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*acute pancreatitis, pancreonecrosis, pancreas, Atlant classification*

# MODERN METHODS OF DIAGNOSIS AND TREATMENT OF ACUTE PANCREATITIS. LITERATURE REVIEW

**Ibekenov O.T.[1,2], Berkinbay A.B.[1], Mamyr E.Zh.[3], Aitzhanov D.Y.[3], Abdilla M.B.[3], Mukhambet A.K.[3], Sauranbay D.A.[1], Yesimkhan D.M.[1], Zhienbekova G.S.[1], Myrzakhmet B.B.[1], Uays M.K[1]**

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***Abstract***

***Purpose.*** *Differentiation of modern methods of diagnosis and treatment of acute pancreatitis in clinical practice.*

*A literature review of foreign randomized clinical trials and meta-analysis, international clinical recommendations of the PubMed electronic database for the period from 2002 to 2022 was conducted. 28 relevant articles on the topic of the review were selected from them.*

***Conclusions.*** *Thus, using one method or one scale, it is impossible to predict the severity of acute pancreatitis in the first hospitalization hours. This days the treatment of acute pancreatitis is based on the latest international recommendations developed by the International Association of Pancreatology (IAP) and the American Pancreatic Association (APA). According to this guide, we believe that acute pancreatitis needs to be diagnosed and treated, also there is a need a number of randomized large-scale surgical trials of acute pancreatitis which have to be conducted.*

## Жедел панкератиттің диагностикасы мен емінің заманауи әдістері. Әдебиет шолуы

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***Түйінді сөздер:***
*жедел панкреатит, панкреонекроз, ұйқы безі, Атлант классификациясы*

***Тұжырым***

***Мақсаты.*** *Клиникалық тәжірбиеде жедел панкератиттің диагностикасы мен емінің заманауи әдістерін саралау.*

*2002-2022 жылдар аралығындағы PubMed электрондық дерекқорының шетелдік рандомизацияланған клиникалық зерттеулері мен мета-талдауларына, халықаралық клиникалық ұсыныстарына әдебиет шолуы жүргізілді. Олардың ішінен шолу тақырыбына арналған 28 өзекті мақала таңдалды.*

***Қорытынды.*** *Осылайша, бір әдісті немесе бір шкаланы қолдана отырып, ауруханаға түскен алғашқы сағаттарда жедел панкреатиттің ауырлығын болжау мүмкін емес. Бүгінгі күнге дейін жедел панкреатитті емдеу Халықаралық панкреатология қауымдастығы (IAP) және Американдық ұйқы безі қауымдастығы (APA) әзірлеген соңғы халықаралық нұсқауларға негізделген. Осы нұсқаулықтың*

*негізінде жедел панкреатитті диагностикалау, ем жүргізу қажет және әлі де жедел панкреатиттің хирургиялық емінде бірқатар рандомизацияланған ауқымды зерттеулер керек деп есептейміз.*

## Современные методы диагностики и лечения острого панкреатита. Обзор литературы

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***Конфликт интересов:*** *Авторы заявляют об отсутствии конфликта интересов*

***Ключевые слова:*** *острый панкреатит, панкреонекроз, поджелудочная железа, классификация Атлант*

***Аннотация***

***Цель исследования*** *- дифференциация современных методов диагностики и лечения острого панкреатита в клинической практике.*

*Был проведен литературный обзор зарубежных рандомизированных клинических исследований и метаанализа, международных клинических рекомендаций электронной базы данных PubMed за период с 2002 по 2022 год. Из них отобраны 12 актуальных статей, посвященных теме обзора.*

***Заключение.*** *Таким образом, с помощью одного метода или одной шкалы невозможно предсказать тяжесть острого панкреатита в первые часы госпитализации. На сегодняшний день Лечение острого панкреатита основано на последних международных рекомендациях, разработанных международной ассоциацией панкреатологии (IAP) и Американской ассоциацией поджелудочной железы (APA). На основании этого руководства мы считаем, что необходимо диагностировать острый панкреатит, провести лечение и еще предстоит провести ряд рандомизированных крупномасштабных исследований хирургического лечения острого панкреатита.*

