appendicitis can be made only about 80% of the time.

Newer preoperative imaging modalities may be increasing diagnostic accuracy to 95%. Regardless, it is generally conceded that it is better to occasionally resect a normal appendix than to risk the morbidity and mortality (2%) of appendiceal perforation.

Diagnosis

Diagnosis is based on patient history (symptoms) and physical examination backed by an elevation of neutrophilic white blood cells. Histories fall into two categories, typical and atypical. Typical appendicitis usually includes abdominal pain beginning in the region of the umbilicus for several hours, associated with anorexia, nausea or vomiting. The pain then "settles" into the right lower quadrant, where tenderness develops. Atypical histories lack this typical progression and may include pain in the right lower quadrant as an initial symptom. Atypical histories often require imaging with ultrasound and/or CT scanning. A pregnancy test is vital in all women of child bearing age, as ectopic pregnancies and appendicitis present similar symptoms. The consequences of missing an ectopic pregnancy are serious, and potentially life threatening. Furthermore the general principles of approaching abdominal pain in women (in so much that it is different from the approach in men) should be appreciated.

Blood test

Most patients suspected of having appendicitis would be asked to do a blood test. Half of the time, the blood test is normal, so it is not foolproof in diagnosing appendicitis. Two forms of blood tests are commonly done: Full blood count (FBC), is an inexpensive and commonly requested blood test. It involves measuring the blood for its richness in red blood cells, as well as the number of the various white blood cell constituents in it. The number of white cells in the blood is usually less than 10,000 cells per cubic millimeter. An abnormal rise in the number of white blood cells in the blood is a crude indicator of infection or inflammation going on in the body. Such a rise is not specific to appendicitis alone. If it is abnormally elevated, with a good history and examination findings pointing towards appendicitis, the likelihood of having the disease is higher. In pregnancy, elevation of white blood cells may be normal, without any infection present.

C-reactive protein (CRP) is an acute-phase response protein produced by the liver in response to any infection or inflammatory process in the body. Again, like the FBC, it is not a specific test. It is another crude marker of infection or inflammation. Inflammation at ANY site can lead to a rise in CRP. A significant rise in CRP, with corresponding signs and symptoms of appendicitis, is a useful indicator in the diagnosis of appendicitis. If the CRP continues to be normal after 72 hours of the onset of pain, the appendicitis likely will resolve on its own without intervention. A worsening CRP with good history is a sure signal of impending perforation or rupture and abscess formation.

X-Ray

In 10% of patients with appendicitis, plain abdominal x-ray may demonstrate hard formed feces in the lumen of the appendix (Fecolith). It is agreed that the finding of Fecolith in the appendix on X-ray alone is a reason to operate to remove the appendix, because of the potential to cause worsening symptoms. In this respect, a plain abdominal X-ray may be useful in the diagnosis of appendicitis, though plain abdominal x-ray is no longer requested routinely in suspected cases of appendicitis. An abdominal X-ray may be done with a barium enema contrast to diagnose appendicitis. Barium enema is whitish fluid that is passed up into the rectum to act as a contrast. It will usually fill the whole of the large bowel. In normal appendix, the lumen will be present and the barium fills it up and is seen when the x-ray film is shot. In appendicitis, the lumen of the appendix will not be visible on the barium film.

Ultrasound

Ultrasonography and Doppler sonography provide useful means to detect appendicitis, especially in children, and shows free fluid collection in the right iliac fossa, along with a visible appendix without blood flow in color Doppler. In some cases (15% approximately), ultrasonography of the iliac fossa does not reveal any abnormalities despite the presence of appendicitis. This is especially true of early appendicitis before the appendix has become significantly distended and in adults where larger amounts of fat and bowel gas make actually seeing the appendix technically difficult. Despite these limitations, sonographic imaging in experienced hands can often distinguish between appendicitis and other diseases with very similar symptoms, such as inflammation of lymph nodes near the appendix or pain originating from other pelvic organs such as the ovaries or fallopian tubes.

Treatment

Acute appendicitis is a treatable condition. If acute appendicitis is diagnosed and treated promptly before the appendix ruptures, the outcome is generally very good. Treatment for appendicitis includes hospitalization and:

- Intravenous antibiotics to clear any infections
- Laparoscopic appendectomy, a minimally invasive surgery to remove the appendix, requiring small incisions
- Open appendectomy, a major surgical procedure to remove the appendix and clean out the abdominal cavity. This procedure is performed if the appendix ruptures before it is surgically removed.
- Pain medications

People in good health generally recover from an appendectomy procedure quickly without complications, particularly if the procedure is performed before the appendix ruptures.

References

1. http://en.wikipedia.org/wiki/Acute_appendicitis#Blood_test
2. Basic Pathology 8th Edition: Robins

Questions

1. Discuss the Clinical features of acute appendicitis.
 2. Discuss the laboratory findings in a patient diagnosed with acute appendicitis.
 3. Discuss the pathogenesis of acute appendicitis.
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