BILATERAL PATHOLOGIC FEMORAL NECK FRACTURE AS A CONSEQUENCE OF RENAL OSTEODYSTROPHY: REPORT OF TWO CASES AND REVIEW OF THE LITERATURE

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SUMMARY
Pathologic femoral neck fracture secondary to renal osteodystrophy is uncommon. Bilateral occurrence is even rarer. Thus, the treatment is controversial. We presented two cases with bilateral femoral neck fractures. The etiology and the way of treatment is discussed under the light of current literature.

Key Words: Bilateral, Femoral Neck Fracture, Renal Osteodystrophy.

INTRODUCTION
Advances in the management of renal failure and the success of renal transplantation have lessened the severity and frequency of renal osteodystrophy and improved both the long term survival and the quality of life1-4. Unfortunately, there are still a number of people who, despite treatment, develop skeletal problems. These problems include osteonecrosis, osteochondritis dissecans, "brown tumors", gout, pathological fractures and several types of developmental problems of the children5-8. However, bilateral spontaneous fracture of the hip is extraordinary, and this combination imposes an increased morbidity and mortality on these patients2,9. We report the cases of two patients one of whom had been receiving hemodialysis treatment, and developed simultaneous, bilateral pathologic fracture of the hip.

CASE REPORT
Case 1
A forty-five year old man with the diagnosis of renal amyloidosis for four years, had a convulsive attack while he was at home, after he had been discharged from the hospital following a renal biopsy operation. His wife related that he had been supine at the time and that he had no trauma other than that of the convulsion itself. The patient was admitted to the renal service with the diagnosis of chronic renal failure. When he was seen by the orthopedic service the next day, he could not actively move either of his legs, which were tender and painful with any motion. Laboratory work on admission showed the following abnormal values: sodium, 131 milliequivalents per liter; calcium, 7.0 milligrams per 100 milliliters; alkaline phosphatase, 129 international units per liter; creatinine 12.5 milligrams per 100 milliliters; and blood urea nitrogen 86 milligrams per 100 milliliters. Roentgenograms revealed bilateral fracture through the neck of the femur of Garden type-3. Treatment consisted of open reduction and internal fixation with three cannulated hip screws (Figure 1a, b). No complications were observed after the operation. At four years postoperatively, he had no complaints and was walking and sitting without help. X-rays showed complete union.

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Case 2
A thirty-five year old man with chronic renal failure secondary to renal stones, developed bilateral hip pain while he was staying at the renal service. It was four months before, when he got the diagnosis of renal insufficiency, and he had been receiving hemodialysis since that time. Laboratory values were as follows: sodium, 138 milliequivalents per liter; calcium, 7.5 milligrams per 100 milliliters; creatinine, 5.5 milligrams per 100 milliliters; and blood urea nitrogen, 107 milligrams per 100 milliliters. There was no history of convulsion.

Roentgenograms revealed bilateral hip fractures of Garden type-3. He was treated with open reduction and internal fixation with three cannulated hip screws (Figure 2a, b). At the third month follow-up, he had stiff hips due to the lack of rehabilitation because of his worsened general condition, but, there was not any loss of reduction.

DISCUSSION
Osteodystrophy develops in most patients with chronic renal failure. With hemodialysis, patients who have chronic renal failure live longer and the
incidence of bone disease increases. Renal transplantation seems to have lessened the severity and frequency of renal osteodystrophy\textsuperscript{1-5,7}. However, transplantation also has its own drawbacks, such as increased rates of osteonecrosis due to steroid and immunosuppressive therapy, with incidence showing considerable variation between 0 and 25\%\textsuperscript{2}. Although implications of steroid dosage are controversial, the incidence appears to be less if steroid dosage is reduced\textsuperscript{2}. Transplant rejection and long term dialysis have also been implicated. There is a high incidence of avascular necrosis of the hip and bilaterality and most occur within 2 years of transplantation\textsuperscript{1-5,7,10}. Seizure induced bone fractures in patients with renal osteodystrophy are uncommon. Fractures (most commonly of vertebral bodies) have been reported to occur during convulsive seizures in uremic bone disease during hemodialysis and are most commonly associated with transient hypotension secondary to hypovolemia\textsuperscript{6}. Although it is uncommon, patients who undergo
ultrafiltration may become hypovolemic-hypotensive with no manifestations other than seizures and shock syndrome which can be corrected by rapid fluid replacement.

Mathews et al. reported a case having multiple fractures that occurred shortly after hemodialysis. Schaab et al. reported a case of a chronic renal patient who had bilateral hip fractures during grand mal convulsions. Berman et al. reported a central acetabular fracture-dislocation secondary to an epileptic seizure in a chronic renal patient which he treated conservatively. Zingraf et al. reported a patient who had bilateral fracture of the femoral neck complicating uremic bone disease prior to hemodialysis. In the first of our patients, as there was no history of hemodialysis, the possibility of convulsive seizures due to hypotension can be eliminated. The second patient had had hemodialysis treatment but, he did not have convulsive attacks prior to his fracture episode.

Pathological fractures of the hip have also been reported by Hay and Mahony, to occur due to amyloidosis. They believed renal transplantation prevented further deposition of amyloid, but, the long term complications of dialysis related amyloidosis might still occur. Case-1 in our report, had been treated for renal amyloidosis for four years, and this could be the facilitating factor besides his convulsive attack, to sustain bilateral hip fractures.

Gerster et al. reported of two patients with moderate renal failure who sustained bilateral hip fractures after 11 and 21 months of treatment with fluoride for osteoporosis. Histologic examination showed severe fluorosis which was considered to be the consequence of excessive retention of fluoride due to renal insufficiency. As bilateral femoral neck fractures are very rare, these data suggest a causal link between fractures and fluoride in patients with renal failure.

Aluminum induced bone disease in uremic patients receiving dialysis was first described in 1980’s. The epidemic form of the disease was seen in centers where there was a high aluminum content in the water dialysate. Sporadic form of the disease continue to be noted, which causes multipl nontraumatic fractures. Sundaram et al. reported 4 such cases having hip, rib and cervical vertebra fractures. Healing was not seen in any of these fractures. He claimed that, spontaneous fractures of patients receiving dialysis, should raise the possibility of aluminum induced osteomalacia. In case-2, long term hemodialysis treatment seems to be the suspect, whether the etiology is due to excessive fluoride or aluminum retention, and/or uremic bone disease.

In the treatment of skeletal problems due to renal failure, early reports favored nonoperative management because of the risk of precipitating uremia and because internal fixation was considered ill-advised, but more recently, operative treatment has been advocated for a variety of skeletal disorders.

Schaab et al., studied morbidity and mortality rates in his series of 11 femoral neck fractures and compared the results of operative and non-operative management of these fractures. All fractures occurred in older men and were unilateral. He found operative management superior to conservative treatment as far as complications and mortality rates are concerned.

Pathologic fracture of the hip due to renal osteodystrophy is rare and bilateral occurrence is all the more uncommon. We described two such cases which we treated operatively. The results are encouraging, but, it is apparent that such injuries deteriorate the general condition of the patient.

REFERENCES