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Total Parathyroidectomy: A Surgical Management for Uncontrolled Secondary Hyperparathyroidism in a Patient with End Stage Renal Disease

ABSTRACT

Objective: To present the case of an adult patient with end stage renal disease who underwent total parathyroidectomy with autotransplantation for uncontrolled secondary hyperparathyroidism

Methods:
Design: Case Report
Setting: Tertiary Hospital
Patient: One

Result: Total parathyroidectomy with autotransplantation resulted in decrease in parathyroid hormone from a pre-operative value of 1,347pg/mL (15-65 pg/mL) to 28.05 pg/mL. Pruritus disappeared two days after the surgery. Phosphorus and calcium levels were within normal values four days and two months post-operatively, respectively.

Conclusion: Total parathyroidectomy with autotransplantation may be a viable surgical option for controlling secondary hyperparathyroidism associated with end stage renal disease and may play an important role in reducing morbidity and mortality among patients with end-stage renal disease.

Keywords: *Secondary hyperparathyroidism, parathyroidectomy, autotransplantation, end- stage renal disease, hungry bone syndrome, parathyroid hormone*

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Secondary hyperparathyroidism (2˚ HPT) is a complication of end stage renal disease (ESRD) wherein parathyroid hormone (PTH) elevates in a hypocalcemic setting. Coronary artery calcification and calciphylaxis or purplish skin discoloration progressing to non-healing ulcers are secondary hyperparathyroidism complications that contribute to its high mortality rate. [1] Medical treatment to control PTH level in ESRD patients usually fails. Thus, surgical parathyroidectomy is resorted to. [2]

In the Philippines, parathyroidectomy is performed for symptomatic primary hyperparathyroidism while surgery for 2˚ HPT due to renal failure is virtually nonexistent.

An adult patient in whom parathyroidectomy was performed for 2˚ HPT is presented.

CASE REPORT

A 51-year-old Filipino on six years' hemodialysis for end stage renal disease from hypertensive nephrosclerosis had generalized pruritus refractory to medication for five years. Four months before admission, he was referred to the department due to a markedly high parathyroid hormone level of 1,347pg/ml (Normal Values: 15-65pg/mL). Investigations revealed hypocalcemia, increased phosphorus and elevated alkaline phosphatase; enlarged parathyroid glands, a left thyroid nodule and right thyromegaly on neck ultrasonography; and concentric left ventricular hypertrophy and aortic sclerosis on two-dimensional echocardiogram. He had undergone a thyroidectomy in 1988.

On physical examination, he had ash-colored dry skin with scratch marks, a thyroidectomy scar, hyperpigmented papules over the scapular area, upper and lower extremities, pale palpebral conjunctivae, a globular abdomen, an arterio-venous (A-V) shunt on the right arm and Grade I bipedal edema.

Informed consent was obtained, and he was admitted for surgery with the diagnoses of End Stage Renal Disease secondary to Hypertensive Nephrosclerosis with Uncontrolled Secondary Hyperparathyroidism (2˚ HPT); Nodular Non-toxic Goiter, left; status post Thyroidectomy (1988); Hypertension stage II, Controlled. A bilateral neck exploration, total parathyroidectomy with sternocleidomastoid muscle parathyroid gland autotransplantation and right subtotal thyroid lobectomy were performed.

RESULTS

Intraoperatively, extensive fibrosis made recurrent laryngeal nerve and parathyroid gland localization particularly complex. The left thyroid lobe was surgically absent, contrary to the ultrasound report. The right thyroid gland solid nodule measured 10 mm x 10 mm. Four hypertrophied parathyroid glands respectively measured: 35 x 25 x 12 mm (left superior); 25 x 18 x 17 mm (left inferior); 5 x 5 x 5 mm (right superior) and 25 x 20 x 15 mm (right inferior). Their average size was 20 mm x 20 mm x 10 mm compared to the normal size of 6 mm x 2 mm x 3 mm. [3] A 20 mm^3 section of the smallest parathyroid gland was cut into 20 parts of 1 cu mm apiece, and autotransplanted into each sternocleidomastoid muscle. All submitted parathyroid and thyroid tissues were histopathologically benign.

Following surgery, hypocalcemia (1.7 mmol/L) lower than pre-operative levels was noted after 12 hours and eventually corrected with intravenous and oral calcium. Hemodialysis was resumed after 24 hours. Pruritus disappeared on the second post-operative day, although soft-tissue calcification remained. Serum phosphorus and calcium levels normalized on the 4th post-operative day, and PTH levels normalized two months later, although serum alkaline phosphatase levels remained elevated (Table 1).

DISCUSSION

Table 1. Patient's Biochemical Parameters

Biochemical Parameters	Values		
	Normal	Pre-operative	Post-operative
Serum Phosphorus	0.8–1.6 mmol/L*	2.9 mmol/L	(4th day) 1.1 mmol/L
Serum Parathyroid Hormone level	15-65 pg/ml†	1,347 pg/ml	(60th day) 28.05 pg/mL
Serum Calcium	2.1-2.5 mmol/l	1.9 mmol/L	(4th day) 2.4 mmol/L
Serum Alkaline	25-90 g/L‡	174 g/L	(60th day) 191 g/L

* mmol/L – millimoles per liter
† pg/ml – picagrams per milliliter
‡ g/L – grams per liter

The indications for parathyroidectomy included PTH levels more than 1000 pg/mL refractory to medication, debilitating pruritus, marked soft tissue calcifications, and hyperphosphatemia.[2] High serum PTH and phosphorus levels particularly increase sudden cardiac-related death risks from coronary artery disease[4] and their control can reverse left ventricular hypertrophy.[5] Increased alkaline phosphatase levels suggested increased bone resorption rates, and anemia probably resulted from ESRD and high PTH levels inhibiting red blood cell production.

Bilateral neck exploration was certainly the procedure of choice over unilateral neck dissection or minimally invasive parathyroidectomy in this case. It allowed direct visual assessment of all four hypertrophied parathyroid glands, facilitating their removal in a single operation. This eliminated the need for costly, preoperative Technetium 99-Sestamibi imaging which is unavailable in this institution. Ultrasonography, which was available, has been reported to have a wide sensitivity range of 27% - 97 % in identifying parathyroid pathology.[6] In this case, it did identify enlarged parathyroid glands, although it curiously failed to note the surgically absent thyroid lobe.

The postoperative hypocalcemia reflecting a dramatic calcium uptake by bone following post-parathyroidectomy drops in high PTH levels has been termed the "hungry bone syndrome".[7] Autotransplanted parathyroid gland functions 60 days post-operatively

and bars permanent hypoparathyroidism as PTH levels normalize and serum calcium and phosphorus levels improve.[8] Sternocleidomastoid autotransplantation ensures accessibility under local anesthesia should recurrent 2˚ HPT or 3˚ HPT manifests. It utilizes the same operative site, and is associated with less graft ischemia, low infection incidence, and high graft survival rates. [9] Elevated alkaline phosphatase levels are expected to normalize after 3 months.[10] Pruritis disappears, improving quality of life while residual soft tissue calcifications no longer progress to more severe calciphylaxis. [11]

Total parathyroidectomy with autotransplantation may be a viable surgical option for controlling secondary hyperparathyroidism associated with end stage renal disease and may play an important role in reducing morbidity and mortality among patients with end-stage renal disease.

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