

소아 만성신질환 I-V (투석전) 단계에서의 무기질 뼈 장애

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Mineral and Bone Disorder in Children with Chronic Kidney Disease Stage I to V (Predialysis)

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Purposes: To evaluate the mineral and bone disorders in children with chronic kidney disease (CKD) stage I to V predialysis.

Methods: Pediatric subcohort of KNOW-CKD (KoreaN cohort study for Outcome in patients With CKD) enrolled children (younger than 20 years) with CKD stage I-V (pre-dialysis) from five major pediatric nephrology centers in Korea and collected medical data associated with CKD-mineral and bone disorder.

Results: Total number of 300 patients (male:female=199:101) was included in this study. Serum phosphorus (mean±standard deviation 4.89±0.75, 4.6±0.83, 4.63±0.85, 5.13±1.37, 5.35±1.2 from CKD stage I to V, p=0.0002), fibroblast growth factor (FGF)-23 (32.29±42.04, 41.33±41.00, 70.68±121.06, 67.9±66.95, 121.74±139.36, p=0.0030) and the prevalence of hyperphosphatemia (8.51%, 10.64%, 25.53%, 25.53%, 29.79%, p=0.010) increased as CKD progressed. Intact parathyroid hormone (iPTH) increased (40.84±40.37, 44.13±20.2, 78.93±65.21, 181.39±183.86, 313.85±324.95, p<0.001) and serum 1,25D3 level decreased (47.52±21.32, 37.43±12.26, 36.86±25.97, 28.29±15.81, 34.11±21.34, p<0.001) significantly as CKD aggravated. Serum iPTH (r=-0.608, p<0.0001) and FGF-23 (r=-0.4943, p<0.0001) showed negative correlation whereas 1,25D3 (r=0.3288, <0.0001) showed positive correlation with glomerular filtration rate. FGF-23 showed positive correlation with serum phosphorus (r=0.3342, p<0.0001), iPTH (r=0.3214, p<0.0001) and proteinuria (r=0.3609, p<0.0001), and negative correlation with urine phosphorus (r=-0.2597, p=0.0006). The prevalence of patients with increased alkaline phosphatase level increased significantly as CKD progressed (5.66%, 15.09%, 39.62%, 16.98%, 22.64%, p=0.042), which was due to increased prevalence of hyperparathyroidism (p<0.001). Active form vitamin D (0%, 3.77%, 11.88%, 40.74%, 68.89%, p<0.0001), calcium (2.13%, 0%, 9.90%, 4.44%, 62.22%, p<0.0001) and non-calcium phosphorous binders (0%, 0%, 0%, 0%, 13.33%, p<0.0001) were prescribed significantly more often in advanced CKD. Calcium x phosphorus was significantly increased in advanced CKD (11.59%, 17.39%, 28.26%, 21.01%, 21.74%, p=0.002).

Conclusion: As CKD progressed, hyperphosphatemia, hyperparathyroidism and 1,25D3 deficiency increased, serum FGF-23 level increased and urinary phosphorus excretion decreased in children with CKD stage I to V predialysis.

Key Words: 만성신질환, 무기질과 뼈 장애, 소아

Chronic kidney disease, Mineral and bone disorder, Children