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Original Research

Lipid indices in women blood serum before and after the procedure of removal of mature ovarian teratoma

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Summary

Purpose of Investigation: The aim of this study was to find new markers for detection of ovarian neoplasms. Authors decided to compare the lipid indicies in the blood serum of patients undergoing surgery treatment of mature ovarian teratomas. Lack of data on this subject in accessible literature was a stimulating factor for this study. *Materials and Methods:* The examinations covered two groups of women, each with 32 persons. Fasting blood serum gained from blood samples was analysed, marking before the surgical procedure, on the 7th day, six and 12 months after the procedure. Correlations between lipid indices changes HDL/TCH, HDL/LDL, and ApoA1/ApoB was analysed with use of Spearman correlation test. *Results:* In all parameters of the lipid metabolism and lipid indices, similar direction of changes - that is a trend direction, has been observed. *Conclusions:* Lipid indices showed their usefulness in preoperational monitoring, the effectiveness of treatment, and postoperative monitoring of mature ovarian teratomas.

Key words: Lipid index; Ovarian neoplasm; Ovarian teratoma; Blood serum; Lipid changes.

Introduction

Mature teratomas (teratoma adultum) occur in young women with a frequency of about 25% of all ovarian cancers [1–4]. They arise from moved germ cells and mostly occur in the form of dermoid cyst (cystis dermoidalis) containing thick fluid and mature tissues, such as tallow, hairs or bone tissues [5].

Clinical mature ovarian teratomas fall within benign germ-cell tumours, however in solid forms malignant character of the tumour can arise. Squamous cell carcinoma is the most common malignant tumour among mature teratomas [6, 7]. The diagnostics of mature ovarian teratomas is based mainly on gynaecological examination and transabdominal and via vagina ultrasound examination [8].

Lack of data on this subject (lipid indices) in accessible literature was a stimulating factor for this study. The purpose of the present work, with the use of previous examination results, is the diagnostic role of the selected lipid indices in the women blood serum, subject to the procedure of removal of mature teratomas [9, 10].

Materials and Methods

The examinations covered two groups of women, each with 32 persons. Research material derived from the 1st Department of Gynaecology, Medical University in Wroclaw.Group 1 consisted of healthy women at the average age of 25.2 years.

The criteria for inclusion in the examination were as follows: pathological changes have not been found in the gynaecological examination, no deviations from the norm in general urine examinations, complete blood count and enzymologic diagnostics, age between 18 and 34 years, and BMI between 19.2 and 26,5 kg/m^2

Criteria for exclusion from examinations were data gathered in the medical history concerning burdens of liver, kidneys, and bile ducts diseases. Group 1 patients remained on a varied diet that did not change during the past four weeks. It contained no medications, diet supplements, and slimming products. Women declared moderate physical activity.

Group 2 constituted patients operated due to cancerous changes within appendages (ovary, paroophoron, epoophoron, and other mesonephric structures). Teratoma adultum was found through the postoperative histopathological examination. The size of the tumour found in the gynaecological examination and confirmed with ultrasound examination was the indication for the operation. The size of operated tumours ranged between 5 and 23 cm in diameter. Group 2 patients remained on the primary hospital diet.

The research material was fasting blood taken from basilic vein in early morning hours. Serum gained from blood samples was analysed, marking before the surgical procedure (A), on the 7th day (B), six months (C), and 12 months after the procedure (D): A and B apolipoprotein concentration with immunoturbidimetric method with the use of reagents on an analyser, triacylglycerol (TG) with the enzymatic colorimetric method, lipoproteins of HDL cholesterol with precipitation method, and total cholesterol

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Table 1. — *The value of lipid indices in the examined women blood serum.*

		HDL/ TCH	HDL/ LDL	ApoA1/ ApoB
Group I (control group)		0.39±0.02	0.75 ± 0.05	2.03 ± 0.09
Group II (mature teratoma)	A. Before the procedure	0.31± 0.03	0.54±0.06	1.40±0.11
	B. the 7th day after the procedure	0.30±0.04	0.56±0.05	1.42±0.12
	C. 6 months after the procedure	0.31±0.03	0.59±0.04	1.50±0.10
	D. 12 months after the procedure	0.33±0.03	0.65±0.04	1.85±0.09

