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Is There a Cost-Effective Way of Predicting Postthyroidectomy Hypocalcemia?

Lazard DS, Godiris-Petit G, Wagner I, Sarfati E, Chabolle F. Early detection of hypocalcemia after total/completion thyroidectomy: routinely usable algorithm based on serum calcium level. World J Surg. August 2, 2012 [Epub ahead of print]. doi: 10.1007/s00268-012-1727-5.

SUMMARY

Background

Transient and permanent hypocalcemia and hypoparathyroidism may occur in up to 30% of patients after total or completion thyroidectomy. Hypocalcemia is the most common complication of thyroid surgery. This was a prospective study of preoperative and postoperative calcium and phosphorus levels after total or completion thyroidectomy, with the creation of an algorithm to detect patients at risk of hypocalcemia.

Methods and Results

This was a retrospective analysis at a single academic center of a prospectively created database. This observational study examined 136 patients who underwent total thyroidectomy or completion thyroidectomy. Serum calcium and phosphorus were measured preoperatively and postoperatively at 6, 12, 20, and 48 hours after skin closure. Hypocalcemia was defined as a postoperative calcium level of ≤7.6 mg/dl (1.9 mmol/L) or symptoms of hypocalcemia any time after surgery; 24% of patients had hypocalcemia by this definition. Calcium was not administered before 20 hours after surgery, and calcium levels were compared. The lowest level of calcium occurred at 12 and 20 hours after surgery. At 20 hours, the difference had the best area under the receiver operating characteristic (ROC) curves (0.87), and a difference of –1.2 mg/dl (–0.3 mmol/L) or less was a significantly more frequent indicator of hypocalcemia (P = 0.0001). Serum phosphorus was not helpful in predicting hypocalcemia.

Conclusions

The comparison of four postoperative times for collection of calcium levels showed that 12 and 20 hours postoperative levels display similar rates of hypocalcemia, but the 6-hour value was too early and was less reliable. A decrease of ≥1.2 mg/dl (0.3 mmol/L) between the preoperative calcium level and the value at 20 hours after surgery was the best predictor of hypocalcemia (100% sensitivity and 88.4% specificity). None of the patients at with a calcium level >7.6 mg/dl at 20 hours after surgery, even with a drop at hour 20 of 1.2 mg/dl as compared with preoperative levels, had hypocalcemia at 48 hours. This combination of preoperative and hour-20 postoperative calcium levels predicted 79% of the patients in whom hypocalcemia eventually developed. The authors recommend that this algorithm be used cautiously until a larger validation study is performed.

ANALYSIS AND COMMENTARY

Hypocalcemia is the most common complication after total thyroidectomy. As thyroid surgeries at some institutions are becoming an outpatient procedure, it is important to identify predictors of significant hypocalcemia that may occur after the patient has returned home. Predictors for safe early discharge have been based on calcium (1), ionized calcium (2), and parathyroid hormone levels (3,4). Parathyroid hormone levels appear to be a reliable marker (4) of hypoparathyroidism requiring treatment, but quick turnaround times for parathyroid assays in the postoperative period are relatively expensive and may not be universally available. This group focused on postoperative calcium levels, since the results of the test are quickly available and the test is inexpensive. Although the decrease in parathyroid levels occurs as soon as 1 hour after damage to the

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glands (4), the calcium decline is delayed, as shown by this study until 12 to 20 hours after surgery. This study suggests that the change in calcium level is too delayed to be used for safe same-day discharge or even discharge the morning after surgery. Since most of my patients are being discharged sooner than 20 hours after surgery, this study suggests that postoperative calcium levels before 20 hours may not be predictive of which patients will have hypocalcemia and which require calcium and calcitriol supplementation at discharge. I will encourage our service to obtain immunoreactive (iPTH) levels during the late evening prior to discharge the next morning to help predict which patients should receive calcium and calcitriol supplementation after discharge (3).

— Stephanie L. Lee, MD, PhD

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