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P245 -Vascular calcification in advanced CKD and its relationship with bone microstructures

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Introduction

Vascular calcification (VC) is part of chronic kidney disease-mineral bone disorder (CKD-MBD). It is highly prevalent in advanced CKD (50-90%) and is associated with increased mortality {1}. VC is also associated with 2-6 times increased risk of fractures {2}. There is increasing evidence on the importance of bone microstructure assessment in CKD. This can be done using high resolution peripheral quantitative computed tomography (HR-pQCT) which can also be used to detect VC (Figure). The technique has been validated for ankle VC in dialysis patients {3}. Currently, the recommended test for VC assessment in CKD is abdominal aortic calcification (AAC) imaging using X-ray {1}. We aimed to assess VC severity in advanced CKD using the two imaging techniques and to assess VC relationship with bone microstructures.

Methods

We recruited 69 CKD stages 4-5D patients (eGFR<30ml/min/1.73m² or dialysis) and 68 age and gender-matched controls (eGFR>60ml/min/1.73m²). All participants had bone imaging using HR-pQCT of distal radius (wrist) and tibia (ankle), and dual-energy X-ray absorptiometry (DXA) of lumbar spine, hip and forearm. Ankle VC detected by distal tibia HR-pQCT was quantified in mgHA. AAC detected using lateral lumbar spine images on DXA was measured using AAC-8 score {4}. 43 CKD patients had trans-iliac bone biopsy evaluable for histomorphometry.

Results

Advanced CKD patients had significantly higher ankle VC than healthy controls (median [IQR] of 1.04 [0.05 - 16.52] versus 0 [0 - 0.55] mgHA, $p<0.001$). Furthermore, CKD patients with diabetes (28%) had higher ankle VC than non-diabetic CKD (24.07 [3.42 - 61.30] vs 0.23 [0 - 3.78] mgHA, $p<0.001$). Although AAC score was also higher in CKD than controls, there was no difference between diabetic and non-diabetic CKD. Ankle VC mass only weakly correlated with AAC score (Spearman's rho 0.28, $p<0.05$).
Ankle VC had significant correlations with distal tibia cortical bone microstructure measured by HR-pQCT; negatively with cortical thickness and positively with cortical porosity (Table). No significant correlations were found with distal radius HR-pQCT measurements and DXA bone mineral density (BMD) T-score for total hip and 1/3 distal radius. Nearly half of CKD had AAC detected which would have overestimated lumbar spine BMD, thus its relationship with ankle VC was not analysed. Amongst patients who had bone biopsy, ankle VC did not correlate with bone turnover, mineralization and volume.

Conclusion

Advanced CKD patients had more severe ankle VC than healthy controls, especially CKD patients with diabetes. Ankle VC was associated with worse cortical bone microstructure of distal tibia. Given the high risk of cardiovascular disease and fracture in advanced CKD, future research on the bone-vascular effects of bone-specific therapy is needed. HR-pQCT allows simultaneous assessment of bone microstructure and VC in these patients.