**Relevance**

Acute pancreatitis is a polyethiological is demarcation type acute aseptic inflammation of the pancreas based on pancreatic necrobiosis and enzyme autoaggression, necrosis and dystrophy of the gland with the addition of a secondary purulent infection. About 20-30% of patients suffer from a severe form of acute pancreatitis, and the mortality rate in the hospital is 15% [4]. Among the causes of high mortality, one of the most important places is occupied by late diagnosis of destructive forms and various complications of the disease, an insufficient choice of conservative and surgical tactics. The solution to these problems can be achieved by examining the patient, collecting a detailed anamnesis and the ability to make the correct diagnosis of the disease by providing first aid and sending the patient to a surgical hospital. Most of the generally accepted methods of treatment are aimed at eliminating the complications of the disease, among which are such common methods of treatment as organ failure and infection. Here we will consider in practice the modern therapy of acute pancreatitis, emphasize the importance of diagnostics in determining the etiology and identifying complications that have a sharp impact on the body and during control.

About 140 causes of acute pancreatitis are known. Of these, the most basic features are shown in table 1 below [5].

| Etiological factors | Explanation |
|---|---|
| I. Disorders of the biliary tract | 1. Gallstone diseases |
| II. Toxic condition | 1. Alcohol |

**Table 1.**
The most common causes of acute pancreatitis [4]

The most widely used classification system for acute pancreatitis is based on international consensus Atlanta classification, which is considered and revised in 2012. [4]. Based on this classification, it was achieved to characterize the standardized clinical and X-ray nomenclature of acute pancreatitis and associated complications, based on the scientific advances achieved over the past two decades. Thus, the use of the terms"acute pseudocyst"and "pancreatic abscess" is currently not recommended. Instead, the four classification types are determined based on the presence of pancreonecrosis and the time elapsed since the onset of pancreatitis [4].

According to the Atlantic classification (2012),

at least two of the following three symptoms are required to diagnose acute pancreatitis: abdominal pain (constant, severe pain in the epigastric region, transmission to the back, with a very acute onset); serum lipase (amylase) values must be at least 3 times higher than the normal upper limit; detection of the characteristic symptoms of acute pancreatitis in contrast-enhanced CT or, more rarely, magnetic resonance imaging (MRI) or transabdominal ultrasound.

In the Atlantic classification, the following morphological types of acute pancreatitis are distinguished:

- interstitial edema pancreatitis
- necrotic pancreatitis, which in turn is divided into several types: parenchymal necrosis of the pancreas, peripancreatic necrosis, parenchymal pancreatic necrosis (the most common) combined with peripancreatic necrosis.

According to the 2014 classification proposed by V.S. Savelyeva, there are three main forms of acute pancreatitis [5]:

I. Edematous pancreatitis;

II. Sterile pancreatic necrosis: - by prevalence: limited and spreading;

- depending on the type of lesion: fatty, hemorrhagic, combined.

III. Infected pancreatic necrosis

To determine the severity of the process, it is necessary to take into account the presence of local and general complications (Table 3). Local complications: peripancreatic accumulation of septic phlegmon; pancreatic pseudocyst; acute pancreatitis and limited necrosis; fibrosic-purulent peritonitis (local inflammation); gastric evacuation disorders, thrombosis of the spleen and portal veins and necrosis of the large intestine; formation of internal and external pancreatic, gastric and intestinal Eels; arrosive bleeding.

Common complications are transient (can be detected within 48 hours) or chronic. To determine polyorgan insufficiency, three organ systems must be evaluated: respiratory, cardiovascular and renal. For this purpose, a modified Marshall scale [4] is used (Table 2). If there are 2 or more points on this scale-it means that there is organ failure.

