Acute appendicitis is the most frequent inflammatory disease in the abdominal cavity, the frequency of which ranges from 1 to 1.5 cases per 1000 people. Usually, the disease concerns adults and children, to a lesser extent old people. Appendectomy is the most frequent abdominal operation. Diagnosis of acute appendicitis is based on clinical grounds: history and physical examination; biochem and imaging tests prove to be of lesser importance. As to date no conclusive diagnostic test for acute appendicitis has been introduced, clinical acumen and experience of the surgeon are still of definitive importance in the decision-making process. Although in most cases a clinical image of acute appendicitis is unambiguous, in terms of an indefinite percentage of people it raises doubts and poses diagnostic difficulties, and a final decision is made with a lesser or bigger probability, but not with a 100% certainty. Acute appendicitis is not the only, and even not the most frequent cause of pain in the right iliac fossa, which is usually associated with this disease. Other frequent chronic illness manifested in pain in the place includes: right-sided ureteral colic, inflammation of urinary ducts, gynecologic diseases: inflammation of appendages, ovarian cysts, extrauterine tubal pregnancy, crack of Graaf follicle, inflammation of lymph nodes of the mesentery of the small intestine, or Leśniowski-Crohn’s disease. The above causes are often taken into consideration in terms of differentiating acute appendicitis.

For reasons mentioned above and for the fact that there is not a 100% accurate diagnostic test, which might confirm or exclude illness, a percentage of misdiagnosed cases of acute appendicitis is estimated to be 20-30% in different books (1, 2). It means some delay in diagnosing the patient, who went to the doctor and was sent back home (a false-negative diagnosis) or cutting out a healthy appendix (a false-positive diagnosis). Both situations are improper and may result in dangerous consequences for the patient, the first diagnosis to a much bigger degree than the second one. As a consequence surgeons adopt a traditional attitude by choosing operations when having diagnostic doubts.

Such a philosophy is justified by calculating potential dangers, including perforation of the changed appendix and peritonitis, or an occurrence of periappendicular infiltration is connected with more serious consequences than just cutting out a healthy appendix in the case of an inaccurate diagnosis. As in every situation, when the choice of a lesser evil is a subjective decision of a doctor, and also in terms of a great number of patients sent to the surgical ward due to pain in the right iliac fossa – taking this into account one can expect a relatively high percentage of unnecessary appendectomies. It results from lesser or more justified care in order not to cause health danger (or even life danger) of the patient, and also it is thought that unnecessary appendectomy is not a mistake and does not lead to negative consequences.

As care about not omitting acute appendicitis is justifiable, failure to see the consequences of unnecessary laparotomy is considered to
be totally unacceptable. First of all, the consequences include intraperitoneal concretions: mechanic obstruction of the alimentary tract and disturbances to fertility among women caused by tubal obliteration of the ostium of the right uterine tube, which adjoins the appendix. Hernia in postoperative scar poses another essential complication. That is why, it is important to adopt a rational approach to diagnosing acute appendicitis and carefully qualify patients with an unclear clinical image for operation as well as using maximum diagnostic possibilities with a view to making the diagnosis more accurate. There are modern imaging tests, e.g. ultrasound and computed tomography, and also observation of patients, very often even after 24 hours imaging tests make the diagnosis more probable (3, 4).

By the 1970s observation in the case of suspicion of acute appendicitis had been considered to be an improper procedure, because it increases a risk of perforating the appendix. Such symptoms among children can be justified on account of the frequent fast progress of inflammation of the appendix, whereas among adults without any unambiguous symptoms such symptoms do not have rational grounds. Results of several papers in which 1-day observation was made among people with suspected acute appendicitis, but with ambiguous clinical imaging indicated a decrease in the number of unnecessary appendectomies, with a similar percentage of perforated appendixes and during hospitalization (5, 6). It was observed that a risk of perforating the inflammatorily changed appendix is nearly exclusively dependent on duration of the disease before hospitalization, and is not influenced by a 1-day observation. The frequency of perforations of the appendix is also changeable depending on ages of patients, it is bigger among infants and small children (about 50%), is considerably less among older children and adults (about 10%) and is bigger at old age (about 30-50%) (2). In an age bracket in which there is the biggest incidence of the disease the probability of perforating the appendix is the least. Making the diagnosis of acute appendicitis more probable, detection of another cause of the disease, regression of symptoms and discharging the patient from hospital without unnecessary operation — are unquestionable benefits as a result of postponing the decision to carry out an operation and make a 1-day operation, without any rational dangers. It should be stressed at this point that diagnostic doubts in the case of perforated appendixes are very seldom and refer to comparatively no more than about 5% of cases (2).

