ECHOCARDIOGRAPHIC DIFFERENCES BETWEEN THE MILD FORM OF SUBCLINICAL HYPOTHYROIDISM AND HEALTHY SUBJECTS

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BACKGROUND

Treatment of subclinical hypothyroidism (ScH) when TSH is between the upper reference value and 7mU/L, especially in pts <65 years is controversial.

OBJECTIVES

To compare the risk factors for atherosclerosis and echocardiographic parameters in patients with ScH1 (4,2≤TSH≤7mU/L) to euthyroid subjects and patients with ScH2 (TSH>7mU/L).

MATERIAL AND METHODS

Prospectively 54 consecutive pts with newly diagnosed ScH (19 with TSH≤7mU/L (ScH1) and 35 with TSH>7mU/L (ScH2)) started for the first time with levothyroxine therapy (LT-4), and 30 healthy subjects were included. Laboratory analyses and an echocardiography study were done at the first visit and after 5 months in a euthyroid stage in patients with ScH. The results are presented as mean±SD and percentage. NS: non-significant. * chi-square test, Yates correction.

RESULTS AND DISCUSSION

Table 1. Differences in echocardiographic parameters between control and ScH1 group

	Control group	4,2≤TSH≤7mU/L	Statistical significance
	n=30	n=19	
Sex (m:f)	3 : 27 (10%)	0	NS*
Age (years)	39,3 ± 11,7	45,1±12,3	NS
BMI (kg/m2)	24,3 ± 3,0	26,4 ±3,7	NS
TSH mU/L	1,7 ± 1,05	6,3 ± 1,0	p<0,001
fT4 pmol/L	15,4 ± 2,2	12,1 ± 21,6	p<0,01
fT3 pmol/L	5,2±2,1	4,4±1,3	p<0,05
LA area (cm^2)	13,7±1,8	12,9±3,6	NS
LA (mm)	31,7±3,1	31,7±3,6	NS
LAVI (ml/m^2)	24,43±4,31	21,98±5,79	NS
LVEDd (mm)	46,0±4,8	46,6±4,7	NS
LVED vol (ml^3)	79,1±11,9	85,3±18,4	NS
LVES vol (ml^3)	31,3±7,0	31,9±9,3	NS
EF (%)	62,8±2,3	61,9±5,2	NS
FS (%)	33,9±2,5	32,9±2,9	NS
IVS (mm)	10,4±1,1	10,8±0,9	NS
PW (mm)	8,7±1,2	8,7±1,2	NS
E/A (m/sec)	1,26±0,36	1,05±0,25	p<0,05
DT(msec)	156,8±29,7	173,0±44,5	NS
E/e' sep.	6,04±1,64	8,56±2,63	p<0,01
E/e' lat.	6,08±1,24	6,55±1,61	NS
E/e' average	6,06±1,24	7,40±2,11	p<0,01
A dur (msec)	117,9±16,8	112,57±15,73	NS
Ar dur (msec)	98,64±14,4	89,21±14,95	p<0,01
IVCT (msec)	60,04±10,9	67,26±11,4	p<0,01
IVRT (msec)	66,39±8,3	69,47±14,04	NS
MPI	0,43±0,07	0,47±0,09	p<0,05
s/d	1,26±0,11	1,29±0,14	NS
MR	7/30 (23,3%)	1/19 (5,3%)	NS *
Ao	1/30 (3,3%)	0	NS *
pericarditis	6/30 (20%)	4/19 (21,0%)	NS *
GLS (%)	-20,9%±1,7	-19,34±2,0	p<0,001
S/TDI (msec)	0,092±0,011	0,074±0,01	p<001
Ar-A	18,87±10,78	23,4±14,3	NS

Statistically significant changes in E/A, E/e' sep., E/e' average, and duration of LA filling go in addition to initial changes in the diastolic function of the LV.

