

Appendicitis

National Digestive Diseases Information Clearinghouse



U.S. Department
of Health and
Human Services

NATIONAL
INSTITUTES
OF HEALTH

NIDDK
NATIONAL INSTITUTE OF
DIABETES AND DIGESTIVE
AND KIDNEY DISEASES

What is appendicitis?

Appendicitis is a painful swelling and infection of the appendix.

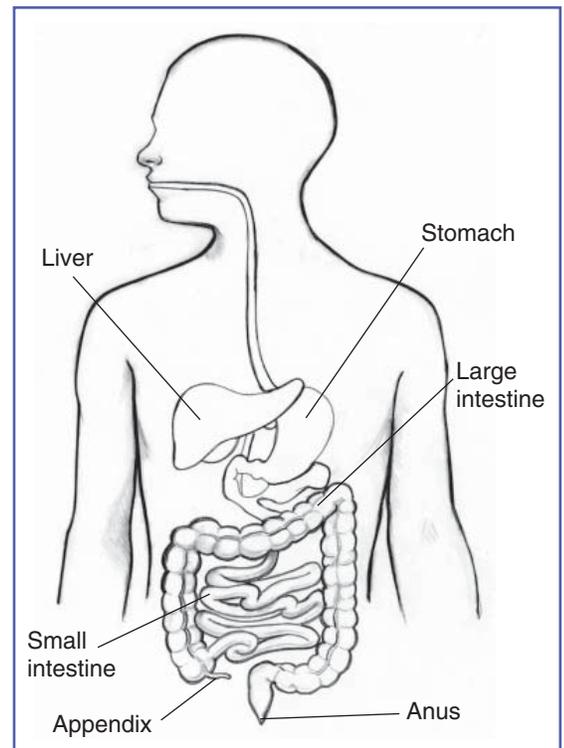
What is the appendix?

The appendix is a fingerlike pouch attached to the large intestine and located in the lower right area of the abdomen. Scientists are not sure what the appendix does, if anything, but removing it does not appear to affect a person's health. The inside of the appendix is called the appendiceal lumen. Mucus created by the appendix travels through the appendiceal lumen and empties into the large intestine.

What causes appendicitis?

Obstruction of the appendiceal lumen causes appendicitis. Mucus backs up in the appendiceal lumen, causing bacteria that normally live inside the appendix to multiply. As a result, the appendix swells and becomes infected. Sources of obstruction include

- feces, parasites, or growths that clog the appendiceal lumen
- enlarged lymph tissue in the wall of the appendix, caused by infection in the gastrointestinal tract or elsewhere in the body
- inflammatory bowel disease, including Crohn's disease and ulcerative colitis
- trauma to the abdomen



The appendix is a fingerlike pouch attached to the large intestine in the lower right area of the abdomen.

An inflamed appendix will likely burst if not removed. Bursting spreads infection throughout the abdomen—a potentially dangerous condition called peritonitis.

Who gets appendicitis?

Anyone can get appendicitis, but it is more common among people 10 to 30 years old. Appendicitis leads to more emergency abdominal surgeries than any other cause.

What are the symptoms of appendicitis?

Most people with appendicitis have classic symptoms that a doctor can easily identify. The main symptom of appendicitis is abdominal pain.

The abdominal pain usually

- occurs suddenly, often causing a person to wake up at night
- occurs before other symptoms
- begins near the belly button and then moves lower and to the right
- is new and unlike any pain felt before
- gets worse in a matter of hours
- gets worse when moving around, taking deep breaths, coughing, or sneezing

Other symptoms of appendicitis may include

- loss of appetite
- nausea
- vomiting
- constipation or diarrhea
- inability to pass gas
- a low-grade fever that follows other symptoms
- abdominal swelling
- the feeling that passing stool will relieve discomfort

Symptoms vary and can mimic other sources of abdominal pain, including

- intestinal obstruction
- inflammatory bowel disease

- pelvic inflammatory disease and other gynecological disorders
- intestinal adhesions
- constipation

How is appendicitis diagnosed?

A doctor or other health care provider can diagnose most cases of appendicitis by taking a person's medical history and performing a physical examination. If a person shows classic symptoms, a doctor may suggest surgery right away to remove the appendix before it bursts. Doctors may use laboratory and imaging tests to confirm appendicitis if a person does not have classic symptoms. Tests may also help diagnose appendicitis in people who cannot adequately describe their symptoms, such as children or the mentally impaired.

