Low Vitamin D Status Does Not Adversely Affect Short-Term Functional Outcome After Total Hip Arthroplasty

INTRODUCTION
Low serum vitamin D levels cause muscle weakness and progressive muscle deconditioning, leading to the impairment of physical function. Since the prevalence of low vitamin D levels in patients undergoing total hip arthroplasty (THA) is high, it is questionable whether there is a potential effect of low vitamin D levels on physical functioning after THA. This is of great importance because vitamin D deficiency can be easily and safely corrected by simple oral vitamin D supplementation. The hypothesis of our study was that low serum vitamin D levels adversely affect the short-term functional outcomes in THA patients during the early postoperative period.

METHODS
We prospectively collected data from a cohort of patients who underwent unilateral THA by 2 arthroplasty surgeons from July 2010 to May 2011. Serum 25(OH)D were obtained as part of the routine preoperative laboratory tests. Functional outcomes were assessed from both self-reported questionnaires (Western Ontario McMaster Universities Osteoarthritis Index [WOMAC] and the Short-Form-36 physical function subscale [SF-36 PF]) and performance-based tests (2-minute walk test [2MWT] and timed get-up-and-go test [TUG]) at the time of preoperative evaluation and 6 weeks following surgery. Patients were divided into 3 groups based on their 25(OH)D levels (< 20, 20-29 and ≥ 30 ng/mL for deficiency, insufficiency and normal vitamin D levels, respectively). The primary outcome of this study was the within-patient changes of functional outcomes determined by WOMAC functional subscale. The data were analyzed with the use of one-way ANOVA and Kruskal-Wallis test for parametric and nonparametric data, respectively. In addition, Spearman’s rho were used to determine the association between serum 25(OH)D levels and each outcome measurement.

RESULTS
Of 187 patients, 16, 78 and 93 were categorized with vitamin D deficiency, insufficiency and normal vitamin D levels, respectively. There were more female patients in vitamin D deficiency group (p<0.0003, 0.008, respectively) (Table 1). There were no differences in other preoperative characteristics including race, body mass index, diagnosis, Charlson comorbidity index, number of additional lower extremity joint pain, active back pain and the use of walking aid (Table 1). There were also no differences in preoperative WOMAC, SF-36 PF, 2MWT and TUG among the 3 groups. At 6 weeks follow-up, all the mean outcome scores significantly improved when compared to baseline levels. There were no differences of both postoperative and the within-patient changes of all 3 WOMAC subscales, SF-36 PF, 2MWT and TUG among the 3 groups (Figure 1 and Table 2). When evaluated for the association between serum 25(OH)D levels and within-patient changes of outcome measurements, the correlations were not statistically significant (p ranges from 0.153 to 0.088, p>0.05).

DISCUSSION
Prior published evidence suggests a serum 25-hydroxy vitamin D (25(OH)D) of 30 ng/mL as the low end of the acceptable range for both skeletal and non-skeletal health. Our study, however, showed that serum vitamin D status doesn’t affect postoperative functional performance as measured from WOMAC, SF-36 PF, 2MWT and TUG during the early postoperative recovery period. One possible explanation is that the success rate of THA is extremely high; therefore, patients who need THA will benefit from the surgery regardless of serum vitamin D levels. In light of this study, because low vitamin D levels did not compromise the short-term functional outcomes after THA, orthopaedic surgeons can safely proceed with THA without delay. Nevertheless, since the long-term consequences are unknown, any vitamin D defect should be corrected postoperatively.

SIGNIFICANCE
It is unclear whether there is a negative effect of vitamin D on the postoperative recovery after THA. Our study was conducted using a prospective design with stringent outcome measurements in order to evaluate the association between vitamin D levels and postoperative function after THA.

Table 1. Demographic and clinical characteristics.

Table 2. Pre- and postoperative performance-based tests showed no significant differences among the three vitamin D groups.

Figure 1. Changes in self-reported questionnaires were not significantly different among the three vitamin D groups.

Table 1. Demographic and clinical characteristics.

Table 2. Pre- and postoperative performance-based tests showed no significant differences among the three vitamin D groups.

*Error Bars represent the standard deviation of the change in score

Data was presented as mean ± SD for continuous variables and number (%) for categorical variables.

Difference is significant between normal and insufficient groups

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