It is worth mentioning the question of evolution of the inflammatorily changed appendix. It is thought that perforation and limited, or split peritonitis is the final stage of the above evolution. However, defensive mechanisms of the peritoneum among most healthy adults are efficient enough to limit the inflammatory process and not to lead to spillover of the infected substance to the peritoneal cavity. The gluing of the changed appendix with a grid and intestines efficiently limits a danger of inflicting the peritoneum, just as humoral and cellular defensive mechanisms started by the immune system. Symptoms connected with the perforation of the appendix and the resulting life-threatening peritonitis concern only a number of patients, mainly children and old-age people among whom such a scenario is more probable.

A rational and reasonable attitude to suspected acute appendicitis with ambiguous clinical imaging should be a rule because there is a chance of having a proper diagnosis, or — in the case of lack of diagnosis — of excluding acute appendicitis. Not always is it possible to specify the cause of pain in the right hypogastrium among patients among whom the pain finally receded. To describe such a situation the name "acute, untypical abdominal pain" was introduced (2, 7). The surgeon is not free from looking for the causes of the pain, however in most cases the cause of pain is difficult or impossible to find even by using cutting-edge imaging techniques. It is debatable if — in the cases of the regression of pain — such all-embracing and cost-absorbing tests are fully justifiable. Acute appendicitis is another issue, which — according to traditional observations made by surgeons — as it starts it proceeds progressively through successive phases until gangrene and perforation. Epidemiological and imaging (ultrasound and computed tomography) research results among patients among whom pain receded during the observation are indicative of the spontaneous regression of the early inflammatory state of the appendix, which is quite frequent can provide an explanation for such a clinical course of the disease (8). Histopathological research of the cut appendixes, which the surgeon assessed as being unchanged, is indicative
of in about 30% the characteristics of inflammation limited to the mucous membrane, and such a state is called catarrhal inflammation and treated as being the first stage of the disease. Some pathologists regard the stage as reversible, i.e. it can recede spontaneously, or under treatment (8).

What remains undecided is whether the assessment of the state of the appendix is more accurate and more factual. Own observations made by of the authors indicate a frequent discrepancy between the assessment of the stage of the inflammatory state of the cut appendix and histopathological test result: usually the latter indicates at least one degree bigger inflammatory state. It is also to be decided whether initial stage of appendicitis, visible only in the histopathological test can lead to clinical symptoms sufficient enough to cause some pain to the patient, and for the doctor to suspect acute appendicitis. First of all, it refers to compression pain in the right iliac fossa, which is a fundamental symptom of the disease. One should bear in mind the fact that typical pain starts from pain in the epigastrium and midgastrium, shifting after a few or more than ten hours into the right iliac fossa. Such doubts are certain not to be dispersed soon, but it is good to realize different aspects of the disease which most surgeons encounter almost every day.

All the arguments mentioned above justify adopting a careful attitude to the decision about operating on patients with pain in the right epigastrium, but with an ambiguous clinical image which does not provide a sufficient basis for diagnosing acute appendicitis with high probability. Proofs resulting from a careful observation of such people indicate that among about 1/3 of the symptoms recede spontaneously or after a typical symptomatic treatment and do not require laparotomy (1). Opponents of such an attitude indicate that observation of patients diagnosed with "true" acute appendicitis, but with an unclear clinical image, increase a risk of perforation, which is true. However, the benefit of avoiding many unnecessary laparotomies at least balances a risk of a more-than-ten-hour delay in carrying out an operation. Besides, cutting-edge imaging techniques such as ultrasound or computed tomography, enable to make the diagnosis more probable. Such a model of procedure makes it possible to lower a percentage of unnecessary operations by some percent, which – in comparison to 20-30% of cases of patients diagnosed with suspected acute appendicitis and operated on immediately – seems to be much improvement.