Medical History

The doctor will ask specific questions about symptoms and health history. Answers to these questions will help rule out other conditions. The doctor will want to know when the pain began and its exact location and severity. Knowing when other symptoms appeared relative to the pain is also helpful. The doctor will ask questions about other medical conditions, previous illnesses and surgeries, and use of medications, alcohol, or illegal drugs.

Physical Examination

Details about the abdominal pain are key to diagnosing appendicitis. The doctor will assess pain by touching or applying pressure to specific areas of the abdomen.

Responses that may indicate appendicitis include

- **Guarding.** Guarding occurs when a person subconsciously tenses the abdominal muscles during an examination. Voluntary guarding occurs the moment the doctor's hand touches the abdomen. Involuntary guarding occurs before the doctor actually makes contact.
- **Rebound tenderness.** A doctor tests for rebound tenderness by applying hand pressure to a patient's abdomen and then letting go. Pain felt upon the release of the pressure indicates rebound tenderness. A person may also experience rebound tenderness as pain when the abdomen is jarred—for example, when a person bumps into something or goes over a bump in a car.
- **Rovsing's sign.** A doctor tests for Rovsing's sign by applying hand pressure to the lower left side of the abdomen. Pain felt on the lower right side of the abdomen upon the release of pressure on the left side indicates the presence of Rovsing's sign.
- **Psoas sign.** The right psoas muscle runs over the pelvis near the appendix. Flexing this muscle will cause abdominal pain if the appendix is inflamed. A doctor can check for the psoas sign by applying resistance to the right knee as the patient tries to lift the right thigh while lying down.
- **Obturator sign.** The right obturator muscle also runs near the appendix. A doctor tests for the obturator sign by asking the patient to lie down with the right leg bent at the knee. Moving the bent knee left and right requires flexing the obturator muscle and will cause abdominal pain if the appendix is inflamed.

Women of childbearing age may be asked to undergo a pelvic exam to rule out gynecological conditions, which sometimes cause abdominal pain similar to appendicitis.

The doctor may also examine the rectum, which can be tender from appendicitis.

Laboratory Tests

Blood tests are used to check for signs of infection, such as a high white blood cell count. Blood tests may also show dehydration or fluid and electrolyte imbalances. Urinalysis is used to rule out a urinary tract infection. Doctors may also order a pregnancy test for women.

Imaging Tests

Computerized tomography (CT) scans, which create cross-sectional images of the body, can help diagnose appendicitis and other sources of abdominal pain. Ultrasound is sometimes used to look for signs of appendicitis, especially in people who are thin or young. An abdominal x ray is rarely helpful in diagnosing appendicitis but can be used to look for other sources of abdominal pain. Women of childbearing age should have a pregnancy test before undergoing x rays or CT scanning. Both use radiation and can be harmful to a developing fetus. Ultrasound does not use radiation and is not harmful to a fetus.

How is appendicitis treated?

Surgery

Typically, appendicitis is treated by removing the appendix. If appendicitis is suspected, a doctor will often suggest surgery without conducting extensive diagnostic testing. Prompt surgery decreases the likelihood the appendix will burst.

Surgery to remove the appendix is called appendectomy and can be done two ways. The older method, called laparotomy, removes the appendix through a single incision in the lower right area of the abdomen. The newer method, called laparoscopic surgery, uses several smaller incisions and special surgical tools fed through the incisions to remove the appendix. Laparoscopic surgery leads to fewer complications, such as hospital-related infections, and has a shorter recovery time.

Surgery occasionally reveals a normal appendix. In such cases, many surgeons will remove the healthy appendix to eliminate the future possibility of appendicitis. Occasionally, surgery reveals a different problem, which may also be corrected during surgery.

Sometimes an abscess forms around a burst appendix—called an appendiceal abscess. An abscess is a pus-filled mass that results from the body's attempt to keep an infection from spreading. An abscess may be addressed during surgery or, more commonly, drained before surgery. To drain an abscess, a tube is placed in the abscess through the abdominal wall. CT is used to help find the abscess. The drainage tube is left in place for about 2 weeks while antibiotics are given to treat infection. Six to 8 weeks later, when infection and inflammation are under control, surgery is performed to remove what remains of the burst appendix.

