Evaluation of Vitamin D status during kidney transplantation: factors related and effect of the treatment

Alfieri C.[1], Regalia A. [1], Cosa F. [1], Meneghini M. [1], Ikehata M. [2], Mattinzoli D. [2], Gandolfo MT [1], Binda V. [1], Campise M.R. [1], Cresseri D. [1], Fusaro M. [3], Aghi A.[3], Messa P.[1].

[1]Unit of Nephrology, Dialysis and transplantation, Fondazione I.R.C.C.S. Ca' Granda Ospedale Maggiore Policlinico Milano – Italy.
[2]Research Laboratory of Nephrology, Fondazione Istituto di Ricerca e Cura a Carattere Scientifico Ca' Granda Ospedale Maggiore Policlinico, Milan, Italy.
[3]National Research Council (CNR)-Neuroscience Institute, Padua, Italy.

Background

Native vitamin D (25(OH)D) deficiency is a common finding during kidney transplantation (KTx).

The aim of our study is to examine retrospectively in a cohort of kidney transplanted patients the 25(OH)D status and its modification during the first year of KTx.

Material and Methods

In 290 patients (age 48±11 yrs; M=172) up to the 480 transplanted between 2004 and 2013 in our Department, an evaluation of plasmatic 25(OH)D, clinical parameters, blood and urinary samples at 1st (T1), 6th (T6) and 12th (T12) month of KTx was made. Levels of 25(H)D<20 ng/dL were categorized as insufficient, between 21 and 30 ng/mL as sufficient, >30ng/mL as optimal. The average of the three registration of 25OH(D) was calculated to estimate the level of exposition during the 12 mth of KTx (25(OH)Da). Tertiles of 25(OH)Da were also derived (1st 7.9±1.74 ng/mL; 2nd 12.6±1.27 ng/mL; 3rd (20.3±4.89 ng/mL). The variation on 25(OD)D levels (Δ-25(OH)D) levels was quantified using the formula (T12-T1).

A	*Parameter*				
Number of patients (n)		290			
Time of Dialysis (mths)		58±56			
Age at Tx (years)		48±11			
Gender (n) (M/F)		172/118			
Kind of transplant (n) (deceased donor/living donor)		240/50			
CMV IgG pos N (%)		85			
HCV pos N (%)		4			
HbsAg pos N (%)		3			
B	***Parameter***	***1st mth***	***6th mth***	***12th mth***	***p****
25(OH)D (ng/mL)		13±6	14±8	16±9	<0,0001
Vitamin D Therapy (%) (No/Calcitriol/Calcifediol/Calcitriol + Calcifediol)		85/12/3/0	69/20/11/0	69/20/10/1	0,005
25(OH) D Status (%) (Insufficient/Sufficien/Optimal)		84/14/2	80/14/6	80/13/5	0,0003

Table I: *A) General Characteristics of cohort studied. CMV: cytomegalovirus, HBsAg: antigenes against the virus of the hepatitis B; HCV:virus of the hepatitis C; B) Vitamin D status in the cohort studied. *1° mth vs 12° mth*

Parameter	**1st mth**	**6th mth**	**12th mth**	***p****
BMI (Kg/m2)	23±5	NA	25±3	<0,0001
SBP(mmHg)	131±17	133±19	132±18	0,74
DBP (mmHg)	80±10	81±10	81±10	0,89
Creatinine (mg/dL)	1,44±0,46	1,45±0,42	1,42±0,41	0,48
eGFR (mL/min)	48±24	47±22	47±23	0,85
Uric Acid (mg/dL)	6,8±2,2	7,4±2,5	7,5±2,7	<0,0001
Hb (g/dL)	10,2±2,8	11,1±3,1	11,5±3,2	<0,0001
Albumin (g/dL)	4,17±0,4	4,39±0,3	4,40±0,3	<0,0001
PTH (pg/mL)	73±64	71±82	64±75	0,07
Calcium (mg/dL)	8,81±2,65	9,69±2,52	8,90±2,45	0,07
Phosphorus (mg/dL)	2,45±0,8	3,03±0,8	3,02±0,7	<0,0001
ALP (U/L)	89±56	90±61	78±49	<0,0001
Prot-U (g/	0,23±0,15	0,21±0,23	0,27±0,60	0,48

Table II: *biochemical characteristics of the cohort.: BMI: Body mass index, NA: not applicable; SBP: systolic blood pressure; DBP:diastolic blood pressure eGFR: estimated glomerular filtration rate PTH: Paratormone; ALP: Alkaline Phosphatase; Prot-U: protein urinary excretion. *1 mth vs 12° mth*

Results

25(OH)D was significantly higher in males (p=0.007) and in patients transplanted during the summer in which remained higher all year long (p=0.0008 vs winter).

At T1 and T12, 25(OH)D level was insufficient in 84% and 70% of patients, sufficient in 14% and 23% and optimal in 2% and 7% respectively (p<0.0001).

During the first year of KTx a significant increase in 25(OH)D was observed in the patients taken as a whole (T1: 13.2±6.8 – T12: 16.8±9.9 ng/mL– p<0.0001). A treatment with 25(OH)D was present at T1 and T12 in 3% and in 15% of patients (25(OH)Dt+).

25(OH)D was inversely related with time of dialysis at T6 and T12 and an inverse correlation with PTH was present at the three timepoints. A correlation for 25(OH)D with creatinine and eGFR was found only at T6. Also 25OH(D) was correlated to time of dialysis and PTH, and with Ca at T1 and T6. These results were confirmed also after subdivision of 25(OH)Da in tertiles.

In logistic regression winter-KTx and time of dialysis (inversely) and male gender (directly) were related to the affiliation to the 3rd tertile of 25(OH)D. No effect for immunosuppressive therapy was demonstrated.

At T12 in the overall cohort Δ-25(OH)D was 3.2±9.24 ng/mL, in 23% of patients (9% of them treated with 25OHD), a passage in an higher category of 25(OH)D was observed, whether 8% of patients (4 % of them treated with 25(OH)D) were categorized in a lower category.

Interestingly, not significant differences between 25(OH)Dt+ and patient non treated with 25(OH)D both in Δ-25(OH)D and in change of 25(OH)D category were demonstrated.

Parameter	***Coefficient***	***Standard Error***	***Coef/SE***	***Exp(Coef)***	***95% Lower***	***95% Upper***	***p***
Season of Ktx: Winter	-1,54	0,45	-3,42	0,21	0,09	0,52	0,0006
Gender: Male	1,099	0,328	3,35	3,00	1,58	5,70	0,0008
Time of dialysis (mths)	-0,007	0,003	-2,33	0,99	0,98	0,99	0,01
PTH 12th mth (pg/mL)	-0,004	0,003	-1,67	0,99	0,99	1,00	0,09
Season of Ktx: Spring	-0,52	0,45	-1,14	0,59	0,42	1,44	0,25
Season of Ktx: Summer	-0,08	0,46	-0,17	0,92	0,36	2,31	0,86

Table III: *Logistic regression: dependent variable: 3rd. Winter-KTx and time of dialysis (inversely) and male gender (directly) were related to the affiliation to the 3rd tertile of 25(OH)D.*

Conclusions

According to our results, the prevalence of native hypovitaminosis D in KTx patients is high, especially at the beginning of KTx. KTx performed during winter, the time of dialysis and female gender influence negatively 25(OH)D levels. The treatment typically used was not sufficient in correct vitamin D deficit.

Email address of the author:

carlo.alfieri1@gmail.com

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