Rationalization of clinical imaging of acute appendicitis

A considerable percentage of false-positive diagnoses of acute appendicitis associated with many unnecessary laparotomies made clinicians deeply analyze respective symptoms of the disease and their importance for the proper diagnosis of the disease. Thus, the most characteristic constellation for "true" acute appendicitis is the shift of pain from the epigastrum and midgastrium into the right iliac fossa, compression sensitivity and increased pressure of abdominal walls in the area. Whereas a lack of a shift of pain, occurrence of similar symptoms in the past, vomiting preceded by an occurrence of abdominal pain and compression pain outside the right iliac fossa – decrease a probability of the disease. Very often such symptoms as a lack of appetite, vomiting and a positive Blumberg's symptom turned out not to be predicatively valuable for acute appendicitis (2, 7). By way of comparison, Fenyo and his colleagues taking into consideration clinical symptoms and the number of leukocytes in the group of 1,167 patients with suspected acute appendicitis stated that a change in localization of pain occurred among 68% of patients diagnosed with acute appendicitis and among 30% of patients the disease was finally excluded, an escalation of pain occurred among 75% and 55%, a positive Blumberg's symptom occurred among 79% and 45%, an increased tension of abdominal walls occurred among 40% and 14% and an escalation of pain while coughing occurred among 84% and 56% (8). As observed, the above symptoms occurred in statistic terms most frequently (test chi², p<0.0001) among patients diagnosed with acute appendicitis, however the symptoms were present also among a sizeable number of people among whom the disease was finally excluded. The research papers show that in order to properly diagnose the disease the constellation of symptoms and a specific sequence of their occurrence prove to be essential. However, one should emphasize the fact that individual clinical experience of the surgeon sometimes enables to make deci-
sions about diagnosing or excluding acute appendicitis, on the basis of a discreet clinical sign, which is colloquially called “having a nose for that”. In modern medicine it may not be an appropriate diagnostic tool, but it sometimes proves to be helpful in terms of acute appendicitis.

In terms of the diagnostic process in order to consider as much clinical and laboratory information as possible, algorithms were established for acute appendicitis (9). In the 1980s and 1990s such scales appeared as to facilitate making a rational decision by less experienced a doctor, by expressing in semi-quantitative terms characteristic data from a review, test and results of biochem tests. The sum total of scores given for respective elements of such a scale made the diagnosis more or less probable and enabled in this way to make a decision about operation, observation or sending the patient back home.

The 1986 Alvorado’s scale is one of the most frequently cited ones (10). It consists of 8 elements: a change of the localization of abdominal pain, loss of appetite, nausea and vomiting, tenderness in the right iliac fossa, rebound tenderness, increased temperature (<37.3°C and >37.3°C), leukocytes rate (<10 G/l and >10 G/l) and a shift to the left of a smear of white blood cells (neutrophiles). The scale is categorical: present symptom is assigned 1 point, absent 0 points (except of tenderness in the right iliac fosse and leukocytes rate >10 G/l, both assigned 2 points), a range is from 0 to 10, and the interpretation of the result is as follows: 0-4 exclusion of acute appendicitis, 5-6 observation, 7-10 indication for operation (10).

Fenyo and colleagues elaborated a scale consisting of 10 parameters: sex of the patient, the number of leukocytes, duration of abdominal pain, escalation of pain, change of localization of abdominal pain, vomits, increase of pain while coughing, presence of rebound tenderness, rigidity of abdominal wall and tenderness outside the right iliac fossa. Each of the elements of the above-mentioned scale was scored in a different range (from -15 to 15), and a total score indicated the degree of probability of the diagnosis of acute appendicitis: -2 points, or more were an indication for operation, from 3 to -16 points were suggestive of observation and a repetitive examination, and less than -17 points – meant sending the patient back home as a result of not detecting acute appendicitis.

Reliability of the scale was tested in a group of 1,167 patients sent to two Swedish hospitals due to being diagnosed with suspected acute appendicitis. Whether the patient was observed, or sent back home was finally decided on by an experienced surgeon on the basis of available clinical data. Among 475 (41%) of patients were initially diagnosed with acute appendicitis and the patients were operated on immediately or shortly after observation, and 692 people (59%) were sent back home after a medical examination or observation. 475 patients were operated on due to suspected acute appendicitis, among 392 (82%) the diagnosis was confirmed intraoperatively and/or in a later histopathological test, and among 83 patients (18%) the diagnosis proved wrong. The wrong diagnosis of acute appendicitis was confirmed among 11% of the men and among 25% of the women operated on for acute appendicitis. The authors do not provide a percentage of perforated appendixes in the group. In terms of the patients with the wrong diagnosis, most often – among 33 people (40%) no pathological change was detected in the abdominal cavity during the operation, among 28 (34%) the inflammation of lymph nodes of the mesentery of the small intestine was confirmed, among 6 (7%) ovarian cyst was detected, and in the rest other, single pathologies were observed. Among patients with real acute appendicitis, 72% of them had a score in the scale suggestive of an operation, 10% of them had a score suggestive of observation, and 18% of them had a score suggestive of being sent back home. The authors think that their scale of the assessment of symptoms serves as a helpful tool for optimizing the decision-making process as to qualification of patients with symptoms suggestive of acute appendicitis, especially for less experienced surgeons. A relatively high percentage of patients with a false-negative diagnosis (according to the scale) is however indicative of the fact that the point of the cutoff of the scale suggesting sending the patient back home (-17 points), was specified a little too low (8).