Table 2. Differences in echocardiographic parameters between control and ScH2 group

	Control group	TSH>7,0mU/L (ScH2 group)	Statistical significance
	n=30	n=35	
Sex (m:f)	3 : 27 (10%)	2/35 (5,7%)	NS*
Age (years)	39,3 ± 11,7	43,1±12,4	NS
BMI (kg/m2)	24,3 ± 3,0	26,7 ±4,2	NS
TSH mU/L	1,7 ± 1,05	8,1 ± 2,3	p<0,001
fT4 pmol/L	15,4 ± 2,2	12,3 ± 2,0	p<0,01
fT3 pmol/L	5,2±2,1	4,5±1,1	p<0,05
LA area (cm^2)	13,7±1,8	13,1±2,7	NS
LA (mm)	31,7±3,1	31,3±3,9	NS
LAVI (ml/m^2)	24,43±4,31	21,92±5,74	NS
LVEDd (mm)	46,0±4,8	46,4±4,3	NS
LVED vol (ml^3)	79,1±11,9	81,7±18,4	NS
LVES vol (ml^3)	31,3±7,0	31,6±7,8	NS
EF (%)	62,8±2,3	61,6±4,4	NS
FS (%)	33,9±2,5	33,6±3,2	NS
IVS (mm)	10,4±1,1	10,8±0,9	NS
PW (mm)	8,7±1,2	8,7±1,2	NS
E/A (m/sec)	1,26±0,36	1,03±0,29	p<0,01
DT(msec)	156,8±29,7	167,94±38,6	NS
E/e' sep.	6,04±1,64	7,62±2,29	p<0,05
E/e' lat.	6,08±1,24	6,35±1,62	NS
E/e' average	6,06±1,24	6,98±1,9	NS
A dur (msec)	117,9±16,8	112,18±17,2	NS
Ar dur (msec)	98,64±14,4	86,94±15,9	p<0,01
IVCT (msec)	60,04±10,9	64,14±13,4	NS
IVRT (msec)	66,39±8,3	67,27±13,7	NS
MPI	0,43±0,07	0,47±0,08	p<0,05
d/s	1,26±0,11	1,26±0,16	NS
MR	7/30 (23,3%)	7/54 (12,9%)	NS *
Ao	1/30 (3,3%)	0	NS *
pericarditis	6/30 (20%)	15/54 (27,8%)	NS *
GLS (%)	-20,9%±1,7	-19,55±2,3	p<0,001
S/TDI (msec)	0,092±0,011	0,077±0,013	p<001
Ar-A	18,87±10,78	25,2±16,1	p=0,08

ScH2 vs.control group indicate initial changes in the systolic (longitudinal dysfunction) and diastolic function of the LV.

Table 3. The difference in echocardiographic parameters between ScH1 and ScH2 groups before L-T4 therapy

	Patients with ScH before L-T4 therapy (n=54)		Statistical significance
	TSH≤7,0mU/L n=19	TSH>7,0mU/L n=35	
Age (years)	45,1±12,3	42,1±12,5	NS
BMI (kg/m2)	26,4 ±3,7	26,9 ±4,5	NS
TSH mU/L	6,3 ± 1,0	9,1 ± 2,1	p<0,001
fT4 pmol/L	12,1 ± 21,6	12,5 ± 2,2	NS
fT3 pmol/L	4,4±1,3	4,6±0,9	NS
LA area (cm^2)	12,9±3,6	13,1±2,1	NS
LA (mm)	31,7±3,6	31,1±4,2	NS
LAVI (ml/m^2)	21,98±5,8	21,92±5,7	NS
LVEDd (mm)	46,6±4,7	45,2±4,2	NS
LVED vol (ml^3)	85,3±18,4	79,8±18,4	NS
LVES vol (ml^3)	31,9±9,3	31,3±6,9	NS
EF (%)	61,9±5,2	61,5±3,9	NS
FS (%)	32,9±2,9	33,9±3,4	NS
IVS (mm)	10,8±0,9	10,7±1,0	NS
PW (mm)	8,7±1,2	8,7±1,2	NS
E/A (m/sec)	1,05±0,25	1,01±0,31	NS
DT(msec)	173,0±44,5	165,2±35,2	NS
E/e' sep.	8,56±2,63	7,11±1,93	p<0,05
E/e' lat.	6,55±1,61	6,25±1,64	NS
E/e' average	7,40±2,11	6,31±1,69	p<0,05
A dur (msec)	112,57±15,73	111,97±18,2	NS
Ar dur (msec)	89,21±14,95	85,71±16,50	NS
IVCT (msec)	67,26±11,4	62,45±14,25	p<0,01
IVRT (msec)	69,47±14,04	66,08±13,62	NS
MPI	0,47±0,09	0,46±0,09	NS
d/s	1,29±0,14	1,25±0,18	NS
MR	1/19 (5,3%)	4/35 (11,4%)	NS *
Ao	0	0	NS *
pericarditis	4/19 (21,0%)	11/35 (31,4%)	NS *
GLS (%)	-19,34±2,0	-19,66±2,0	p<0,05
S/TDI (msec)	0,074±0,01	0,079±0,01	NS
Ar-A	23,4±14,3	26,3±17,2	p<0,01

