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CASE REPORT

Chronic kidney disease presenting with bilateral spontaneous femoral neck fracture: A case report

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Abstract

Bone and mineral metabolism disorders are common in patients with chronic kidney disease (CKD). These patients are susceptible to fractures. Bilateral femoral neck fracture secondary to renal osteodystrophy is a rare complication. We report a case of CKD with bilateral spontaneous femoral neck fracture associated with secondary hyperparathyroidism and osteoporosis.

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Keywords: Bone and mineral disorders, chronic kidney disease, fracture, osteoporosis, secondary hyperparathyroidism.

Introduction

Progression of chronic kidney disease (CKD) leads to various bone diseases and mineral metabolism disorders due to changes in calcium (Ca), phosphorus (P), parathyroid hormone (PTH) and vitamin D metabolism in these patients. Chronic kidney disease-mineral and bone disorder (CKD-MBD) may present with different clinical manifestations depending on existing metabolic abnormality and characteristic bone disease. Patients with end-stage renal disease (ESRD) are at increased risk for bone loss and are susceptible to fractures, especially hip fractures.[1,2] Osteoporosis is a skeletal disorder characterized by compromised bone strength predisposing to an increased risk of fracture, and CKD-MBD is one of the possible causes of osteoporosis.[2] Here we report a patient who was diagnosed with new CKD and bilateral femoral neck fracture.

Case Report

A 22-year-old male patient was admitted to another hospital with complaints of weakness and difficulty in walking and was referred to our hospital because of high serum urea and creatinine levels. His previous medical history was unremarkable, and his blood pressure was 110/60 mmHg and pulse 72 beats/min. He had bilateral diffuse hip sensitivity and limitation of motion. His laboratory tests revealed that serum glucose 94 mg/dL, urea 87 mg/dL, creatinine 6.3 mg/dL,

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uric acid 10.7 mg/dL, albumin 4.8 g/dL, sodium 131 mEq/dL, potassium 3.9 mEq/dL, Ca 6.7 mg/dL, P 3.5 mg/dL, AST 54 IU\L, ALT 17 IU\L, serum alkaline phosphatase (ALP) 573 IU\L, hemoglobin 9.29 g/dL, CRP 30.4 mg/dL, 25OH vitamin D 4 ng/mL, intact PTH 559 pg/mL and ferritin 238 ng/mL. Hepatitis B and C tests were negative. Renal ultrasonography showed reduced renal size and grade III echogenicity and was consistent with CKD. eGFR was 4 mL/min/1.73 m^2. The patient' findings were consistent with ESRD. Direct anterioposterior pelvic radiograph revealed a bilateral femoral head fracture (Figure 1). In his dual-energy x-ray absorptiometry (DEXA) scan, the T score was -2.8 and the Z score was -1.6. In MR imaging of the left and right hip joints, there was complete fracture in the both femoral necks. It was displaced about 3-4 cm from the level of fracture on both sides towards the superior of the trochanteric section of the femur. It was thought that fractures might be related to CKD-MBD in the patient who had no history of trauma or seizure. He underwent total hip replacement operation for fractures in both femoral neck (Figure 1). Dialysis treatment, calcium and vitamin D supplements were started.

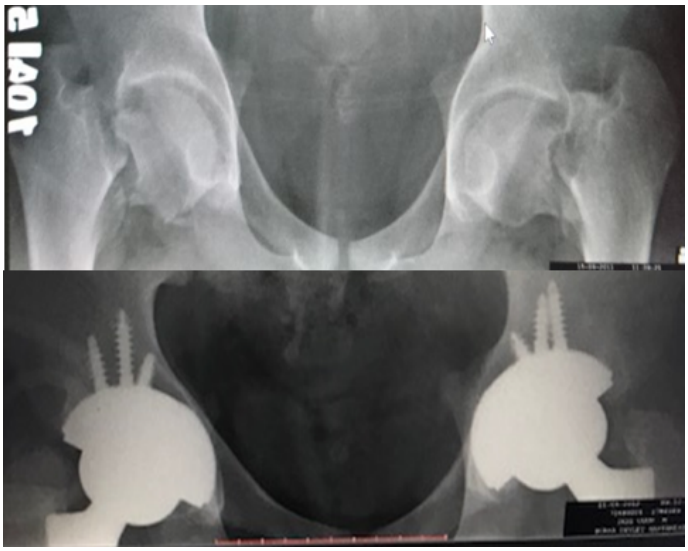

Figure 1. Pre- and post-operative radiographs of the patient showing bilateral femoral neck fractures