Value of scales in terms of diagnosing acute appendicitis was not unambiguously assessed. Apart from obvious benefits as to simplification of the diagnostic process attention is being paid to potential sources of errors, which include among other things the quality of data in the scale and a specific clinical image or period of the disease which can substantially change a
general score. Some elements of the clinical assessment, particularly the research, are dependent on a subjective assessment of the researcher, e.g. Blumberg’s symptom, increased tension of abdominal walls or sensitivity outside the area of the right iliac fossa. A proper interpretation of the test depends much on clinical experience and knowledge of the surgeon, and can be totally different than that of made by the non-surgeon, or a a trainee (2, 9, 11). Besides, accuracy and possibility of assessment of their own pain by the patient can differ, e.g. in terms of observing an escalation of pain, relocation of pain and its duration. The second factor refers to a specific clinical image or the duration of the disease. And at the advanced stage of acute appendicitis, the duration of pain can exceed 48 hours, and compression pain caused by the peritoneal exudate can refer to the area of the right iliac fossa. Both factors lower a general score in the scale, e.g. Fenyo’s or Alvorado’s ones, and for an experienced clinicist they are suggestive of the perforation of the appendix and the necessity of an immediate operation.

Another shortcoming of the algorithm is failure to consider the importance of subtle clinical information, which can prove to be decisive for an experienced clinicist. The information can include a patient’s reaction to an abdominal test, persistence of pain, a chronic bad mood, or the worsening general state of the patient. Only single elements of the scale constitute such symptoms, but their importance for a proper diagnosis can be much bigger than participation in the general score. Scales can be very helpful in diagnosing the disease, but none of them ensure bigger efficiency in providing diagnoses other than an exhaustive clinical assessment made by an experienced surgeon. Scales are helpful for entry-level surgeons, thus enabling them to systematize important clinical information and preventing its omission. They are a sort of a “diagnostic charade”, in which on one side data is written for making a diagnosis, and on another side there is data against it, and a final result depends on a simple calculation. For experienced clinicists the data is of lesser importance because the process acquisition and analysis of information takes place automatically, at the same time there is some selection, evaluation and confrontation of information with earlier experience. It – in most cases – enables to make a proper decision without recourse to using the scale.

Some authors recommend a careful interpretation of a score among children under 5 and old-age people over 70. The course of the disease in such age brackets can be less typical than in terms of young and middle-aged people. In terms of children acute appendicitis can proceed much faster and can lead to perforation even during 24 hours. In terms of old age people symptoms more slowly, and the decreased reactivity to intra-abdominal inflammatory state and the presence of other troublesome diseases leads to patients with acute appendicitis at the advanced stage, often with perforation, or peritonitis (2). In both situations depending on the decision based on a scale score result can result in a diagnostic error or postponing an immediately necessary intervention. So again experience of a clinicist in making rational decisions of decisive importance.

Biochemical tests in the diagnosis of acute appendicitis

An increase of the number of leukocytes in simple blood cell count is considered to be a classic indicator of inflammation, which serves as an argument for making a diagnosis of acute appendicitis in patients with the right iliac fossa. The range of norm of the leukocytes rate in simple blood cell count amounts to 4-10 G/l, with a method error equaling about 1 G/l. So values 11-12 G/l are not unambiguously diagnostic, and level >14 G/l is indicative of almost certain occurrence of inflammation (2, 8). Obviously, an increase of the number of leukocytes speaks volumes about there being an inflammatory state, and not necessarily about the inflammation of the appendix, that is why it should be seen as an argument for the “the appendix” in the cases when there are other clinical indications for making a diagnosis of the disease. Sensitivity and specificity of the test is limited and does not exceed 70-80%, and most experienced surgeons know that it is not decisive for diagnosing acute appendicitis. Many surgeons encountered cases where the level of leukocytes was at its normal among patients diagnosed with the phlegmonous or perforated appendix, and also they encountered opposite situations. It is difficult to explain such discordances. It is however a cheap, simple and
commonly available lab test, which perfectly complements a clinical evaluation.

