

ACUTE ABDOMEN

So-called “acute abdomen” is a semeiotic - better yet syndromic - term that indicates the whole of signs and symptoms deriving from a serious abdominal disease, one which in any case involves the peritoneal cavity and its contents. It is important to bear in mind that we will be discussing **surgical acute abdomen**, for which surgical intervention may be indicated; we will then briefly touch on **non-surgical acute medical abdomen**, which are usually managed by a medical approach, and for which surgery may be not only useless, but also harmful.

Surgical Acute Abdomen

The term acute abdomen is generally adopted on a provisional basis. In fact, since the syndromic picture often has a rapid, aggravating evolution and an unfavorable natural history *quoad vitam*, There is normally not much time for an accurate diagnostic definition. This is often only approximate, and the greater the ability of the medical team is, the greater the approximation will be.

Patients with acute abdomen require emergency therapeutic measures, and, overall, the diagnosis must be accurate enough to allow determining whether:

- the Pt. needs to be operated on or not;
- the Pt. needs to be operated on immediately;
- the Pt. can wait for a postponed operation.

The main symptoms of acute abdomen are:

- pain;
- general, especially cardiovascular, signs;
- alterations of intestinal function;
- signs of peritoneal impairment.

Pain is generally violent: it is spontaneous (aching); distributed throughout the abdomen or localized; and may have radiating features. Pain is exacerbated or caused by palpation, even superficial (tenderness). Abdominal pain increases with movement of the patient, who therefore, assumes an immobile and as pain-relieving as possible position. This is a feature that distinguishes the condition from other types of abdominal pain, such as, for example, colic.

The general signs are:

- tachycardia;
- hypotension;
- fever, with an altered relationship between axillary and rectal temperature, even in the presence of hypothermia.
- leukocytosis.

The alterations of intestinal function usually entail reflex paralytic ileus, with all the pathophysiological consequences of adynamic occlusion: this leads to the closure of the bowel to gas and feces and to the absence of peristaltic sounds on auscultation of the abdomen. As we will see, there are - in particular cases - exceptions to this frequent and pathognomonic situation.

Pain, the above-mentioned general symptoms, and the ileum may already constitute signs of peritoneal impairment. This may include:

- peritonitis, with all its characteristic signs:
 - contraction of abdominal muscles,
 - tenderness to superficial palpation and/or touch,
 - pain on rectal examination,

or peritonism, for which tenderness is less superficial, but there may be analgesic contractions of the abdominal wall without contracture. In this case, the Blumberg sign, namely rebound tenderness, is

elicited.

Generally speaking, when the syndromic picture described above is complete (pain, collapse, peritonitis), the patient must undergo surgery immediately. Nevertheless, even if the emergency circumstances leave little time for action, it is still possible and necessary to look for diagnostic clues while performing the first therapeutic measures aimed primarily at correcting the patient's general status. It is all the more feasible and necessary when the syndrome is incomplete or in any case attenuated, and the patient can wait for delayed intervention.

The most frequent causes of acute abdomen are:

- appendicitis;
- acute cholecystitis, empyema due to lithiasis;
- acute mechanical bowel obstruction;
- perforation of viscera, e.g., duodenum, stomach, sigmoid colon, etc.;
- acute pancreatitis;
- intestinal infarction;
- hemoperitoneum (ectopic pregnancy - splenic rupture - etc.);
- torsion of ovarian cysts or uterine fibroids.

The differential diagnosis, usually difficult, essentially relies on traditional means, namely:

- the patient's past medical history, and previous significant events, such as the gallstones due to acute cholecystitis and pancreatitis, and characteristics of onset, e.g., the nature of pain, changes in bowel habits, etc.;
- physical examination;
- instrumental examinations, e.g., radiology, ultrasonography (US), Video-laparoscopy, etc., which are not always feasible, given the urgency of the situation.

Let us now look in detail at the pathological situations that may account for acute abdomen.

