

ACUTE APPENDICITIS: WHAT IS IT AND HOW DO DOCTORS TREAT IT?

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YOUNG REVIEWERS:



BENJAMIN

AGE: 15



BREANNA

AGE: 12



ELISA

AGE: 12

Acute appendicitis is the medical term for inflammation of the appendix, which is a tubular structure located at the beginning of the large intestine. Acute appendicitis is usually caused by a blockage of the appendix, increasing the pressure inside it and decreasing its blood supply. Acute appendicitis is a very common disease, mostly affecting people 10–20 years old. The usual symptoms are abdominal pain, located at the center of the abdomen and moving to the lower right quadrant, accompanied by fever and loss of appetite. The best available treatment is surgery to remove the appendix. Surgery can be done in a way that leaves only a small scar. The patient is usually discharged from the hospital 2–3 days after surgery, and most people have a full and fast recovery.

WHAT IS ACUTE APPENDICITIS?

The appendix is a worm-shaped structure that is connected to the first portion of the large intestine, which is also known as the colon. The

ACUTE APPENDICITIS

Acute inflammation of the appendix. It is a medical emergency, needing surgery in order to remove the appendix.

INFLAMMATION

A reaction of the body against injury or infection, in which the affected area becomes swollen, hot, red, and painful.

FECALITH

A stone made of feces, that can block the appendix and cause an acute appendicitis.

appendix is located in the lower right region of the abdomen, and is usually 6–10 cm long (2.36–3.93 inches) (Figure 1) [1].

Acute appendicitis (AA) happens when the appendix becomes inflamed. This **inflammation** is usually caused by a blockage within the appendix. Blockage most often results from a hard, stony mass of feces called a **fecalith**, but can also be created by parasites or viruses, overgrowth of normal tissue, or tumors. Due to the inflammation and obstruction, the appendix becomes completely stuffed with mucus, which causes an increase in pressure, decreasing the blood flow to the appendix. The bacteria in the appendix reproduce rapidly under these conditions. The inflammation can even lead to the rupture (“bursting”) of the appendix, which can be extremely dangerous and can cause dangerous bacteria to spread throughout the abdomen and eventually throughout the body via the blood stream. Untreated AA can even lead to death. AA can happen at any age; however it is more common from 10 to 20 years old and it is slightly more prevalent in boys [2]. AA is the main cause of abdominal surgery in people of this age range. Evidence suggests that people are more likely to have AA if their family members have also had it.

WHAT ARE THE SYMPTOMS OF AA?

The main symptom of AA is abdominal pain near the belly button, which travels to the right lower region of the abdomen (Figure 2). Other symptoms include vomiting, loss of appetite, low-grade fever, and abdominal tenderness upon a doctor’s examination [3]. Usually,

Figure 1

(A) The large intestine is a long tubular organ that connects the small intestine to the anus. It begins in the right lower sector, where the appendix is (red circle) and travels up, transversely and down at the left side. (B) In this enlarged view, you can see the inside of the lower right part of the large intestine, as well as the appendix (Image credit: Servier Medical Art under Creative Commons Attribution 3.0 Unported License).