Another biochem test, more and more done in terms of suspected inflammatory states of the abdominal cavity is the level of C-reactive protein, CRP. Just as the number of leukocytes, an increase in CRP above 5 is only indicative of the presence of the inflammatory state without specifying its localization. In one of the tests diagnostic value of level CRP was compared to a clinical assessment made by the surgeon on the basis of a review and a test. Among 108 of the people a clinical diagnosis of acute appendicitis was made and a laparotomy was done. Among 90 of the people (83%) a diagnosis was confirmed, and among 18 of the people (17%) the appendix turned out to be healthy. Among 87 of the patients (97%) with a "true" acute appendicitis, the level of CRP was essentially higher, and among 3 of the people (3%) it was within norm (a false-negative result). CRP was in norm among 16 out of 18 people (89%), whose appendix turned out to be healthy, and among 2 (11%) CRP was considerably higher (a false-positive result) (12). The test of the level of CRP is nowadays often done in the diagnostics of different diseases of inflammatory characteristics, including the abdominal cavity and a suspected acute appendicitis. It is difficult to assess whether it provides more information for the clinician than the number of leukocytes does. Personal experience of the first author of the research paper does not rather indicate it.

In one of his research papers a test was done several times of the number of leukocytes and the level of CRP among patients with a suspected acute appendicitis. It was stated that among patients with a final "true" acute appendicitis diagnosed intraoperatively – during 24-hour observation the number of leukocytes tended to lower, whereas the level of CRP tended to increase (13). So the value of the test of the level of CRP can prove significant in unclear cases subject to a clinical observation with a view to specifying a diagnosis.

Ultrasound in the diagnosis of acute appendicitis

Ultrasonography as an noninvasive test and less troublesome for the patient is recommended by many authors and enthusiasts of this method, as an essential help in diagnosing acute appendicitis. Its real usefulness has not been unambiguously stated, although there are many cases which confirm the benefits resulting from the test. The article cited below serves as a good example. Chen and his colleagues did an ultrasound test USG on 191 patients who re-entered or were sent to hospital due to pain in the right iliac fossa and other symptoms indicative of acute appendicitis. The test was done by surgeons experienced enough both in clinical and sonographic diagnosis of the disease. Among 92 of the patients a review and a clinical image indicated unambiguously acute appendicitis, and among 99 of the patients symptoms did not allow excluding the disease. Among 158 of the patients (83%) an ultrasound revealed an image which was interpreted as indicating appendicitis: extension of the lumen more than 7 mm, the changelessness of the width in compression, lack of sonographic continuity of the mucous membrane, presence of faecalith in the lumen and presence of the tank of liquid around the appendix. Among 18 (9%) of the patients the disease other than acute appendicitis was detected, not requiring an operation, and among 15 (8%) of the patients a sonographic image was right. All the patients with a positive ultrasound result were operated on (n=158), confirming acute appendicitis among 143 of the patients (90%), among 14 (9%) of the patients the unchanged appendix was detected, and one person the perforated small intestine was observed. Among 8 out of 14 of the patients with the unchanged appendix, in its lumen faecalith was found. In terms of 33 of the patients, diagnosed in ultrasound with pathology other than acute appendicitis, or a normal image of the right iliac fossa, only in one person further observation revealed acute appendicitis and the person was operated on. Calculated diagnostic parameters of the method are as follows: sensitivity 99%, specificity 68%, and accuracy 92%, (the authors do not regard such numbers as having been obtained in a clear way). Chen and his colleagues underline the fact that among 32 of the patients (17%) an ultrasound was conducive to avoiding an unnecessary operation, which speaks volumes about much importance of this test (14).

In one of the Polish research papers the benefits from an ultrasound scan were assessed among patients with suspected acute appendicitis classified, according to Alvorado’s scale, into the group of an ambiguous clinical image (scale score 4-6). The authors stated that a
clinical test complimented by an ultrasound scan increases a percentage of proper diagnoses from 63% to 86%, which constituted a statistically significant difference (15).