Statistically significant changes in parameters indicative of initial diastolic dysfunction and involvement of longitudinal LV function in patients with a TSH ≤7.0mU/L

Table 4. The difference in echocardiographic parameters between ScH1 and ScH2 groups after L-T4 therapy

	Patients with ScH after L-T4 therapy (n=54)		Statistical significance
	TSH≤7,0mU/L n=19	TSH>7,0mU/L n=35	
Age (years)	45,1±12,3	42,1±12,5	NS
BMI (kg/m2)	25,3 ±3,9	26,0 ±4,5	NS
TSH mU/L	2,4±0,7	2,2±1,1	NS
fT4 pmol/L	14,6±1,4	14,9±1,7	NS
fT3 pmol/L	5,0±0,6	5,3±0,8	NS
LA area (cm^2)	13,2±2,1	13,1±2,1	NS
LA (mm)	31,9±3,6	31,6±4,1	NS
LAVI (ml/m^2)	20,8±5,4	20,5±5,4	NS
LVEDd (mm)	45,6±4,5	45,6±3,9	NS
LVED vol (ml^3)	82,7±16,1	77,1±19,8	NS
LVES vol (ml^3)	30,7±6,4	30,5±6,7	NS
EF (%)	63,1±4,6	62,8±3,6	p<0,01
FS (%)	34,1±2,3	33,0±2,3	p<0,01
IVS (mm)	10,9±1,0	10,7±1,0	NS
PW (mm)	8,7±1,2	8,7±1,1	NS
E/A (m/sec)	1,01±0,24	1,13±0,39	NS
DT(msec)	163,6±31,3	155,8±32,8	NS
E/e' sep.	7,21±2,23	6,27±1,92	p<0,05
E/e' lat.	6,40±1,9	5,84±1,64	NS
E/e' average	6,96±1,92	6,02±1,69	NS
A dur (msec)	111,26±12,80	105,07±14,91	NS
Ar dur (msec)	85,78±9,76	82,85±14,54	NS
IVCT (msec)	59,42±9,57	60,77±14,27	NS
IVRT (msec)	65,05±12,12	64,97±13,43	NS
MPI	0,43±0,05	0,43±0,08	NS
d/s	1,31±0,27	1,22±0,17	NS
MR	2/19 (10,5%)	4/35 (11,4%)	NS*
Ao	1/19 (5,3%)	0	NS*
pericarditis	6/19 (31,6%)	7/35 (20,0%)	NS*
GLS (%)	-19,97±3,0	-20,12±2,0	NS
S/TDI (msec)	0,077±0,009	0,079±0,01	NS
Ar-A	25,5±8,02	22,2±9,5	NS

Table 5. Difference in echocardiographic parameters before and after L-T4 therapy in patients with ScH with TSH ≤7.0 mU/L (ScH1 group)

	TSH≤7,0mU/L (ScH1 group) (n=19)		Statistical significance
	Before therapy	After therapy	
Age (years)	45,1±12,3	45,1±12,3	NS
BMI (kg/m2)	26,4 ±3,7	25,3 ±3,9	NS
TSH mU/L	6,3 ± 1,0	2,4±0,7	p<0,001
fT4 pmol/L	12,1 ± 21,6	14,6±1,4	p<0,01
fT3 pmol/L	4,4±1,3	5,0±0,6	p<0,01
LA area (cm^2)	12,9±3,6	13,2±2,1	NS
LA (mm)	31,7±3,6	31,9±3,6	NS
LAVI (ml/m^2)	21,9±5,8	20,5±5,4	NS
LVEDd (mm)	46,6±4,7	45,6±4,5	NS
LVED vol (ml^3)	85,3±18,4	82,7±16,1	NS
LVES vol (ml^3)	31,9±9,3	30,7±6,4	NS
EF (%)	61,9±5,2	63,1±4,6	p<0,05
FS (%)	32,9±2,9	34,1±2,3	p<0,05
IVS (mm)	10,8±0,9	10,9±1,0	NS
PW (mm)	8,7±1,2	8,7±1,2	NS
E/A (m/sec)	1,05±0,25	1,01±0,24	NS
DT(msec)	173,0±44,5	163,6±31,3	NS
E/e' sep.	8,56±2,63	7,21±2,23	p<0,05
E/e' lat.	6,55±1,61	6,40±1,9	NS
E/e' average	7,40±2,11	6,96±1,92	p<0,05
A dur (msec)	112,57±15,73	111,26±12,80	NS
Ar dur (msec)	89,21±14,95	85,78±9,76	NS
IVCT (msec)	67,26±11,4	59,42±9,57	p<0,05
IVRT (msec)	69,47±14,04	65,05±12,12	NS
MPI	0,47±0,09	0,43±0,05	p<0,05
d/s	1,29±0,14	1,31±0,27	NS
MR	1/19 (5,3%)	2/19 (10,5%)	NS *
Ao	0	1/19 (5,3%)	NS *
pericarditis	4/19 (21,0%)	6/19 (31,6%)	NS *
GLS (%)	-19,34±2,0	-19,97±3,0	NS
S/TDI (msec)	0,074±0,01	0,077±0,009	NS
Ar-A	23,4±14,3	26,3±17,2	NS

