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LIPID DISTRESS SYNDROME IN PATIENTS WITH UNSTABLE ANGINA PECTORIS AND DIFFERENT GALLBLADDER CONDITIONS

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Abstract

Cholelithiasis and ischemic heart disease (IHD) are possibly connected by systemic lipid distress syndrome.
T**he aim of our paper** was to compare lipid metabolism parameters in patients with IHD on the background of different gallbladder (GB) conditions.
Methods. We analysed data from 116 patients with IHD, unstable angina pectoris, who were divided into groups according to GB condition (intact GB; sludge; bent GB body; signs of cholecystitis; cholelithiasis; cholecystectomy). Lipid distress syndrome was diagnosed according to lipidogram parameters.
Results. Lipid distress syndrome of different potency was present in all groups. Patients with sludge had the highest levels of total cholesterol (TC), β–lipoproteids (BLP), triglycerides (TG), very low density lipoproteins cholesterol (VLDL–C), atherogenic index of plasma (AIP), Castelli indexes I and II together with the lowest concentration of high density lipoproteins cholesterol (HDL–C). Patients after cholecystectomy were characterized by the lowest levels of TC, TG, VLDL–C and AIP. M/HDL–C ratio was the highest in case of bent GB body (1.75 times higher than in the intact GB group), which was accompanied by the higher levels of TG, BLP, VLDL–C and lower concentration of HDL–C.
Conclusions.The values of proatherogenic parameters in the sludge group were higher than in the intact GB group, whereas in the cholecystectomy group they were lower than in the intact GB group. Both Castelli indexes were the highest in patients with sludge and bent GB body; their increase was accompanied by the trend to hyperglycaemia.

Key words: Cholelithiasis, gall bladder, ischemic heart disease, lipid distress syndrome

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Introduction

Cholelithiasis and ischemic heart disease (IHD) are supposedly connected by the systemic lipid distress syndrome. The latter is based on such elements of pathogenesis as atherogenic dyslipidemia, increase of cholesterol in bile, and alterations of cholate–cholesterol ratio. The literature shows that in patients with a cholelithiasis lipid profile can improve after cholecystectomy (CE) [1–3]. In one study, low density lipoprotein cholesterol (LDL–C) significantly decreased in 2, 4, and 6 months; triglycerides (TG) increased in a week, but then lowered back to baseline values; high density lipoprotein cholesterol (HDL–C) insignificantly decreased; total cholesterol (TC) significantly decreased in 4 and 6 months, and TC/HDL–C ratio increased in a week and then significantly decreased in a year after surgery [4]. Atherogenic index of plasma (AIP) had also significantly decreased [5]. Nevertheless, lipid distress syndrome in various gallbladder (GB) conditionshas not been extensively studied.

The aim of this paper

The aim of this paper was to compare lipid metabolism parameters on the background of different gallbladder (GB) conditions in patients with IHD, namely, unstable angina pectoris.

Materials and methods

We analysed data from116 patients with IHD, unstable angina pectoris (58 males, 58 females, mean age 59.37±2.31 years), who were treated in the Cardiology department of Lviv Regional Hospital for 12.9 ± 0.5 days. The diagnosis and treatment of IHD were held according to the Ministry of Health of Ukraine Decree No. 436 dated 03.07.2006 "About approval of medical care protocols in "Cardiology" specialty". Patients were divided into groups according to GB condition, estimated with the help of an ultrasound [6]. The groups included group 0 – intact GB (n=44), group 1 – sludge (n=13), group 2 – bent GB body (n=7), group 3 – signs of cholecystitis (n=24), group 4 – cholelithiasis

(n=22), group 5 – condition after CE because of cholelithiasis (n=6). Lipid distress syndrome was diagnosed on the basis of routine lipidogram parameters, ratio of monocytes to LDL–C (M/LDL–C), and AIP and Castelli indexes I and II [7]. The digital data was processed with the help of Statistica 6.0 software (Statsoft, USA) after checking for normality (distribution was found to be Gaussian). The data was considered significant if the ρ–value was < 0.05 (intergroup differences are marked by indexes).

