Oral High Dose of 1,25-Dihydroxyvitamin D₃ Increases Bone Mineral Content

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Dear Sir,

We have read with a great interest the recent paper by Muramoto et al. [1]. They reported that the oral dose of 2-3 µg dihydroxyvitamin D₃ [1, 25-(OH)₂D₃] 3 times a week could successfully suppress serum levels of parathyroid hormone after 20-32 weeks. However, they were not able to discuss the effect of the regimen on the bone mineral content because the observation period was too short. Many other reports also confirm the efficacy of intermittent high-dose vitamin D₃, either oral or intravenous, on secondary hyperparathyroidism, but they fail to confirm the efficacy of their regimen on increasing bone mineral content.

We present a case in whom the intermittent oral high dose of 1,25-(OH)₂D₃ resulted in a decrease in the serum alkaline phosphatase level and an increase in the bone mineral content without a significant reduction in the serum PTH level.

The patient, a 66-year-old male, who had been on hemodialysis therapy for 7 months, was treated with 4-6 µg 1,25-(OH)₂D₃ twice a week for 102 weeks. The cause of his renal failure was nephrosclerosis due to prolonged and severe hypertension. The regimen was

1,25-(OH)₂D₃ 0.5 µg 3/wk

Ca P
(mmol/L) (mmol/L)

Al-P (U/L)

C-PTH (pg/L)

3.74 -4.84

3.23

■ 1.61

ΣGS/D

(mmHg) AE

CaCO₂

(mg/cm)

1/8 3 11 12 90/1 2 3 4 5 6 ? 8 3 11 12 91/1 2 3 4 5 6 1

Fig. 1. A clinical course of intermittent oral 1,25-(OH)₂D₃ pulse therapy in a hemodialysis patient (66-year-old male).

adopted to ameliorate the severe bone and joint pain. The therapy resulted in a significant decrease in the serum alkaline phosphatase level without a concomitant decrease in the serum

C-PTH level. Bone and joint pain was significantly reduced. Bone mineral content was assessed by a digital image processing (DIP) method and a quantitative computed tomography (QCT) method. DIP is a new photodensitometric technique which assesses the bone density of the middle of the second metacarpal bone [2]. QCT assesses the bone density of the third lumbar vertebra. The high-dose vitamin D₃ therapy was shown to increase the bone mineral content by both the DIP (0.94-1.21 mm Al) and the QCT method (21.8-35.9 mg/cm).

Although questions remain as to the mechanism by which high-dose vitamin D₃ increased the bone mineral content without suppressing secondary hyperparathyroidism, this case suggests that the intermittent high-dose vitamin D₃ regimen could increase the bone mineral content in the long run.

References

Muramoto H, Haruki K, Yoshimura A, Mima N, Oda K, Tofuku Y: Treatment of refractory hyperparathyroidism in patients on hemodialysis by intermittent oral administration of 1,25-(OH)₂D₃. *Nephron* 1991;58:288-294. Fukunaga M, Tomomitsu T, Otuka N, Imai H, Morita R, Nishii Y: Indexes of bone mineral content on second metacarpal bone roentgenogram analyzed by digital image processing: A comparison with other bone mass quantifying methods. *Rad Med* 1990;8:230-235.

Book Review

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This review summarizes the proceedings of the Second International Workshop of Renal Failure Caused by Polycystic Kidney Disease, held in Parma, Italy, on September 20-21, 1991, with chapters by experts in the field from both sides of the Atlantic.

It encompasses advances in both clinical and research aspects of autosomal dominant polycystic kidney disease (ADPKD). On the clinical front, it summarizes effectively the possible pathogenesis and treatment of hypertension observed in approximately 80% of patients with ADPKD. The available evidence for efficacy of a relatively low protein diet on the rate of progression of renal failure in patients with polycystic kidney disease is summarized by Gretz and Strauch.

Genetic aspects of the disease ranging from the inadequacy of present day genetic counselling to the various molecular biologic techniques employed in an attempt to find and clone the PKD1 gene on the short arm of chromosome 16 are discussed in detail. The frequency of polycystic kidney disease, which is not associated with anomalies on chromosome 16, namely PKD2, among European countries is also reviewed. Lastly, details of a computer program set up to facilitate storage and analysis of clinical and DNA data in ADPKD are summarized. The utility of similar programs in the workup of other genetic diseases is obvious.

Animal models of polycystic renal disease, including three rat variants and transgenic and chimeric mouse models, are discussed in detail. The information derived from these and other models has expanded knowledge into the pathogenesis of the disease, as reviewed by Drs Grantham, Avner and Sweeney.

In summary, this is an excellent up-to-date review of autosomal dominant polycystic disease, encompassing advances in genetics, research models and clinical management strategies and as such is a valuable addition to the library of nephrologists, geneticists and molecular biologists.

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