Experience of clinicists and radiologists doing ultrasound scans in terms of diagnosing acute appendicitis indicates the validity of its interpretation:

1) unchanged appendix, visible in an ultrasound scan, is nearly always healthy,
2) visualization of the appendix considerably improves specificity and negative predictive value of the medical examination,
3) extension of transversal size of the appendix >7 mm and/or the presence of faecalith in the lumen are not sufficient arguments for diagnosing its inflammation,
4) result of a sonographic test done by the surgeon is more decisive than that of obtained by the radiologist, as the surgeon bears in mind a total clinical image, and not only a sonographic image.

Factors decreasing the accuracy of sonographic diagnosis include flatulence and obesity of the patient, although the use of more advanced heads and imaging programs enables to avoid the obstacles and obtain an accurate image of the appendix and other structures of the right iliac fossa. Additional imaging of the appendix and its mesentery in Doppler technology provide information about their congestion, which is characteristic of acuteness and can prove to be helpful in making a diagnosis (14, 16).

Orr and his colleagues made a meta-analysis of articles published in the years 1986-1994 stating that an average sensitivity of ultrasound in the diagnosis of acute appendicitis amounts to 85%, specificity 92% and it is the most helpful in the case of an uncertain or probable clinical diagnosis of the disease. Where a clinical diagnosis is certain (both arguments for and against acute appendicitis), sonography does not provide any essential diagnostic information (16). Most authors underscore the fact that certainty and reliability as a result of testing by aid of this technique depends much on experience of testers and sonography is not a repetitive test and thus it is difficult for sonography to be objective (2, 16).

An evaluation of the appropriateness of ultrasound in the diagnosis of acute appendicitis depends much on answering the following questions: whether doing such a test has improved treatment results, i.e. has considerably decreased in statistic terms a percentage of unnecessary appendectomies, has shortened time of diagnosing the patients to be observed in hospital and has decreased a percentage of patients with appendix perforation? Wilcox and Traverso think that test results obtained so far do not enable to give a positive answer to any of the questions above (2). In individual research papers, above-cited results obtained by Chena and his colleagues are optimistic, but they are obtained in specific and favorable conditions. A review of research papers and own experience of the authors make it possible to give the following evaluation of the test when diagnosing the disease:

- the test proves advantageous for women at fertile age among whom the presence of causes of pain in the right iliac fossa other than acute appendicitis is highly probable,
- in the cases of ambiguous symptoms, which do not exclude the disease,
- in the cases of suspected inflammation of lymph nodes of the mesentery of the small intestine,
- among children and old people among whom the risk of perforation is bigger or the clinical course of the disease can be atypical and difficult to interpret.

The test should be done at the suggestion of the surgeon, who sees such a need, and not at the suggestion of a family doctor or the Hospital Emergency Ward which routinely sends patients to such a test, just as to biochem tests. Our experience indicates that in most cases a definitive diagnosis is possible on the basis of history, clinical imaging and lab research, without additional sonographic imaging. Ultrasound had better be done by the surgeon, who is experienced enough to be able to do such a test and interpret it in a proper way. It seems to be the best way to use this technique in an optimum manner when diagnosing acute appendicitis.

Computed tomography in the diagnosis of acute appendicitis

As compared to ultrasound, computed tomography is considered to be a more expensive and less available method, which exposes patients to X-rays and contrasting agents, but very efficient in diagnostic terms. The work done by Rao and his colleagues serves as a good ex-
ample. They did a spiral computed tomography by aid of an oral and rectal contrast among 100 patients diagnosed by non-surgeons with suspected acute appendicitis. Preparations of patients for a medical examination involved drinking 100-750 ml of water suspended solids of barium sulphate 30 minutes before the examination started (depending on individual capabilities) and administering 700-1000 ml of contrast (gastrografin) rectally by aid of a catheter shortly before the examination (17). The range of spiral computed tomography imaging was limited only to the right iliac fossa, and examination time amounted to about 15 minutes. The following features of tomography imaging were considered to be indicative of acute appendicitis:

- extension of transversal size of the appendix >6 mm,
- fatty infiltration of the mesoappendix,
- liquid with flatulence near the appendix and/or,
- presence of faecalith in its lumen.

