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DIAGNOSTIC ACCURACY OF IMAGING IN THE DETECTION OF ACUTE PANCREATITIS IN THE POSTOPERATIVE PATIENT

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The purpose of the work was to improve the diagnostic results of acute postoperative pancreatitis through the use of computed tomography. The study included 60 patients aged from 30 to 50 years and older. All patients underwent analysis of data from ultrasound, computed tomography. In the study cohort of patients, patients predominated after undergoing surgery in the area of the pancreas itself, on the organs of the hepatic-pancreatic-biliary zone. Ultrasound confirmed the diagnosis of acute postoperative pancreatitis in 27 patients, and computed tomography data confirmed acute pancreatitis in 36 cases. Among patients with positive ultrasound results, in 22 they were true positive and in 5 they were false positive. Among the 33 patients with negative ultrasound results, 2 were false-negative, while 31 were true-negative. The sensitivity and specificity of ultrasound in diagnosing postoperative acute pancreatitis, using computed tomography as the gold standard, was 91.7 %, 86.1 %.

Keywords: postoperative acute pancreatitis, ultrasound, computed tomography, sensitivity, specificity.

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ДІАГНОСТИЧНА ТОЧНІСТЬ ВІЗУАЛІЗАЦІЇ ПРИ ВИЯВЛЕННІ ГОСТРОГО ПАНКРЕАТИТУ У ПІСЛЯОПЕРАЦІЙНИХ ПАЦІЄНТІВ

Метою роботи стало покращення результатів діагностики гострого післяопераційного панкреатиту шляхом використання комп'ютерної томографії. До дослідження було включено 60 пацієнтів віком від 30 до 50 років і старше. Всім пацієнтам проводився аналіз даних ультразвукового дослідження та комп'ютерної томографії. У досліджуваній когорті хворих переважали пацієнти після перенесеної операції в області підшлункової залози, на органах гепато-панкреато-біліарної зони. УЗД підтвердило діагноз гострий післяопераційний панкреатит у 27 пацієнтів, а дані комп'ютерної томографії підтвердили гострий панкреатит у 36 випадках. При цьому, серед пацієнтів з позитивним результатом ультразвукового дослідження, у 22 вони були істинно позитивними і у 5 помилково позитивними. Серед 33 пацієнтів з негативними результатами УЗД, 2 були помилково-негативними, у той час як 31 – істинно негативними. Чутливість, специфічність ультразвукового дослідження у діагностиці післяопераційного гострого панкреатиту, із застосуванням комп'ютерної томографії як золотого стандарту склали 91,7 %, 86,1 %.

Ключові слова: післяопераційний панкреатит, ультразвукове дослідження, комп'ютерна томографія, чутливість, специфічність.

In the world of medical practice, postoperative pancreatitis is one of the most dangerous and widespread complications of abdominal surgery [3, 6, 8]. Some specialists consider the evaluation of the degree of deviations from the norm of some laboratory parameters, i.e. an increase of pancreatic enzymes in the blood, sufficient for diagnosing this pathology, while others prefer to identify it in the diagnostic approach with the combination of laboratory parameters and clinical signs [10, 13, 14].

High complication rate is associated with surgical operations both on the pancreas and on other organs [11]. According to some authors, the cause of acute pancreatitis can also be an infectious factor [5]. More rarely such complications were recorded against the background of surgical treatment of gallbladder and extrahepatic bile ducts diseases [1]. It is necessary to show some factors that significantly complicate the diagnosis of acute postoperative pancreatitis: the presence of severe concomitant diseases, severe general condition of the patient before, the severity of surgical intervention [15].

A factor that reduces the effectiveness of diagnostic measures is the smoothing of clinical manifestations by analgesic therapy and the presence of symptoms characteristic of the postoperative period [8]. Sometimes the severity of a patient with acute postoperative pancreatitis is regarded as a manifestation

of another postoperative complication [12]. Regarding biochemical threshold values, the most common is the determination of indices in blood and urine of some laboratory markers, including amylase, the sensitivity and specificity of which can vary widely. In the diagnosis of acute postoperative pancreatitis, as well as in its prognosis, some foreign authors focus on the results of studying the activity of secretory phospholipase A2 and elastase-1, although there are known cases of their low specificity [10, 15]. Thus, it is difficult to accurately point to any specific laboratory indicators as the so-called gold standard.

