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Bile a-Amylase and Lipase – Possible Predictors of Acute Pancreatitis in Case of Bile Duct Stone Impacted at the Major Duodenal Papilla.

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ABSTRACT

The results of diagnostics and treatment of 102 patients with bile duct stone impacted at the major duodenal papilla were subject to analysis. The obtained results demonstrate that the level of bile α-amylase and lipase may serve as a predictor of acute biliary pancreatitis progression. It was ascertained that the patients with the level of bile α-amylase and lipase over 110 u/l and 600 u/l respectively had considerably higher incidence of acute pancreatitis and its complications as compared to the patients who showed lower bile α-amylase and lipase levels (87.93% and 11.36% respectively, $p<0.05$).

Keywords: Acute biliary pancreatitis, choledocholitiasis, major duodenal papilla, amylase, lipase, predictor.

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INTRODUCTION

Extrahepatic bile duct disorders are one of the principal etiological agents contributing to progression of acute pancreatitis. The disease pathogenesis is based on pancreatic juice outflow disorders as a result of the major duodenal papilla obstruction by a bile stone [1, 2]. The problem of laboratory diagnostics of acute pancreatitis is far from being settled. This is particularly so with acute pancreatitis developing due to impacted bile duct stone at the major duodenal papilla [3-5]. Given the variety of factors predisposing to disorders of pancreatic juice passage (anatomic variants of the common bile duct and the pancreatic duct, size and form of gallstones, organic and functional changes in the major duodenal papilla, initial state of the pancreas) it becomes apparent that it is almost impossible to predict acute pancreatitis progression by applying traditionally used methods of laboratory and instrumental diagnostics. And we often come up against the situation when ampullary obstruction accompanied by obstructive jaundice does not induce acute pancreatitis development while biliary sand passing through the major duodenal papilla to the dodecadactylon frequently initiates progression of fatal pancreatonecrosis [6, 7, 8, 9, 10]. In the available literature we could hardly find any convincing data relating to incidence, character and prognosis of acute pancreatitis development in the patients with impacted bile duct stone at the major papilla of the dodecadactylon. In this respect it is necessary to search for new predictors and diagnostic markers of acute biliary pancreatitis development.

METHODOLOGY

The examined group comprised 102 patients with impacted bile duct stone at the major duodenal papilla. The patients were divided into two panels. The first panel included 60 patients with diagnosed acute pancreatitis at time of admission to a clinic. The second panel included 42 patients who had no acute pancreatitis as of time of admission to a clinic. The majority of the patients were admitted to an inpatient facility within the period up to 72 hours after start of the disease. Biochemical serum markers analysis showed that the patients from the first panel had increased levels of bile α-amylase and lipase (Table 1).

Table 1: Biochemical serum markers in the patients with the impacted bile duct stone at the major duodenal papilla.

Marker, units	I panel	II panel
A-amylase, u/l	1064.7±294.2	104.7±68.4
Lipase, u/l	756.3±226.3	64.2±28.3
Total bilirubin, µmol/L	125.4±21.9	154.7±41.1
Alkaline phosphatase, u/l	291.9±66.4	566±91.7

The common bile duct dilatation was detected by ultrasonography in 52 patients (86.7%) from the first panel and 38 patients (90.5%) from the second one. We have found the ultrasonographic criteria of acute pancreatitis only in the patients from the fist panel, among them 51.7% were referring to the pancreadic duct dilatation. All of the patients were subject to endoscopic papillosphincterotomy. Simultaneously bile aspiration from the bile ducts was performed in order to determine the levels of α-amylase and lipase in the same.

MAIN BODY

Analysis of biochemical bile markers is shown in Table 2. On the basis of the resulting data we have calculated the threshold value of bile α-amylase and lipase activity upon reaching which the probability of acute pancreatitis development in the patients with impacted bile duct stone at the major duodenal papilla would be equal to 50%: α-amilase – 110 u/l and lipase – 600 u/l.

Table 2: Biochemical bile markers in the patients with impacted bile duct stone at the major duodenal papilla.

