

One in seven Americans suffered it. Appendicitis. What is it? Part 2

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One in seven Americans suffered it. Appendicitis. What is it? Part 2

By Aleksandr Kavokin, MD/PhD

**One in seven Americans suffered it. Appendicitis. What is it? Part 2 by Aleksandr Kavokin,
MD/PhD**

Next they try to image what is going on in your belly. An abdominal x-ray may detect the fecalith as the cause of appendicitis (5%). Free air due to perforation can might be seen on the plain film.

A barium enema may be used. It is an x-ray test where liquid contrast is used from the anus to fill the colon. Sometimes it show an impression on the colon in the area of inflamed appendix. Barium enema also can exclude other intestinal problems that mimic appendicitis.

Ultrasound shows an enlarged appendix or an abscess. Ultrasound is painless, but the appendix can be seen in only half of patients. Ultrasound also is helpful in excluding the problems with ovaries, fallopian tubes and uterus. Ultrasound machine usually looks like a small thumb on wheels that they bring into your room. Technician puts gelly on and drives the probe over you belly.

Often they go straight to CT Scan (computer tomography). Especially if the patient is not pregnant. CT scan gives relatively high irradiation of your body by x-rays. However benefits of prompt diagnose of appendicitis outweigh the risk of radiation. CT scan gives slicing images of your body.

What do they look for? As any inflammation causes edema, the wall of the appendix will be thickened. This is actually a defensive mechanism – by edema the organism try to wall of, to seal off the area of infection and inflammation.

But it is useful for us because we can surely say there is an inflammation. The same goes for ultrasound.

CT scan is expensive – around 1000 dollars in an American hospital, though 40 dollars in Russia.

If the CT scan is taken during the night, CT image may be send to Australia Russia or India.

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An American radiologist is paid around 40 dollars to read just an X-ray film. I guess he gets more for reading the CT scan. It is only 5 dollars in India. This is why even such clinics as Harvard and Yale adopt this model of work – they send the CT scans to the cheap labor abroad. Especially during the night. Half an hour later the fax from Australia arrives. "Inflammatory pericecal mass in the right iliac fossa consistent with the diagnosis of severe acute appendicitis." Any doctor can read an x-ray film or CT scan. Radiologists are doctors who specialize in the reading of the films. They may find what was missed by others.

At this point diagnosis is usually clear. In cases if it is not, there is Laparoscopy. Laparoscopy is a surgical procedure. Small fiberoptic tube with a camera is inserted into the abdomen through a small puncture in abdominal wall.

Yet there is no test that will diagnose appendicitis with 100% certainty.

The position of the appendix may vary. If it is longer than normal, appendix may go deep down into the pelvis. It also may move behind the colon (called a retro-caecal appendix). From one hand it is better because retro-caecal appendix has less chances to burst into peritoneal cavity, from the other it is difficult to diagnose and it is difficult to approach surgically. Inflammation of other organs, for example, female pelvic organs, may resemble inflammation of the appendix. Pregnant women may have appendix pushed up in abdomen by the enlarged uterus. Athletic young adults may tolerate more pain and may have not so obvious symptoms of appendicitis. Old patients may have vague symptoms as well.

Other inflammatory problems may mimic appendicitis. Surgeons often observe patients with suspected appendicitis for a period of time to see if the problem will resolve or suggest appendicitis more strongly versus another condition. Conditions that mimic appendicitis are:

1) Meckel's diverticulitis. 2) Pelvic inflammatory disease –infection of tube and ovary. It is treated with antibiotics alone 3) Fluids from the right upper abdomen may drip into the lower abdomen and cause inflammation resembling appendicitis. Then, for example, patient has gallbladder disease or liver abscess, but all symptoms suggest acute appendicitis. 4) Diverticulitis that occur on the right side. 5) Inflammation of right kidney. 6) Crohn's disease or ulcerative colitis 7) Yersinia enterocolitica infection – the bacteria that comes from certain food – like unpasteurized milk. – may cause appendicitis 8) passing kidney stone 9) ectopic pregnancy 10) ovarian cyst rupture. And so on. There are some other conditions.

Appendectomy is performed urgently usually. Thomeo is Latin for dissect or cut. Lapar – is abdomen (belly) in medical Latin. Laparotomy is opening of belly. Appendectomy is cutting of appendix. Laparoscopy is looking (by scope) into belly. Antibiotics almost always are given prior to surgery as soon as appendicitis is suspected.