Among the instrumental diagnostic methods, some methods of radial diagnostics, including CT and MRI of the abdominal cavity organs, radiological examination and ultrasound of the pancreas are distinguished [4, 9]. But the absence or presence of single studies on the indications for the use of these methods in the diagnosis of postoperative complications in the pancreas [2]. It is important to note the rare occurrence of common radiological signs of primary acute pancreatitis in acute postoperative pancreatitis. The purpose of ultrasound in the early diagnosis of acute pancreatitis is accurate optimal diagnosis and differential diagnosis. Among the most significant ultrasound signs of acute pancreatitis are: increase in the size, vagueness of the pancreas contours, increase in the distance between the posterior wall of the stomach and the anterior surface of the pancreas, and decrease in echogenicity [5, 7].

The frequently discussed ultrasound signs of acute pancreatitis include the presence of free fluid in the retroperitoneal fibres and abdominal cavity [4]. In addition, it should be added that in the diagnosis of postoperative complications, apart from ultrasound, CT and MRI are of great importance, which are often used in clinical practice, but, in our opinion, would allow an accurate differential diagnosis of various postoperative conditions, in this case, with acute postoperative pancreatitis [2, 6].

The purpose of the study was to improve the results of diagnostics of acute postoperative pancreatitis by using computed tomography.

Materials and methods. These studies were performed based on the Department of Radiological Diagnostics of the Scientific Centre for Experimental Surgery from 2019 to 2022. The study included 60 male and female patients aged 30 to 50 and older years (working age) where 31 (51.7±6.45 %) were males and 29 (48.3±6.45 %) were females.

Inclusion criteria were presence of acute postoperative pancreatitis, exclusion criteria: acute pancreatitis of non-operative etiologies, age up to 30 years, other diseases of the pancreas.

Table 1

Characteristics of patients with acute postoperative pancreatitis (n=60)

Characteristics	n	%	m %
Male	31	51.7	6.45
Female	29	48.3	6.45
30–50 year	22	36.7	6.22
> 50 year	38	63.3	6.22
Symptom duration ≤ 7 days	42	70.0	5.92
Symptom duration >7 days	18	30.0	5.92

All patients during the whole period of observation were analyzed data of instrumental methods of research (ultrasound, computed tomography – CT).

The data obtained during the studies were entered into the statistical package SPSS 22. A 2×2 random number table was used to determine the sensitivity, specificity, as well as the prognostic value and diagnostic accuracy of some radiotherapy diagnostic methods used in the studies in the diagnosis of acute postoperative pancreatitis. A value of $p \leq 0.05$ was considered significant.

Results of the study and their discussion. In the studied cohort of patients, patients prevailed after surgery on the pancreas itself, on the organs of the hepato-pancreato-biliary zone, such as colon resection for intestinal obstruction, and after surgical intervention in the biliary system, that is, in the area of the gallbladder and its ducts (Table 2).

Table 2

Etiology and gender characteristics of acute postoperative pancreatitis

Etiology	Gender	Male			Female			Total		
		Abs.	%	m%	Abs.	%	m%	Abs.	%	m%
Cholecystectomy		6	37.5	12.10	10	62.5	12.10	16	26.7	5.71
Acute intestinal obstruction		7	100.0	0.00	0	0.0	0.00	7	11.7	4.14
Gastric resection		0	0.0	0.00	1	100.0	0.00	1	1.7	1.65
Primary complications		0	0.0	0.00	26	100.0	0.00	26	43.3	6.40
Endoscopic retrograde cholangiopancreatography		7	70.0	14.49	3	30.0	14.49	10	16.7	4.81

The development of complications can also be caused by some types of diagnostically important clinical and instrumental manipulations, such as such frequently used methods as angiography, biopsy or endoscopic retrograde cholangiopancreatography, which can be used both during surgical intervention and in the differential diagnosis of complications occurring in the early postoperative period. Thus, acute pancreatitis, as a complication of abdominal surgery or surgical interventions performed on different anatomical areas not related to the pancreas, should be presented as a poly-etiological disease.

The investigated pathological condition often leads to disturbances in the functional state of the gastrointestinal tract organs, in particular, severe disturbances in the motor function of the duodenum, characterized by nausea, repeated vomiting symptoms in parallel with dull pain in the epigastric region.

According to our data, abdominal bloating in the epigastric region against the background of isolated paresis of the transverse colon can be a characteristic sign of acute postoperative pancreatitis. In addition, some painfulness is observed palpatorily in the projection of the pancreas during clinical examinations.

