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Case Report

Post-parathyroidectomy thyrotoxicosis and atrial flutter: a case for caution

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Abstract

Despite transient hyperthyroidism reportedly occurring in ~30% of post-parathyroidectomy (PTX) patients with primary hyperparathyroidism, it has rarely been described in the internal medicine literature. It occurs within days of surgery, is usually clinically mild or silent, and typically spontaneously resolves within weeks. Patients can, however, unusually present with symptoms and signs of thyrotoxicosis, including arrhythmias. We report a case of a hemodialysis patient who developed self-limited hyperthyroidism after intra-operative thyroid manipulation and excision during PTX surgery for secondary hyperparathyroidism that failed medical management. The patient was symptomatic with agitation, restlessness and new-onset atrial flutter, which required electrical cardioversion and temporary beta blockade. It is important that clinicians be aware of this potential surgical complication, so as to not attribute manifestations to post-PTX divalent cation disorders (i.e. hungry bone syndrome), thereby allowing prompt diagnosis and treatment. Post-operative monitoring of thyroid function is warranted for at least some subsets of patients: individuals who undergo thyroid exploration and palpation as part of their surgery to localize the parathyroid glands, as well as those with underlying cardiac disease or who are otherwise at high risk from even mild states of hyperthyroidism.

Keywords: hyperparathyroidism; hyperthyroidism; parathyroidectomy; renal failure

Introduction

Despite advances in pharmacologic therapies, secondary hyperparathyroidism remains problematic in end-stage renal disease patients, a subset of whom will fail 'medical' parathyroidectomy (PTX) and need surgery [1]. Although there is an extensive literature describing post-PTX disorders of divalent ion homeostasis (i.e. hypocalcemia), there is a paucity of publications describing other potential complications in renal patients. In particular, temporary hyperthyroidism is well known in the primary hyperparathyroidism post-operative population; however, there have been only three reports [2–4] of this problem in those on dialysis, leading to the suggestion that it is under-diagnosed [5]. Here, we report a case of an end-stage renal disease (ESRD) patient who developed transient thyrotoxicosis complicated by arrhythmias after parathyroid surgery.

Case

A 62-year-old African American man with ESRD secondary to diabetes had undergone 9 years of uncomplicated hemodialysis therapy. There was no evidence of cardiac disease on thorough evaluation for transplant candidacy. He had a history of secondary hyperparathyroidism that was under good control (i.e. serum intact PTH levels <300 pg/mL) on a medical regimen that included non-calcium-based phosphate binders, intravenous paricalcitol and oral cinacalcet. The latter was discontinued elsewhere secondary to what was considered an allergic rash. Subsequently, his serum intact PTH level progressively rose to as high as 1917 pg/mL, paricalcitol dosing strategies were limited by hyperphosphatemia, and he was referred for surgical PTX. On admission, the patient had normal vital signs, an unremarkable general physical examination and routine laboratory findings. Intraoperatively, there was difficulty localizing the right superior parathyroid gland despite thorough palpation of that region of the thyroid gland, and a right thyroid lobectomy was performed. A parathyroid fragment was implanted in the left sternocleidomastoid muscle.

Two days post-operatively, the patient manifested an obvious change in his affect and behaviour. He appeared very nervous, restless and agitated, and had a blood pressure of 130/80 with a regular heart rate at 135–150 beats/min. There was no sweating, heat intolerance or tremor. The neck incision was healing without signs of swelling, redness or tenderness. An electrocardiogram demonstrated new atrial flutter with a 2:1 block, and cardiology was consulted. Transthoracic echocardiography imaged normal left ventricular systolic function and left atrial dimensions. Thyroid function tests showed elevated levels of free triio-

dothyromine (FT3 4.30, normal 1.23–1.54 pmol/L) and free thyroxine (FT4 28.57, normal 11.97–21.88 pmol/L), as well as suppressed thyroid-stimulating hormone (TSH 0.22, normal 0.27–4.20 mIU/L). With endocrinology consultation guidance, the patient was started on oral beta blockade. Direct current cardioversion was then performed, which reverted the patient to normal sinus rhythm with heart rates ~80 beats/min. Histological examination of the thyroid gland revealed benign tissue (no evidence for thyroiditis) with a single cystically dilated follicle, which was consistent with there being no identifiable causes of the thyrotoxicosis other than intra-operative manipulation. At 1-month follow up, the patient was off the beta-blocker, remained in sinus rhythm and was found to have biochemical evidence of hypothyroidism.