Table 6. Difference in echocardiographic parameters before and after L-T4 in pts with ScH with TSH>7,0 mU/L

	TSH>7,0mU/L (ScH2 group) (n=35)		Statistical significance
	Before therapy	After therapy	
Age (years)	42,1±12,5	42,1±12,5	NS
BMI (kg/m2)	26,9 ±4,5	26,0 ±4,5	NS
TSH mU/L	9,1 ± 2,1	2,2±1,1	p<0,001
fT4 pmol/L	12,5 ± 2,2	14,9±1,7	p<0,01
fT3 pmol/L	4,6±0,9	5,3±0,8	p<0,01
LA area (cm^2)	13,1±2,1	13,1±2,1	NS
LA (mm)	31,1±4,2	31,6±4,1	NS
LAVI (ml/m^2)	21,9±5,7	20,8±5,4	NS
LVEDd (mm)	45,2±4,2	45,6±3,9	NS
LVED vol (ml^3)	79,8±18,4	77,1±19,8	NS
LVES vol (ml^3)	31,3±6,9	30,5±6,7	NS
EF (%)	61,5±3,9	62,8±3,6	p<0,05
FS (%)	33,9±3,4	33,0±2,3	NS
IVS (mm)	10,7±1,0	10,7±1,0	NS
PW (mm)	8,7±1,2	8,7±1,1	NS
E/A (m/sec)	1,01±0,31	1,13±0,39	p<0,05
DT(msec)	165,2±35,2	155,8±32,8	NS
E/e' sep.	7,11±1,93	6,27±1,92	p<0,05
E/e' lat.	6,25±1,64	5,84±1,64	NS
E/e' average	6,31±1,69	6,02±1,68	p<0,05
A dur (msec)	111,97±18,2	105,07±14,91	p<0,05
Ar dur (msec)	85,71±16,50	82,85±14,54	NS
IVCT (msec)	62,45±14,25	60,77±14,27	p<0,05
IVRT (msec)	66,08±13,62	64,97±13,43	NS
MPI	0,46±0,09	0,43±0,08	p<0,05
d/s	1,25±0,18	1,22±0,17	NS
MR	4/35 (11,4%)	4/35 (11,4%)	NS *
Ao	0	0	-
pericarditis	11/35 (31,4%)	7/35 (20,0%)	NS *
GLS (%)	-19,66±2,0	-20,12±2,0	NS
S/TDI (msec)	0,079±0,01	0,079±0,01	NS
Ar-A	26,3±17,2	22,2±9,5	p<0,05

In those with a lower initial value of TSH, LV systolic function improves more easily, but certain parameters that refer to diastolic dysfunction (E/e' sep.) improved in the group with a higher initial TSH value.

The analysis of both groups (table 5 and 6) after therapy, shows that E/e' sep improves statistically significantly in both groups, as the most sensitive parameter that represents diastolic dysfunction of the LV; MPI in both groups normalizes after therapy, as a parameter that represents an improvement of global LV systolic and diastolic function.

CONCLUSION

In a small study, patients with ScH1 (TSH≤7mU/L) versus healthy individuals had subtle changes in certain parameters that indicate involvement of diastolic function of the LV in ScH, and these parameters improved after L-T4 therapy.