CLINICAL AND BIOLOGICAL VARIABLES ASSOCIATED WITH MORTALITY IN HEMODIALYSIS PATIENTS

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Introduction:

Global and cardiovascular mortality remains high in hemodialysis patients. Different hypotheses have been proposed to explain this over-mortality: high inflammation, vascular calcifications, high oxidative stress. We tested here potential clinical and biological variables which are associated with a higher mortality risk.

Methods :

Prevalent hemodialysis patients from three centers in Belgium (Liège area) were recruited for this study. Following clinical data were available: age, gender, BMI, dialysis vintage, status of hypertension and diabetes, smoking status, and history of cardiovascular (Ant Vasc) disease. Among biological variables, we tested classical variables in serum like calcium, phosphorus (P), parathormone, 25-OH vitamin D (OH25), albumin and C-reactive protein. Several new biomarkers were also tested: bone-specific alkaline phosphatase, C-terminal telopeptide of collagen type I (CTX), intact amino-terminal propeptide of type I procollagen, tartrate-resistant acid phosphatase 5b, osteoprotegerin, troponin T, homocystein, interleukin-6, TNFα, FGF-23, fetuin and desphospho-uncarboxylated matrix Gla-protein. Time of follow-up is expressed in months. Cox proportional hazards regression and logistic regression were performed to evaluate the possible effect of covariates, like clinical variables and biomarkers.

Results :

The sample included 165 patients with the following clinical characteristics: median age was 74 y [63;80], mean BMI was 26±7 kg/m², median dialysis vintage 22 months [11;43], 44% were diabetic, 87% were hypertensive, 21% were smokers and 65% had history of CV disease. Mean follow up time was 22.1±11.3 months. A total of 74/165 (44.8%) died with a mean follow up time of 13.1±9.1 months (median value was 11.3 [5.4;20.8]). Hazard ratios were calculated using Cox proportional hazards modeling with the following statistically significant covariates in the final model (HR and 95% HR confidence limits) (Table 1): history of CV disease (HR: 0.544 [0.31-0.953] for no history), age (HR: 1.054 [1.09-1.079]), phosphorus (HR: 1.223 [1.029-1.454]), troponin T (HR: 253.283 [14.831-4325]) and CTX (HR: 1 [0.999-1]). When considering logistic regression to estimate mortality probability (Table 2), age phosphorus, troponin T and CTX were still in the final model of prediction, but not history of CV disease. In this last analysis, concentration of 25 OH-vitamin D was also significant.

Analysis of Maximum Likelihood Estimates

Parameter		DF	Parameter Estimate	Standard Error	Chi-Square	Pr > ChiSq	Hazard Ratio	95% Hazard Ratio Confidence Limits		Label
Ant_Vasc	0	1	-0.60921	0.28645	4.5232	0.0334	0.544	0.310	0.953	Ant_Vasc 0
Age		1	0.05236	0.01230	18.1273	<.0001	1.054	1.029	1.079	Age
P		1	0.20162	0.08820	5.2250	0.0223	1.223	1.029	1.454	P
Troponine_T		1	5.53451	1.44788	14.6114	0.0001	253.283	14.831	4325.594	Troponine_T
CTX		1	-0.0003973	0.0001563	6.4639	0.0110	1.000	0.999	1.000	CTX

Table 1

Analysis of Effects Eligible for Removal

Effect	DF	Wald Chi-Square	Pr > ChiSq
Age	1	18.5491	<.0001
P	1	3.9216	0.0477
Troponine_T	1	9.5657	0.0020
OH25	1	10.7143	0.0011
CTX	1	10.4854	0.0012

Table 2

Conclusion :

In this longitudinal study, we confirmed that age and phosphorus levels are clearly associated with a higher risk of mortality. Among the "non-classical" variables, concentration of troponin T is the most interesting one to assess the risk of mortality in our hemodialysis populations.

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