P-005

Bone health in liver transplant recipients: Corticosteroids preserve their significance, what about late follow-up?

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INTRODUCTION: Osteoporosis still remains as an important complication after liver transplantation (OLT), and the risk is deemed to be high particularly in the first 6-12 months following the procedure. Therefore, we aimed to assess bone health in liver transplant recipients at a tertiary care center.

METHODS: In this cross-sectional study, which was conducted between November 2016 and October 2017, 72 liver transplant recipients were enrolled. All relevant information, including history of fractures, demographics, clinical features and laboratory characteristics were collected. Bone mineral density (BMD) in the lumbar spine (L1-L4) and hip was obtained with dual energy X-ray absorptiometry (DXA) using a Hologic QDR 4500C bone densitometer (Hologic Inc., Bedford, MA, USA). Osteoporosis was defined as a BMD T score ≤ -2.5 in the lumbar spine, total hip or femoral neck.

RESULTS: Demographic, clinical and laboratory features of patients are summarized in the table. Of these 72 patients, 40 (55.6%) were male, and median age was 55 (IQR: 44-62) years. Osteoporosis was found in 15 patients (20.8%), nine of which were female. Three patients (4.2%) experienced vertebral (n=1) and femoral (n=2) fractures. Patients with osteoporosis had lower BMI values (p=0.036) and tendency to have more calcium and vitamin D supplements (p=0.016) when compared with patients without osteoporosis. Post-transplant corticosteroid use was 90% in osteoporotic and 71% in non-osteoporotic OLT recipients (p=0.177); however patients with osteoporosis had a longer exposure to corticosteroids with a median of 6 (5.25-22) months as compared to patients without osteoporosis [3.5 (2-6) months, p=0.050]. There were no statistically significant differences between osteoporotic and non-osteoporotic patients in terms of tacrolimus (p=0.892), cyclosporine (p=0.728), mycophenolate mofetil (p=0.181), sirolimus (p=0.490), and everolimus (p=0.887) uses. All patients were stratified into 5 groups according to their durations of post-transplant follow-up at the time of study visit: 0-1 year (3 patients), 1-5 years (21 patients), 5-10 years (20 patients), 10-15 years (20 patients), and 15-20 years (8 patients). Osteoporosis was found in 2 (66.7%), 5 (23.8%), 1 (5%), 3 (15%), and 4 (50%) patients in these groups, respectively (p=0.021).

CONCLUSIONS: Duration of post-transplant corticosteroid use remains as an important risk factor for osteoporosis. Bone health of OLT recipients should be carefully monitored throughout the years, since osteoporosis can be encountered at the late follow-up.

Keywords: liver transplantation, osteoporosis, corticosteroids

Table. Demographic, clinical and laboratory features of patients with and without osteoporosis.

Characteristics	Patients with osteoporosis (n=15)	Patients without osteoporosis (n=57)	P value	Characteristics	Patients with osteoporosis (n=15)	Patients without osteoporosis (n=57)	P value
Age (years), median (IQR)	57 (55-63)	53 (42.5-61.5)	0.141	Post-transplant use of calcium and vitamin D supplements (%)	66.6%	47.1%	0.223
Sex (male), n (%)	6 (40%)	34 (59.6%)	0.173	eGFR* (ml/min/1.73 m^2), mean ± SD	79 ± 28.9	83.4 ± 21.7	0.524
Females who were postmenopausal, n (%)	7 (77.7%)	10 (41.6%)	0.065	Serum calcium (mg/dl), mean ± SD	8.8 ± 0.2	9 ± 0.3	0.091
BMI (kg/m2), mean ± SD	23.4 ± 4.3	25.9 ± 3.5	0.036	Serum phosphorus (mg/dl), mean ± SD	3.1 ± 0.6	2.9 ± 0.6	0.484
Donor type (living), n (%)	4 (26.6%)	26 (45.6%)	0.185	Serum magnesium (mmol/l), mean ± SD	0.79 ± 0.05	0.76 ± 0.06	0.405
Pre-transplant liver disease duration (months), median (IQR)	90 (36-138)	72 (18-120)	0.789	25 OH vitamin D (ng/ml), mean ± SD	37.9 ± 21.6	28.6 ± 15.3	0.080
History of alcohol (%)	0%	22.6%	0.068	Serum iPTH (pg/ml), median (IQR)	68.6 (47.3-93.9)	68.8 (51.7-100.9)	0.617
History of smoking (%)	41.6%	30.1%	0.443	24-hour urine calcium (mg/kg), mean ± SD	2.50 ± 1.48	1.76 ± 1.15	0.074
Pre-transplant corticosteroid use (%)	0%	13.7%	0.173	L1-L4 T score, mean ± SD	-2.8 ± 0.6	-0.5 ± 1.1	<0.001
Pre-transplant use of calcium and vitamin D supplements (%)	50%	17.3%	0.016	Femur total T score, mean ± SD	-1.5 ± 0.7	-0.8 ± 0.7	0.002
Post-transplant corticosteroid use (%)	90%	71%	0.177	Femur neck T score, median (IQR)	-2.3 [(-2.8) - (-0.7)]	-1.2 [(-1.6) - (-0.5)]	0.003
Post-transplant corticosteroid use (months), median (IQR)	6 (5.25-22)	3.5 (2-6)	0.050				

Abbreviations: IQR: interquartile range, BMI: body-mass index, SD: standard deviation, iPTH: intact parathyroid hormone, eGFR: estimated glomerular filtration rate. *eGFRs of patients were calculated using CKD-EPI formula.