- Perforation is the most paradigmatic case. Free gas, usually from the stomach or duodenum, seeps into the peritoneal cavity and collects in the upper spaces, which, with the patient supine or half seated, include the space between the liver, the front wall and the diaphragm. This finding is detectable by x-ray of the abdomen or - better still - of the thorax. Thus, as for physical and radiological tests, in doubtful cases it may be useful to repeat the examination with the patient in the left lateral decubitus: the bubble of free air then moves against the right lateral chest wall, thereby more readily revealing itself.
In nearly one third of cases the bubble of free air is not initially demonstrable by radiography. This, however, usually appears, the examination is repeated shortly thereafter. It is not advisable, in our opinion, to perform radiological examination (as indicated by some Authors) in an emergency setting with gastrografin and subsequent retrieval of the contrast medium outside the viscera.
- Acute mechanical occlusion occurs when, in addition to interrupting canalization, alterations in the vasculature are present: typical examples are volvulus, invagination, and strangulation. In such cases, there is a rapid succession from mechanical ileus, and with this hyperperistaltism upstream of the obstacle, to adynamic ileus when vascular phenomena start.
- Volvulus. In the first phase, the abdomen, which is still tractable, presents swelling due to the affected loop. Volvulus very frequently involves the ileo-cecal loop and the sigmoid colon, and normally causes asymmetry of the abdomen. Contrast-free x-ray examination confirms the gaseous distension of the twisted loop.
In the second phase, signs of a paralytic ileum appear, as do radiological findings of air-fluid levels in the dilated loops upstream of the obstacle.
- Intussusception. It is generally quite easy to suspect intussusception, which is usually colocolic or

ileocolic: patients very early on experience hematochezia due to alterations of the invaginated loop. Under these conditions, barium enema can confirm the diagnosis with its characteristic appearance and, in some cases, can reduce the intussusception. However, since the diagnosis is easy, and because the use of barium has proved at times to be dangerous, this method has for the most part been abandoned. Most likely, the classic sausage-shaped mass caused by the intussusception, which in the early stages is easily palpable, can be studied, if necessary, using less invasive methods.

- Reduction en masse of a strangulated hernia, usually inguinal, is a particularly dangerous situation arising from acute mechanical obstruction. This occurs when the herniated loop is reduced back into the abdominal cavity together with the strangulating cord, which is, of course, the neck of the sac; vascular impairment of the loop is thereby maintained, with subsequent ischemia and necrosis of the loop itself. This situation is particularly serious as it often arises in elderly patients in whom the physician has reduced - apparently successfully - the hernia in a home care setting; surgery, however, is inauspiciously delayed.

The gallbladder may be responsible for acute abdomen when a stone, wedged in the neck or in the cystic duct, blocks it, creating first a hydrops and thereafter an empyema. In this case, the gallbladder will become very voluminous and, before abdominal contractions arise, it will be clearly palpable. While diagnosis at this stage is easy, when confirming acute abdomen difficulties may be present. In this case, radiography can reveal images of radiopaque stones and US, although disturbed by initial distension of the bowel loops, can highlight gallbladder involvement.

Quite similar to the above is the situation of torsion of ovarian cysts, but this depends on when the patient comes under observation. In the early stages only peritonism is present: the mass is palpable and fairly easy to diagnose. This is no longer the case if contracture of the wall has set in. Radiological examination, or better still US, may be helpful for a precise diagnosis.

In acute pancreatitis, there is often a certain discrepancy between the patient's general condition, greatly compromised by severe pain, and the relative lack of significance of abdominal findings. Often, the condition forces the physician to wait before deciding to perform emergency surgery, which in some instances is not even warranted. On the other hand, it is precisely for this reason that the diagnosis is accurate. Assuming all laboratory diagnostic findings are known, which, for that matter, are not conclusive, there exists for this disease a clear indication for radiological examinations and, if possible, US. Indeed crucial for diagnosis is the radiological evidence of:

- Calcifications in the pancreas;
- Gaseous distension of a loop of the small intestine or of the transverse colon (sentinel loop);
Pleural effusion on the left.
- Gallstones.

If not excessively disturbed by meteorism, US becomes evidently valuable for the definition of pancreatic morphology and for the presence of calcifications and gallstones.

Intestinal infarction can in many ways be confused with pancreatitis, with which it shares the discrepancy in the initial stages between abdominal symptoms and the severity of pain and general condition. In this disease, however, bloody diarrhea is frequent, as are fairly early signs of ileus.

