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Case Report

Pathological fracture of subtrochanter femur, soft tissue infection along the fracture site, shaft femur bone cortex thickening and blastic lession on contralateral shaft femur due to renal osteodystrophy on the end stage renal disease patient: a case report

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ABSTRACT

Renal osteodystrophy (ROD) is a skeletal complication resulting from pathologic alterations in calcium, phosphate, and bone metabolism. The potential link between bone turnover and bone quality is an important question meriting study because of the relatively high incidence of fractures reported. In this case presents a pathological fracture on a routinely hemodialyzed woman. She complained pain on her left subtrochanteric area after low energy trauma accident. A thickening of the shaft femoral bone cortex was also found, reflecting the osteosclerosis event due to imbalance of proliferation and differentiation of osteoblast with increase bone formation. She also had a blastic lesion on her contralateral shaft femoral during the bone survey, but this finding remains asymptomatic. Decreased osteoclastic activity may contribute to cortical thickening, resulting in overall bone mass increase, which may lead to decreased elasticity of the bone or impaired repair capabilities, therefore increasing the risk of fracture. The blastic lesion that occurred on contralateral side may indicated effect of ROD or primary bone lesion. Careful assessment and holistic management of patients with kidney disease is necessary to achieve optimal outcome. The prevention of falls is also an important strategy to prevent pathological fractures. End stage renal disease (ESRD) have reduced bone mineral density, a risk factor for fracture incidence. Careful anamnesis and clinical examination are needed for diagnosis and management.

Keywords: Case report, End stage renal disease, Pathological fracture, Renal osteodystrophy

INTRODUCTION

The traditional term for bone lesions in conjunction with chronic kidney disease (CKD) is ROD and is now considered a part of this disease. In the last decade, the number of CKD has increased consistently. Bone turnover abnormalities are well known in patients with CKD. These abnormalities encompass a spectrum from severely suppressed to markedly elevated bone turnover. In approximately 85% of patients with CKD stage 5 on dialysis, abnormal bone turnover occurs, and there is a greater risk of a bone fracture within this patient group than within the general population. The implication of this phenomenon is the number of pathological fractures of the bone increase as well.[1]

ROD is skeletal complications that outcome from pathologic alterations in calcium, phosphate, and bone metabolism. Hyperphosphatemia and hypocalcaemia could result from impaired renal function. When the

condition of calcium levels in the blood become too low, parathyroid glands release parathyroid hormone (PTH) in the blood, which will remove too much calcium from the bones, the constant removal of calcium will weaken the bones. Bone quality is the current term used to refer to the structural and material parameters that together enable bone to bear the load and resist fracture or excessive distortion. The possible connection between bone turnover and bone quality is a significant question meriting study because of the relatively high prevalence of fractures reported to occur with abnormal turnover.[1-3]

In this case, found a pathological fracture on the female routinely hemodialysis patient. She complains of pain in her left subtrochanteric area after low energy trauma accidents. She had hemodialysis for her kidney failure in the last one year ago, with frequency twice a week.

The patient also got an infection on the soft tissue along with the fracture site with Staphylococcus Aureus isolated on the culture. Besides that, there is a thickening of the shaft femoral bone cortex that may reflect the osteosclerosis event due to an imbalance of proliferation and differentiation of osteoblast with increase bone formation. Besides that, pathology, the patient also got a blastic lesion on her contralateral shaft femoral during the bone survey, but this finding still remains asymptomatic.

CASE REPORT

The patient 53 years old woman with ESRD or CKD for the previous one year on routine hemodialysis two times weekly. She came to hospital with complaint of pain on her left thigh after walking at her house suddenly heard a crack sound. After that event, she unable to walk a bearing weight. No history of fever or loss of body weight. She had also a diagnosis of Diabetes Mellitus (DM) that was diagnosed 2 weeks ago by an internist. On physical examination, there was an abnormality found on the left thigh, consist of swelling on the subtrochanteric or proximal to middle thigh. The deformities were shortening and of external rotation with normal motor, sensorics and reflexes on left lower extremity.

The patient underwent radiologic examination and laboratory test. From the left thigh x ray, there was a fracture on the subtrochanteric femur region with oblique configuration. (Figure 1). Consulted this patient to the nephrologist and anesthesiologist for the pre-operative planning for the pathological fracture of left subtrochanteric femur. Also check for the bone survey to exclude the probabilities of a metastasis bone disease, a blastic lesion on the contralateral found (Figure 2).

At the beginning, planned to do the Intramedullary Nailing as a fracture fixation in order to make a good protection for whole bone. During the operation, found a mucous liquid at the soft tissue around the fracture site. Took a culture sample and doing the sensitivity test as well. So, decided to do more irrigation with saline solution to the soft tissue and fracture site. The insertion of nailing initiated with reaming the medulla of the femoral bone. It was unable to do bone reaming; the cortex of bone was too thick. Decided to put temporary bone cement spacer with the Steinman pin while waiting for culture result and antibiotic therapy (Figure 3).

