

Answer

Tertiary Hyperparathyroidism After Parathyroidectomy With Autotransplantation

In patients with chronic renal failure, secondary hyperparathyroidism is a common sequela, ultimately necessitating parathyroidectomy in 38% of patients within 20 years owing to medically refractory hyperparathyroidism.^{1,2} Impaired glomerular filtration leads to decreased circulating 1,25-dihydroxycholecalciferol (calcitriol; active vitamin D), increased serum phosphate, and prolonged half-life of parathyroid hormone.³ Together, these factors lead to hyperparathyroidism and hypocalcemia. Eventually, long-standing hyperparathyroidism can progress to tertiary hyperparathyroidism, a state of autonomous parathyroid function that is not suppressed after renal function is restored, as indicated by hypercalcemia and hyperparathormonemia. This phenomenon results from down-regulation of calcium-sensing receptors on the chief cells within the parathyroid glands.⁴ This is most commonly seen in patients with renal failure after undergoing renal transplant.

In recent decades, the percentage of patients with chronic renal failure requiring parathyroidectomy has declined as medical management has improved.⁵ Medical management of secondary hyperparathyroidism includes dietary phosphorus restriction, phosphorus-binding medications, calcitriol, and calcimimetics (cinacalcet). However, secondary hyperparathyroidism sometimes persists despite these interventions. Indications for surgery include failure of medical management, calciphylaxis, parathyroid hormone level greater than 800 pg/mL, hyperphosphatemia, hypercalcemia, hypercalciuria, osteoporosis, and significant symptoms such as pruritus, pathologic bone fracture, and bone pain.⁶ Demeure et al⁷ have argued that patients with secondary hyperparathyroidism are more likely to benefit from parathyroid surgery when they have bone pain, malaise, pruritus, calciphylaxis, or if parathyroid hormone levels are highly elevated (greater than 10 times the reference value). The options for parathyroidectomy in these patients include subtotal (3.5 gland) parathyroidectomy and total (4 gland) parathyroidectomy with autotransplantation. Parathyroid tissue can also be cryopreserved at the time of surgery and autotransplanted later if needed.

The mainstay of treatment for tertiary hyperparathyroidism is surgery.⁷ Because most patients have developed 4-gland hyperplasia, total parathyroidectomy is generally performed, with autotransplantation of 20 to 75 mg of parathyroid tissue.⁸ Autotransplantation is performed in a surgically accessible area, traditionally in the sternocleidomastoid or brachioradialis muscles. The rate of autograft-related recurrent hyperparathyroidism has been estimated at 11.6% in patients with tertiary hyperparathyroidism, even after renal transplantation.⁹

Although notes from this patient's prior operation in his home country were not able to be located, his history suggested a diagnosis of recurrent hyperparathy-

roidism due to hyperplasia of autotransplanted parathyroid tissue. To confirm this, we performed a fine-needle aspiration biopsy in the clinic, which revealed parathyroid cells.

After discussion with the patient and his nephrologist, excision of the mass was performed using local anesthesia. At the time of surgery, the mass was excised with a cuff of sternocleidomastoid muscle, leaving a small portion of tissue approximately half the size of a normal parathyroid gland in place, pedicled on its blood supply. The postexcision intraoperative parathyroid hormone level was 37.9 pg/mL. Postoperatively, the serum calcium nadir was 7.2 mg/dL, which stabilized with oral calcium supplementation. At the most recent follow-up visit, his calcium level was 8.9 mg/dL and his parathyroid hormone level was 50.5 pg/mL. The final pathologic analysis confirmed hyperplastic parathyroid tissue. The patient will continue to receive close clinical and biochemical surveillance for the possibility of recurrent hyperparathyroidism.

Accepted for Publication: March 16, 2010.

Correspondence: Luc G. T. Morris, MD, Department of Surgery, Memorial Sloan-Kettering Cancer Center, New York, NY 10065 (morrisl@mskcc.org).

Author Contributions: Study concept and design: Morris. Acquisition of data: Lieberman, Vouyiouklis, Elangovan, and Morris. Analysis and interpretation of data: Morris. Drafting of the manuscript: Lieberman, Vouyiouklis, Elangovan, and Morris. Critical revision of the manuscript for important intellectual content: Morris. Administrative, technical, and material support: Lieberman, Vouyiouklis, Elangovan, and Morris. Study supervision: Morris. Financial Disclosure: None reported.

REFERENCES

1. Drüeke TB, Ritz E. Treatment of secondary hyperparathyroidism in CKD patients with cinacalcet and/or vitamin D derivatives. *Clin J Am Soc Nephrol*. 2009;4(1):234-241.
2. Fassbinder W, Brunner FP, Brynner H, et al. Combined report on regular dialysis and transplantation in Europe, XX, 1989. *Nephrol Dial Transplant*. 1991;6(suppl 1):5-35.
3. Fraser WD. Hyperparathyroidism. *Lancet*. 2009;374(9684):145-158.
4. Grzela T, Chudzinski W, Lasiecka Z, et al. The calcium-sensing receptor and vitamin D receptor expression in tertiary hyperparathyroidism. *Int J Mol Med*. 2006;17(5):779-783.
5. Cohen EP, Moulder JE. Parathyroidectomy in chronic renal failure: has medical care reduced the need for surgery? *Nephron*. 2001;89(3):271-273.
6. Pitt SC, Sippel RS, Chen H. Secondary and tertiary hyperparathyroidism, state of the art surgical management. *Surg Clin North Am*. 2009;89(5):1227-1239.
7. Demeure MJ, McGee DC, Wilkes W, Duh QY, Clark OH. Results of surgical treatment for hyperparathyroidism associated with renal disease. *Am J Surg*. 1990;160(4):337-340.
8. Kebebew E, Duh QY, Clark OH. Tertiary hyperparathyroidism: histologic patterns of disease and results of parathyroidectomy. *Arch Surg*. 2004;139(9):974-977.
9. Schlosser K, Rothmund M, Maschuw K, et al. Graft-dependent renal hyperparathyroidism despite successful kidney transplantation. *World J Surg*. 2008;32(4):557-565.