Few patients have mild "confined appendicitis" localized to a small area. These patients may improve during several days of observation when treated with antibiotics alone. Doctors may or may not removed the appendix later. Chances are you are not one of this patients.

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If a person has not seen doctor for many days while appendicitis ruptured (yeah, sometime happens; there are some tough guys), an abscess may form, and the perforation may close. Initially it can be treated with antibiotics; however, that will require drainage later. A drain is guided under ultrasound or CT scan and appendix is removed after the abscess resolves.

In modern days surgeons offer laparoscopic appendectomy. They insert laparoscope (it is like a small telescope with a video camera) and remove appendix with special instruments through small puncture wounds.

If you had this type of surgery, you will probably have four 1–cm size scars and you will go home in one or two days.

But if your case is complicated or there is just no laparoscopy in the hospital, they will do classical appendectomy. Surgeon cuts 10–cm incision in the area of the appendix. Appendix is removed from the right lower abdomen or where it is. Area is checked for other problems. In the case of abscess the purulent stuff will be drained with rubber tubes through the skin. With that kind of surgery you will probably stay for four to seven days. Antibiotics will help to resolve the abscess.

This is why you sign the consent: "laparoscopic appendectomy, possible conversion to an open appendectomy".

The most common complication of appendectomy is wound infection. If it is severe, the surgeon will postpone incision closure for several days.

Ok, now you have those four small scars or one big scar, you go home and visit that party that you missed.

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One in seven Americans suffered it. Appendicitis. What is it? part1

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It's 10 pm. Severe pain in your belly. You are in ER. Previous day you had a nice party with your friends. Then pain started around your umbilicus (navel). You thought first: aha, probably you ate something bad, it will go away. But it doesn't. You have vomited once and lost appetite. Pain did not improve but worsened. After a day of suffering you decided to visit the hospital. Long taxi trip. Pain is shooting every time the car bumps into a pot. Nurses ask you bunch of questions and place in an available room. There is a confused 90 something years old women in the neighbor room. She mumbles something incomprehensibly. The woman has come from a nursing home. She suffers Alzheimer disease and yells every night for the past 7 years. She has history of multiple medical

problems. They brought her in the ER after she developed fever. Nurses draw your blood. Your pain is getting gradually worse. Change your position, pull your legs. Pain doesn't go away. When the ... doctor comes? At last ER physician sees you. He writes H+P and ER orders. A stretcher is rolled in. They take you to a radiology department and put into a big machine looking like a gate. Everybody leaves you and the machine drives you into the big metal doughnut. They bring you back into the ER.

Surgical intern comes. He did not rest since 5 AM. He asks bunch of the same questions again and pokes your belly. A tired resident comes. He pokes your belly again. You still wait, become bored, complain on delay, call your relatives. It's already 2 AM. At last the resident discuss your symptoms with attending over the phone. He tells you that you have appendicitis and CT scan confirmed it. History and physicals are written. Admission orders are written. Pre-op orders are written. Antibiotics are prescribed. IV fluid is running 80 ml an hour. You sign consent for operation. Transporting guys take you upstairs – depending on severity of your symptoms – straight to or to the floor. Attending will operate you first thing in the morning.

Classically appendicitis starts as a pain that began in the periumbilical region (around navel – you belly pot). Then pain moves to the right lower quadrant of the abdomen. Nausea and vomiting often present after the onset of the pain. Classically, patient has low grade fever (this means around 37–38 C or 101–102 F), positive psoas sign (you stretch your leg and this movement increases your pain), positive Rovsing sign (Doctor pokes in your left lower quadrant of the abdomen, and you feel the pain in your right lower quadrant), Leukocytosis. Leukocytes are the white blood cells – WBC. Usually there are around 4000–9000 white cells per micro liter of your blood. When you have inflammation in your body the count goes up.

Your pain during appendicitis classically localizes in Mc Burney's point. That is one third between your umbilicus and anterior superior iliac spine (this is the bony point that is sticking most prominently from your pelvis – you can palpate it yourself on the side of your belly). For confirmation a doctor also may try to elicit obturator sign – he will ask you to bend your knee and bring your heel to your groin – this manoeuvre increases the pain during appendicitis. Similar test is the raising of the leg while you lie on the stretcher. That movement also increases your pain.

