Relationship between thyroid function tests and all-cause mortality in patients on peritoneal dialysis: a prospective analysis

J.J. Díez[1], S. Romero-Pérez[2], M.A. Bajo[3], P. Iglesias[1], C. Grande[4], G. del Peso[3], R. Madero[5], M. Ossorio[3] and R. Selgas[3]

[1]Dep. Endocrinology. Hospital Ramón y Cajal, [2]Dep. Nephrology, Hospital del Sureste, [3]Dep. Nephrology, [4]Biochemistry and [5]Biostatistics, Hospital La Paz, Madrid, Spain

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Introduction

In uremic patients undergoing peritoneal dialysis (PD) only few studies have assessed the relationship of thyroid function with cardiovascular disease (CVD) or mortality. Alterations in thyroid function tests in these patients might represent a risk factor for CVD and mortality.

Objective

Our aim has been to investigate the relationship of serum thyrotropin (TSH), free thyroxine (FT4) and total triiodothyronine (T3) concentrations with incident CVD and mortality in PD patients.

Patients and methods

We performed a prospective study including all patients attending our PD Unit between 2003-2012 who had remained at least for 3 months in the PD porgram.

All patients were followed until death, exit of PD program, loss of follow-up, or census date (Sep 2012).

Survival time was estimated by the Kaplan-Meier method. Unadjusted and multivariate adjusted Cox regression models were used to assess the effects of several variables on the risk of death.

Results

- From 169 subjects included in our program, 139 (15.4%) were euthyroid, 4 (2.4%) had overt hypothyroidism, and 26 (15.4%) had subclinical hypothyroidism.
- There were no significant differences between patients with euthyroidism and subclinical hypothyroidism in clinical and PD parameters (tables 1 and 2).
- No significant differences were observed in the baseline prevalence of CVD in patients classified by tertiles of TSH, FT4 and T3.
- Patients in the first tertile of T3 had a higher percentage of CVD events during follow-up than patients in the second and in the third tertile of T3 (table 3).
- During follow-up, 16 patients died, 4 of them because of CVD. All-cause mortality was higher in patients in the lowest tertile of T3 in comparison with patients in the second and third tertiles (table 4).
- Mortality and incidence of new CVD events were not different in patients classified by tertiles of TSH or FT4.
- Kaplan Meier analysis showed that median survival time for all-cause mortality were significantly lower in patients in the first tertile of T3 (P=0.013) (figure 1).
- Unadjusted Cox regression analysis showed an increase in the risk of death in patients in the first tertile of T3 (HR, 4.3; 95%CI, 1.48-12.45, P=0.007).
- In the multivariate (adjusted by age, gender, prevalent CVD, and albumin) analysis the risk of death remained significant (HR, 3.14, 95%CI, 1.05-9.43, P=0.041) for patients in the first tertile of T3.

Table 1. Clinical features of studied uremic patients with normal thyroid function and subclinical hypothyroidism

	Euthyroid patients (n=139)	Sub. hypothyroid patients (n=26)	P
Age (yr)	50.0±16.0	53.9±15.1	NS
Gender (F/M)	43/96	10/16	NS
BMI (kg/m^2)	25.42±3.95	25.41±4.33	NS
SBP (mmHg)	137(88-187)	132(80-167)	NS
DBP (mmHg)	82(47-111)	70(47-93)	<0.001
Diabetes (n, %)	29 (20.9)	9 (34.6)	NS
Hypertension (n, %)	132 (95.0)	23 (88.5)	NS
Hyperlipidemia (n, %)	89 (64.0)	19 (73.1)	NS
COPD (n, %)	3 (2.2)	2 (7.7)	NS
Neoplasia (n, %)	10 (7.2)	4 (15.4)	NS

Data are the mean±SD or the median (interquartile range), or the number and percentage of patients.
Abbreviations: BMI, body mass index; SBP, systolic blood pressure; DBP, diastolic blood pressure; COPD, chronic obstructive pulmonary disease.