Table 2. — *Statistical analysis.*

	HDL/ TCH	HDL/ LDL	ApoA1/ ApoB
I: IIA	<0.001	<0.001	<0.001
IIA : IIB	NS	NS	NS
IIA : IIC	NS	NS	NS
IIA : IID	<0.001	<0.001	<0.001
IIB : IIC	NS	0.05	NS
IIB : IID	<0.001	<0.001	<0.001
IIC : IID	<0.001	<0.001	<0.001

Table 3. — *Correlation coefficient between lipid indices in the groups of the examined women.*

Lipid Index	**Correlation coefficient**				
	Group I	Group II			
		before the procedure A	7 days after the procedure B	6 months after the procedure C	12 months after the procedure D
HDL/LDL to HDL/TCH	0.847316	0.176566	0.594149	0.832613	0.899954
HDL/LDL to ApoA1/ ApoB	0.198708	0.010964	0.150628	0.163767	0.454692
HDL/TCH to ApoA1/ ApoB	0.222469	0.133222	0.154935	0.219338	0.556063

Table 4. — *Comparison of critical values of the distribution of the Student t-tested parameters in patients before and 12 months after the procedure (group 2) in comparison to the control group (group 1)*

	I/II A	I/II D	The direction of changes
HDL/LDL	0.001 t_α 15,21	0.001 t_α 8,83	↓
HDL/TCH	0.001 t_α 12,55	0.001 t_α 7,84	↓
$ApoA_1$/ApoB	0.001 t_α 25,07	0.001 t_α 8,00	↓

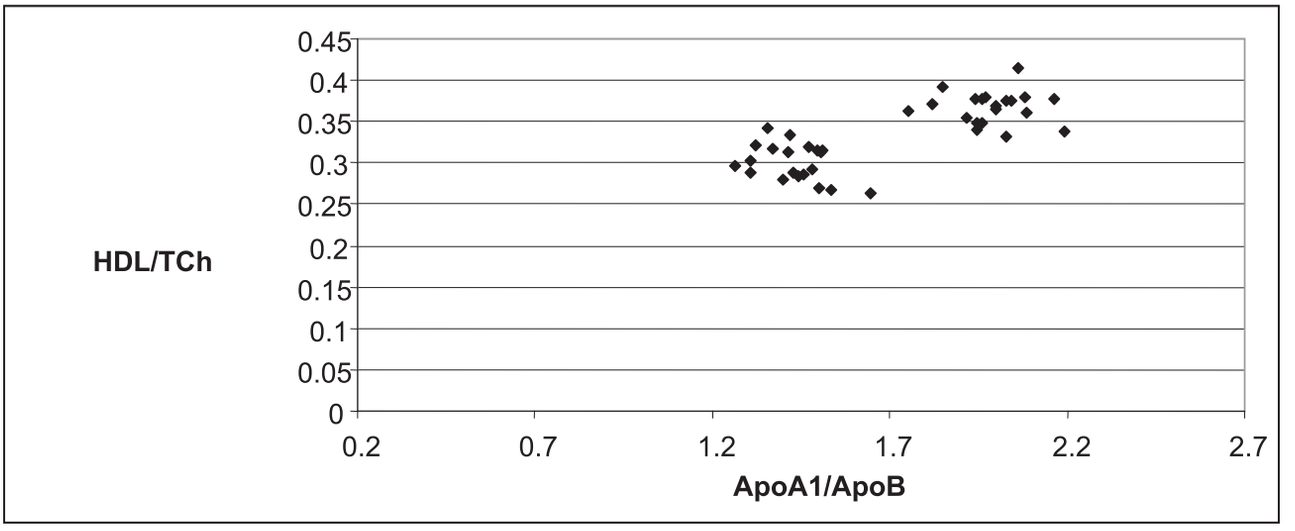

Figure 1. — Relation of ApoA1/ApoB index to HDL/TCh in groups of healthy women and women with teratoma adultum.