Appendicitis is the inflammation of appendix supposedly due to narrowing of this lumen. That

narrowing may be caused by hyperplasia of appendix (means too big growth, overgrowth of the tissue) . That variant happens in children mostly. Another variant – is fecalith (small stony fecal material) that impacts into the appendix lumen. That is seen in young adults mostly.

Appendix itself is a small part of gut . It is pencil–size sticking out gut. Gut is a continuous tube. Mouth is entry. Anus is exit. Appendix sticks out from the wall and ends blindly. It has only one entrance. Appendix is attached to the Caecum (part of gut – literally means blind colon in Latin). Appendix of ruminating animals (animals that chew grass, like cow) is very long and big. Appendix in humans is reduced to the pencil–size. However it doesn't disappear. There is a theory that appendix plays role in immune response. The walls of appendix are actually filled with lymphatic tissue containing lymphocytes (those are subtype of White Blood Cells). Lymphatics is responsible for immunity.

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The removal of appendix doesn't really change immunity significantly. Nonetheless, it is not something redundant. Unless it is inflamed there is no good reason to remove it .

Now, acute appendicitis is the acute inflammation of appendix. Suffix "-itis" means inflammation in Latin. Appendicitis is also the most common cause of acute abdomen. Acute abdomen in surgery is a condition in abdomen that requires urgent actions, usually surgical.

To diagnose appendicitis you need to have right lower quadrant pain.

The pain should be present together with either appropriate history (all those classical signs and lack of appetite) or Leukocytosis (increase in white blood cells in the blood).

Patients often ask questions: Can I avoid surgery? Can you treat me with antibiotics alone? You told me that it is possible to treat the appendicitis with antibiotics alone. Please, I do not want surgery, my mother (father, brother, fiancée) said that I can avoid surgery.

The answer is: you can try to avoid it probably, but the odds of death are much higher if you treat appendicitis without surgery. Untreated appendicitis may lead to perforation in less than a day. Sun rises. Sun sets. Appendix bursts. So, the prompt surgical intervention is the main solution. On occasion, the surgeon may even find a normal-appearing appendix and no other problem explaining the symptoms. He may remove the appendix anyway because it is better to remove a normal-appearing appendix than to miss mild case of appendicitis.

To cool down the infection before surgery doctors use antibiotics. Antibiotics may convert acute appendicitis into more chronic type. However the removal of the appendix is the choice.

With modern technology it becomes much easier to distinguish appendicitis and other causes of pain in right lower quadrant. Yet there is no 100% proof diagnostics. Sometime doctors treat with antibiotics alone, when they are not sure. Though, modern CT-scan shows appendicitis almost close to 100%.

What would happen if you miss the appendicitis and appendix bursts? You will get one of the most dreaded surgical complication – peritonitis. Again, "-itis" equals inflammation. Peritoneum means the peritoneal cavity.

It is difficult to describe the shape of the peritoneal cavity . That shape is very complex. Simple explanation: peritoneal cavity is like a closed bag. It is completely closed in males

Female have small holes in the peritoneum. Oocytes (future babies) go from ovaries first to peritoneal cavity. The holes in the peritoneum allow oocyte to go into Fallopian tubes. Fallopian tubes lead into the uterus (womb in English or hyster in Latin or uterus in Greek). Organs that are covered by peritoneal cavity linings are named intra-peritoneal. There are also melo-peritoneal, extra-peritoneal or retro-peritoneal organs that covered partially or not covered at all. It looks like the main function of peritoneum (peritoneal cavity) is to give some lubrication to your guts. Though there are other functions as well.

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Now, take a plastic bag, pour a little bit of water or oil into it and seal. Put one hand on one side of the bag, another hand – on another side of the bag and rub against each other. You can see your hands slide easily. This is the idea of peritoneum – you bowels slide easily against each other even when they are stretched by food and when they are pushing the digested food down. When a bowel is punctured (perforated), the content of the bowel will go into the peritoneal cavity. Colon (lower, bigger bowl) has the fecal material. Fecal material consists of bacteria on 2/3 (yeah, there are so many of them). Now, that small puncture in one part of the gut will cause spillage of the bacteria all around that closed bag of peritoneum.