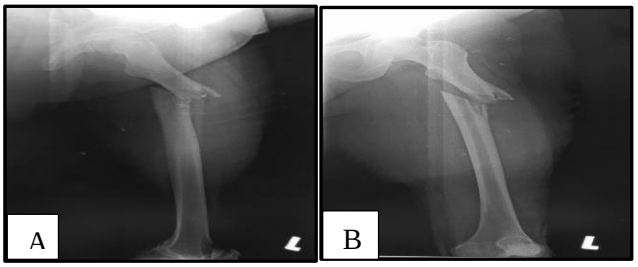

Figure 1: Left thigh X ray anteroposterior (A) and lateral view (B).

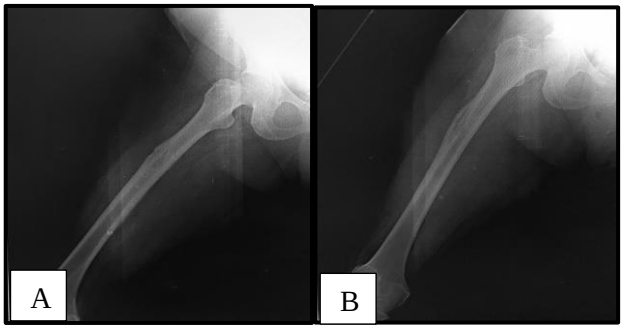

Figure 2: Right thigh X ray anteroposterior (A) and lateral view (B).

Figure 3: The left thigh X ray after bone cement spacer on the fracture site.

The culture result with *Staphylococcus Aureus* isolated on the sample with sensitivity to antibiotic cephalosporin third generation (ceftriaxone). Decided to give two weeks period of antibiotic treatment for this patient. Monitor the clinical and laboratory with good response on the patient with no fever and decrease of infection markers on the blood test. After that the patient underwent second operation debridement and external fixation application to stabilize the fracture in order to promote bone union (Figure 4).

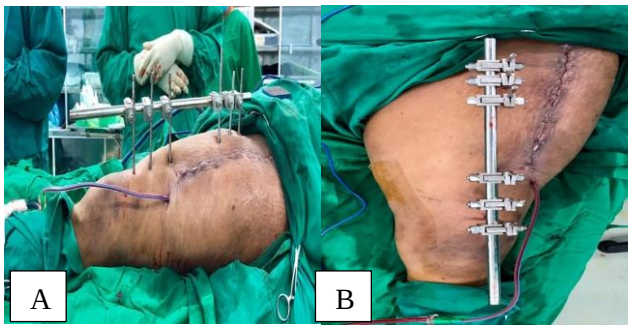

Figure 4 (A and B): Clinical picture after debridement and application of external fixation.

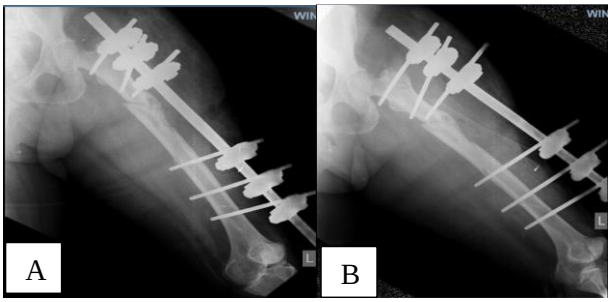

Figure 5: Left thigh X ray anteroposterior (A) and lateral view (B) post-operative debridement and open reduction and external fixation.

The position of the pins external fixation could maintain a good femoral alignment (Figure 5). No leg length discrepancies were found. During the second operation, biopsy specimen also taken to confirm the clinical finding. The result of histopathology test, there were an inflammatory cell that consist of lymphoid and plasma on the bone trabeculae with a lot of necrotic cells. There was no malignant cell found on the sample biopsy specimen.

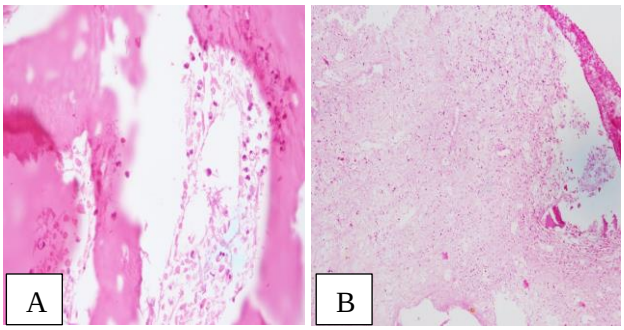

Figure 6: The microscopic slide of the biopsy sample (A and B).

