Determination of Serum Lipid Levels During Mid-Trimester Hypertonic Saline Solution Induced Abortion

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Abstract : *Lipid metabolism modifications during pregnancy are strictly correlated with changes of the hormonal factors which regulate it. Serum lipid levels rise during the progression of gestation and reach the peak at the end of pregnancy. Although these changes are reversible, the possible influence of elevated serum lipids on atherosclerotic and ischemic cardiovascular disease as well as biliary tract lithiasis development is still unresolved. The aim of this study was to investigate interrelationship between serum lipids during mid-trimester hypertonic saline solution induced abortion. Blood samples were taken from the cubital vein of 30 primigravid women, without any endocrine and metabolic disorders, ages 15-40, admitted for the mid-trimester pregnancy abortion, four times: I) before instillation intraamnion ultrasonographically guided hypertonic saline solution application (control), II) three hours after, III) in the active phase of abortion, and IV) twelve hours after the curettage. Quantitative assay was used for determination of total cholesterol, triglycerides, phospholipids, LDL and HDL, while apolipoprotein A1 and apolipoprotein B were determined by immunochemical methods. Three hours after instillation levels of cholesterol, phospholipids, HDL and apolipoprotein A1 were higher, while other lipids were lower, compared to the control group. During the abortion's active phase all lipid concentrations were higher, compared to the control ones, but only apolipoprotein B level was lower. Triglyceride was found to be on the same level as to that before the procedure. Twelve hours after curettage, serum lipid concentrations decreased, reaching control levels. Apolipoprotein A1 and apolipoprotein B were supposed to have a protective role against biliary tract disease development, while decreased proportions of LDL to HDL suggest that they are relevant to atherosclerosis development. (Thai J Obstet Gynaecol 1993;4:99-103.)*

Key words : hypertonic saline solution, mid-trimester pregnancy abortion, serum lipid levels

On the basis of bibliographic references and our own data, maternal hyperlipidemia at late gestation results from the juxtaposition of several factors: a) maternal hyperphagia and unmodified gut lipid absorption increasing chylomicron formation from dietary lipid, b) enhanced adipose

tissue lipolysis facilitating the availability to the liver of substrates for triglyceride synthesis, and c) reduced lipoprotein lipase activity in extrahepatic tissues, especially adipose tissue, which does not allow a triglyceride and other lipids removal proportional to their enhanced production[1].

According to the literature data about half of the pregnancies are terminated by abortion. During only one year about 35-55 million abortions were performed in the world while 84000 of women died due to pregnancy interruption complications[2]. It is also well known that mid-trimester pregnancy abortion can be performed by hypertonic saline solution as well as by prostaglandin or mifepristone given intramuscularly[3]. Mid-trimester pregnancy abortion has twenty times higher morbidity and mortality risk compared to the first trimester one[4].

Elevation of serum lipid levels during pregnancy is progressive and reversible[5,6]. Previous investigations confirmed that serum lipid concentrations rise during mid-trimester pregnancy abortion induced by prostaglandin and proposed that their investigation may be of use for the study of atherosclerotic and ischemic cardiovascular disease as well as for biliary tract lithiasis development. So, the aim of this research was to investigate serum lipid levels during mid-trimester pregnancy abortion induced by intraamnially application of hypertonic saline solution and to speculate their possible role in the pathogenesis of those diseases.

Materials and Methods

The study comprised of 40 primigravid women, without any endocrine or metabolic disorders, ages 15-40, admitted for mid-trimester pregnancy abortion for social reasons.

After the routine investigations on admission, gestational age was assessed by gynaecological and ultrasonographic examinations. Peripheral blood samples from the cubital vein were taken four times: before ultrasonographically guided intraamnially applied hypertonic saline solution instillation (I) (control group), three hours after that (II), in the active phase of abortion (III), and twelve hours after the placental expulsion and curettage (IV). The levels of total cholesterol, triglycerides, phospholipids, LDL and HDL were investigated by quantitative assays, while concentrations of apolipoprotein A1 and apolipoprotein B were determined by immunochemical methods. Obtained data were tested by variance analysis for attributive parameters.

Results

Concentrations of cholesterol, phospholipids, HDL and apolipoprotein A1 were slightly higher three hours after application of hypertonic saline solution compared to the controls, while levels of other investigated lipids were lower, but not significantly ($p>0.05$) (Table 1).