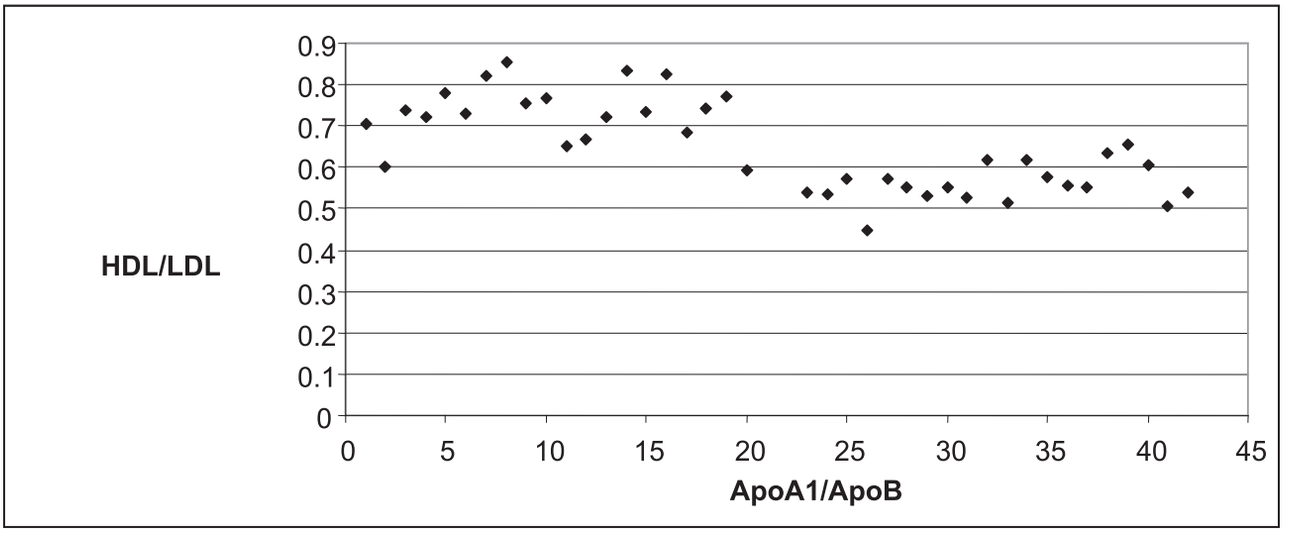

Figure 2. — Relation of ApoA1/ApoB index to HDL/LDL in groups of healthy women and women with teratoma adultum.

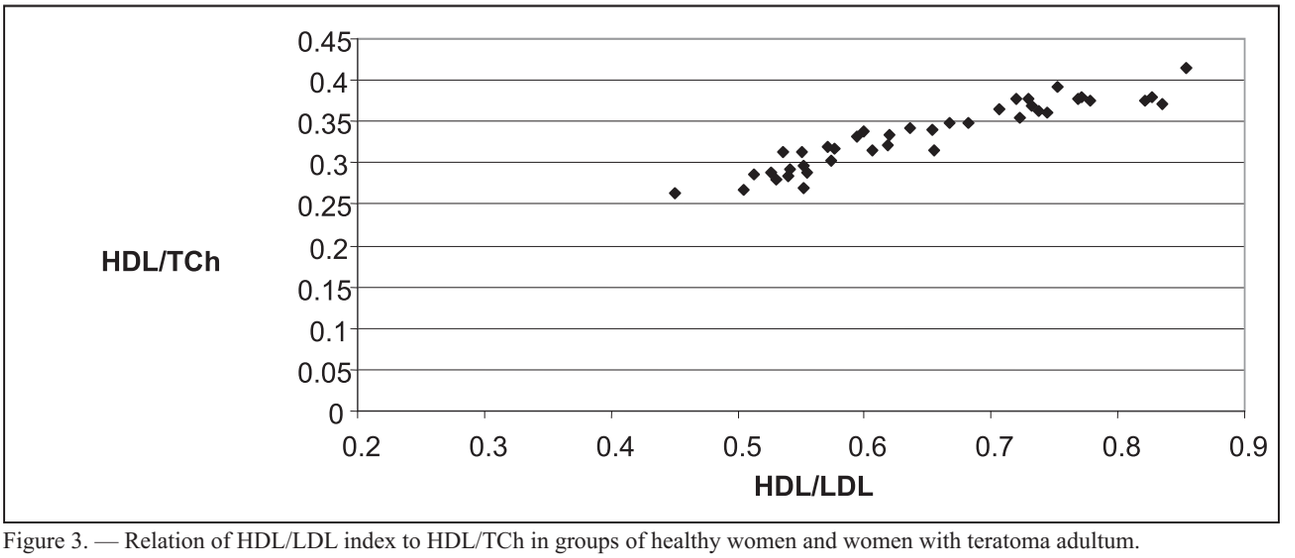

Figure 3. — Relation of HDL/LDL index to HDL/TCh in groups of healthy women and women with teratoma adultum.

(TCH) was measured with enzymatic oxidate method. Lipoprotein of LDL cholesterol was calculated from Friedewald formula.