Guts on inside have several mechanisms protecting from bacteria. Peritoneal cavity doesn't have such a protection.

Small puncture in one part of gut will cause all of you guts be inflamed on outside non-protected side (for the gut it is outside, but for the peritoneal cavity it is the inside). This is the peritonitis (diffuse). This what the surgeons are afraid of. Look at you. You belly is like half of you body. So it is like half of you body is severely inflamed. Eventually it may lead to sepsis, a condition in which bacteria enter the blood and infect other parts of the body. This is life-threatening complication.

Sometime inflammation stays local and seals off forming an abscess. Abscess is the walled off accumulation of pus. Pus is the mixture of dead and alive bacteria, dead white blood cells (leukocytes; leukos = white, cyte = cell) that fought the infection and honorably died, and dead tissue, that was digested partially by bacteria and partially by the stuff from leukocytes. Inflamed peritoneum (the lining of the peritoneal cavity is also named peritoneum) easily adhere to each other and may seal of the infection – there will be local peritonitis. Any adherence may cause problems in the future – guts do not slide easily anymore and food or stool sticks. Blockage of the intestine may occur in acute appendicitis as well. This is partially responsible for the nausea and vomiting. Sometimes, when antibiotics are used, appendicitis goes away without surgical treatment. It happens in elderly patients. The patients may come to the hospital with a lump or a mass in the right lower abdomen looking like tumor.

Diagnostic problem with appendicitis is that some other conditions may mimic it.

Abdominal cavity is packed with different organs. Other sources could cause pain in right lower quadrant. Females may have ovarian torsion or tuboovarian abscess or extrauterine pregnancy (this is why doctors persistently ask: when was your last menstrual period? Are you taking contraceptive hormones? Did you have vaginal bleeding?), etc. They also check your chorionic hormone, trying to find if you are pregnant.

Scrupulous doctor asks your permission to perform rectal exam. Many people refuses to do it. I can understand that. Who would like that somebody sticks fingers into his ass. I wouldn't. But the rectal exam gives a lot of information. Rectum – is the part of gut that is closest to the back orifice. Back orifice is named anus in Latin or anal canal. Surgeons say that there are only two contra-indications for

avoiding rectal exam: 1. patient does not have anus 2. Surgeon does not have fingers.

Rectal exam in appendicitis is usually unremarkable. Maybe you can cause pain by palpating the side

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wall of the rectum that is close to the appendix. But the rectal exam allows to distinguish other disorders. During the rectal exam you may palpate hemorrhoids, uterus, nodules in prostate or enlarged prostate, you may feel fluid in lower part of peritoneal cavity, etc. You may see blood on the finger telling you about internal bleeding. You may check the stool for small amount of blood (named fecal occult blood test – FOBT – or Guaiac test by the name of the dye that turns blue in the presence of blood. At last rectal exam may help in dis–impaction of rectum. That is when hard stool causes bowel obstruction.

Usually a rectal exam is more or less normal. But every surgeon will tell you a war story about how once in while, once in five years he found something significant on rectal exam, something that every other doctor missed. Just by putting the finger into the butt. I saw how a surgeon put a finger into an old, demented women and pulled out a pessarium. It was an apple–size pink plastic membrane , that should go into vagina, but somebody (at home?) put it (by mistake?) into the rectum of that woman. You really need to push hard to get such big object into the anus. The poor lady suffered bowel obstruction for a week and would probably die if it stayed long enough.

OK, lets return to appendicitis. So, doctors will check you White Blood Cell Count Any infection or inflammation may cause this count to be abnormally high. It is not specific for appendicitis, but it confirms other findings.

Next, doctors check Urinalysis – microscopic examination of the urine. That detects red blood cells, white blood cells and bacteria in the urine. When there is inflammation or stones in the kidneys or bladder, the urinalysis is abnormal. A normal urinalysis is more characteristic to appendicitis.

Next they try to image what is going on in your belly. An abdominal x–ray may detect the fecalith as the cause of appendicitis (5%). Free air due to perforation can might be seen on the plain film.

A barium enema may be used. It is an x–ray test where liquid contrast is used from the anus to fill the colon. Sometimes it show an impression on the colon in the area of inflamed appendix. Barium enema also can exclude other intestinal problems that mimic appendicitis.

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