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Efficacy of Denosumab for Hemodialysis Patients with low Bone Mineral Density

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Objectives: The incidence of fractures is much higher in patients with chronic kidney disease (CKD), especially hemodialysis (HD), than people without CKD. Denosumab, a RANKL inhibitor, is known to be an effective anti-osteoporotic agent for patients with osteoporosis by reducing osteoclast activity. However, the guidelines of denosumab use based on its concrete effect on HD have not been established. Thus, we determined the effectiveness of denosumab in HD patients.

Methods: A bone densitometry, dual-energy x-ray absorptiometry (DXA), was performed in 91 hemodialysis patients. Thirty-seven patients were treated with denosumab. We conducted observational retrospective analysis of 23 HD patients who were treated with denosumab for more than 6 months. Serum bone turnover markers were measured at 6 months and bone mineral density (BMD) was evaluated using DXA 1 year after treatment.

Results: After denosumab treatment, BMD and serum bone turnover markers were restored. The BMD of femur neck and lumbar spine were improved 3.40 ± 7.3% and 4.96 ± 4.6%, respectively. The T-score of femur neck and lumbar spine were increased 0.153 ± 0.3 (P=0.052) and 0.323 ± 0.35 (P=0.001), respectively.
The level of C-terminal telopeptide, a bone resorption marker, significantly decreased from 2.27 ± 0.22 to 1.36 ± 0.18 ng/mL (p=0.001) after 6 months of denosumab treatment. The level of bone specific alkaline phosphatase, a bone formation marker, also decreased from 63.86 ± 6.37 to 30.44 ± 2.38 IU/L (p<0.001). However, there is no significant change in the level of osteocalcin.
Three patients showed numbness related to hypocalcemia. Two patients among them suffered from sustained hypocalcemia for 2 months after the treatment. There was no occurrence of hypocalcemia after active prevention with calcium and calcitriol.

Conclusions: In conclusion, denosumab could improve bone density in HD patients. These result suggests the potential efficacy of denosumab in HD patients with low BMD.