**Table 2.**
Modified Marshall assessment system to assess organ dysfunction [4]

| Organ system | Score | | | | |
|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 |
| Respiratory ($PaO_2/FIO_2$) | >400 | 301-400 | 201-300 | 101-200 | <=101 |
| Renal (serum creatinine, mg/dL) | <1.4 | 1.4-1.8 | 1.9-3.6 | 3.6-4.9 | >4.9 |
| Cardiovascular (systolic blood pressure, mmHg) | >90 | <90 | <90 | <90 | <90 |

By clinical picture and severity:

Acute mild pancreatitis has a rapid positive effect with the effect of infusion therapy, usually within 3-7 days. There is no need for resuscitation measures and surgical treatment. Frequency-80-85%. Morphologically, interstitial edema corresponds to pancreatitis, microscopic necrosis of the parenchyma is rare detected (Table 3).

Acute pancreatitis of moderate severity is characterized by transient polyorgan dysfunction, which can be stopped within 48 hours with appropriate infusion therapy. Morphologically, there is a necrosis of peripancreatic tissues of different distribution and location.

Severe acute pancreatitis is accompanied by persistent or progressive polyorgan dysfunction, which is not stopped by infusion therapy for more than 48 hours. Morphologically, necrosis of the pancreatic parenchyma and the appearance of other local complications of acute pancreatitis. Severe pancreatitis occurs in about 15-20% of patients [4].

**Table 3.**
The main complications of acute pancreatitis (Banks P.A. Classification of acute pancreatitis—2012 y. [4]

| Local complications of acute pancreatitis | Non-pancreatic manifestations and systemic complications |
|---|---|
| 1. Accumulation of acute fluid in the abdominal cavity<br>2. Acute pancreatitis - sterile infective<br>3. Acute peripancreonecrosis - sterile/infective<br>4. Acute extrapancreonecrosis - sterile/infective<br>5. Pancreatic pseudocyst - sterile/infested | 1. Cholecystolithiasis<br>2. Choledocholithiasis<br>3. Expansion of the bile ducts outside the liver<br>4. Thrombosis of the portal vein<br>5. Varicose veins of the esophageal and gastric veins<br>6. Arterialpseudoaneurysm<br>7. Hydrotorax<br>8. Ascites<br>9. Spread of inflammation to the stomach, duodenum,colon, kidneys<br>10. Necrosis of the colon wall |

Balthazar E.J. and other authors proposed [6] a complex CT severity index (CT Severily Index-CTSI) to assess the severity of pancreatic parenchymal necrosis (score from 0 to 6) and extraglandular inflammatory process (Grade A — E, Score 0-4) (Figure 1, 2). Determines the clinical severity, complications and mortality rate through a CT range of 0 to 10 (Table 4). Patients with CTSI from 0 to 1 do not have mortality and complications, while patients with index 2 have 4% of cases of complications, and with index 7-10, 17% of deaths occur and 92% of cases develop complications [6].

| | |
|---|---|
| *Degree A.* Normal type of pancreas-0 points (Figure 1)<br>*Degree B*. Increase in pancreatic Volume - 1 point<br>*Degree C.* Signs of inflammation in the area of the pancreatic parenchyma-2 points<br>*Degree D.* Enlargement of the pancreas and the presence of fluid in the anterior paranephral pace-3 points<br>*Degree E.* Fluid retention in at least 2 areas-4 points | *According to the indicators of the prevalence of necrosis:*<br>Damage to <30% of the pancreatic parenchyma — 2 points<br>Damage to the parenchyma of the pancreas in the range of 30-50% - 4 points<br>Damage to the parenchyma of the pancreas >more than 50% - 6 points |

