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# Introductory Chapter: Doubts, Problems, and Certainties about Acute Appendicitis

*Angelo Guttadauro*

## 1. Introduction

Acute appendicitis (AA) is one of the most common abdominal surgical emergencies, studied and treated for hundreds of years. Although the progress of medicine, in particular radiology, has allowed a safer diagnosis, its treatment is still under discussion.

AA disease can affect people of all ages with a prevalence in subjects between 10 and 20 years. Its incidence rate is reduced with increasing age. There is a predominance of cases in the male sex, although the female sex receives appendectomy in more cases. The estimated lifetime risk of AA is between 7 and 9%.

The precise etiology of appendicitis is not yet fully understood. Probably an obstruction of the lumen due to coprolites, foreign bodies, lymphoid hyperplasia, or tumors leads to a subsequent blood stasis, necrosis, and perforation of the organ. Symptomatology does not always occur in a similar manner, but in most cases the patient refers center-abdominal pain migrating to the right iliac fossa, usually accompanied by fever, nausea, vomiting, anorexia, and/or diarrhea and, in the most advanced cases, signs of peritoneal irritation. The symptomatology in the elderly patient is more nuanced and difficult, and often the aid of radiodiagnostics is needed to diagnose AA.

### 1.1 Diagnosis

Due to the differences in symptoms dependent on age, sex, and comorbidities, it is not possible to follow a flowchart for the diagnosis but it is necessary to adopt an individualized approach. There are useful scores for diagnosis and treatment that consider the age of the patient.

In most cases, in a young patient, already with a history and objective examination, it is possible to diagnose an acute appendicitis with a good probability. In support of a differential diagnosis with other diseases, there are no specific laboratory tests. WBC count, PCR, and VES increase during appendicitis, but they are universal signs of any type of inflammation. More help is provided by radiodiagnostic tests. Ultrasound and a CT scan allow safe diagnosis in severe or blurred cases as in advanced age.

Current guidelines recommend the use of the abdominal ultrasound as the first diagnostic test. Advantages include low cost, easy accessibility, and the absence of ionizing radiation, generally contraindicated in younger women and in pregnancy. The main limits of this method are a lower sensitivity and specificity compared to CT, which are also related to the operator's experience. In cases where the ultrasound is not straight and the patient cannot be subjected to CT, MRI is a valid

alternative. It has excellent sensitivity and specificity but is little used because of the costs, duration, motion artifact, and poor accessibility. Whichever method is used, the most suggestive radiological characteristics of AA are the thickening of the walls, a noncompressible lumen with a diameter of more than 6 mm, the presence of coprolites, the heterogeneity of the peri-appendicular fat, and the presence of free fluid in the abdomen and/or lymphadenopathy.

## **1.2 Treatment**

Regarding treatment, although until a few years ago the most practiced surgery was open appendicectomy, today's guidelines recommend the use of a laparoscopic approach, where, of course, the surgeon has practical skills. This method is now recognized as safe and executable on patients of all ages and also in complicated cases. Recent meta-analyses have shown that, despite a longer duration of surgery and a higher surgical cost, the laparoscopic surgery is associated with a lower postoperative pain, less length of hospital stay, faster resumption of daily activities, better esthetic result, and lower rate of surgical wound infections. In the past, some studies had found a higher rate of postoperative intra-abdominal abscess associated with the laparoscopic technique, but recent work has shown that this complication occurs equally.

There are two other surgical techniques available: the laparoscopic appendicectomy through single incision and the NOTES (Natural Orifice Transumbilical/gastric/vaginal Endoscopic Surgery) approach. The approach by single incision showed no clear advantages due to the long learning curve and due to the difficult accessibility of the equipment, despite some evidence in the literature of lower post-operative pain and shorter hospitalization.

The NOTES approach, which uses a natural orifice (oral or vaginal) as miniminvasive access in the abdomen, although there is some positive feedback such as the reduction of the postoperative pain, surgical wound infections, hernias and abdominal adhesions, is performed only in very specialized centers due to the long learning curve and the high cost of the intervention.

Regarding the stages of surgery, there are many points that are debated.

The current guidelines, based on the latest studies and meta-analysis, no longer consider it useful to irrigate the peritoneum in cases of complicated AA compared to aspiration alone.

There are no substantial differences in terms of clinical outcomes, length of stay, and rate of complications depending on the technique used for the dissection of the mesenteriol.

The use of an endostapler for the closure of the appendicular stump is not advantageous compared to the endoloops, even in complicated cases. There are also no real advantages of the introflexion of the appendicular stump after its section.

There is no concrete evidence of benefits related to the use of intra-abdominal drainage even in complicated cases. In fact, the use of the drainage is related to a longer duration of the surgical time and of the hospital stay as well as a higher rate of wound infections.

An important aspect is the use of a nonsurgical treatment in selected cases. In fact, not all AAs progress toward perforation, and a resolution can commonly occur with an appropriate medical therapy. Although appendicectomy must remain in my opinion the first-line therapy in acute and/or complicated forms, in some patients, it can be considered a reasonable first approach with only antibiotic therapy and support.

Conservative treatment with antibiotic therapy can be considered, for example, when clinical conditions are not serious, laboratory tests are not extremely altered,

there are doubts about the diagnosis, the patient has severe comorbidities, or the patient refuses the intervention.

Numerous studies have shown the applicability and safety of this approach in selected patients with uncomplicated forms of AA although in these patients, there could be a recurrence rate of up to 38%. Some recent works have shown that some forms of uncomplicated AA can be treated with the support therapy only (rehydrating, analgesics, antipyretic) and without the use of antibiotics, reducing the duration and costs of the hospital stay.

The administration of a broad-spectrum antibiotic therapy has shown benefit before surgery. Postoperative administration is now recommended only for complicated forms. The duration of the treatment must be evaluated depending on clinical and laboratory data, but in general a treatment period of 3–5 days is considered appropriate.

There are also two categories in which a personalized approach is needed: in elderly patients (>65 years old) and in pregnant women. In elderly patients, the incidence of AA is much lower than in younger people, but the mortality rate reaches up to 8%, compared to 0–1% of the rest of the population. For this reason, it is necessary to pay particular attention when there is a suspect of AA in these subjects; in particular, clinical examination and blood tests should be completed with a radiological test. Also, in these cases, it is necessary to consider the surgery as a first-line treatment, paying particular attention to the clinical history of the patient and assessing a precise balance of risks–benefits.

Regarding pregnant women, the main recommendations concern diagnostic imaging, which involves only those methods that do not use ionizing radiation. The surgical option remains the best choice for this category as well. Until recently, it was believed that laparoscopy is related to a higher risk of fetal death and premature childbirth, but more recent studies have shown that these complications occur in equal measure both with the open approach and with the laparoscopic one. For that reason, the laparoscopic approach also remains the gold standard in pregnancy.

## Author details

Angelo Guttadauro

Department of Medicine and Surgery, University of Milano-Bicocca, Italy

\*Address all correspondence to: [angelo.guttadauro@unimib.it](mailto:angelo.guttadauro@unimib.it)

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