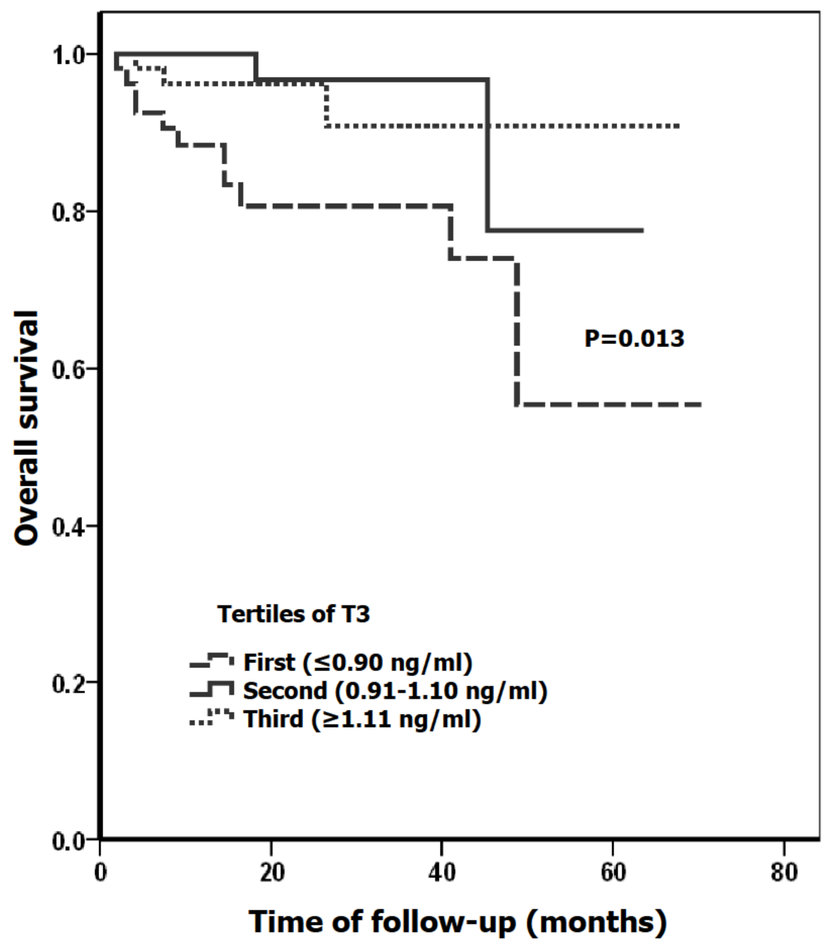

Figure 1. Kaplan Meier curves for all-cause mortality according to tertiles of serum triiodothyronine concentrations in patients on peritoneal dialysis.

Table 3. Incident CVD events in PD patients classified by tertiles of T3

	First tertile (≤0.90 ng/ml) (n=55)	Second tertile (0.91-1.10 ng/ml) (n=52)	Third tertile (≥1.11 ng/ml) (n=54)
Overall CVD event	6 (10.9)	1 (1.9)	1 (1.9)*
CHD event	3 (5.5)	0 (0)	0 (0)*
CeVD event	3 (5.5)	1 (1.9)	1 (1,9)
PVD event	1 (1.8)	1 (1.9)	0 (0)

Data are the number and percentage of patients.
Abbreviations: CVD, cardiovascular disease; CHD, coronary heart disease; CeVD, cerebrovascular disease; PVD, peripheral vascular disease
*P<0.05

Table 4. All cause and CVD mortality in PD patients classified by tertiles of T3

	First tertile	Second tertile	Third tertile
All cause mortality	11 (20.0)	2 (3.8)	3 (5.6)*
CVD mortality	3 (5.4)	0 (0)	1 (1.9)

Data are the number and percentage of patients.
Abbreviations: CVD, cardiovascular disease
*P<0.05

Table 2. Peritoneal dialysis parameters in patients with subclinical hypothyroidism and with normal thyroid function

	Euthyroid patients (n=139)	Sub. hypothyroid patients (n=26)	P
Urea Kt/V	2.66±0.72	2.51±0.64	NS
nPCR (g/kg/d)	1.17±0.33	1.07±0.25	NS
RRF (ml/min)	6.48±3.42	6.60±3.43	NS
CAPD/APD	68/70	15/10	NS

Data are the mean±SD or the median (IQR), or the number of patients.
Abbreviations: nPCR, normalized protein catabolism rate; RRF, residual renal function; CAPD, continuous ambulatory peritoneal dialysis; APD, automatic peritoneal dialysis.

Conclusion

Our data suggest that thyroid function tests alterations are associated with long-term incidence of CVD and mortality in uremic patients undergoing PD. In particular, low T3 levels are significantly related to all-cause mortality in this population.

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Juan J. Díez
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