**Table 4.**
Balthazar E.J. the main criteria for the severity of acute pancreatitis on the scale in CT [6]

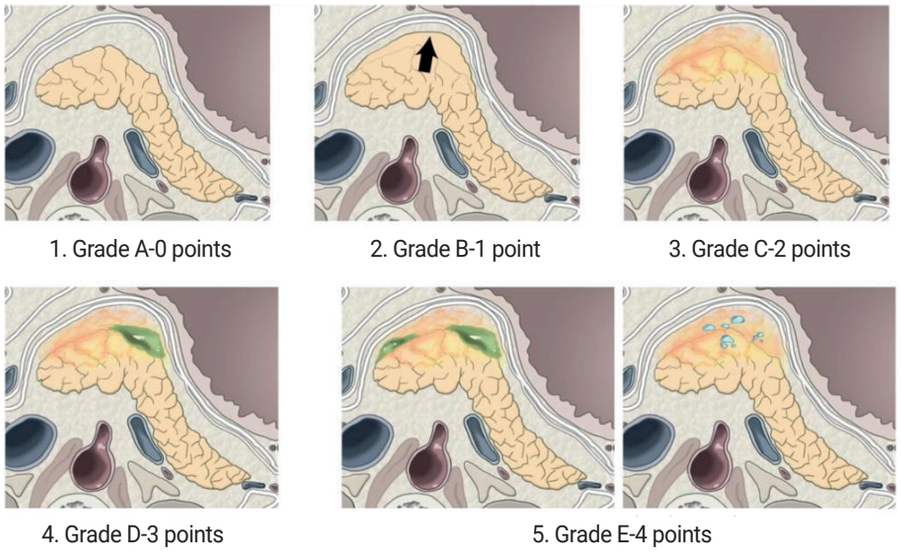


**Figure 1.**
Balthazar E.J. assessment of acute pancreatitis on the scale [6]

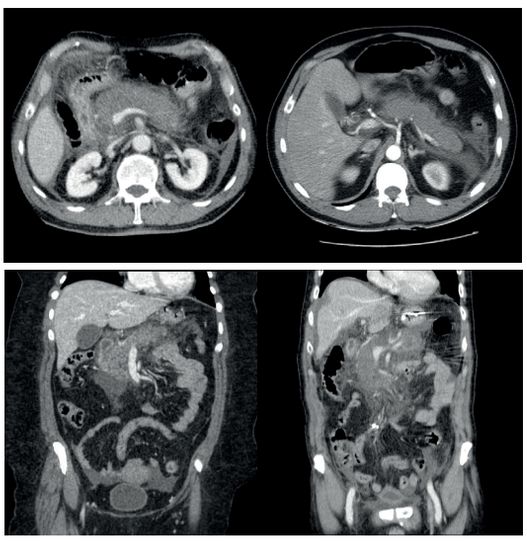

**Figure 2.**
Patient A., 60 years old, as a result, due to the development of acute pancreatitis in the pancreas, which coincides with tomographic signs of necrosis of Grade E on the Balthazar scale

There are various clinical and scoring acute pancreatitis severity determination systems have been developed, such as Ranson, BISAP, APACHE II, etc. for assess the severity of the disease and identify the patients who requiring intensive care or aggressive treatment [7, 8].

The most common for an objective assessment of the severity of patients with acute pancreatitis is the Ranson scale (Table 5), proposed in 1974 [7]. It includes 11 criteria that are evaluated during the patient's admission and within the first 48 hours after the onset of the disease.

| At the reception | After 48 hours |
|---|---|
| 1. Age >55 years<br>2. Leukocytosis >16,000/ml<br>3. Glucose level >11.1 mmol/l<br>4. LDG >350 ED/l<br>5. AST >250 ED l | 1. HT reduction >10%<br>2. Urea level rise >1.8 mmol/l<br>3. Plasma calcium level <2 mmol/l<br>4. $PaO_2$ <60 mm Hg<br>5. BE > 4 mmol/l<br>6. Estimated sequester of liquid >6 L |

**Table 5.**
Prognostic criteria for acute pancreatitis on the Ranson scale [7]

The presence of each sign is estimated at 1 point, the absence – at 0 points. The prognostic value of the Ranson scale is as follows: with a score of 2 or less, the mortality rate is less than 1% (mild severity of pancreatitis), from 3 to 5 points-the mortality rate is up to 15% (moderate severity of pancreatitis), from 6 to 8 points - the mortality rate is up to 40% and from 9 or higher – the mortality rate is up to 100% (6 or more points-severe pancreatitis).

