SHORT REPORT

Relationship between apoA-I, chemerin, Procalcitonin and severity of hyperlipidaemia-induced acute pancreatitis

Yuan Yin, Na Wei, Zhiqiang Zheng, Hongliang Liang

Abstract

The aim of this study was to investigate the relationship between apoA-I, chemerin, and Procalcitonin (PCT) and the severity of hyperlipidaemia-induced acute pancreatitis (HLAP), as well as the importance of their application in the diagnosis of severe HLAP. This study was conducted at the 363 Hospital, Chengdu City, China, from January 2016 to August 2020. There were significant differences in the levels of serum apoA-I, chemerin, and PCT among the three-mild, moderate and severe-groups (all p <0.001). Serum apoA-I was negatively correlated with chemerin and PCT levels in the severe group (p=0.006, p=0.011, respectively). Serum chemerin and PCT levels in the severe group was a positive correlation (p=0.032). Receiver Operating Characteristic (ROC) curve area of serum apoA-I in the diagnosis of severe HLAP was 0.808 (95% CI:0.727-0.888, p value <0.001), which was higher than that in serum chemerin and PCT, and its sensitivity and specificity were 0.628 and 0.814, respectively. Hence, in patients with HLAP, serum apoA-I, chemerin, and PCT are closely correlated. The efficacy of serum apoA-I in the diagnosis of severe HLAP is higher than that of serum chemerin and PCT.

Keywords: Hyperlipidaemia, Acute pancreatitis, ApoA-I, Chemerin, PCT.

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Introduction

Hyperlipidaemia refers to the increase of plasma total cholesterol (TC) or triglyceride (TG). Hyperlipidaemia is an independent risk factor for acute pancreatitis (AP) other than biliary and alcoholic pancreatitis[1] and can cause AP.[2] At present, AP needs serum amylase, lipase or even CT to be diagnosed. The diagnosis of hyperlipidaemia-induced acute pancreatitis (HLAP) needs serum TG determination on the basis of the diagnosis of AP. However, the detection of serum TG is easy to be interfered by blood and urine amylase, because of which the increase of blood and urine amylase in HLAP patients is not obvious, resulting in insensitive detection results and missed diagnosis. Compared with AP patients, HLAP patients have more severe clinical symptoms, more complications and worse prognosis, and are prone to suffer recurrent attacks.[3,4] Therefore, early definite diagnosis is important for clinical treatment of HLAP patients.[5]

ApoA-I is one of the main structural proteins of high-density lipoprotein. Serum apoB/A-I ratio appears to be valuable for predicting severe AP patients.[6,7] Chemerin is an important adipocytokine in inflammatory reaction, adipocyte differentiation and maturation, and lipid metabolism, etc. Serum chemerin level in HLAP patients was significantly high and positively correlated with HLAP disease severity.[8] The level of procalcitonin (PCT) is closely related to the degree of inflammation. Blood PCT may assess the clinically relevant pancreatic infections and overall prognosis in AP.[9]

This study aimed to investigate the relationship between apoA-I, chemerin, PCT and the severity of HLAP, as well as the importance of their application in the diagnosis of severe HLAP.

Patients/Methods and Results

One hundred and twenty-nine patients with HLAP were recruited at the 363 Hospital, Chengdu City, China, from January 2016 to August 2020. Diagnostic criteria of AP included acute attack of epigastric pain, accompanied with upper abdominal tenderness or sign of peritoneal irritation; increased pancreatic amylase in blood, urine or ascitic fluid; indirect changes such as inflammation and necrosis of pancreas found on imaging examination (B-ultrasound, CT) or operation. AP can be diagnosed if more than two of these symptoms are present and other acute abdomens are excluded.

Diagnostic criteria in HLAP were serum TG $\geq$1000.8 mg/dl, or serum TG at 500 -1000.8 mg/dl accompanied with chylous serum on the basis of the diagnosis of AP, excluding other pathogenic factors of AP such as biliary disease (bile duct obstruction), alcoholic, drugs, and tumour.

The study included patients who met the diagnostic criteria of HLAP, and patients $\geq$ 18 years old who

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consented to join the research. The exclusion criteria included patients with tumour, psychosis, patients who gave up treatment, those who moved to another hospital or died, pregnant women, and patients with AP caused by other known pathogenic factors, including biliary disease (bile duct obstruction), alcoholic, drugs, and tumour.

HLAP was classified in terms of severity as: (i) Mild HLAP - subjects without organ failure, local or systemic complications; (ii) Moderate HLAP — subjects with organ failure recovered within 48 hours, and/or local or systemic complications, without persistent organ failure; and (iii) Severe HLAP — persistent organ failure > 48 hours. According to the severity of this disease, all subjects were divided into mild, moderate and severe groups.