Table 1 Serum lipid levels during mid-trimester hypertonic saline induced abortion

	before intervention	*3 h after instillation*	*during abortion's active phase*	*12 h post abortion*
Cholesterol (mmol/l)	6.50 +/- 1.09	6.97 +/- 0.06	7.28 +/- 0.28	6.85 +/- 1.35
Triglycerides (mmol/l)	2.04 +/- 0.70	1.49 +/- 0.32	2.04 +/- 0.23	1.49 +/- 0.50
Phospholipides (mmol/l)	3.26 +/- 0.32	3.65 +/- 0.13	3.50 +/- 0.16	3.32 +/- 0.13
LDL (mmol/l)	3.57 +/- 1.06	3.38 +/- 0.30	3.73 +/- 0.21	3.16 +/- 0.38
HDL (mmol/l)	1.81 +/- 0.55	2.49 +/- 0.20	2.69 +/- 0.40	1.98 +/- 0.34
Apolipoprotein A_1 (g/l)	1.92 +/- 0.17	2.15 +/- 0.07	2.26 +/- 0.11	1.95 +/- 0.04
Apolipoprotein B (g/l)	1.51 +/- 0.35	1.38 +/- 0.10	1.46 +/- 0.03	1.32 +/- 0.06

During the active phase of abortion all serum lipid levels were higher compared to the controls ($p<0.05$), while only apolipoproteins B were slightly lower. Triglyceride concentrations were found to be the same as those before instillation.

Twelve hours after the placental expulsion and curettage, serum lipids were decreased compared to the previous respective sample concentrations. Serum lipid levels in this postabortive phase are comparable to those before the abortive procedure initiation.

Discussion

A significant alteration of maternal metabolism occurs during pregnancy. It seems certain that these changes are the result of feto-maternal interaction. This can be concluded from the fact that they are observed only during the period when the products of conception coexist within the mother and are almost completely reversed after delivery[7].

There is a relatively small number of investigations of serum lipid levels during mid-trimester pregnancy abortion. Changes of serum lipids during the abortion active phase is due to the stress effect on pituitary-adrenal axis, and elevation of ACTH and cortisol concentration in the serum[8].

In healthy persons, lipid metabolism modifications are strictly correlated with changes of the hormonal factors which regulate it[9]. During progression of gestation there is a steady and significant increase of serum cholesterol levels and LDL lipoproteins, but also a decrease of HDL lipids[10]. Maximal serum lipid concentrations are registered between the 33rd and 36th week of gestation[5].

Jimenez et al in 1988[6] found that HDL is in negative correlation with cholesterol and triglycerides during the second half of gestation. Our investigation confirmed significantly lower LDL to HDL levels after instillation. This finding may indicate a protective role of HDL in atherosclerosis and ischemic myocardial disease development, but biochemism of this protective mechanism is still unclear[11].

In a detailed study of serum lipids during hypertonic saline solution induced abortion Sane et al in 1983[12] found that serum cholesterol levels rose in the abortion's active phase and dropped sharply after termination of the abortion, as did the concentrations of phospholipids and triglycerides. However, we found that triglycerides in the active phase of abortion were on the same level as those before instillation, showing a slightly decrease three hours after initiation of the procedure and twelve hours after the curettage, while cholesterol and phospholipids showed the same trend as those in the cited papers. Steady increase of serum cholesterol levels during gestation is due to a progressive concentration rise of LDL. Composition of these lipoproteins is changed and manifested in decreased ratio of cholesterol and apolipoprotein B[10]. This finding is not in correlation with estrogen and progesterone levels rise. If the content of biliary cholesterol is a reflection of the serum concentration of this lipid, bile may be more lithogenic during pregnancy[13].

Investigating vascular disease risk factors, Carlton et al[14] proved that the increased proportion of LDL to HDL suggests that a person is exposed to an increased theoretical long term vascular risk. Phospholipids are very important for the metabolism of arachidonic acid, as a precursor of prostaglandins, prostacyclins and tromboxans[15]. Increase of serum phospholipid concentrations that we have found is due to degenerative and necrotic changes in feto-placental compartment. Apolipoprotein A1, a constitutive part of HDL and chilomicrons, stimulates hepatic lipoprotein lipase and is very important in cholesterol and HDL metabolism[16]. Clinical value of apolipoprotein A1 determination is still unresolved, but we found that its concentrations were almost the same after the abortion procedure was completed compared to those before the instillation. We must admit that, far from being clear, however, is our understanding of the underlying mechanisms. We propose that they have, besides an HDL, a protective role in atherosclerosis and ischemic myocardial disease as well as biliary tract lithiasis development. Zannis and Brsesloa[17] regarded the concentrations rise of apolipoprotein B to be due to LDL binding for their specific receptors. It was confirmed that elevated apolipoprotein B is more important for atherosclerotic changes of development in blood vessels than decreased concentrations of HDL[11].

In conclusion one can say that, although apolipoprotein A1 and

apoliporpotein B were supposed to have a protective role against biliary tract diseases development and the decreased ratio LDL/HDL suggests their relevance to atherosclerosis commencement. Serum lipid levels require further investigations for elucidation of pathophysiological changes during pregnancy.

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