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SPARING EFFECT OF PERITONEAL DIALYSIS VS HEMODIALYSIS ON CHANGE OF BONE MINERAL DENSITY EVALUATED BY WHOLE-BODY DXA AFTER INITIATION OF DIALYSIS THERAPY AND ITS IMPACT ON CLINICAL OUTCOME

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Background and Aims: Bone loss is associated with progression of cardiac calcification and increased mortality in end stage renal disease (ESRD) patients but the relations and underlying causes are unclear. We investigated factors associated with changes of bone mineral density (BMD) during the first year after initiation of dialysis and the association between BMD changes and subsequent mortality in ESRD patients.

Method: In a prospective study of 242 ESRD patients (median age 55 years, 61% men) starting dialysis, total BMD and BMD at specific bone sites (including seven subregions: head, arms, legs, trunk, hip, pelvis and spine) was assessed by whole body dual-energy X-ray absorptiometry (DXA) at baseline and one year after dialysis start. Framingham cardiovascular disease (CVD) risk score, body composition, nutritional status, handgrip strength, various biochemical biomarkers (white blood cell, hemoglobin, albumin, creatinine, calcium, phosphate, intact parathyroid hormone, triglyceride, cholesterol, HDL cholesterol and high-sensitivity C-reactive protein) were recorded. We used multivariate linear regression analysis for BMD change analysis. We followed patients from 12 months after initiating of dialysis until renal transplantation, death or end of 60 months follow-up. During follow-up, 59 patients (24%) died due to CVD (n=33) or other causes (n=26) and 95 patients (39%) underwent renal transplantation. Fine and Gray competing risk analysis was used to ascertain associations of BMD changes with all-cause and CVD-related mortality.

Results: From baseline to one year after initiation of dialysis, there was a significant decrease of BMD_{total} and $BMD_{leg,\ trunk,\ rib,\ pelvis\ and\ spine}$ in hemodialysis (HD) patients, whereas no difference was seen in peritoneal dialysis (PD) patients. In multivariate linear regression analysis adjusting for several confounders, HD therapy - compared to PD therapy - was significantly associated with negative changes in $BMD_{total\ (\beta=-0.15)}$, $BMD_{head\ (\beta=-0.14)}$, $BMD_{leg\ (\beta=-0.18)}$ and $BMD_{trunk\ (\beta=-0.16)}$. The direction and extent of changes in BMD, i.e. increase of BMD, associated with statistically significant lower all-cause mortality risk for BMD_{total} (sHR, 0.91), BMD_{head} (sHR 0.91) and BMD_{leg} (sHR 0.92), while for CVD-mortality a significant association with BMD changes was found only for changes in BMD_{head} (sHR 0.92).

Conclusion: In patients starting on dialysis, PD therapy appeared to have a beneficial effect on BMD changes as compared to HD during the first year of dialysis therapy. This difference may have implications for clinical outcomes as the degree of bone loss was associated with subsequent mortality. Changes towards increased BMD_{total}, BMD_{head} and BMD_{leg} associated with lower all-cause mortality. For head region – which is known as a cortical bone rich site – positive BMD change associated also with lower CVD mortality suggesting that increase or maintenance of BMD of cortical bone rich sites may have stronger association with clinical outcome in ESRD than BMD of trabecular bone.