In early stages radiology may in the differential diagnosis help to exclude signs related to pancreatitis. Still in the early stages, in which hyperperistaltism is frequent, direct x-ray examination of the abdomen can detect the disappearance of gas in the right colon, with dilatation of the left colon.

Evidence of gaseous emboli in the mesenteric veins or the portal vein, while not being constant and - in any case - a late finding, is pathognomonic of advanced infarction.

In case of acute abdomen of vascular origin, the problem of angiography must be borne in mind, inasmuch as the examination may prove difficult to perform in an emergency setting, both for logistic reasons and because it poses risks to this type of patient, who is often elderly and critically ill. There is no doubt, however, that angiography, especially in the early stages, can be extremely advantageous, since it

may allow earlier and less radical intervention, and because it may be - in more cases that are thought - curative. Many reports demonstrate that, in nearly 1/3 of cases, intestinal infarction may not be occlusive in nature, but caused by spasms of the splanchnic arterial bed. According to some authors, the selective perfusion of vasodilators during pre-infarction phases would yield valuable results. These possibilities are, however, difficult to achieve, since most patients present when infarction has already occurred, thereby making angiography meaningless, also and above all because at this point surgical intervention becomes urgent.

Hemoperitoneum may be caused by previous or post-traumatic events. The conditions most frequently observed are those due to ectopic pregnancy and from fissures of the spleen (usually enlarged spleens) resulting from even minor trauma. The diagnosis is based primarily on the condition of acute anemia, with or without hemorrhagic shock; radiological investigations are hardly ever needed, but can be performed if time is available. In these patients, abdominal and thoracic x-ray may reveal an elevated and/or immobile left hemidiaphragm when the blood reaches the hypochondrium. The presence of splenomegaly can be detected by palpation and/or US, when possible radiologically.

Other more dramatic situations are those due to ruptures of aneurysms; among these, the most frequent are those affecting the splenic or the hepatic artery, not to mention the aorta, particularly the abdominal aorta. In any event, these patients rarely reach the emergency room alive.

A disease that is beginning to assume a certain importance in this regard is hepatic hemangioma, which may undergo infarction and create acute syndromes that are predominantly painful when the capsule is only distended, but become hemorrhagic when this breaks, thus leading to hemoperitoneum. In such cases, the condition should be suspected only if it is known that the patient has hepatic hemangioma, which can evidently be studied well using US and tomographic methods.

I have left for last the most frequent cause of acute abdomen, appendicitis, because in most cases it involves young patients who present signs of the condition, which is usually interpreted correctly without the need for morphological examinations. The diagnosis is correct in most cases, but not always.

Precisely for this percentage of diagnostic errors, a quick and conclusive test would be useful. Normally, however, conventional clinical diagnostic approaches are employed, and I am not aware that morphological, radiological or ultrasonographic diagnostics are, except in particular cases, effective.

The following are the disorders known to simulate acute appendicitis:

- acute cholecystitis;
- mesenteric lymphadenitis;
- acute ileocecal Crohn's disease;
- Meckel's diverticulitis;
- acute pelvic inflammatory disease;
- cecal "rimbalzo" (rebound) stenosis of the left colon;
- pyeloureteral lithiasis.

Only in the first, cholecystitis, and in the last two of these can a morphological diagnosis be formulated, albeit of guidance.

We have already discussed the first disorder. In cecal "rimbalzo", because it is in reality an intestinal obstruction due to a double obstacle - on the left and on the continent ileocecal valve - the diagnosis is possible if information, directly or referable to the onset of the condition, namely pain and hyperperistaltism. Even when the mechanism of cecal distention has begun, it is still possible to observe x-ray images of the distension with levels from the cecum to obstacle to the left, usually at the splenic flexure. It is obvious that this is no longer possible when the regressive events of the cecal wall and of the appendix begin, or worse yet, if perforation occurs.

The last disease, urolithiasis, may be included in the differential diagnosis when it is accompanied by a severe paralytic ileus. The diagnosis may in some cases be difficult, because conclusive morphological

investigations are often unfeasible.