General information including gender, age, history of hyperlipidaemia, and history of smoking and drinking were collected. Fasting blood samples were drawn within 48 hours after the onset of the disease, and serum was collected after it was centrifuged for the first time. The level of apoA-I was measured by immune transmission turbidimetry. Serum chemerin was measured by ELISA, while serum PCT was measured by automatic fluorescent enzyme labelling immunoassay. Serum apoA-I, chemerin, and PCT were compared among the mild, moderate and severe groups.

SPSS 25 was used for data analysis. Shapiro Wilk test was used for detecting normality of measurement data. Measurement data in accordance with normal distribution were expressed as mean ± SD, and one-way ANOVA analysis was used to compare the measurement data of three groups, and LSD-t test was used to compare the two groups. The counting data were expressed by n (%), and the comparision between groups was performed by chi square test. Pearson correlation analysis was used to explore correlation among serum apoA-I, chemerin, and PCT. The application value of serum apoA-I, chemerin, and PCT in the diagnosis of severe HLAP was used by receiver operating curve (ROC). The p value < 0.05 was statistically significant.

There was no significant difference in gender, age, history of hyperlipidaemia, and history of smoking and drinking among the patients in severe, moderate and mild groups (p =0.895, 0.053, 0.985, 0.664, 0.295, respectively) (Table-1).

As shown in Table 2, there were significant differences in serum apoA-I, chemerin, and PCT levels among the three groups (all p< 0.001). The

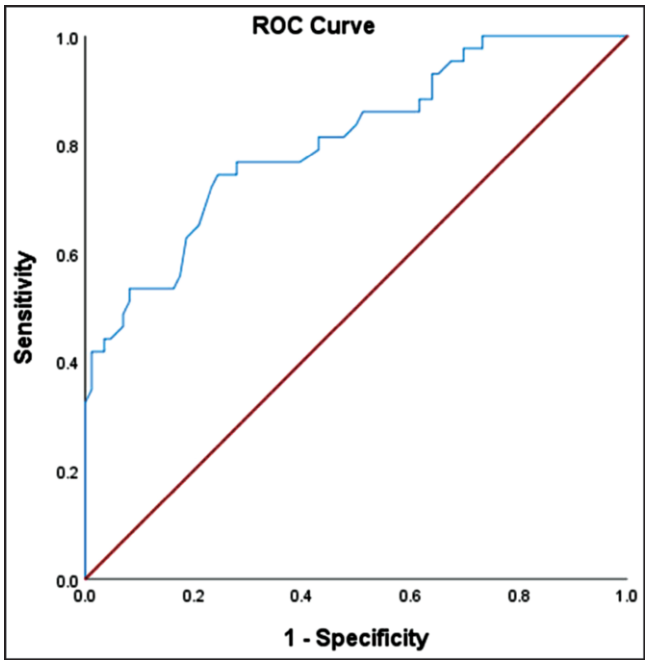

Figure-1: ROC curve of serum apoA-I in the diagnosis of severe HLAP.

level of serum apoA-I in the severe group was lower than that in the mild and moderate groups (both p< 0.001), and the level of serum apoA-I in the moderate group was lower than that in the mild group (p< 0.001, Table-2). The levels of serum chemerin and PCT in the severe group were higher than those in the mild and moderate groups (both p< 0.001, Table-2), and serum chemerin and PCT levels in moderate group were higher than those in the mild group (both p< 0.001, Table-2).

Pearson correlation analysis revealed that serum apoA-I

Table-1: Comparison of general information.

Index	Severe group (n=43)	Moderate group (n=40)	Mild group (n=46)	P value
Gender [Male, n (%)]	29 (67.44%)	28(70.0%)	30(65.2%)	0.895
Age (years)	41.16 (±6.59)	39.20 (±5.37)	38.09 (±5.85)	0.053
Hyperlipidaemia history [n(%)]	26(60.4%)	24(60.0%)	27 (58.7%)	0.985
Smoking history [n(%)]	21(48.8%)	17(42.5%)	24(52.2%)	0.664
Drinking history [n(%)]	23(53.5%)	25(62.5%)	21(45.6%)	0.295

Table-2: Comparison of serum apoA-I, chemerin and PCT.

Index	Severe group (n=43)	Moderate group (n=40)	Mild group (n=46)	P value
Serum apoA-I (g/L)	0.74 (±0.15)	1.04 (±0.21)	1.17 (±0.35)	<0.001
Serum chemerin (g/L)	629.31(±90.00)	544.53 (±32.21)	492.55 (±38.82)	<0.001
Serum PCT (g/L)	8.89 (±1.36)	7.23 (±0.45)	5.30 (±0.78)	<0.001

