The Evaluation of Renal Osteodystrophy with Cortical Quantitative Ultrasound at Various Bone Sites

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Background
In this study we evaluated bone abnormalities of patients with chronic renal failure (CRF) by cortical quantitative ultrasound (QUS) measurements at different bone sites because these abnormalities may be of variable etiology and may start before symptoms or radiological changes are manifested.

Methods
Of fifteen patients with chronic renal failure, seven had moderate-severe disease and eight had been on chronic hemodialysis from 5 to 17 years, with renal osteodystrophy (ROD) confirmed by bone biopsies. Twelve normal subjects of similar age and gender volunteered for the control group.

Results
Patients and controls differed in creatinine clearance, in serum phosphate levels and in serum total alkaline phosphatase. Mean intact-PTH levels differed significantly amongst the three groups of subjects. All patients with ROD has intact-PTH higher than 200 pg/ml. The cortical ultrasound parameter, speed of sound (SOS) was slower in patients with more sever renal failure at all bone sites measured. The group with ROD had significantly lower cortical ultrasound values than the other patients and the control group at all sites. SOS values at the proximal phalanx, distal radius and midtibial sites were positively and significantly correlated. Cortical ultrasound measurements at the radial site correlated with midtibial and phalangeal sites but the correlation between midtibial and phalangeal sites did not reach significance. IPTH levels correlated negatively and significantly with cortical QUS values at all sites being the correlations higher at phalangeal and radial sites than at the midtibial region.

Conclusions
The differences in cortical ultrasound observed indicate the potential clinical application of this methodology to evaluate bone abnormalities in chronic renal failure, especially in patients on chronic hemodialysis.

Published in Renal Failure, 26(3):237-241, 2004