Results and discussion

It was revealed that unstable angina pectoris was significantly more often accompanied by altered GB than by intact ($62.50 \pm 4.50\%$ vs. $37.50 \pm 4.50\%$, $p < 0.05$). Absolute and calculated parameters of lipid profile showed that lipid distress was present in almost all groups, but its potency depended on the GB condition. The target level of TC (4.2 mmol/L) was almost reached only in patients of group 5, target level of TG (<1.70 mmol/L) – in groups 4 and 5, target level of HDL–C (males > 1.0 mmol/L, females > 1.3 mmol/L) – in groups 1 and Г2. Target values of LDL–C (< 2.5 mmol/L) and AIP (males < 2.64, females < 2.14) were not reached in any group (table 1).

Tab. 1: Parameters of lipid metabolism in patients with unstable angina pectoris and different GB conditions

Parameter, units	Group 0 (intact GB), n=44	Group 1 (sludge), n=13	Group 2 (bent GB body), n=7	Group 3 (signs of cholecystitis), n=24	Group 4 (cholelithiasis), n=22	Group 5 (CE in anamnesis), n=6
TC, mmol/L	5.13±0.17	5.54±0.67	4.77±0.28	5.07±0.28	4.86±0.27	4.41±0.64
BLP, units	46.61±1.88 $p_{0\text{-}1}$<0.05	69.42±10.15 $p_{0\text{-}1}$<0.05 $p_{1\text{-}2}$<0.05 $p_{1\text{-}3}$<0.05 $p_{1\text{-}4}$<0.05 $p_{1\text{-}5}$<0.05	48.29±2.90 $p_{1\text{-}2}$<0.05	43.73±3.24 $p_{1\text{-}3}$<0.05	41.14±2.43 $p_{1\text{-}4}$<0.05	42.33±3.08 $p_{1\text{-}5}$<0.05
TG, mmol/L	1.73±0.13 $p_{0\text{-}1}$<0.05	3.72±0.90 $p_{0\text{-}1}$<0.05 $p_{1\text{-}4}$<0.05 $p_{1\text{-}5}$<0.05	1.76±0.21	1.77±0.27	1.44±0.13 $p_{1\text{-}4}$<0.05	1.37±0.19 $p_{1\text{-}5}$<0.05
HDL-C, mmol/L	1.27±0.05 $p_{0\text{-}1}$<0.05	0.94±0.14 $p_{0\text{-}1}$<0.05 $p_{1\text{-}2}$<0.05 $p_{1\text{-}3}$<0.05	0.99±0.12 $p_{1\text{-}2}$<0.05 $p_{2\text{-}3}$<0.05	1.42±0.09 $p_{1\text{-}3}$<0.05 $p_{2\text{-}3}$<0.05 $p_{3\text{-}4}$<0.05	1.16±0.09 $p_{3\text{-}4}$<0.05	1.18±0.16
LDL-C, mmol/L	3.10±0.15	2.87±0.27	2.84±0.23	2.94±0.24	3.10±0.28	2.61±0.54
VLDL-C, mmol/L	0.77±0.06 $p_{0\text{-}1}$<0.05	1.67±0.41 $p_{0\text{-}1}$<0.05 $p_{1\text{-}2}$<0.05 $p_{1\text{-}3}$<0.05 $p_{1\text{-}4}$<0.05 $p_{1\text{-}5}$<0.05	0.80±0.10 $p_{1\text{-}2}$<0.05	0.70±0.10 $p_{1\text{-}3}$<0.05	0.65±0.06 $p_{1\text{-}4}$<0.05	0.62±0.09 $p_{1\text{-}5}$<0.05
M/HDL-C	4.49±0.55	3.92±1.14	7.70±1.66	5.22±0.83	5.74±0.68	4.36±1.89
AIP	3.23±0.20 $p_{0\text{-}1}$<0.05	5.27±0.74 $p_{0\text{-}1}$<0.05 $p_{1\text{-}3}$<0.05 $p_{1\text{-}4}$<0.05 $p_{1\text{-}5}$<0.05	3.62±0.52	2.82±0.26 $p_{1\text{-}3}$<0.05	3.40±0.26 $p_{1\text{-}4}$<0.05	2.77±0.28 $p_{1\text{-}5}$<0.05
Castelli I	4.21±0.20 $p_{0\text{-}1}$<0.05	6.26±0.74 $p_{0\text{-}1}$<0.05 $p_{1\text{-}3}$<0.05 $p_{1\text{-}4}$<0.05 $p_{1\text{-}5}$<0.05	5.64±0.86 $p_{2\text{-}3}$<0.05	3.69±0.26 $p_{1\text{-}3}$<0.05 $p_{2\text{-}3}$<0.05	4.42±0.26 $p_{1\text{-}4}$<0.05	3.77±0.29 $p_{1\text{-}5}$<0.05
Castelli II	2.57±0.15	3.31±0,39 $p_{1\text{-}3}$<0.05 $p_{1\text{-}5}$<0.05	3.29±0.38 $p_{2\text{-}3}$<0.05 $p_{2\text{-}5}$<0.05	2.16±0.20 $p_{1\text{-}3}$<0.05 $p_{2\text{-}3}$<0.05	2.80±0.21	2.17±0.24 $p_{1\text{-}5}$<0.05 $p_{2\text{-}5}$<0.05