Seeing that we began the chapter on the causes of acute abdomen with acute appendicitis, let's now turn our attention to situations of the disorder presenting atypical symptoms and cases of false acute abdomen. In the elderly, in children and in debilitated subjects, acute abdomen may present oligosymptomatically or in any case abnormally, thereby increasing its risk due to diagnostic difficulties.

Let me give an example, which is also the most frequent event: still acute appendicitis. The signs of acute abdomen are incomplete or attenuated, when purulent material is already present in the peritoneum. These are cases that require more than others the experience on the part of the practitioner, and in which all available resources must be exploited.

Abdominal x-ray in such cases often reveals elements which, when added to others, lead to the decision to intervene surgically: normally, these radiological signs for acute appendicitis consist of gaseous expansion in the cecum and the last ileal loop or, in more severe cases, also in ileal loops further upstream.

Non-surgical causes of acute abdomen

As mentioned in the introduction above, we will now briefly review non-surgical acute abdomen. This syndrome, far from being rare, should always be managed medically, inasmuch as rash surgical intervention would be a mistake since it is useless and often dangerous.

The causes of this pathological condition are extremely varied, and this contributes to the difficulties found in formulating a correct diagnosis. Indeed, the extreme variety of causative events makes classification difficult. Nevertheless, among many reports in the Italian literature, the most comprehensive and compelling seems to be that in C. Colombo et al. (1) cited here.

- Endoabdominal causes: intestinal infections; acute hepatitis; biliary colic; urological diseases (renal colic, acute pyelonephritis, acute cystitis); mesenteric lymphadenitis; infectious mononucleosis; malaria; vasculitis; thrombocytopenic purpura; Henoch-Schönlein purpura; polysierositis (Familial Mediterranean Fever); gynecological diseases.
- Thoracic causes: cardiac (heart attack, acute pericarditis); pulmonary (basilar pneumonia, pulmonary embolism); dissecting aortic aneurysm; thoracic trauma.
- Metabolic causes: uremia; diabetic renal failure (diabetic ketoacidosis); electrolyte imbalance; Addisonian crisis.
- Nervous causes: tabes dorsalis; abdominal herpes zoster; radiculitis; vertebral-medullary tumors or trauma; insect bite venoms, including (in Italy) that of the important and relatively common *malmignatta* spider, a.k.a. the Mediterranean black widow.

The above are the situations that most frequently predispose to an unnecessary laparotomy, also because they represent rare, little-known conditions that more often than not cannot be confirmed in the time frame available if acute abdomen is suspected.

It thus becomes clear how difficult a correct diagnostic workup can be. This may take advantage of the patient's medical history and, of course, a thorough physical examination not only of the abdomen, but also of other areas, according to the indications listed above.

It is obvious that the physical examination of the abdomen must be particularly accurate. Indications that may prove useful in the diagnostic interpretation of symptoms are, for example: the absence of abdominal guarding, of peristaltic silence, and of obstipation, all signs characteristic of a peritonitic disorder; or, as another example, intense meteorism with hyperperistalsis, which certainly rule out peritoneal impairment, but instead are suggestive of some form of intestinal obstruction or subobstruction.

The value of hematological, radiological and ultrasonographic examinations in these conditions is evident. Often, however, aggressive video-endoscopy, which, beyond allowing the direct vision and clarification of the underlying cause, has a strong likelihood of resolving the problem surgically, as long as it resides within the abdomen.

At this point I believe that we can conclude. I hope this overview emphasizes how the acute abdomen still constitutes a difficult and dangerous situation, particularly for the surgeon, who often in his stressful decision-making process hopes that the radiologist will better understand what is hidden in an acute abdomen. And I believe that an improved awareness will be possible, thanks to the advent of increasingly refined methods of morphological investigation and, as mentioned above, of video-endoscopic techniques.

Thus, acute abdomen will become a bit less the "tomb of the surgeon", as the ancients called it, and hopefully even less so that of the patient.

Lecture consigliate

- 1 - C. Colombo, A.E. Paletto, G. Maggi, E. Masenti, N. Massaioli
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- 2 - D. F. D'Amico
Chirurgia Generale - Fisiopatologia Clinica e Terapia - Piccin 2006
- 3 - S. Stipa
Manuale di chirurgia - Ed. Monduzzi 2007