Nonsurgical Treatment

Nonsurgical treatment may be used if surgery is not available, if a person is not well enough to undergo surgery, or if the diagnosis is unclear. Some research suggests that appendicitis can get better without surgery. Nonsurgical treatment includes antibiotics to treat infection and a liquid or soft diet until the infection subsides. A soft diet is low in fiber and easily breaks down in the gastrointestinal tract.

Recovery

With adequate care, most people recover from appendicitis and do not need to make changes to diet, exercise, or lifestyle. Full recovery from surgery takes about 4 to 6 weeks. Limiting physical activity during this time allows tissues to heal.

What should people do if they think they have appendicitis?

Appendicitis is a medical emergency that requires immediate care. People who think they have appendicitis should see a doctor or go to the emergency room right away. Swift diagnosis and treatment reduce the chances the appendix will burst and improve recovery time.

Points to Remember

- Appendicitis is a painful swelling and infection of the appendix.
- The appendix is a fingerlike pouch attached to the large intestine and located in the lower right area of the abdomen.
- Symptoms of appendicitis may include abdominal pain, loss of appetite, nausea, vomiting, constipation or diarrhea, inability to pass gas, low-grade fever, and abdominal swelling.
- A doctor can diagnose most cases of appendicitis by taking a person's medical history and performing a physical examination. Sometimes laboratory and imaging tests are needed to confirm the diagnosis.
- Appendicitis is typically treated by removing the appendix.
- Appendicitis is a medical emergency that requires immediate care.

Hope through Research

The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) conducts and supports basic and clinical research into many digestive disorders.

Participants in clinical trials can play a more active role in their own health care, gain access to new research treatments before they are widely available, and help others by contributing to medical research. For information about current studies, visit www.ClinicalTrials.gov.

For More Information

American Academy of Family Physicians
P.O. Box 11210
Shawnee Mission, KS 66207-1210
Phone: 1-800-274-2237 or 913-906-6000
Email: fp@aafp.org
Internet: www.aafp.org

American College of Surgeons
633 North Saint Clair Street
Chicago, IL 60611-3211
Phone: 1-800-621-4111 or 312-202-5000
Fax: 312-202-5001
Email: postmaster@facs.org
Internet: www.facs.org

American Society of Colon and Rectal Surgeons
85 West Algonquin Road, Suite 550
Arlington Heights, IL 60005
Phone: 847-290-9184
Fax: 847-290-9203
Email: ascrs@fascrs.org
Internet: www.fascrs.org

You may also find additional information about this topic by

- searching the NIDDK Reference Collection at www.catalog.niddk.nih.gov/resources
- visiting MedlinePlus at www.medlineplus.gov

This publication may contain information about medications. When prepared, this publication included the most current information available. For updates or for questions about any medications, contact the U.S. Food and Drug Administration toll-free at 1-888-INFO-FDA (463-6332) or visit www.fda.gov. Consult your doctor for more information.

National Digestive Diseases Information Clearinghouse

2 Information Way
Bethesda, MD 20892-3570
Phone: 1-800-891-5389
TTY: 1-866-569-1162
Fax: 703-738-4929
Email: nddic@info.niddk.nih.gov
Internet: www.digestive.niddk.nih.gov

The National Digestive Diseases Information Clearinghouse (NDDIC) is a service of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). The NIDDK is part of the National Institutes of Health of the U.S. Department of Health and Human Services. Established in 1980, the Clearinghouse provides information about digestive diseases to people with digestive disorders and to their families, health care professionals, and the public. The NDDIC answers inquiries, develops and distributes publications, and works closely with professional and patient organizations and Government agencies to coordinate resources about digestive diseases.

Publications produced by the Clearinghouse are carefully reviewed by both NIDDK scientists and outside experts. This publication was reviewed by Jason A. Brodsky, M.D., Shady Grove Adventist Hospital, Rockville, MD.

This publication is not copyrighted. The Clearinghouse encourages users of this fact sheet to duplicate and distribute as many copies as desired.

This fact sheet is also available at
www.digestive.niddk.nih.gov.



U.S. DEPARTMENT OF HEALTH
AND HUMAN SERVICES
National Institutes of Health

NIH Publication No. 09-4547
November 2008