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Internal Medicine: Open Access

ISSN: 2165-8048

Opinion Article

Management of Osteoporotic Fractures in Patients with Renal Failure

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ABOUT THE STUDY

Patients with Chronic Kidney Disease (CKD) who experience osteoporotic fractures experience substantial morbidity and death, which places a significant economic burden on society. Patients with CKD often have a higher risk of osteoporotic fractures than the overall population. Anomalies in bone turnover, mineralization, volume, linear growth, and strength define the bone alterations seen in CKD patients. Predicting the likelihood of osteoporotic fracture in these patients is crucial. The capacity to predict fracture risk is still limited, even though updated Kidney Disease Improving Global Outcomes guidelines propose Bone Mineral Density (BMD) assessment with Dual-energy X-ray Absorptiometry (DXA) to assess osteoporotic fracture risk in these patients. Both bone density and bone quality affect bone strength. However, DXA BMD only evaluates the quantity of bone mineral to determine bone density. To get around this limitation, osteoporotic fracture risk can now be predicted using high-resolution peripheral quantitative computed tomography and markers of bone turnover like osteocalcin, bone-specific alkaline phosphatase, procollagen type-1 N-terminal propertied, and tartrate-resistant acid phosphatase-b. Their use in clinical practice is restricted, nevertheless, because to the high cost and lack of insurance coverage. Therefore, clinical risk factors should be taken into account rather than relying exclusively on fragmented test results to predict osteoporotic fracture because the aetiology of bone abnormalities in individuals with CKD is complex. In general, advanced age, prior fracture, glucocorticoid therapy, family history of hip fracture, low body weight, heavy alcohol intake, and current smoking are factors other than BMD that impact osteoporotic fracture risk.

The most common cause of kidney stones is hypercalciuria, which is brought on by a generalized dysregulation of calcium homeostasis. Additionally, systemic dysregulation of calcium homeostasis, including intestinal calcium absorption, renal tubular calcium reabsorption, and bone demineralization, is linked to osteoporotic fractures. Therefore, decreased bone density may develop in patients with hypercalciuria if they excrete more calcium than they receive. In fact, several earlier researches indicated that people who had kidney stones were more likely to suffer an osteoporotic fracture.

Conceptually, kidney stone development can be prevented by CKD due to a considerable reduction in urine calcium excretion, a major risk factor for stone development. It's interesting to note that kidney stone recurrence is less common in people who have impaired kidney function. Therefore, kidney stone development in CKD patients may be a sign of severe calcium homeostasis imbalance. The relationship between kidney stones and these patients' bone health, however, is not well understood. As a result, it was assumed that among CKD patients, the likelihood of developing kidney stones would be associated with a higher chance of having weak bones. Additionally, we looked into whether these patients' history of kidney stones was linked to a higher risk of osteoporotic fracture.

Statistical analyses

SPSS 19.0 was used to perform statistical analysis (SPSS Inc., Chicago, IL, USA). To check the normality of continuous variables, the Kolmogorov-Smirnov test was applied. For two groups, the normally distributed variables were compared using Student's t-tests and presented as mean SD. Both the chi-square test and Fisher's exact test were used to compare the categorical variables' frequencies and percentages. The relationship between kidney stones and osteoporotic fracture was determined using cumulative survival curves created using the Kaplan-Meier method, and inter-group osteoporotic fracture was compared using a log-rank test. Using multivariate Cox proportional-hazards regression analysis, which took into account all covariates with p values 0.05 in the univariate analysis or conventional fracture risk factors other than BMD, it was estimated the prognostic value of kidney stones for osteoporotic fracture. Patients were separated into 4 subgroups based on kidney stones and renal function in order to assess any potential interactions between these two factors in osteoporotic fracture (CKD stage 3 *vs.* CKD stage 4).

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Received: 29-Aug-2022, Manuscript No. IME-22-19337; **Editor assigned:** 02-Sep-2022, PreQC No. IME-22-19337 (PQ); **Reviewed:** 16-Sep-2022, QC No. IME-22-19337; **Revised:** 23-Sep-2022, Manuscript No. IME-22-19337 (R); **Published:** 30-Sep-2022, DOI: 10.35248/2165-8048.22.12.373.

Citation: Mathew M (2022) Management of Osteoporotic Fractures in Patients with Renal Failure. Intern Med. 12:373.