The changed peak of the caecum and a symptom of an "arrowhead" were additional features indicative of acute appendicitis. The image whose light was totally filled with contrast and the thickness of the wall did not exceed 2 mm, or when its external diameter was <6 mm was indicative of a normal appendix. Among 59 patients computed tomography imaging was indicative of acute appendicitis, i.e. at least 3 radiological symptoms mentioned above were present. 56 patients were operated on from the group (95%) and in terms of all patients the diagnosis of acute appendicitis was confirmed intraoperatively and histopathologically (true positive results). 3 patients (5%) clinical imaging was not indicative of the disease and there were not operated on, and further clinical observation enabled to exclude the disease (false positive results). Among 41 patients computed tomography imaging was indicative of the acute inflammation of the appendix; from the group among 36 people clinical observation excluded the presence of acute appendicitis, and among 5 patients clinical symptoms were indicative of the disease and they were operated on and healthy appendixes were found in them (all true negative results). The obtained diagnostic parameters of the method were high: sensitivity 100%, specificity 95%, and accuracy 98% (17). In another test, spiral computed tomography with intravenous contrast, done among 107 patients diagnosed with clinically suspected acute appendicitis indicated 100% of true positive results and only among 3 patients results were false negative (18).

The results indicate that computed tomography with oral and rectal or intravenous contrast proves to be an efficient diagnostic tool that can be used in such a situation when a clinical image does not provide justification for making a decisive decision. It seems that avoidance of unnecessary laparotomy provides a sufficient argument for using this method. In the hospital where the first author of the paper works, at least 30-40 patients diagnosed with suspected acute appendicitis during the year, computed tomography is used about two or three times, in clinically doubtful situations, usually when the result of a monographic test proves to be ambiguous, or is not consistent with a clinical image. In most cases, computed tomography makes it possible to exclude the disease, which is confirmed in further outpatient monitoring. At the same time, about 8-10 people annually are subject to a 1- or 2-day hospital observation with a view to making the diagnosis more accurate. Such a diagnostic algorithm enabled to reduce unnecessary laparotomies to one case annually (2.5%), which seems to be an optimum result. The authors understand that in wards that do not have technical and logistic facilities, and in addition admitting over 100 cases of suspected acute appendicitis annually, such a model of procedure can be difficult to apply. Very often it is easier (and cheaper) to operate on the patient and immediately disperse doubts rather than deciding to make a troublesome diagnostics. Such action can be said to be the so-called "diagnosis of fight" (military term coming from the military doctrine of the former Warsaw Pact). It cannot be regarded as a mistake, however it is not consistent with a contemporary attitude to diagnostics of acute appendicitis, aimed at obtaining a possibly accurate result on the basis of all means available.

Despite much efficiency in providing diagnoses, computed tomography has not to date been popular enough to diagnose acute appendicitis, first of all on account of its still limited availability, work absorption in terms of preparations for tests and — what is natural — costs. However, the authors believe that computed tomography can prove to be helpful in diagnostically difficult
situations, and also in terms of patients whose operation can be a problem: obese, old-age patients and patients with numerous diseases, taking anticoagulants and others. Indications for computed tomography are selective, which has been justified in the paragraph.

Summing up our considerations about the diagnosis of acute appendicitis, we would like to draw attention to the importance of careful qualification of patients with pain in the right iliac fossa for operation. Diagnosis of the disease should be absolutely certain, which can be obtained by aid of short hospital observation and/or imaging tests that prove to be especially important in terms of diagnostic doubts, and also patients with relative contraindications for operation. Postponement of operation, use of ultrasound, and sometimes computed tomography can be conducive to making the diagnosis more probable and accurate, thus decreasing the percentage of unnecessary laparotomies and shortening the time of observation of patients in the ward. It seems that such an algorithm of diagnosis of acute appendicitis can be seen as being reasonable and consistent with contemporary standards. Simultaneously, the authors do not renounce the useful surgical principle that, in acute appendicitis, the decision of operation must be made in due time, avoiding unnecessary delay.

Each situation, in which the condition of the patient does not improve or gets worse, and diagnostics does not provide definitive and decisive information, should be an indication of immediate laparotomy. In the paper, we deliberately have not taken into consideration the so-called “diagnostic laparoscopy” as the decision to carry out a laparoscopy is based on similar assumptions as the decision about laparotomy in the case of suspected acute appendicitis. Thus, it is difficult to treat such an attitude as diagnostics, as the decision about operation has already been made and is not in any way different to (apart from operating theatre instruments) laparotomy in the case of unclear clinical imaging.

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Received: 8.03.2010 r.
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