In 2008 Wu B.U. et al. proposed a new predictive assessment system for early determination of the severity of acute pancreatitis, which they called BISAP (Bedside Seex of Severity in Acute Pancreatitis-an indicator of the severity index of acute pancreatitis) [8]. If one of the listed criteria is present, one point is awarded. Based on the studies carried out, it can be concluded that using the BISAP scale (Table 6, 7), even before the onset of complications on the first day of the patient's stay in the hospital, it is possible to identify a group at high risk. The BISAP scale more accurately predicts organ failure at an early stage of the disease, which increases the advantage of this scoring system [8, 9].

**Table 6.**
Criteria for early detection of acute pancreatitis on the BISAP scale [8]

| Clinicalsigns | Point |
|---|---|
| Blood urea nitrogen (BUN) >25 mg/dl | 1 |
| Impairedmentalstatus | 1 |
| Systemic inflammatory response syndrome (SIRS) | 1 |
| Age >60 years | 1 |
| Presence of a pleural effusion | 1 |

3 points correspond to 5-8% of mortality, 5 points or higher correspond to 25% of mortality.

**Table 7.**
Criteria for the severity of acute pancreatitis [8]

| Mild pancreatitis | Severe pancreatitis |
|---|---|
| Minimal functional disorders and absence of serious complications | Polyorgan deficiency and local complications |
| By relieving symptoms and normalizing indications, there is a rapid clinical effect of conservative therapy; | 1. 9 points or higher on the APACHE – II scale or shock.<br>2.Respiratory failure ($PaO_2$< 60 mm Hg)<br>3. Renal failure (creatinine level above >177 mmol/l)<br>4. Gastrointestinal bleeding (more than> 500 ml\day)<br>5. Coagulopathy (PLT level<100 – 109/l, fibrinogen<1.0 g/l)<br>6. Metabolic disorders (hypocalcemia<1.87 mmol/l) |

To date, the treatment of acute pancreatitis is based on the latest international guidelines developed by the International Association of pancreatology (IAP) and the American pancreatic Association (APA). Modern recommendations provide for the use of evidence-based medicine-based methods in the treatment of acute pancreatitis [10].

The main diagnostic criteria for acute pancreatitis [11]: pain; vomiting; flatulence (Mondor triad); subfebrile body temperature; cyanosis of the face and limbs.

Cyanosis in the form of purple spots on the face is called Mondor's symptom, cyanosis spots on the lateral walls of the abdomen ("pericoplastic ecchymoses") - Gray-Turner symptom, pericoplastic cyanosis - known as Grunwald symptom [12]. The presence of hyperesthesia of the skin in the area of the navel and the parotid area on the left at the level of ThVIII-IX is a symptom of Makhov and Kach.

The diagnostic algorithm for acute pancreatitis consists of a step-by-step approach. The first stage is the initial diagnosis at the reception, the second is the enzymatic-reactive phase of pancreatitis-the first two weeks of the disease, the third stage is the stage of infective pancreatitis.

At the first stage of diagnostics at the reception, the main task is to be able to carry out differential diagnostics with urgent surgical pathology of the abdominal cavity [12]. Comprehensive diagnostics is carried out with a thorough analysis of the cause, history of the disease, clinical-laboratory and instrumental methods (ultrasound examination, laparocentesis, videolaparoscopy). Clinical leading signs of acute pancreatitis are characterized by acute onset, pronounced pain in the upper half of the abdomen, irrationality, nausea, vomiting that does not bring relief, dry mouth, thirst, and a brownish coating on the tongue [11].

A laboratory sign of acute pancreatitis is hyperfermentemia (usually serum amylase and urine diastase are examined). Normal indicators of the level of amylase in the blood in the apparent clinic of pancreatitis and hypoamylasemia indicate a violation of the pancreas and loss of its excretory function. It has been found that with acute pancreatitis, the concentration of trypsinogen-2 in the urine increases. Determining the level of this protein in the urine is a more reliable test than a diastasis test. Trypsinogen-2 levels increase rapidly and increase for several days or even weeks after the seizure, and amylase concentration decreases after 1-3 days [11].