It was taken during the operation showed an inflammatory cell consist of lymphocyte and plasma on bone trabeculae. There are a lot of necrotic cell detected on the microscopic specimen. There was no malignant cell found.

The patient was treated post operatively by cleaning the surgical wound and change the dressing on the pins external fixation regularly to avoid pin tract infection. The wound become good in healing without sign of infection. The antibiotic is continuing until two weeks after the operation. The patient rehabilitates immediately after the operation and allowed to use walker with non-weight bearing on the left lower extremity mobilization.

DISCUSSION

Another extremely common disorder of aging is decreasing kidney function. Over the past decade, there has been a worldwide epidemic of CKD. CKD patients are living longer at present than at the end of the past century. Several investigators have shown that patients with ESRD have reduced bone mineral density, a risk factor for fracture in the general population. As CKD progresses, ensuing abnormalities in mineral metabolism result in distortions in trabecular microarchitecture, thinning of the cortical shell, and increased cortical porosity.[1]

The prevalence of skeletal fractures has increased because of bone loss increases with aging. In a recent analysis of the Third National Health and Nutrition Examination Survey (NHANES III), Coresh et al found that the prevalence of significant kidney impairment was remarkably high in the elderly US population. However, despite the fact that osteoporotic fracture and mild-to-moderate CKD (Stages 1 until 4) are highly co-prevalent in the elderly, relatively few studies have examined the contribution of impaired kidney function to the risk of fragility fracture.[2]

The assessment of bone strength includes several factors that influence the quality of bone extracellular matrix. Bone quantity can be estimated by bone density, whereas bone quality can be estimated by the microarchitecture, both leading to a reduced mechanical bone adaptation. Occurrence of a fracture is the result of a fall in addition to failure in mechanical strength.[3-5]

The infection can be multifactorial in origin. In this case, the infection can be occurred because of dysregulation of the immune system in the CKD patient and higher susceptibility to infection with increasing in age. These changes are consistent with some of the changes to the adaptive immune system and are likely related in part to persistent microinflammation. Uraemia and its treatment can alter the immune system in haemodialysis patients.[6] Several factors influence immunity in these patients, such as uremic toxin, malnutrition, chronic inflammation, vitamin D-parathyroid hormone axis alternation, and therapeutic dialysis. Many studies have shown that both naive and acquired immune systems are impaired in these patients. This condition involves the coexistence of chronic immune activation and chronic immune suppression.[7]

The thickening of the cortex during reaming the bone medulla indicated the even quite similar to osteopetrosis

that happened because decreased osteoclastic activity, their overall bone mass is increased, which may lead to decreased elasticity of the bone or impaired repair capabilities and, therefore, increased risk of fracture. Orthopaedic surgeons have described the bones of osteopetrosis patients as being anywhere from chalky to extremely hard and thus causing damage to their surgical instruments. Therefore, these patients are at risk for postsurgical complications, including delayed union, non-union, and infection.[7-9]

The blastic lesion that occurred on contralateral side may indicated effect of the ROD or primary bone lesion. In ROD, bone remodelling is a dynamic process that occurs throughout the life of the individual in all segments of the skeleton.[10-13] Remodelling involves the action of resorption and formation cells (osteoclasts and osteoblasts, respectively), and its essential objective is to replace old tissue with new tissue. This process is regulated carefully by local and hormonal factors, and an imbalance between resorption and formation in certain cases can result in bone loss with disastrous consequences such as fractures.[14] To reach a diagnosis of bone lesion caused by ROD, a differential diagnosis between fibrous dysplasia, Paget's disease and brown tumour must be made. The most important factors to distinguish a ROD lesion from other bone lesions are the report of CKD, haemodialysis and secondary hyperparathyroidism, once the brown tumour is more likely to occur in primary hyperparathyroidism and shows a faster growth.[15] The lesion usually slow progression, high parathyroid hormone levels, a long haemodialysis history, histopathological findings, trabecular bone interspersed with fibrous connective tissue, the expansive and painless character of the lesions, and treatment based on secondary hyperparathyroidism control, mainly by means of parathyroidectomy.[16]

In the management of patients with kidney disease, it is necessary to have a rational approach to the diagnosis and assessment of ROD in order to devise a treatment plan that hopefully will lead to an improved outcome. Most fragility fractures occur due to a fall. The prevention of falls is, thus, another important strategy in fragility fracture prevention, and in fact, it is the most practical tactic at this moment.[17-20]

CONCLUSION

In this case report present about pathological fracture of subtrochanter femur, soft tissue infection along the fracture site, shaft femur bone cortex thickening and blastic lession on contralateral shaft femur due to ROD on the ESRD patient. ESRD have reduced bone mineral density, a risk factor for fracture incidence. Careful anamnesis and clinical examination are needed for diagnosis and management.

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