On the basis of gained laboratory data, lipid coefficients are presented: 1) HDL/LDL, 2) HDL/TCH, and 3) ApoA1/ApoB. Obtained results are presented in the form of arithmetic means and standard deviations, and statistically analysed with the use of Student's *t*-test, parametric analysis for dependent groups including time after the surgery, and for independent groups with comparison critical t_α values with control group. Correlations between lipid indices changes was analysed with use of Spearman correlation test. The results were considered statistically significant at $p < 0.05$ in all the analyses.

Results

Table 1 presents the value of lipid indices HDL/TCH, HDL/LDL, and ApoA1/ApoB in the blood serum of women from groups 1 and 2. Table 2 presents the results of the statistical analysis for the tested groups. Statistically significant decrease has been found in the value of the tested indices at the significance level of $p < 0.001$ in women from group 2 (A) in comparison to group 1.

After the performed treatment (B) and after six months (C), no statistically significant changes were found in the tested indices. Twelve months after the procedure (D), statistically significant increase in the lipid indices ($p < 0.001$) were found in comparison to the preoperative examination (A) and examinations during B and C. Based on 100% value of indices at healthy persons, 12 months after the procedure (D), their percentage value equalled 85% for HDL/TCH, 87% for HDL/LDL, and 91% for ApoA1/ApoB, respectively.

Table 3 presents correlation coefficients between the tested lipid indices before and after the procedure (group 2) and with the data of healthy persons (group 1). When comparing the correlation coefficient, before the procedure (A), their lower values were found in comparison to the data from group 1. Similarly, lower values of these coefficients in comparison to group 1 were found seven days after the procedure (B) and six months after the procedure (C). Twelve months after the procedure (D), a higher value of the tested correlation coefficients was found in comparison to the data from group 1.

Table 4 presents comparison of critical values of distribution of Student's *t*-tested parameters and lipid indices at patients before group 2 (A) and after 12 months after the procedure group 2 (D) in comparison to the control group (group 1).

In all parameters of the lipid metabolism and lipid indices, similar direction of changes - that is a decreasing trend, was been observed. This indicates that critical values for groups 1/2 (D) scheme were lower in comparison to the critical values of groups 1/2 (A).

Figures 1, 2, and 3 present the dependence of lipid indices in the examined groups of healthy women and women with teratoma adultum. Among three relations, only ApoA1/ ApoB to HDL/ TCH scheme had a significant diagnostic value (Figure 1).

Discussion

Along with the development of surgical techniques in gynaecological oncology, diagnostically useful biochemical parameters are searched for. Among them, parameters of lipid metabolism including lipoproteins and apoproteins play an important part [9, 11–13]. Attention is drawn to the diagnostic value of lipid indices such as (HDL/LDL, HDL, TCH, and ApoA1/ApoB) [11, 14]. The value of the HDL/LDL index below 0.4 and HDL/TCH index below 0.2 indicate an increased illness risk, especially ischemic heart disease and atherosclerosis [4,15–17].

It can be considered that lipid indices meet stricter criteria in comparison to single parameters of lipid metabolism in diagnosis of a lot of illnesses [12,15,16]. On the basis of the present [9] and other authors' research, lipid indices have been calculated showing their postoperative changes and under the influence of diet and physical activity.

In the present research the usability of lipid indices was shown in women who underwent gynaecological surgeries during menopause [9] and with pathological changes within ovaries. The lipid index WS has recently been described, and it has been successfully used in ovarian cancer diagnostics [12, 17, 18].

Diagnostic differences have been found in the patients who were operated with reproductive organ-sparing as opposed to the group surgically deprived of this organ [13]. Wood *at al.* in turn, stated positive impact on the lipid profile both of diet and diet combined with physical exercises [10].

Comparison between the impact of physical activity and diet in women on the value of lipid indices reveals analogy to changes of the tested indices of the operated women with cancerous changes. Likewise, after the adjustment of the lifestyle favourable changes of lipid indices (especially HDL/LDL, ApoA1, and ApoB) occurred also after the surgical procedures - similar period of 12 months – an increase in all tested lipid indices was observed. It can be surmised that following months from the performed surgery will show a further increase in lipid indices along with a health improvement.

Conclusions

In this study lipid indices showed their usefulness in preoperational monitoring, in the effectiveness of treatment, and postoperative monitoring of ovarian tumours such as mature teratomas.

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