Ultrasound examination is one of the informative methods of instrumental diagnostics. In acute pancreatitis with ultrasound, you can see an increase in the volume of the pancreas, infiltration of surrounding tissues, accumulation of fluid around the gland, in the fatty sac. The main difficulties in conducting ultrasound in acute pancreatitis are associated with intestinal pneumatosis, difficulties in scanning with pronounced obesity. When conducting an ultrasound examination, the following parameters are assessed: the shape, dimensions, contours, structure and echogenicity of the pancreas, the quality of visualization of the pancreatic duct and its diameter, the presence or absence of focal changes in the gland, the condition of the gland and tissues around the pancreas, as well as the presence or

absence of fluid in the abdominal cavity [12, 13].

The main changes that can be detected on ultrasound are as follows: increase in the size of the pancreas in 88% of cases (normal size of the pancreas: head 3-4. 5 cm; body 2.5-3 cm; tail 3-4 cm); blur of contours-in 90.6% of cases; exceeding 3 mm of distance between the posterior wall of the stomach and the anterior surface of the pancreas and reaching 10-20 mm, which characterizes the edema of parapancreatic tissues in 53% of cases; changes in the echogenicity of the gland (Figure 3-4): increase - in 85.6% of cases; (normal - in 8.6% of cases) decrease-in 5.8% of cases [14].

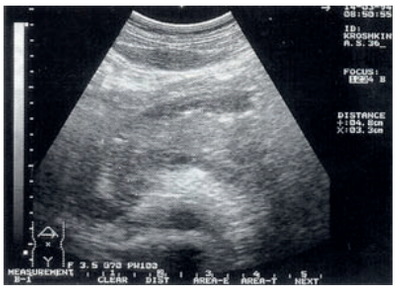

**Figure 3.**
Acute pancreatitis, destructive type. An increase in the volume of the pancreas, blurring of the contours, an increase in the distance between the stomach and the back wall of the pancreas are detected

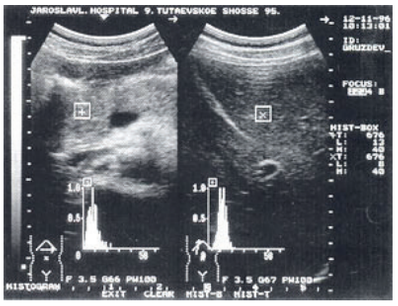

**Figure 4.**
Acute pancreatitis, increased echogenicity of the pancreas (compared to echogenicity of the liver)

So, in the 70s of the last century, methods of treating acute pancreatitis with hypothermia, peridural anesthesia, forced diuresis were introduced into practice [15]. Knowledge has been accumulated about the enzymatic-toxemic pathogenesis of acute pancreatitis, extracorporeal detoxification methods have been actively introduced into clinical practice: hemosorption [16], lymphosorption [17] or a combination of them. Intravenous anti-enzyme therapy with drugs trasilol, kontrikal, gordox, etc. they began to replace intra-arterial, including local and intrauterine administration [18]. Considering the connection of acute pancreatitis with arterial hypoxemia and respiratory insufficiency, many authors recommended including hyperbaric oxygen saturation procedures daily in the complex of therapeutic measures, and in more severe cases - twice a day [19].

In the 80s, a fundamentally new method of treating acute pancreatitis was developed with 5-fluorouracil and fluorofur, which were administered intravenously, endolymphatically, intraductally and topically [20].

Treatment of acute pancreatitis should be general pathogenetic, according to the accepted classification, it should also begin with complex conservative therapy, and the following basic principles: elimination and prevention of hypertension in the bile and pancreas, suppression of secretion of the pancreas, stomach and duodenum, elimination and reduction of enzyme toxemia, elimination of hypovolemia, prevention of water-electrolyte and protein disorders, analgesic therapy, the fight against intestinal paresis. The severity of acute interstitial (edema) pancreatitis allows patients to be admitted to the surgical department for treatment, while treatment with pancreonecrosis should be carried out only in the intensive care unit and intensive care unit [10].

Relief of pain syndrome in many patients can be achieved with the use of analgesics, antispasmodics, a glucose-novocaine mixture. In the absence of an analgesic effect, it is necessary to resort to injections of narcotic analgesics, the performance of various novocaine blockages (round liver ligament, etc.), although preference is given to peridural anesthesia, including the fight against intestinal paresis [21].