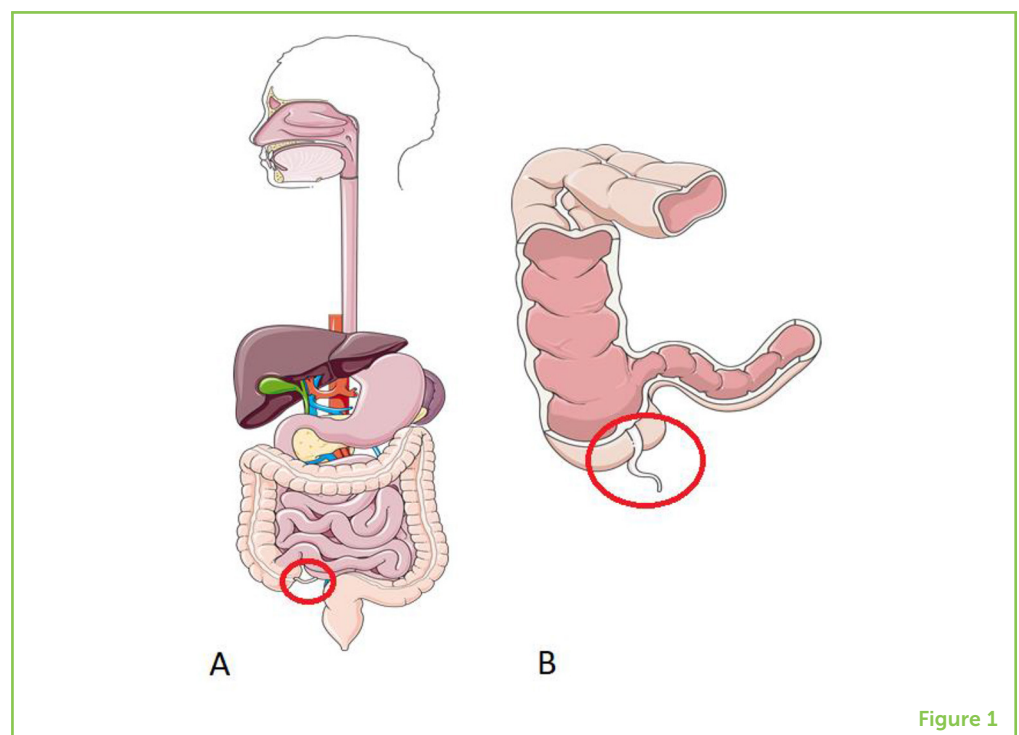


Figure 1

Figure 2

Appendicitis occurs when the inside of the appendix is blocked, usually by a fecalith. The image shows the typical location of pain and the site of surgery to treat AA. This is the approximate size of a scar from open appendectomy (Figure designed using Freepik.com).

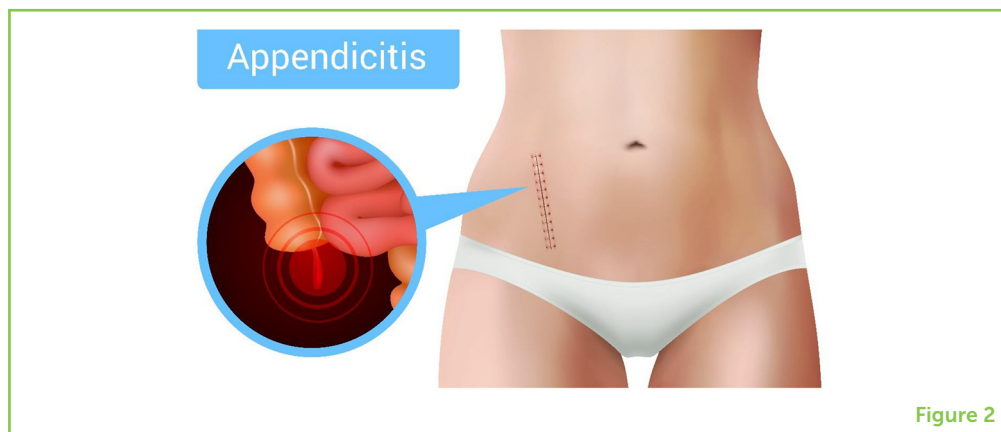


Figure 2

in AA, the pain starts near the belly button, gets worse when walking or traveling in a car, and then, over 12–24 h, the pain intensifies and migrates to the lower right section of the abdomen and continues to get worse.

In early AA, the symptoms can be very subtle and the description of the symptoms that the patient gives the doctor can be very non-specific, meaning that the symptoms do not clearly point to a diagnosis of AA. The location of the appendix can differ slightly between individuals, and this variation can sometimes make the diagnosis of acute appendicitis complicated, since different locations can change the findings of the doctor's exam and can also influence the symptoms that patients report. As the inflammation spreads and gets worse, abdominal tenderness increases, and it eventually becomes easier for a doctor to make a diagnosis of AA.

TESTS TO DIAGNOSE AA

Usually, doctors can diagnose AA by combining information from various sources, including the patient's medical history, the physical examination, and the laboratory tests, which usually show an increase of white blood cells. There are a few simple tests that doctors can use quickly, in the office, to help them diagnose AA. One of these is to look for what is called the Rovsing sign, which means that the patient will have pain in the lower right region of the abdomen when the doctor presses on the lower left area. Also, if the patient has pain in the lower right area of the abdomen upon examination, this is called the Blumberg sign. However, these signs are not always present—it depends upon the exact location of the appendix in each patient, and on the degree of inflammation.

To make a more accurate diagnosis of AA, doctors often use a method called medical imaging. Medical imaging includes a variety of techniques that allow doctors to see what is going on inside the body. The first type of imaging usually used, especially in children

Figure 3

(A) An inside-view of a normal appendix. (B) During AA, the appendix is red and inflamed.

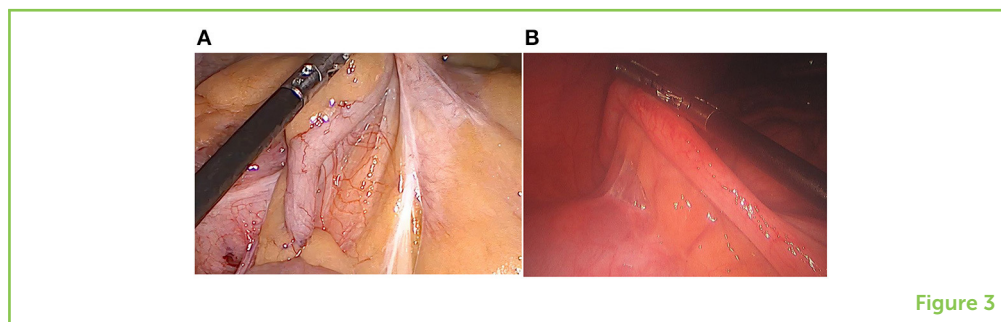


Figure 3

ABDOMINAL ULTRASOUND

Ultrasound are sounds higher than 20,000 Hz. Abdominal ultrasound is an imaging technique that allows doctors to see the inside of the body and identify when people are sick.

