

## FEATURES OF ECHOCARDIOGRAPHY FINDINGS IN THYROTOXICOSIS SYNDROME

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**Annotation:** *The aim of the study was to study the features of ECHO CG findings in patients with thyrotoxicosis syndrome.*

### MATERIALS AND METHODS

60 patients with thyrotoxicosis syndrome were examined. Thyroid hormone background and echocardiography were examined.

### RESULTS

DTG was diagnosed in 50% of patients. In the general group, there is a significant decrease in the findings of EDV and ESV and a significant decrease in the ratio of peaks E and A in relation to control.

### CONCLUSIONS

ECHO CG changes are characteristic already at the stage of subclinical thyrotoxicosis.

**Keywords:** *thyrotoxicosis, echocardiography, thyroid hormones.*

### INTRODUCTION

Many patients with thyrotoxicosis have clinical features that reflect the effect of an excess of thyroid hormones on the cardiovascular system. Thyrotoxicosis can worsen a pre-existing heart disease, and can also lead to atrial fibrillation, congestive heart failure or exacerbation of angina pectoris. In elderly patients, these cardiac manifestations may dominate in the clinical picture and require measuring the concentration of thyrotropin in the blood serum. In the absence of pre-existing heart diseases, treatment of thyrotoxicosis usually leads to the restoration of normal cardiac function. Since atrial fibrillation may be the only manifestation of thyrotoxicosis, an excess of thyroid hormones should be regularly excluded in patients with this rhythm disorder. Heart failure occurs mainly in the presence of an underlying heart disease or tachycardia-induced cardiomyopathy in patients with long-standing atrial fibrillation.

**The aim** of the study is to identify and study the features of ECHO CG findings at various clinical stages of the disease.

## MATERIALS AND METHODS

60 patients with thyrotoxicosis syndrome were examined. The average age of the patients was  $44.8 \pm 2.14$  years. Anamnesis and complaints were collected from all patients. Hormonal background (TSH, free T4, free T3, Anti-TPO, antibodies to TSH receptors – for diagnosis), ultrasound of the thyroid gland, pulse, heart rate, BP, ECHOCG findings were studied.

According to the results of our studies, thyrotoxicosis syndrome was found in 50% of cases with DTG, in 16% with AIT, in 7% with toxic thyroid adenoma, in 12% of cases with multi-nodular goiter and 15% with mixed goiter. DTG affected 53.3% of women and 46.7% of men from among all patients with DTG; MNG – in 100% of cases occurred in women; TTA and AIT in men in 20% of cases, in women in 80% with both pathologies, MG in 33% of cases was in men, in 66.7% - in women (Table 1).

Table 1. Distribution of patients depending on sex and the pathology of the thyroid gland encountered

	DTG (n=30)	AIT (n=10)	TTA (n=4)	MNG (n=7)	MG (n=9)
Men %	46.7	20	20	-	33,3
Women %	53,3	80	80	100	66,7

Note: n is the number of examined patients

According to the clinical stage, 16 patients were in the stage of subclinical thyrotoxicosis, 44 patients in overt thyrotoxicosis. The most frequent complaint of patients with thyrotoxicosis from the cardiovascular system was a complaint of palpitations, the cause of which in most cases was sinus tachycardia (87%). The peculiarity of tachycardia is that it does not change when the patient's body position changes, does not disappear during sleep, with little physical exertion, the heart rate increases sharply, and the recovery of the original rhythm is very slow. In 4 patients with thyrotoxicosis, the leading ones were interruptions in the work of the heart with the background of palpitations. Patients also complained of increased pulsation in the neck, head, and abdomen. Complaints of heart pain were observed in 66,7 % of patients, angina pectoris were observed in 18 patients, appearing in patients under the age of 40 and older, equally often had the character of angina pectoris of tension and rest. In all patients, complaints from the heart began to bother after the onset of the disease. When examining patients, there is an increase in the apical pulse, an increase in heart sounds, a split of the second sound over the pulmonary artery. During auscultation, functional systolic murmur is also detected at the apex of the heart, at the V point and on the pulmonary artery. The borders of the heart were enlarged to the left.

The picture of changes in heart rate and blood pressure findings in individuals with overt and subclinical thyrotoxicosis compared with the control was studied. Thus, (Table 2)

with overt thyrotoxicosis, the heart rate averaged  $105.95 \pm 1.69$  per minute, while the BP findings were  $149.1 \pm 2.12$  mmHg. systolic and  $87.3 \pm 21.03$  mmHg. diastolic pressure. These findings were reliable compared to the control group. In subclinical thyrotoxicosis, these indicators corresponded to  $103.3 \pm 3.22$  per minute and  $144.7 \pm 4.12$  mmHg. systolic and  $86.9 \pm 2.41$  mmHg. diastolic pressure, which were also reliable relative to the control group.