Discussion

The risk of fracture in hemodialysis, peritoneal dialysis and kidney transplant patients is higher when compared with the general population.[3] The recent observational study showed that the fracture risk of dialysis patients was 16% higher than that of pre-dialysis CKD patients.[4] In another study including 68,764 individuals with confirmed CKD with a median follow-up of 2.7 years, 9,219 fractures occurred, of which 3,105 were hip fractures. A more severe CKD stage was associated with a higher risk of fractures, particularly hip fractures: compared with CKD Stage 3a, the adjusted HR was 1.10, 1.32 and 2.47 for CKD Stage 3b, 4 and 5, respectively.[5]

Risk factors for fracture in CKD patients are similar to those in the general population, such as low body weight, menopause, a history of personal and familial osteoporosis, chronic inflammatory diseases and corticosteroid usage.[6] Some bone histology types such as osteomalacia, high turnover bone disease or adynamic bone disease in CKD-MBD is associated with the elevated rates of bone fracture.[7] Spontaneous bilateral femoral neck fracture in a renal disease patient is a rare complication. A retrospective analysis of etiological factors in 26 pathological fractures of the femoral neck of 19 chronic hemodialysis patients with 11 (range 2 to 21) years of mean duration of dialysis was found the presence of beta-2-microglobulin amyloidosis, aluminic osteomalacy, osteoporosis, and cortisonic necrosis and porosis.[8] Certain risk factors including high PTH levels and the use of narcotics and psychoactive medications may increase the likelihood of fracture.[9] Secondary hyperparathyroidism may cause lead bilateral spontaneous simultaneous rupture of the Achilles tendon and pathological fracture of right femur neck in patients after the long-term hemodialysis without predisposing factors such as previous use of corticosteroids or fluoroquinolones.[10] Femoral neck fractures in elderly dialysis patients are associated with advanced renal osteodystrophy and multiple medical problems such as confusion caused by narcotics and analgesics, pneumonia, hepatic coma, decubitus ulcers, severe depression and severe hypoalbuminemia.[11] There was no history of injury, trauma, fall, seizure, steroid medication, fluoride treatment, smoking and alcohol abuse in our case. Several cases of bilateral femoral neck fractures have been reported in patients with CKD in the literature.[11-23] Hypocalcaemic convulsions or muscle cramps can also cause fractures in patients with CKD.[11,14-16]

Bone mineral density (BMD) was low in our case with secondary hyperparathyroidism.

BMD was also significantly lower in patients with secondary hyperparathyroidism than in those with adynamic bone disease. A prospective study including 62 hemodialysis patients that 11% of all had a positive fracture history showed that osteopenia was frequent in patients on hemodialysis, especially those with biochemical and histological findings of secondary hyperparathyroidism.[24] A meta-analysis investigating the relationship between BMD values and fractures in patients with stage 5 CKD shows that BMD is lower in patients with fractures.[25] A total of 374 patients with CKD G3a-G5 was followed by DEXA for a total of 5 years, and measured BMD. 14.3% of patients with G3a and G3b, 15.7% of of patients with G4, and 19.7% of of patients with G5 experienced a clinical fracture during the study period. The multivariate analysis showed that each decline of 1.0 SD in total hip BMD T-Score was associated with a significant increase in the risk of fracture (OR = 1.46).[26] Furthermore, both genders with impaired kidney function are at increased risk of bone loss, even with minimal reduction in kidney function.[27] PTH can stimulate bone resorption which renders the bone susceptible to fractures. Ayurvedic medications also may accelerate osteoporosis of the proximal femur, and lead to bilateral femur neck fractures. A 41-year-old male who was diagnosed with CKD for 6 months and started taking Ayurvedic medications after the diagnosis had a trivial trauma 2 months before. As our case, the patient was admitted for inability to walk, and was diagnosed bilateral femur neck fracture.[28]

Hip and long-bone fractures are associated with an increased risk of all-cause mortality, major cardiovascular and infectious events in the dialysis population.[29,30] In our patient who was diagnosed as end-stage renal disease, high PTH, low vitamin D, low calcium and high ALP levels were consistent with high-turnover bone disease. Serum ALP is a marker of high-turnover bone disease and is associated with coronary artery calcification and death risk in hemodialysis patients. A relationship between high serum ALP and worse BMD has been reported in dialysis patients.[31] A large cohort study revealed that higher serum ALP levels were independently associated not only with mortality but also with the incidence of hip fracture in Japanese hemodialysis patients.[32]

As a result, bilateral femoral neck fractures without risk factors such as trauma, convulsion and steroid medication are rare in a young patient with CKD. Since the presence of secondary hyperparathyroidism and osteoporosis increases the risk of fracture in patients with CKD even in the early stages, physicians should consider the possibility of developing this complication in the follow-up of such patients.

Conflict of interest

The authors declared that there are no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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