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유지투석환자에서 FDG-PET/CT를 이용한 혈관 석회화정도 및 골밀도의 평가 : 부갑상선호르몬농도와의 관련성을 중심으로

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Assessment of Vascular Calcification and Bone Mineral Density using Fluorodeoxyglucose-PET/CT in Patients on Maintenance Dialysis : Focused on Relationship with Intact PTH Level

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Objective : Aims of our study are to find factors associated with vascular calcification scores of total aorta (ACS) and coronary arteries (CCS),vertebral volumetric bone mineral density (vBMD), standardized uptake value of L-spine (LSUV) and mean target-to-background ratio of right carotid artery (CTBR) measured by whole body FDG-PET/CT in patients on maintenance dialysis. We investigated relationships between ACS/CCS, CTBR and vBMD in terms of vessel and bone interaction considering iPTH level. Correlation of LSUV and vBMD was also analyzed to evaluate bone metabolism.

Methods : 29 patients on maintenance dialysis (>6 months) were enrolled. ACS/CCS were assessed by whole body FDG-PET/CT with both area (Agatston) and volume measurement. CTBR and LSUV were recorded. Threshold attenuation of 130 Hounsfield units was used as significant calcification.Total vertebral (TVBMD) and trabecular vBMD were obtained by quantitative CT (qCT) method. Variables including age, presence of DM, serum iPTH, ALP, Ca, and P were used to identify factors associated with ACS/CCS and/or vBMD. After classifying patients into 3 groups based on iPTH target by K/DOQI, differences of ACS/CCS and vBMD between groups were assessed by nonparametric tests. Comparison between ACS/CCS and vBMD was made. Relationship between LSUV and vBMD was assessed by linear regression.

Results : 14 patients were on hemodialysis (HD), 15 on peritoneal dialysis (PD) (mean age 54±10yrs, mean dialysis duration 91±68m, male 62%). Significant calcification was found on 93% (aorta) and 62% (coronary) of the patients. No patient had inflammation due to criteria CTBR>1.60. ACS correlated with age, ALP and Ca× P. CCS was significantly higher in patients on HD compared to PD. High PTH group (n=13, mean 1,062 pg/ mL) had significantly higher ACS compared to optimal (n=6, mean 188 pg/mL) and lower PTH (n=10, mean 58 pg/mL) group. vBMD was not related to iPTH groups. Significant linearity between L-spine SUV and vBMD was present.

Conclusion : Our patients on maintenance dialysis had no significant vascular inflammation (CTRB) but showed highly prevalent vascular calcifications. ACS reflected CKD-MBD variables better than CCS. TVBMD by qCT was related to LSUV implying bone remodeling and turnover. However, TVBMD may not represent actual bone strength and trabecular microarchitecture could be more important. From viewpoint of vessel and bone interaction we propose ACS as a vascular calcification assessment, and alternatives for BMD in patients on maintenance dialysis should be sought

Key Words : 양전자방출단층촬영, 혈관 석회화, 골밀도
PET CT, vascular Calcification, Bone mineral density