Note: BLP - β-lipoproteids, VLDL-C – very low density lipoprotein cholesterol.

The sludge group differed from all other groups according to all analysed parameters. It was characterized by the highest concentrations of TC, TG, very low density lipoprotein cholesterol (VLDL–C), β–lipoproteids (BLP), AIP, Castelli indexes I and II, and the lowest level of HDL–C (table 1). The values of all lipid metabolism parameters (except HDL–C and M/HDL–C) in this group were higher than the parameters of intact GB group, which are represented in fig.1 as 100%. The most dramatic increase was noticed in TG, VLDL–C and Castelli index I (fig.1). Similar changes were described in pregnant women, but the difference did not reach asignificant level [8]. The maximal potency of lipid distress syndrome in the sludge group can play an important role in atherosclerosis progression, in particular, via hypertriglyceridemia and VLDL–C increase or via related unfavourable alterations of carbohydrate metabolism because Castelli index I, according to literature data, was associated with the development of type 2 diabetes mellitus more closely than LDL–C, HDL–C, TG and TC [9]. The latter association can be proven by the fact that in the sludge group fasting glucose level was the highest (7.09 ± 1.03 mmol/L vs 5.08 ± 0.21 in case of intact GB, ρ=0.07).

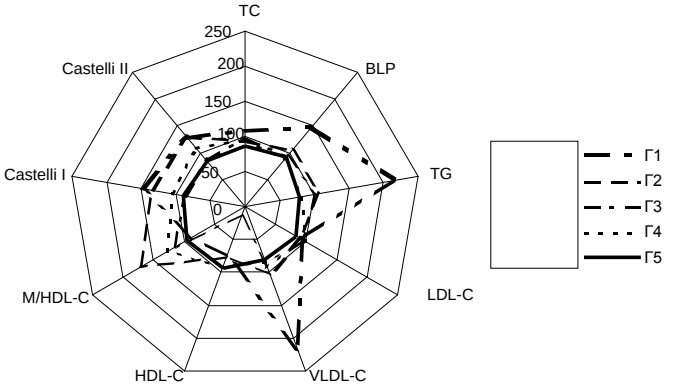

Fig. 2: Lipid profile in patients with unstable angina pectoris and different GB conditions (100% – intact GB, group 1 – sludge, group 2 – bent GB body, group 3 – signs of cholecystitis, group 4 – cholelithiasis, group 5 – CE in anamnesis)