Table 2.

Hemodynamic parameters in patients with various forms of thyrotoxicosis

	Control group (n=20)	Subclinical thyrotoxicosis (n= 16 )	Overt thyrotoxicosis (n=44)
HR beat/min	72,6±1,03	103,3±3,22*	105,95±1,69*
Systolic BP (mmHg)	113,25±2,33	142,7±4,12*	149,1±2,12*
Diastolic BP (mmHg)	68,25±1,63	70,9±1,39	75,2±1,00

Note: n is the number of examined patients;

\*-the presence of reliability in relation to the control (\*p<0.0005)

When analyzing the data of the ECHO CG study in patients with thyrotoxicosis syndrome, it is clear that in the general group of patients there is a significant decrease in the indicators of EDV and ESV and a significant decrease in the ratio of peaks E and A in relation to the control group (Table.3)

Table 3

Changes in ECHO CG parameters in patients with thyrotoxicosis.

	Control group (n=20)	Number of patients (n=60)
IVS	0,86±0,03	1,01±0,02*
EDV	4,33±0,16	4,84±0,06*
PWLV	0,89±0,02	0,98±0,02*
ESS	2,86±0,10	3,57±0,51
EDV	123,4±2,15	107,8±3,55*
ESV	55,9±2,31	37,7±1,38*
SV	70,4±1,83	71,6±2,23
EF	61,6±1,43	64,7±0,79

PEAK E	0,82±0,03	0,52±0,02*
PEAK A	0,39±0,01	0,74±0,02*
E/A	2,08±0,08	0,73±0,04*

Note: n is the number of examined patients;

\*-the presence of reliability in relation to the control (\*p<0.05)

According to two-dimensional echocardiography, there were no cases of dysfunction of local LV contractility.

The EDV of LV figure in patients with thyrotoxicosis (107.8±3.55\*) was significantly lower than in the control group (123.4±2.15ml; p<0.05). The mean ESV of LV in patients was also significantly lower (37.7±1.38\*) than in the control group (55.9±2.31ml; p<0.05). Indexed EDV and ESV of LV in patients with thyrotoxicosis syndrome had statistically significant differences compared with the data of the control group (p<0.05).

Analysis of ECHOCG findings in patients with thyrotoxicosis, depending on the clinical form, showed that in the overt form, the indicators of EDV and ESV, PEAK E, E/A ratio were significantly reduced. In the subclinical form, the findings of IVS, PEAK A were significantly increased and there was a significant decrease in ESV. It can be seen that the maximum changes are characteristic of the overt form of thyrotoxicosis, although signs reflecting ventricular afterload are already noted in subclinical thyrotoxicosis (Table 4).

Table 4

LV findings in the examined patients depending on the form of thyrotoxicosis

	Overt thyrotoxicosis (n=44)	Subclinical thyrotoxicosis (n=16)	Control group (n=20)
IVS	1,01±0,03*	1,01±0,12*	0,86±0,03
EDS	4,88±0,08*	4,75±0,08*	4,33±0,16
PWLF	0,99±0,02*	0,95±0,03	0,89±0,02
ESS	3,08±0,06	4,79±1,79	2,86±0,10
EDV	109,6±4,56*	103,4±4,88*	123,4±2,15
ESV	38,7±1,69*	35,3±2,26*	55,9±2,31
SV	73,1±2,68	67,9±3,95	70,4±1,83
EF	64,3±0,83	65,6±1,86	61,6±1,43
PEAK E	0,51±0,02*	0,56±0,05*	0,82±0,03
PEAK A	0,75±0,02*	0,74±0,05*	0,39±0,01
E/A	0,71±0,05*	0,77±0,07*	2,08±0,08

Note: n is the number of examined patients;

\*-the presence of reliability in relation to the control (\*p < 0.05)

According to the formula RB Devereux, N Reicheck (1977) and Dubois D (1975) calculated the mass of the left ventricle, the mass index of the left ventricle and the

relative thickness of the walls of the left ventricle. The findings were significantly reduced in relation to the control group (Table 5)

Table 5

Parameters of the left ventricle in the examined groups of patients

Findings	All patients (n=60)	Control group (n=20)
Myocardial mass, g	414,2±12,6*	110±8,9
Myocardial mass index	65,5±4,5*	68,9±9,8
RWT (Relative wall thickness)	0,40±0,01 *	0,43±0,02
EDV ml	107,8±3,55*	123,4±2,15
ESV ml	37,7±1,38*	55,9±2,31
EF %	64,7 ±0,79*	61,6±1,43

#### CONCLUSIONS

1. 50% of patients with thyrotoxicosis syndrome suffered from DTG
2. Changes in hemodynamic parameters and ECHOCG findings are noted already with subclinical thyrotoxicosis.
3. There is a need in patients with heart pathology to check the thyroid status and carry out hormonal corrections.

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