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Diagnostic significance of ultrasound histogram indices of pancreas in different clinicopathogenetical variants of chronic alcoholic pancreatitis

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Key words: chronic alcoholic pancreatitis, clinical and pathogenic variants, ultrasound histography, histographic index, structural changes of the pancreas.

Chronic alcoholic pancreatitis (CAP) is an important medical social problem. CAP disease comprises from 5,7 to 10 cases in 100. 000 population in different countries. The prevalence of this disease in Europe is 25 cases in 100 000 of population. There are more than 20 000 sick people in Germany, and more than 60 000 are in Russia. Primary disability of patients reaches 15%. Early complications, and mortality among patients with CAP in 30% cases composes 5,1%. During 20 years history of pancreatitis increases risk of cancer pancreas development (CP) in 5 years. As result during 10 years 30% patients die, during 20 years die more than 50% patients with CAP.

Disease affects mostly people of active working age: average age of disease is 44,6±12,6 years. As alcohol is one of the main etiologic pancreatitis factors, the direct relation between alcohol dose and the risk level of its development is still have discussed. It is common, CAP is able to grow even at consumption of small alcohol dose, and on the contrary, disease is not able to appear at longtime consumption of big ethanol dose. CAP diagnostics still remains complicated, because of nebulosity of biochemical criterions and late revelation of structural changes of PG. So CAP diagnostics is possible to consider as a component part of unfinished pancreatitis problem.

Ultrasound investigation of PG is one of the main diagnostics technique. Sonographic signs of CAP are nonspecific. Initial stage of CAP does not exclude normal sizes, cutouts, echostructure of PG. An on the contrary, the increase of echogenicity, enlargement of PG sizes, cutouts nebulosity are not always considered

as CAP. Last signs, expansion of Wirsung's canal, dissimilarity of CP structure can happen at PG cancer. Interpretation of PG sonic changes is not always objective and persuasive, not all ultrasonic doctors take into account the sonographic features: age, the stage of patient's nutrition, associated diseases, clinical-biochemical manifestation. That is why sonographic alterations of PG patients with CAP and other disease of PG are not always differentiated and discussed correctly. The results of biopsy with sonography control sometimes are the only one argument in the differential diagnostics. The information promotion of ultrasonography, decrease of subjectivity according to estimation of changes in PG sonography are very important objects in science and practice.

Aim of investigation: to elevate diagnostic information of ultrasonography at CAP.

Materials and technique.

84 patients with CAP and 30 healthy people were examined with direct investigation (interview, physical diagnostics), were studied exocrine and endocrine function of PG. Exocrine function of PG was examining with direct (probe) and probeless techniques. Aminophylline calcium testing was used as a direct technique, with dual canal gastroduodenal probe. In the resulting duodenal contents (isolated basal and stimulated secretion of the pancreas) were determined by the volume flow rate of bicarbonate-hour back-titration method, yield-hour trypsin method of Gross-hour production rate of lipase-hour production rate of amylase and pancreatic isoamylase using kits Lachema (Czech Republic).

Probeless technique estimation of exocrine function PG and specification of "deviations" blood enzymes in the blood and urine was determined level amylase and pancreatic isoamylase with complex usage of Lachema (Chech Republic), in blood — indications of lipase with complex usage of Sentinell (Italy), imunoreactive trypsin with complex usage of CIS (France). Moreover, measured flow rates uroamilase (D1 - basal, D2 - after 30 min and D3 - 60 min after breakfast) and coefficients of induction of endogenous pancreozymin measured flow rates uroamilase (D1 - basal, D2 - after 30 min and D3 - 60 min after breakfast) and

coefficients of induction of endogenous pancreozymin (D_1 — базального, D_2 — after 30 min and D_3 — 60 min after breakfast) and (K_1 — after 30 min and K_2 — 60 min after breakfast). 100 g of wheat bread with 20 g of butter + 100 g of cottage cheese + 200 ml of tea with 5 g of sugar was used as a typical dietary exposure.

The content of pancreatic elastaze 1 in feces was defined with help of complex Schebo (Германия), and also scatoscopy was executed.

To estimate endocrine function of PG level of immunoreactive C-peptide in blood serum was used complex CIS (France).

The indications of amylase, lipase in biological fluids were investigated with biochemical анализаторе Vitalab Flexor – 2000 (Netherlands), trypsin and C-peptide blood - on the counter "Gamma-12» (Kiev plant medical equipment), trypsin duodenal contents — by manual technique.

PG ultrasound was made with the help of ALOKA SSD-630 (Japan), and by the way, besides quality signs (PG sizes, its structure, echogenicity, contours, the presence of cysts, calcifications, the state of Wirsung duct). To increase information of sonography we worked out special gistographic index, which allows to differentiate clinical-pathogenetic options of CAP:

$$I = \frac{\quad}{\quad + \quad}, \qquad (1)$$

I — gistographic index;

B — the base of gistogram;

S — initial interval (the distance from the level of grey colour equals one unit, to the level of grey colour, relevant to first gistogram element);

L — the level of grey colour, more often visible in prescribed area.