Detoxification methods (forceful diuresis), including extracorporeal (plasmapheresis, blood ultrafiltration, hemosorption, lymphosorption) and enterosorption are only used for subtotal pancreonecrosis or in severe cases of patients infected with pancreonecrosis, bacterial peritonitis or septic phlegmon [16, 17].

In case of edematous pancreatitis, antibacterial prophylaxis is not indicated, and for pancreatitis it is necessary. In addition, it is difficult to strictly distinguish between the therapeutic or prophylactic purpose of prescribing antibiotics. Of course, one point should be taken into account: when empirically choosing antibiotics, their selective penetration into the pancreatic tissue and the spectrum of their action should spread to Gram-negative and Gram-positive aerobic and anaerobic bacteria. In this regard, carbapenems, fluoroquinolones (especially Pefloxacin)+metronidazole, Generation III–IV cephalosporins, penicillins with a β-lactam ring (piperacillin/ tazobactam, ticarcillin/clavulanate) are considered the drugs of choice today [22].

The use and effectiveness of preventive antibiotic therapy in acute pancreatitis has long been disputed. Although early studies have shown that the administration of antibiotics can prevent infectious complications in patients with sterile necrosis [22], subsequent studies have not revealed benefits. Thus, recent data have shown that the preventive use of antibiotics in patients with acute pancreatitis is less associated with a significant reduction in mortality or morbidity [23]. Thus, conventional prophylactic antibiotics are not

recommended for all patients with acute pancreatitis [3].

Aminoglycoside antibiotics (for example, gentamicin and tobramycin) do not enter the pancreatic parenchyma in standard intravenous doses. Acyl-ureidopenicillins and cephalosporins penetrate into pancreatic tissues and are effective against gram-negative microorganisms [24]. Ciprofloxacin, moxifloxacin and carbapenems penetrate the pancreatic tissue well, however, due to the high level of tolerance to quinolones worldwide, the use of quinolones should be limited as much as possible and used in patients with allergies to antibiotic drugs with a β-lactam ring [25].

Metronidazole, which has a bactericidal spectrum directed only against anaerobes, also penetrates well into the pancreas. The pathogenesis of secondary bacterial infection of the pancreas is still being discussed. Pathogens can enter the pancreas hematogenously, through the biliary system, from the duodenum through the main pancreatic duct, or through transmural migration of the large intestine through the translocation of colon bacteria [26]. Most of the causative agents of pancreatic infection are Gram-negative bacteria of the gastrointestinal tract (Escherichia coli, Proteus, Klebsiella pneumonia), which are caused by a violation of the intestinal flora and damage to the intestinal mucosa. Fungal infection is a serious complication of acute pancreatitis, accompanied by morbidity and mortality [27]. Candida albicans is the most common organism, followed by Candida tropicalis and Candida krusei. Although fungal infections that complicate acute pancreatitis usually occur in proportion to the degree of pancreatic necrosis, there is not enough data to support the prevention of fungal infections, so it is not recommended. The expediency of introducing antifungal drugs (fluconazole, etc.) into complex treatment 7-10 days after the start of antibacterial therapy is beyond doubt [22].

The introduction of a nasogastric probe and its regular aspiration for at least 2-3 days in order to create functional rest of the pancreas, stomach and duodenum 12, the same period is prescribed to the dietNº0, the epigastric region is provided with an ice [15, 20]. Enteral nutrition maintains the barrier of the intestinal mucosa, prevents destruction and prevents the movement of bacteria that cause pancreatic necrosis. Compared to parenteral nutrition in general, enteral nutrition reduces infectious complications, organ failure, and mortality [28].

The list of absolutely useless drugs in the treatment of acute pancreatitis can be found in the latest international guidelines developed by the International Association of pancreatology (IAP) and the American pancreatic Association [10].

They are: atropine, protease inhibitors (aprotinin, cordox, kontrical); antisecretory drugs, (octreotide); anti-inflammatory drugs; glucocorticoids; antioxidants, etc.

