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Postoperative Hypocalcemia Is Associated with Preoperative Vitamin D Deficiency

Kirkby-Bott J, Markogiannakis H, Skandarajah A, Cowan M, Fleming B, Palazzo F. Preoperative vitamin D deficiency predicts postoperative hypocalcemia after total thyroidectomy. World J Surg 2011;35:324-30.

SUMMARY

Background

A common complication of thyroid surgery is transient postoperative hypocalcemia, which occurs in up to 30% to 35% of patients. The rate of permanent hypocalcemia is thought to be <2% in the hands of experienced surgeons. The actual number of events has been estimated to be much higher in the population at large. The actual prevalence of important hypocalcemia is unknown, since there is no accepted level of calcium that defines hypocalcemia (1). Prevention of this transient event may reduce costs due to extra days of hospitalization, extra medication, additional blood tests, and outpatient visits. This study examined the relationship between preoperative vitamin D levels and postoperative calcium levels.

Methods and Results

Data were collected prospectively from 165 consecutive thyroidectomies between January 2006 and March 2009 at a premier academic hospital in London. The data were retrospectively analyzed. Patients were divided into three groups based on the preoperative total vitamin D (vitamin D2 + vitamin D3) level: group 1, <10 ng/ml; group 2, 10 to 20 ng/ml; group 3, >20 ng/ml. Hypocalcemia was defined as a postoperative calcium level (corrected for albumin) of <8 mg/dl on postoperative day 1 or 2. There were 44 cases of postoperative hypocalcemia in the 165 patients. There was a significant stepwise increased risk of transient but not permanent hypocalcemia with lower vitamin D levels. Hypocalcemia occurred in 35.4% of group 1, 28.2% of group 2, and 15.2% in group 3. Graphically and statistically, the midpoint of group 2 appeared to be the threshold of vitamin D at which the risk of hypocalcemia increased. Reforming the groups to ≤14 ng/ml and >14 ng/ml, the rate of hypocalcemia was significantly different—35.5% and 19.1%, respectively (P = 0.014 by the chi-square test). Binary logistic regression analysis of postoperative parathyroid hormone and vitamin D levels show that they are independent risk factors for hypocalcemia. The median length of the hospital stay was significantly greater (P<0.001) in those with preoperative vitamin D deficiency (<10 ng/dl; 2 days), as compared with those without vitamin D defi-

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ciency (>20 mg/dl; 1 day). The risk of hypocalcemia was not associated with the type of thyroid pathology.

Conclusions

This study shows that preoperative low serum vitamin D deficiency is a risk factor for transient but not permanent postoperative hypocalcemia. The risk was stepwise, but the threshold of the increased risk of postoperative hypocalcemia was associated with a low vitamin D level (<14 ng/ml).

ANALYSIS AND COMMENTARY

The increasing incidence of thyroid cancer has resulted in larger numbers of thyroidectomies for the treatment of malignant thyroid nodules and the diagnosis of indeterminate thyroid nodules. These surgeries are accompanied by the cost of thyroid hormone replacement medication and also the cost of unintentional complications of surgery, including transient and permanent hypocalcemia. This retrospective study had a relatively high incidence of postoperative hypocalcemia, which was defined by albumin-corrected calcium <8 mg/dl, a finding not usually associated with significant symptomatic hypocalcemia. This study is not randomized and does not examine the effect of presurgery therapy. Using these data, it cannot be determined whether low vitamin D levels caused the postoperative hypocalcemia. It does appear that the length of stay after thyroidectomy is shorter in patients with adequate vitamin D levels. It seems reasonable to make sure that preoperative vitamin D is not severely insufficient (3), and according to this study, it should be >14 ng/ml, a level that is still considered to be less than optimal for good bone health per the Institute of Medicine (IOM). I think that a target of >20 ng/ml, recommended by the IOM, is a reasonable minimal preoperative vitamin D target (4).

— Stephanie L. Lee, MD, PhD

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