Group 5 also significantly differed from all other groups. In patients with CE in anamnesis we foundthe lowest values of TC, TG, VLDL–C and AIP (table 1). Absolutely all lipid parameters in group 5 were lower than in patients with intact GB (fig.1).A decrease of LDL–C after CE can be partly explained by the increase of speed of bile acids and phospholipids excretion, regulated by the receptor of LDL–C – apolipoprotein B (ApoB), which leads to endocytosis of LDL–C from blood to hepatocytes. In hepatocytes LDL–C bind to lysosomes and promote TC delivery to the intracellular cholesterol depots, which leads to LDL–C decrease in the blood [2]. The decrease of TC after CE is considered to be a result of TG and phospholipids synthesis activation, improvement of bile characteristics, speeding up of enterohepatic circulation of cholesterol and bile acids, and promotion of endocytosis of lipid fractions [1, 2, 4]. According to the literature data, the TG level after CE increased

in a week after surgery but then lowered back to baseline level or went even lower [4]. This increase can be explained by such mechanisms: increase of TG usage as an energy source in the catabolic stage of surgical trauma; limitation of carbohydrates intake after surgery; release of catecholamines after surgical trauma of anaesthesia (these hormones activate triacylglycerol lipase, which leads to lipolysis with TG release); speeding up of lipolysis of subcutaneous fat as an answer to peri surgical glucose infusions, which is later counteracted by antilipolytic effect of glucose-induced hyperinsulinemia [1]. So, in our point of view, the lowest level of TG in the group 5 (by 20.8% in comparison to group 0) can be the defining criterion of cardiovascular risk in these patients.

According to our previous studies, calculated parameters of lipidogram (M/HDL–C, Castelli indexes I and II) correlated with various clinical, laboratory and instrumental parameters of analysed patients. Their associations with blood glucose level underline the importance of the normalization of the latter for cardiovascular prevention and treatment of these patients [7]. In the population of our study M/HDL–C ratio was the highest in case of bent GB body (1.715 in comparison to group 0), which was accompanied by the increase of TG, BLP, VLDL–C, both Castelli indexes and HDL-C decrease (by 22.1% in comparison to group 0). As M/HDL–C increase is shown to be linked to the slowdown of coronary blood flow [10], a higher prevalence of atrial fibrillation [11], a worsening of elastic properties of vessels [12]; it makes bent GB body an unfavourable background for cardiovascular diseases. Both Castelli indexes were the highest in case of sludge and bent GB body (fig. 1) and the lowest (even lower than in intact GB group) – after CE (group 5). It may prove the fact that in the case of sludge and GB body deformation there is the biggest amount of atherogenic LDL–C in circulation, which can lead to atherosclerosis progression and high cardiometabolic and diabetogenic risks.

Conclusions

1. All the analysed groups of patients with different GB condition were characterized by lipid distress syndrome of different potency.
2. Sludge was accompanied by the highest levels of TC, BLP, TG, VLDL–C, AIP, Castelli indexes I and II, and the lowest concentration of HDL–C. The values of all analysed parameters of the sludge group (except HDL–C and M/HDL–C) were higher than in the intact GB group.
3. The CE group was characterized by the lowest levels of TC, TG, VLDL–C and AIP among all groups including intact GB group.
4. The M/HDL–C ratio was the highest in case of bent GB body (1.715 times higher than in case of intact GB), which was accompanied by increased levels of TG, BLP, VLDL–C, and both Castelli indexes, and lower HDL–C (by 22.1% in comparison to intact GB group). Castelli indexes were the highest in case of sludge and bent GB body. High Castelli indexes were accompanied by the tendency to hyperglycaemia. Castelli indexes were lower than in intact GB group only after CE.

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