COMPUTED TOMOGRAPHY (CT)

An imaging technique that allows to see the inside of the body (like a picture) without surgery. It sends small amounts of radiation detected by the computer which creates an image.

LAPAROSCOPIC APPENDECTOMY

A surgical technique in which the surgeons create small cuts allowing to do surgery with less scars and faster healing.

or pregnant women, is **abdominal ultrasound**, because it does not use radiation. Abdominal ultrasound is pretty good at diagnosing AA, but sometimes it is not sensitive enough. **Computed tomography (CT)** is a more sensitive type of imaging that is also widely used to diagnose AA. Positive findings using either type of imaging include enlargement of the diameter of the appendix and a thickening of the appendix wall.

There are other diseases that can resemble AA, such as, gastroenteritis (also known as stomach flu), diverticulitis (which is an inflammation of sac-like structures in the left part of the large intestine), pregnancy, kidney stones, or urinary tract infection, to name a few. So, a correct diagnosis can be challenging in some patients, but it is essential.

HOW DO DOCTORS TREAT AA?

Once AA is diagnosed in a patient, there are several stages to treating it. The first thing most doctors do is to give the patient painkillers, which are drugs that can relieve pain and make the patient more comfortable.

Surgery is the most common strategy for managing AA. For simple and uncomplicated AA, antibiotic treatment can be attempted first. However, there is a failure rate of 25–30%, which means the patient would need to come back for surgery anyway [2]. **Laparoscopic appendectomy**, which is a relatively minor surgery, is the most-used surgical technique (Figure 3). Laparoscopic appendectomy is most often performed by making a small incision in the skin and placing a hollow tube through the incision, through which the surgical instruments can be inserted to perform the surgery. This method leaves only very tiny scars. In certain cases, like when people had many surgeries before, doctors may need to perform an open appendectomy, which means a larger scar on the lower right sector. The laparoscopic surgery is associated with less pain, less need for pain medication, shorter hospital stays, faster healing, and a reduced chance of wound infection [1].

Patients with simple AA who undergo laparoscopic appendectomy usually stay in the hospital for 1–2 days before going home. Children can take a few more days in the hospital before they are comfortable and fever-free enough to go home. Usually, patients can resume their normal lifestyle 2–3 days after surgery. Full recovery can take 4–6 weeks for a simple AA, or longer, if the AA was severe and the inflammation spread to other abdominal areas.

SUMMARY

In summary, acute appendicitis is a very common disease that affects many young children or teenagers. It begins with a pain on the belly button that goes to the right lower sector (but it can start on this location right from the beginning), with a will to vomit and lack of appetite. Usually, there is a need for surgery in which the appendix is removed and normally the patient goes home after 1–2 days. With this article, the authors want the young readers to be fully prepared if the young reader or someone around him happens to have an AA.

ACKNOWLEDGMENTS

Figure 1 was adapted using Servier Medical Art under Creative Commons Attribution 3.0 Unported License. Figure 2 was designed using resources from Freepik.com. The authors thank the reviewers for the work.

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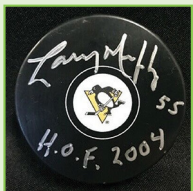
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YOUNG REVIEWERS

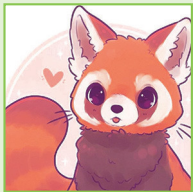
BENJAMIN, AGE: 15

When I was introduced into this world, I first lived in an apartment with my dad and mom. Life was great, I had no responsibilities to take care of. Three years later, my sister joined us. After 5 years, I left that apartment to live in a house. This was also when I was introduced to hockey. When I started my middle school, we moved into a giant house, after that our life has been going smoothly.



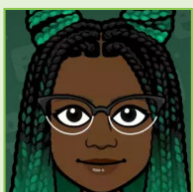
BREANNA, AGE: 12

Hello! I am a sixth grader! I am very funny when I am with friends. I like watching movies, and I read books when I am bored. I like drawing and I love watching my phone. I have a brother, a helpful mom and dad, and my best friend dog. My house has a surrounding of many trees and beautiful birds. My favorite foods are ice-cream, banana bread, and pasta. I like being myself!



ELISA, AGE: 12

Elisa is a young girl with a curious mind. She is very passionate about science, especially related to health. She is interested in research and would like to start getting involved in conducting her own explorations in high school. She hopes that, with her critical thinking, her love for health discoveries and her drive, she will be able to contribute to science through journal review.



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I am a general surgery resident at the Hospital de Braga and a faculty member at the School of Medicine, University of Minho (Braga, Portugal). As a researcher, I have developed work in medical education and now I am trying to follow the dream of becoming a surgeon, an academic and a surgical researcher. Regarding my free time, my priority is to spend time with my family and friends, but I also play sports like soccer and padel. *nunogsilvagoncalves@gmail.com



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Olga is a general surgery specialist, specialized in colorectal surgery. She is extremely interested in providing the best healthcare to every patient. She is also interested in conducting research in colon cancer and proctology.

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