Statistical data manipulation is done with computer programme of Microsoft Excel. Calculation: average unit (M), its error (m). The probability of received datum was estimated with the help of Student’s test, which provided possibility (p) nor less than 95%. Besides, cluster analysis was used to separate patients’ groups, similar in complex of clinical and functional disease manifestations.

According to cluster analysis results patient were divided into 2 groups:

parenchymal CAP — 40 patients (1-group), indurative -obstructive CAP — 44 patients (2 group).

Results

We have analyzed clinical situation of patients from two groups. The pain was strong or very strong among 1st group patients - 16 (40,0%), mild — 15 (37,5%) patients, minimal — 9 (22,5%) patients, there were no patients without pain in this group. The pain was strong or very strong among 2 group patients 10 (22,7%), mild — 15 (34,1%) patients, minimal — 14 (31,8%) patients; the pain was absent - 5 (11,4%) patients.

We have pointed in the history at despite of absence of difference in age of both groups (1 group — 49,2±8,4 years; 2 group — 50,4±7,9 years) the duration of history patients with CAP in 2 group was larger — 10,5±3,2 years, as patients of 1 group — 7,8±3,6 years (although $p>0,05$).

Palpatory morbidity in PG projection as a voluntary pain was expressed at 1 group of patients.

The results of probeless technique of exocrine estimation function of PG and expressed «deviation» of enzymes in blood were following: total -amylase levels in patients of group 1 was 1,78 ± 0,22 mkkat / L in patients in group 2 0,98 ± 0,15 mkkat / L, whereas healthy 1,16 ± 0, 45 mkkat / l. Despite that fact, indications of patients' groups did not have true difference from standarts, but data of patients from both groups had significant difference in between ($p<0,05$). The level of pancreatic isoamylase blood in 1st group patients' was increased, and 2nd group of patients has decreased level (respectively 0,96±0,18 mkkat/l and 0,25±0,06 мккат/l at standart 0,52±0,12 mkkat/l), while the indications of both groups had a big difference. Changes in the general orientation of -amylase and pancreatic isoamylase urine was the same as that in the blood. Diagnostic information determining pancreatic isoamylase and blood and urine with CAP is higher than the total -amylase as makes it possible to distinguish between "evasion" of enzymes in the blood of pancreatic hypofunction (rates of overall -amylase were not significantly different from the norm, that is, to speak confidently about the changes in the index was not

possible). The level of IRT in blood of patients 1st group comprises 112,4±8,0 нг/ml, 2nd group — 22,7±3,7 ng/ml at standart 38,8±6,6 ng/ml. IRT indications of blood even more clearly pointed to the fact that the CAP in patients of 1st group is hyperenzyme, and in patients in group 2 - clearly hyperenzume as performance of these groups were, respectively, significantly elevated and lowered. These studies of lipase levels in patients of 1st group were increased to 46,0 ± 6,1 U / l (in normal-24,0 ± 8,0 U / L, p <0,05), in patients with 2nd group was not significantly different from the norm-18,3 ± 5,1 U / L, although the difference between the indices of the two groups was significant. Production rates and ratios uroamilase induction pancreoenzyme in patients of 1st group were significantly elevated, and in patients of 2nd group had only a non-significant trend towards lower. But these rates differed significantly between the groups, dietary exposure increases the information content of the study -amylase urine (in patients of 1st group usual research -amylase urine without the use of a standardized breakfast did not give reliable results differ from the norm). A similar trend of changes was detected in the calculation of the coefficients of induction pancreoenzyme. It is also very important was the following information: patients in 1st group, as well as in healthy relationships recorded D2> D3, K1> K2; whereas patients in 2nd group on the contrary, - D3> D2 and K2> K1. Inversion of these relations in patients in 2nd group is indirect evidence of difficulties outflow of pancreatic secretions, obstruction (which is why we have introduced a variant of the name of the CAP in patients in 2nd group the word "obstructive"), and below shows that the presence of obstruction was confirmed by direct probe study.

Result analysis of the basal pancreatic secretion was not informative. The main diagnostic information was obtained in the analysis of performance-stimulated secretion of the pancreas. Thus, patients of 2nd group received amount of duodenal content was significantly reduced (68,3 ± 13,1 ml / h at a rate of 158,6 ± 18,4 ml / h), and patients of 1st group was detected only insignificant downward trend indicator-117,6 ± 14,2 ml / h. That is, patients 2nd group there has been a distinct difficulty outflow of pancreatic secretions, while patients of 1st group was significantly this orientation is not verified. Debit-hour trypsin and lipase in patients of 2nd group was

significantly reduced, respectively, to 92647 ± 1328 U / L (normal, 118452 ± 1641 U / L) and up to 85320 ± 3840 U / L (normal, 120800 ± 4640 U / L). Patients in group 1 significantly reduced yield-hours involved only lipase-98440 ± 2520 U / l, while the yield-hour trypsin had a tendency to decrease false 111613 ± 3462 U / l. With regard to both enzyme-hour flow rate difference was significant between the two groups. Debit-hour amylase acquired false downward trend in both variants of HAP, the difference between groups was not significant.

