

25-HYDROXYVITAMIN D, PARATHYROID HORMONE, AND FUNCTIONAL OUTCOME: A SURVEY STUDY OF 456 ELDERLY PATIENTS WITH HIP FRACTURE

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There is increasing interest in the effects of vitamin D and parathyroid hormone (PTH) on extraskeletal tissues, including the muscle. These effects may explain impairment in functional ability found in vitamin D deficient subjects. Our aim was to investigate the role both of vitamin D and of PTH in affecting the ability to perform activities of daily living after hip fracture.

We evaluated 521 hip-fracture patients who had been admitted consecutively to our Physical Medicine and Rehabilitation Service. Eighteen of the 521 patients were excluded because their hip fracture was caused by either major trauma or cancer affecting the bone. Twenty-six patients were excluded because they died or were transferred to other hospitals. Twenty-one of the remaining 477 patients were excluded because they had abnormally high serum calcium. The final study sample included 456 patients. A blood sample was collected 22.3 ± 7.1 days (mean \pm SD) after fracture occurrence, while patients were fasting. PTH was assessed by two-site chemiluminescent enzyme-labeled immunometric assay; 25-hydroxyvitamin D by an immunoenzymatic assay. Functional outcome was assessed after acute in-patient rehabilitation by using the Barthel index score.

The functional scores were significantly correlated with serum levels of 25-hydroxyvitamin D ($\rho=0.190$; $p<0.001$), PTH ($\rho=-0.164$; $p<0.001$) and 25-hydroxyvitamin D/PTH ratio ($\rho=0.261$; $p<0.001$). At multiple regression, 25-hydroxyvitamin D and PTH levels were independently associated with Barthel index scores. The correlation between 25-hydroxyvitamin D/PTH ratio and Barthel index scores was significantly stronger than the one between 25-hydroxyvitamin D and Barthel index scores (difference between the two correlation coefficients = 0.071; 95% CI = 0.009 – 0.133; $p=0.011$). The significant association between 25-hydroxyvitamin D/PTH ratio and Barthel index scores persisted after adjustment for twelve prognostic factors ($p=0.012$). On the whole, the panel of prognostic factors we studied predicted 50.1% of the variance of the functional score.

Data shows that both PTH and 25-hydroxyvitamin D were significantly associated with ability to function after hip fracture, and suggest that the two hormones act through independent mechanisms. The 25-hydroxyvitamin D/PTH ratio significantly contributed to a predictive model of functional outcome.