Acute postoperative inflammation of the pancreas could not be detected by ultrasound in 6 cases, which was possible due to the additional use of CT. Focal lesions of the pancreas with involvement of different anatomical zones of the organ were observed; the pancreatic duct with a diameter of more than 3 mm was considered dilated, and similar changes were observed according to ultrasound in 20 patients, confirmed by CT data. According to computed tomography, 40 patients, i.e. $66.7 \pm 6.09\%$, had normal-sized duct diameter, which, according to ultrasound findings, was observed in only $56.7 \pm 6.40\%$ of patients ($p=0.2599$; $\chi^2=1.27$). The dilated pancreatic duct was found out in $33.3 \pm 6.09\%$ by both ultrasound and computed tomography.

Thus, CT was more sensitive than ultrasound in detecting the absence of any pathological changes in the pancreatic duct. Ultrasound confirmed the diagnosis of acute postoperative pancreatitis in 27 patients, and CT findings confirmed acute pancreatitis in 36 cases, and among the patients with positive ultrasound findings, 22 were true positives and 5 were false positives. Among 33 patients with negative ultrasound findings, 2 were false negative while 31 were true negative ($p=0.0001$). The sensitivity, specificity of ultrasound in the diagnosis of postoperative acute pancreatitis, using CT as the gold standard was 91.7% , 86.1% . Thus, the data on patients with acute postoperative pancreatitis detected both by ultrasound and CT were considered true positive, and in the absence of postoperative complications detected both by ultrasound and CT, the values obtained were considered true negative. And when patients were diagnosed with the pathology under study according to ultrasound and its absence according to CT, the results were considered false positives. False-negative results were considered in the absence of acute postoperative pancreatitis according to ultrasound and CT.

Imaging plays an important role in the assessment of suspected postoperative complications, with CT considered the primary imaging modality, while MRI, digital subtraction angiography, and molecular imaging are considered ancillary diagnostic tools. Accurate diagnosis of postoperative complications requires a solid understanding of pancreatic anatomy, surgical indications, normal postoperative appearance, and expected postsurgical changes [2].

So, in our study, CT was more sensitive than ultrasound in detecting the absence of any pathological changes in the pancreatic duct. According to the studies conducted, it can be concluded that data on patients with acute pancreatitis identified on both ultrasound and CT were considered true positive, and in the absence of pathological postoperative complications identified in the pancreas on both ultrasound and CT, true negative.

Thus, the effectiveness of ultrasound and CT in the diagnosis of acute postoperative pancreatitis is quite high, while ultrasound, as a non-invasive and accessible method, allows you to visualize the course of pathological changes in the gland. However, in the early stages of the disease under study, with certain difficulties in diagnosis and to clarify its prevalence, it is advisable to use CT to identify the structure of possible severe complications [3, 12].

The roles of different investigation methods (ultrasound, computed tomography, and magnetic resonance imaging) in the diagnosis and evaluation of acute pancreatitis and its complications are discussed in various studies. Some authors present a practical image-rich guide, applying the revised Atlanta classification system, with the goal of facilitating radiologists to write a correct report. In contrast with our work Brizi MG, et al (2021) noted that MRI is more useful in many specific situations, due to its superiority soft tissue contrast resolution and better assessment of biliary and pancreatic duct, for example in the ductal disconnection [4].

Cammarata F, et al (2023) reported that the optimal timing for Endoscopic ultrasound is post-resolution of the acute phase of the disease. With a low rate of complications, Endoscopic ultrasound poses minimal safety concerns. But this study was conducted in relation to Idiopathic acute pancreatitis, not

postoperative. Despite the clinical symptoms have similarities, some features impact on diagnostic abilities of visualization process [5].

In numerous studies was noted, that acute pancreatitis, as a complication of abdominal surgery or surgical interventions performed on different anatomical areas not related to the pancreas, is characterized by a very rapid development of the process and the appearance of serious, life-threatening complications [3, 9]. Based on the results of the analysis of the clinical, instrumental and statistical material we collected, it should be noted that despite the frequent erasure of clinical signs due to surgery, the study of laboratory data in patients with a high risk of developing acute postoperative pancreatitis and the adequate use of instrumental radiation diagnostic methods will allow identifying pathology at the early stages of its development.

Conclusion

The study of the etiology of acute postoperative pancreatitis allows to determine the degree of its risk of development depending on the anatomy of surgical intervention and to develop an effective program of timely prevention and treatment.

In diagnostics of acute postoperative pancreatitis ultrasound, as a noninvasive and accessible method, allows to visualize the course of pathological changes in the gland, but at early stages at certain difficulties in diagnostics and to clarify the degree of its prevalence and the structure of possible more severe complications it is advisable to use CT.

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