Greater reduction in pancreatic secretion and the presence of obstruction in patients in 2nd group was confirmed by the analysis of this type of secretion as the results of a probe study. Among these patients, 45.5% of registered hyposecretory, 40.9% - lower obstructive and only 13.6% of upper obstructive type of pancreatic secretion. Patients of 1st group was dominated by the upper obstructive type of pancreatic secretion, indicating a predominance of direct pancrotoxic influence of ethanol, so this option CAP we called parenchymal. Patients of 1st group significantly less likely than patients in group 2 developed hyposecretory option secretion, RV function thus suffers less, and exocrine insufficiency progresses slowly. The presence of the patients in 2nd group is almost half the secretion of pancreatic hyposecretory option indicates rapid progression of the decline of organ function, and the high frequency of the lower obstructive variant secretion is yet another confirmation of the fact that this version of CAP is obstructive.

At scatoscopy steatorrhea was present in 7 (17.5%) patients of 1st group and in 22 (50.0%) patients in group 2. Fecal pancreatic elastase-1 of patients of 1st group had a tendency to decrease false 182,4 ± 38,9 mg / g (normal 272,5 ± 31,5 mg / g), and of patients in 2nd group was significantly decreased - 136,7 ± 25,1 mg / g, which corresponds to the type of analysis of pancreatic secretion in two groups of patients.

Patients of 2nd group noted a distinct decrease not only the exo, but endocrine pancreatic function, levels of C-peptide levels in them was reduced and amounted to 0,42 ± 0,08 pmol / ml at a rate of 0,69 ± 0,09 pmol / ml ($p < 0,05$). And the patients in Group 1 index was 0,58 ± 0,09 pmol / ml (compared to the norm $p > 0,05$).

At comparing the quality changes ultrasound prostate two groups was that the

patients of 2nd group were more frequent increase in echogenicity, 86.4%, expanding the Wirsung duct, 45.5%, calcifications in the prostate tissue, in 40.9% of cases. The patients in 1st group, the frequency was 45.0%, respectively, 20.0%, 25.0%. In contrast, patients in 1st group was more frequent heterogeneity of structure dominated by the pancreas decrease in echogenicity, 55.0%, blurred contours of the prostate, 32.5% (in patients in 2st group, respectively, 13.6%, and at 11, 4%). Such frequent echogenicity pancreas along with the expansion of Wirsung duct in patients in 2nd group gave us reason to believe this version of CAP is not only obstructive, but indurative (with a pronounced fibrosis of the pancreas).

Particular interest has the results of a study we developed gistographic index I (1). During its development, we proceeded from the fact that for obstructive indurative-HAP significantly increased echogenicity of the pancreas, and, the body becomes more dense, but more uniform. This reduces the dimension of the histogram, and an increase in the starting period of the L ultrasonic histogram. As a result, when obstructive indurative embodiment, HAP index decreases numerator and the denominator increases. Thus, I reduces. At the same time, with the parenchymal form of CAP due to the presence of edema RV against fibrotic organ becomes more diverse, and the base of the histogram (B) widens. The presence of edema of the pancreas reduces start-gap measure L and S ultrasonic histogram. That is, the numerator of the index increases, and the denominator is decreased, which leads to an increase of the total result. Indeed, in patients with obstructive indurative CAP-I was 0,42 ± 0,09, and in patients with parenchymal HAP-1,92 ± 0,11 ($p < 0,05$). Healthy hs I 0,96 ± 0,12 (differences were significant compared with both groups of patients). Therefore, we developed an index gistographic I (1) allows to diagnose CAP in principle and identify clinical and pathogenic variant of its course.

Conclusion

1. HAP takes place in the form of two major clinical pathogenic variants - the type of parenchymal or obstructive pancreatitis-indurative that have particular clinical, sonographic manifestations and disorders of the functional state of the pancreas.

2. For the diagnosis of HAP and the definition version of its course is informative gistographic index, which is calculated on the basis of indicators of ultrasound histogram pancreas.

Prospects for future research are to develop new diagnostic index using data sonographic gistography pancreas. These indexes can later be used not only in the diagnosis of pancreatitis, but also in their differential diagnosis with pancreatic cancer, as well as for monitoring the course of disease (evaluating the effectiveness of the treatment).

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The article presents results of study of clinical peculiarities, pancreas functional state in patients with two variants of chronic alcoholic pancreatitis — parenchymatous and obstructive-indurative types. The author presents pathogenetical foundation of diagnostic histographical index worked out by him, which based on data of ultrasound histogram of the pancreas. It was proved, that the index allows not only to diagnose chronic alcoholic pancreatitis, but to differentiate clinicopathogenetical variants of its course.