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Are diabetic patients with chronic kidney disease at higher risk for Charcot foot assessed by calcaneal ultrasonometry than patients with neuropathy?

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Background and aims: Previous studies showed lower bone mineral density (BMD) especially in the calcaneal area in patients with Charcot foot (CF). The typical cause of CF is diabetic neuropathy, but patients with chronic kidney disease (CKD) may also be a risk group for CF. Measurement of calcaneal BMD by ultrasonometry may be useful in assessing the risk of CF in a high risk population. The **aim** of our study was to compare calcaneal ultrasonometry parameters in CKD patients with patients with severe diabetic neuropathy (DN) and with patients with CF. Patients and methods: 65 diabetic patients were enrolled in the study during 1/2012-3/2013 – 20 patients with CKD stage 3-5 and with DN (CKD group), 20 patients with severe DN, but without CKD (DN group) and 25 patients with inactive CF (CF group). BMD in calcaneal area was measured in both feet by ultrasonometry in the CF group; in patients without CF (CKD and DN groups), the foot with the worse T score was used for later analysis. Osteoporosis measured by calcaneal ultrasonometry was defined as T-score ≤−1.8. BMD in the lumbar spine and proximal femur was assessed by dual energy X-ray absorptiometry (DEXA). **Results:** There was a significant lower calcaneal BMD in the CKD group in comparison with the DN group (T score -2.67±1.55 vs. -1.7±1.12; $p<0.05$). Significantly, the lowest calcaneal BMD was seen in affected foot in the CF group (T score -3.89±2.15; vs. CKD $p<0.05$; vs. DN $p<0.001$) and also in comparison with non-affected foot in the CF group (-2.19±21.71; $p<0.01$). The frequency of calcaneal osteoporosis in the CKD group was comparable with affected foot in the CF group (85% vs. 92%), but patients in the DN group had osteoporosis less often than both previous groups (50%; both $p<0.05$). BMD in the lumbar spine and proximal femur in the CKD group was significantly lower in comparison with DN and the DF group (all $p<0.05$). **Conclusion:** Diabetic patients with both CKD and DN had more frequent calcaneal osteoporosis assessed by ultrasonometry than patients with severe DN and normal renal functions. In CKD patients, diabetic neuropathy and secondary osteoporosis contribute in the changes of calcaneal BMD and may increase the risk for development of CF.

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