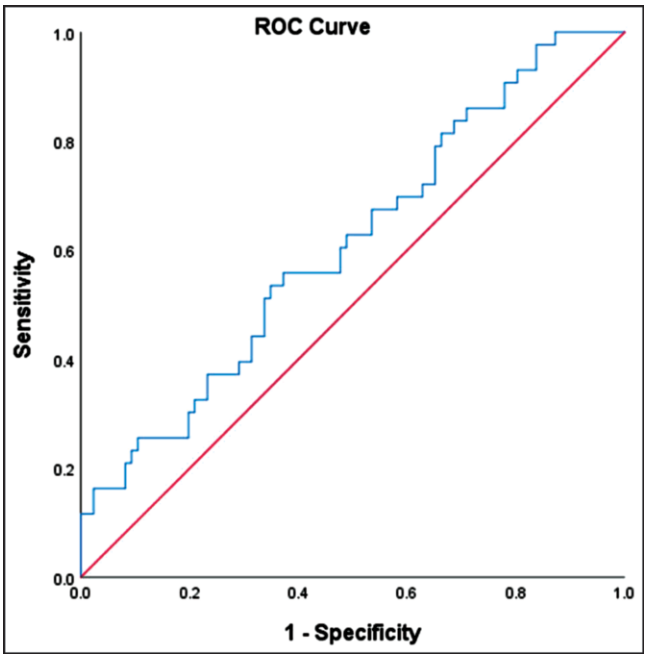

Figure-2: ROC curve of serum chemerin in the diagnosis of severe HLAP.

was negatively correlated with chemerin and PCT levels in severe group (r = -0.411, p = 0.006; r = -0.383, p = 0.011, respectively). There was a positive correlation between serum chemerin and PCT level in the severe group (r = 0.328, p = 0.032).

Results of ROC curve showed that the area under curve (AUC) of serum apoA-I in the diagnosis of severe HLAP was 0.808 (95% CI: 0.727-0.888, p <0.001). When the critical value of serum apoA-I was 0.800 g/ L, the diagnostic sensitivity and specificity were 0.628 and 0.814, respectively (Figure-1).

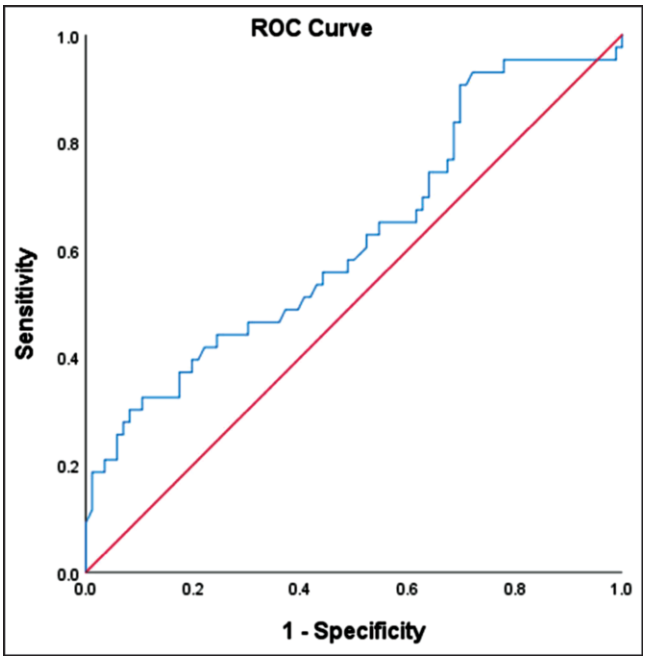

Figure-3: ROC curve of serum PCT in the diagnosis of severe HLAP.

The AUC of serum chemerin in the diagnosis of severe HLAP was 0.610 (95% CI: 0.508-0.712, p=0.042). When the critical value of serum chemerin was 551.82 μg/L, the diagnostic sensitivity and specificity were 0.558 and 0.628, respectively (Figure-2).

The AUC of serum PCT in the diagnosis of severe HLAP was 0.621 (95% CI: 0.516-0.727, p=0.025). When the critical value of serum PCT was 7.37 μg/L, the diagnostic sensitivity and specificity were 0.465 and 0.698, respectively (Figure-3).

The AUC of serum apoA-I in the diagnosis of severe HLAP was higher than it was in serum chemerin and PCT.

Conclusion

The study showed that serum apoA-I level in the severe group was lower than that in the mild and moderate groups, while serum apoA-I level in the moderate group was lower than that in the mild group; serum Chemerin and PCT level changes were the opposite. The study also observed that there was a negative correlation between serum ApoA-I and Chemerin and PCT in severe group and a positive correlation between serum Chemerin and PCT in severe group.

The results of ROC curve evaluation showed that the AUC of serum apoA-I in the diagnosis of severe HLAP was higher than that of serum Chemerin and PCT alone. In this study, the efficacy of serum chemerin and PCT in predicting the severity of HLAP was lower than that of apoA-I in the diagnosis of HLAP. In patients with HLAP, serum apoA-I, chemerin and PCT are closely correlated. The efficacy of serum apoA-I in the diagnosis of severe HLAP is higher than that of serum chemerin and PCT.

Disclaimer: None to declare.

Conflict of Interest: None to declare.

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