Discussion

The treatment of secondary hyperparathyroidism has evolved in the past decade with newer guidelines and medications, but there remains a non-insignificant (yet not well quantified) subset of patients who fail medical management and undergo surgical PTX. In a 2009 retrospective single-practice group report [1] comparing 1988–97 and 1998–2007 cohorts, the number of these surgeries had not declined over two decades; however, it remains to be determined whether fewer operations will be needed with the advent of more recent treatment paradigms. Thus, clinicians still need to be cognizant of post-PTX potential complications, both surgical and medical. The former includes such operative problems as hemorrhage, hematomas, infections, recurrent laryngeal nerve damage and incomplete removal of parathyroid tissue. In the category of medical adverse events, the literature has focused on disorders of divalent cation homeostasis (i.e. the hungry bone syndrome), principally hypocalcemia and hypophosphatemia. The case reported here illustrates that clinicians need to look beyond readily apparent electrolyte problems when evaluating patients who deteriorate post-operatively, and consider thyroid disorders. While it is well known that there can be hypothyroidism following PTX-related partial thyroidectomy, we believe that temporary hyperthyroidism is under-appreciated. The mechanism is thought to be transient thyroid hormone release due to intra-operative manipulation of the thyroid, such as when the tissue is palpated to locate the parathyroid glands (i.e. 'palpation thyroiditis'). This mechanism is likely to have been exacerbated by the extensive palpation and ultimate partial thyroidectomy in the case described here. Similarly, thyroid hormone levels were previously reported to rise following local trauma, fine-needle aspiration, thyroid surgery and strangulation [3]. This is consistent with our case in which there was extensive palpation and exploration to locate a single ectopic parathyroid gland. Indeed, post-PTX hyperthyroidism has been described in patients with primary hyperparathyroidism, as summarized in Table 1. Early reports by Walfish *et al*. in 1992, who concluded from three cases that spontaneously resolving thyrotoxicosis may occur in some patients after PTX, and suggested this was due to thyroid gland manipulation [6]. The single case presented by Musi *et al*. [7] had severe symptoms (including intermittent stupor) necessitating treatment with both propylthiouracil and beta blockade. Stang *et al*. [5] described 125 patients, 39 of whom (31.2%) developed biochemical evidence of hyperthyroidism post-PTX; 19 (15%) were symptomatic for up to 2 weeks, and 5 (4%) needed medical therapy with either propylthiouracil or tapazole. The condition often resolved within 2 weeks but lasted as long as ~3 months. Lindblom *et al*. [8] raised the possibility of an alternative mechanism. Eleven of 26 patients (42%) post-PTX for primary hyperparathyroidism developed hyperthyroidism, 9 of whom (35%) were symptomatic (2 with new angina). Since some patients (a very small proportion based on the overall literature) had an unanticipated small rise in levels of TSH, the authors hypothesized that TRH-mediated secretion was enhanced by acute post-operative hypocalcemia. This mechanism may explain the findings in a related publication from this group [9]: 20% (4 of 20) of post-PTX patients had elevations in thyroxine levels which correlated with the preoperative PTH values (and thus the risk of developing post-surgery decreases in serum calcium).

There have been only three publications [2–4] of this entity in renal patients (Table 1). The hemodialysis patient reported by Sato *et al*. [2] developed atrial fibrillation

Table 1. Description of prior literature

Parathyroid disorder	Authorship	Salient findings
Primary hyperparathyroidism	Walfish [6], 1992	2 hyperthyroidism cases (1 other with evidence of underlying autoimmune disease): 1 symptomatic treated with beta blocker, 1 relatively asymptomatic
	Bergenfelz [9], 1994	Series of 20 post-PTX cases: 20% hyperthyroid based on testing, none with overt signs of thyrotoxicosis.
	Lindblom [8], 1999	Series of 26 post-PTX cases: 42% hyperthyroid, 35% symptomatic. Details of pharmacologic management not reported
	Musi [7], 2000	1 symptomatic severe thyrotoxicosis case treated with propylthiouracil and beta blocker
	Stang [5], 2005	Series of 125 post-PTX cases: 31% hyperthyroid, 15% symptomatic, 4% treated with propylthiouracil or tapazole
ESRD-related (secondary or tertiary) hyperparathyroidism	Lederer [3], 2008	2 asymptomatic hyperthyroidism cases, not needing treatment
	Sato [2], 2008	1 symptomatic thyrotoxicosis case with atrial fibrillation treated with direct current cardioversion
	Rudolfsky [4], 2009	1 mildly symptomatic hyperthyroid case, not needing treatment

3 days after PTX (requiring electrical cardioversion as in our case), and the hyperthyroidism spontaneously resolved by the 12th post-operative day. The two dialysis patients described by Lederer *et al*. [3] were thought to have had only minimal thyroid gland manipulation during their PTX surgery. Despite being asymptomatic, both individuals demonstrated laboratory evidence for hyperthyroidism lasting ~3 weeks. The authors suggest routine post-operative monitoring of thyroid function in this patient population. The single case described by Rudofsky *et al*. [4] had mild symptoms which resolved within 1 month without any therapy. Thus, we believe our case adds to a very sparse nephrology literature and will help heighten the clinician's awareness of this potential problem. Our patient's restlessness, agitation and atrial flutter are consistent with thyrotoxicosis. Indeed, supraventricular arrhythmias are well-known complications of hyperthyroidism in the absence of renal disorders: Frost *et al*. reported that within 30 days of having made the inpatient diagnosis of hyperthyroidism, 8.3% of 40 628 patients had developed either atrial flutter or fibrillation [10].

In conclusion, clinicians need to be aware that transient hyperthyroidism from palpation thyroiditis is a fairly common under-appreciated complication of PTX, which is usually very mild or asymptomatic, and can be rapidly confirmed by laboratory testing. This post-operative problem is important because (i) it uncommonly can lead to serious manifestations of thyrotoxicosis; (ii) it is readily treatable; and (iii) end-organ effects can inadvertently be attributed to divalent ion disturbances.

Conflict of interest statement. None declared.

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