In accordance with the indicated recommendations of the above organization [10], procedures that lead to a deterioration in the patient's condition in acute pancreatitis: starvation, gastric lavage with cold water, plasmapheresis.

On June 3, 2019, the World Society of Emergency Surgery published guidelines for the treatment of patients with severe acute pancreatitis [29]. Based on the instructions, all patients with severe acute pancreatitis should undergo contrast CT or MRI. It is stated that 72-96 hours after the appearance of clinical manifestations is the optimal time to conduct CT with contrast.

Also known as: as laboratory parameters: that the limit values of serum amylase and lipase usually increase by 3 times the upper limit of the norm; that the level of C-reactive protein ≥150 mg/L on the 3rd day of the disease can be used as a predictive factor for severe acute pancreatitis; hematocrit >44% is an independent risk factor for pancreatitis and urea level > 20 mg\l is an independent predictive factor for death; procalcitonin is the most sensitive laboratory test to detect pancreatic infection and the fact that low serum levels are a strong negative predictive sign of infected necrosis; it has been shown that mortality decreases when surgical interventions are postponed for more than 4 weeks after the onset of the disease [29].

In the first 12-24 hours, aggressive infusion therapy reliably reduces mortality. Infusion therapy with maximum effect in the first 12-24 hours of the disease, however, less active infusion therapy is used in patients with heart, kidney failure or ARDS [10].

In acute pancreatitis, the prophylactic use of antibiotics is not recommended to prevent infectious complications. Due to the fact that more than 24 hours after the onset of the disease, almost 60% of patients are admitted to the hospital, conservative treatment they can be considered conditionally late, so it should begin with the first hour of hospitalization and be carried out in parallel with the examination carried out [11].

In the journal Gastroenterology on February 04, 2018, the American Gastroenterological Association's guidelines for the initial treatment of patients with acute pancreatitis were published [31].The instructions recommend the use of targeted infusion therapy for patients with acute pancreatitis. Targeted infusion therapy is defined as titration of intravenous solutions for specific clinical and biochemical perfusion purposes (e.g. heart rate, mean blood pressure, CVD, diuresis, blood urea concentration and hematocrit). The American Gastroenterological Association does not advise whether salt or Ringer's solution should be used. The use of hydroxyethylcrachmal solutions in patients with acute pancreatitis is not recommended and there is no need for prophylactic use of antibiotics in patients with suspected severe acute pancreatitis and necrotic pancreatitis [31]. In patients with predictive severe acute pancreatitis or necrotic pancreatitis requiring enteral tube feeding, a nasogastric or nasoeunal tube is recommended [31].

Acute ERHPG (<24 hours) is required in patients with acute cholangitis. Currently, there is no evidence of optimal timing of ERHPG in patients with biliary pancreatitis without cholangitis [10].

There are many surgical interventions used in the treatment of acute pancreatitis: laparoscopic abdominal drainage and sanation; omentobursopancreatostomy; pancreatic resection; pancreatectomy; pancreatonecrsequestrectomy; pancreatic cryodestruction; drainage of purulent foci, laparotomy, etc.

Pancreatic (enzymatic, non-bacterial) peritonitis is the main indication for laparoscopic sanation and abdominal drainage [32]. The use of minimally invasive(endoscopic) methods for drainage, sanation and necrectomy is recommended [10, 29]. As a rule, Patients with clinical manifestations of septic complications are operated on an average of 14 days

before the onset of the disease, which coincides with the development of complications after necrosis. Ideally, the intervention should be delayed as much as possible (usually 4 weeks), as this reduces complications[10]. In the case of surgical decompression, the retroperitoneal space must be maintained to reduce the risk of infecting the pancreas and peripancreatic space.

Conclusion

Based on the study, we came to the conclusion that using one method or one scale is inaccurate to predict the severity of acute pancreatitis in the first hours of hospitalization. To date, the treatment of acute pancreatitis is based on the latest international guidelines developed by the International Association of pancreatology and the American pancreatic Association. Based on this guide, we believe that it is necessary to diagnose acute pancreatitis, conduct treatment, and there is a still need a number of randomized large-scale surgical trials of acute pancreatitis which have to be conducted.

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