Marker, units	I panel	II panel
A-amylase, u/l	915.4±173	138.1±102.4
Lipase, u/l	1156.7±240.2	443.8±258.1
Total bilirubin, µmol/L	191.4±37.3	182.8±63.3
Alkaline phosphatase, u/l	78±13.4	128.7±47.6

In order to reveal interrelationship between the levels of bile α-amilase and lipase and acute pancreatitis gravity we have analyzed the results of treatment of the patients in the examined panels. The patients in each

panel were additionally divided into sub-panels. The patients with the levels of bile α-amilase and lipase over 110 u/l и 600 u/l correspondingly were referred to A sub-panels (IA and IIA). B sub-panels (IB and IIB) included the patients having bile α-amilase and lipase levels lower then the above values (Table 2).

Table 2: Biochemical bile spectrum in the patients with impacted bile duct stone at the major duodenal papilla.

Marker, units	I panel		II panel	
	IA sub-panel	IB sub-panel	IIA sub-panel	IIB sub-panel
A-amilase, u/l	1436.1±199	77.7±6	229.7±144.7	48.1±7.6
Lipase, u/l	1822.6±226.3	86.2±30.5	726.7±272.6	162.0±51.7

In IA sub-panel 2 patients (5.4%) demonstrated improvement after papillosphincterotomy. It was featured by pain syndrome easing, decrease of serum α-amilase and lipase levels. The patients were discharged from the inpatient facility on the 10^{th} and on the 14^{th} day of post-operative period correspondingly. 35 patients in thus sub-panel (94.6%) demonstrated negative dynamics. Pancreatic and peripancreatic fat necrosis lesions developed in 21 patients (56.75%). In 19 cases acute fluid collections were detected. Abscesses were detected in 2 patients on the 20^{th} - 23^{rd} days. 30 patients (81.1%) in this sub-panel had severe acute pancreatitis, 7 (18.9%) patients had mild acute pancreatitis).

In IB panel 20 patients demonstrated involution of the clinical and laboratory markers of acute pancreatitis. By the 14^{th} day omental abscess formation was observed in one patient (4.35%). Simultaneously severe acute pancreatitis was observed in 3 patients (17%) and mild acute pancreatitis in 20 patients (83%).

5 patients from IIA sub-panel demonstrated persistent improvement of state. 14 patients experienced increase of the level of leukocytes, serum α-amilase and lipase, acute fluid collections were detected in the course of ultrasonography. Peripancreatic abscess and omental abscess formation were observed in one patient. In this sub-panel severe pancreatitis was detected in 14 patients (66.7%), and mid pancreatitis in 2 patients (9.52%).
In IIB sub-panel 19 (90.5%) patients demonstrated pain syndrome easing and biochemical serum markers normalization. Ultrasonography revealed increase of the pancreas dimensions without evident necrosis in 2 patients (9.52%). No severe pancreatitis was observed in the patients of this sub-panel, mid pancreatitis was observed in 2 (9.52%) patients.

CONCLUSION

The obtained results evidence that the markers of activity of α-amilase and lipase in ductal bile of the patients' with bile duct stone impacted at the major papilla of the dodecadactylon may be highly reliable predictors of acute biliary pancreatitis development. This is evidenced by the performed analysis of the results of treatment of the specified patients' group. It was ascertained that the patients with the level of bile α-amylase and lipase over 110 u/l and 600 u/l respectively had considerably higher incidence of acute pancreatitis and its complications than compared to the patients who showed lower bile α-amylase and lipase levels (sub-panel IA and IIA – 87.93 %; sub-panel IB and IIB – 11.36 %, $p<0.05$). Therefore it is possible to predict acute pancreatitis severity even with absence of evident clinical and laboratory symptoms on the basis of bile α-amylase and lipase levels increase.

FINDINGS

The results of diagnostics and treatment of 102 patients with bile duct stone impacted at the major papilla of the dodecadactylon were subject to analysis. It was ascertained that the level of activity of α-amylase and lipase in ductal bile above 110 and 600 u/l correspondingly are predictors of acute biliary pancreatitis development.

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