

Vitamin D level in the serum correlates with fatty degeneration of cuff muscles in patients with rotator cuff tear

Department of Orthopedic Surgery, Seoul National University College of Medicine,
Seoul National University Hospital, Korea

Joo Han Oh, M.D., Ph.D. · Sae Hoon Kim, M.D. · Ki Hyun Jo, M.D.,
Chung Hee Oh, M.D. and Hyun Sik Gong, M.D., Ph.D.

Purpose

To analyze the relationship between vitamin D (25(OH)D₃) level in the serum and the fatty degeneration of the rotator cuff muscles in patients with rotator cuff disorders.

Materials and Methods

Between March and December 2007, 164 patients with shoulder pain underwent magnetic resonance arthrography to evaluate the cuff tear, and simultaneously measured the serum concentration of 25(OH)D₃ and intact parathyroid hormone (iPTH). Ninety seven patients were full-thickness rotator cuff tear (group I) and the remaining 67 were diagnosed as other than full-thickness tear (group II: 27 partial-thickness cuff tears, 13 SLAP lesions, 10 rotator cuff tendinopathies, 8 stiff shoulders, 4 calcific tendinitis, 3 anterior instabilities, 1 long head of biceps rupture and 1 rheumatoid arthritis). In group I, there were 33 males and 64 females with their mean age of 61.7 years (range: 45 to 80, SD: 7.9). In group II, there were 29 males and 38 females with the mean age of 52.5 years (range: 20 to 74, SD: 1.6). The distribution of gender was statistically same between two groups. Various factors (full-thickness cuff tear, gender, age, symptom duration, fatty degeneration of cuff muscles, size of tear, and abduction/external rotation torque of affected and healthy shoulder measured by isokinetic muscle performance test) were collected, and the stepwise linear regression analysis was performed to verify which factor account for 25(OH)D₃ and iPTH level in the serum among our variables.

Results

In group I, the level of serum 25(OH)D₃ had correlation with gender, age, the fatty degeneration of the cuff muscles, size of tear, serum iPTH level and abduction and external rotation torque of affected and healthy side. The Spearman correlation coefficients (SCC) were -0.36 ($p < 0.001$), -0.34 ($p = 0.001$) and -0.22 ($p = 0.035$) between serum 25(OH)D₃ level and fatty degeneration of the supraspinatus, infraspinatus and subscapularis, respectively. Female (SSC = 0.33, $p = 0.001$), old age (SSC = -0.20, $p = 0.046$), larger size of tear (SSC = -0.22, $p = 0.032$), high iPTH level (SSC = -0.24, $p = 0.017$), and low abduction/external rotation torque of

affected and healthy shoulder ($0.28 < \text{SSCs} < 0.36$, $p \text{ values} \leq 0.014$) were also significantly related with lower level of serum $25(\text{OH})\text{D}_3$. Stepwise linear regression analysis exhibited that female ($p = 0.004$) and greater fatty degeneration of the supraspinatus muscles (< 0.001) were separate independent variables for lower serum $25(\text{OH})\text{D}_3$ level. In the group II, the level of serum $25(\text{OH})\text{D}_3$ only had negative correlation with female gender ($\text{SCC} = -0.294$, $p = 0.016$).

Conclusions

The current study demonstrated serum vitamin D level had the significant correlation with the fatty degeneration of the torn cuff muscles. Future study may be needed to verify the local concentration of vitamin D in the cuff muscles, and the supplementation of vitamin D would affect the functional and anatomical outcomes, and the improvement of fatty degeneration after rotator cuff repair.

Key Words: Fatty degeneration, Vitamin D ($25(\text{OH})\text{D}_3$), IPTH, Isokinetics, Rotator cuff tear