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Comparison of Creatinine and Cystatin C in Predicting Hyperphosphatemia and Hyperparathyroidism in Patients with Chronic Kidney Disease

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Objectives: There is no study analyzing the predictive value according to the methods of eGFR calculation in occurrences of hyperphosphatemia and secondary hyperparathyroidism, which are functional and physiological changes according to chronic kidney disease (CKD) progression. Therefore, we compared the predictive power according to the eGFR calculation methods for occurrences of hyperphosphatemia and secondary hyperparathyroidism in CKD patients, especially in patients with a large difference between $eGFR_{Cr}$ and $eGFR_{CysC}$.

Methods: This study was a single center retrospective, cross-sectional study. After eligible data collection, total 639 patients with non-dialysis CKD grade 3 or higher were enrolled. The patients were divided into low- and high-discrepancy groups based on the median value of the difference between $eGFR_{Cr}$ and $eGFR_{CysC}$ (6.353 mL/min/1.73m^2). Multivariate logistic regression analysis was performed to find factors influencing high-discrepancy. To analyze the predictive power according to the eGFR calculation methods, the area under the receiver operating characteristic curve (AuROC) values were compared, and it was performed in overall patients, low-, and high-discrepancy groups, respectively.

Results: In multivariate logistic regression analysis, age > 70 years (odd ratio (OR) 2.194, P < 0.001) and CKD grade 3 (OR 3.191, P < 0.001) were observed as significant factors for high-discrepancy. In the occurrence of hyperphosphatemia, AuROC values were observed to be higher in $eGFR_{CysC}$ and $eGFR_{Cr\text{-}CysC}$ than $eGFR_{Cr}$ in overall patients and in the high-discrepancy group, but there was no difference in the low-discrepancy group. In the occurrence of secondary hyperparathyroidism with hyperphosphatemia, AuROC values were observed to be higher in $eGFR_{CysC}$ and $eGFR_{Cr\text{-}CysC}$ than in $eGFR_{Cr}$ only in the high-discrepancy group.

Conclusions: In patients with a large difference between $eGFR_{Cr}$ and $eGFR_{CysC}$, it was more useful to use $eGFR_{CysC}$ and $eGFR_{Cr\text{-}CysC}$ rather than simply $eGFR_{Cr}$ alone from the physiologic perspective of the kidney.