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A Rare Case of Synchronous Papillary Carcinoma of Thyroid and Carcinoma of Parathyroid

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Abstract

Background: Parathyroid carcinoma is an uncommon endocrine malignancy with an estimated incidence of 5.73 per 10 million population and accounts for less than 1% of primary hyperparathyroidism (PHPT). Synchronous occurrence with differentiated thyroid carcinoma is exceptionally rare, with only a handful of cases reported worldwide. The overlapping clinical and biochemical picture with parathyroid adenoma makes preoperative recognition difficult.

Case Presentation: An 82-year-old male presented with an anterior neck swelling of four years duration and altered voice. Examination showed a firm 4 x 4 cm swelling moving with deglutition and bilateral cervical lymphadenopathy. Biochemistry revealed markedly raised parathyroid hormone (368.7 pg/ml), hypercalcaemia (11.9 mg/dl) and euthyroid status. Fine needle aspiration cytology was reported as papillary thyroid carcinoma, and nasopharyngolaryngoscopy demonstrated left vocal cord palsy. Contrast-enhanced computed tomography of the neck showed an infiltrative left thyroid mass (3.8 x 3.6 cm) with tracheal compression and bilateral cervical lymphadenopathy. The patient underwent total thyroidectomy with left radical neck dissection and right modified neck dissection. Intraoperatively, a 2 x 2 cm right superior parathyroid mass was identified, and frozen section reported parathyroid carcinoma, prompting en bloc right superior parathyroidectomy. Final histopathology confirmed well-differentiated papillary thyroid carcinoma, grade I, pT3 N1b Mx, and parathyroid carcinoma.

Conclusion: Synchronous papillary thyroid carcinoma and parathyroid carcinoma should be actively considered in patients with thyroid malignancy accompanied by biochemical hyperparathyroidism. Routine preoperative estimation of serum calcium and parathyroid hormone is recommended in all patients evaluated for thyroid nodules, and intraoperative inspection of every parathyroid gland with liberal use of frozen section for any suspicious lesion should be integrated into the surgical protocol so that curative en bloc single-stage resection can be achieved.

Keywords: Parathyroid Carcinoma, Papillary Thyroid Carcinoma, Synchronous Malignancy, Primary Hyperparathyroidism, Total Thyroidectomy; HRPT2 (CDC73).

Introduction

Parathyroid carcinoma is a rare endocrine malignancy, with a reported incidence of approximately 5.73 per 10 million populations.[1,2] It accounts for less than 1% of all cases of primary hyperparathyroidism (PHPT), the vast majority of which arise from solitary parathyroid adenoma or primary parathyroid hyperplasia.[3,4]

The clinical presentation of parathyroid carcinoma frequently mirrors that of benign parathyroid disease, with hypercalcaemia and elevated parathyroid hormone (PTH) forming the biochemical hallmark. Preoperative distinction between malignant and benign parathyroid disease is therefore difficult, and the diagnosis is often confirmed only intraoperatively or on final histopathology.[3,5]

The synchronous occurrence of parathyroid carcinoma with differentiated thyroid carcinoma is an exceptionally uncommon clinical entity, with only a small number of well-documented cases in the English literature.[6,7] Recent case series have suggested a higher-than-expected co-occurrence of parathyroid adenomas in patients with differentiated thyroid carcinoma, and the shared cervical location has raised questions regarding common etiological pathways, particularly involving mutations in the HRPT2 (CDC73) gene.[8,9]

This report describes an 82-year-old male in whom synchronous papillary thyroid carcinoma and parathyroid carcinoma were identified, with the parathyroid malignancy first recognised intraoperatively and confirmed by frozen section. The clinical presentation, diagnostic workup, surgical management and relevant literature are discussed.

Case Presentation

An 82-year-old male presented to the outpatient department with a swelling in the anterior aspect of the neck of four years duration, associated with progressive alteration of voice. He was a known hypertensive and type 2 diabetic on regular medical treatment. There was no history of prior neck irradiation, familial endocrine disease, or previous cervical surgery.

Clinical Examination

On general examination, the patient was conscious and oriented with stable vital signs. Local examination of the neck revealed a firm, non-tender swelling measuring approximately 4 x 4 cm in the anterior compartment. The swelling moved with deglutition but not with protrusion of the tongue, consistent with a thyroid origin. Multiple enlarged cervical lymph nodes were palpable bilaterally. Systemic examination was unremarkable.

Investigations

Biochemical evaluation revealed a markedly elevated intact parathyroid hormone level of 368.7 pg/ml (reference range: 10 to 65 pg/ml) with a serum calcium of 11.9 mg/dl. Thyroid function tests were within normal limits: TSH 4.08 µU/mL (0.5 to 8.9 µU/mL), T3 0.9 ng/ml (0.4 to 1.91 ng/ml), and T4 8.62 µg/dl (5 to 10.7 µg/dl). Fine needle aspiration cytology from the neck swelling was reported as papillary carcinoma of the thyroid. Nasopharyngolaryngoscopy demonstrated left vocal cord palsy.

Contrast-enhanced computed tomography of the neck showed irregular enlargement of the left lobe of the thyroid, with a mass measuring 3.8 x 3.6 cm, loss of fat plane with the adjacent structures, infiltration into the strap muscles, compression of the trachea, and multiple enlarged cervical lymph nodes on both sides.

The preoperative working diagnosis was locally advanced papillary carcinoma of the thyroid with bilateral cervical nodal metastasis and biochemical primary hyperparathyroidism.

Surgical Management

The patient was taken up for total thyroidectomy with left radical neck dissection (RND) and right modified neck dissection (MND). Intraoperatively, a firm 2 x 2 cm mass was identified at the site of the right superior parathyroid gland. Frozen section examination of this mass reported carcinoma of the parathyroid. In view of the intraoperative frozen section report, an en bloc right superior parathyroidectomy was added to the planned procedure. Care was taken to avoid capsular rupture of the parathyroid mass and to preserve the remaining parathyroid glands, one of which was reimplanted in the sternocleidomastoid to reduce the risk of postoperative hypocalcaemia.

The final procedure performed was: total thyroidectomy with left radical neck dissection, right modified neck dissection, and right superior parathyroidectomy.

Histopathology

Final histopathological examination confirmed well-differentiated papillary carcinoma of the thyroid, grade I, with strap muscle infiltration and cervical nodal involvement, staged as pT3 N1b Mx. The right superior parathyroid mass was reported as parathyroid carcinoma, showing capsular and vascular invasion with mitotic activity, features consistent with the World Health Organization criteria for parathyroid carcinoma.

Postoperative Course and Follow-up

The postoperative period was uneventful. Serum calcium and PTH were monitored serially and showed a downward trend consistent with successful resection. Oral calcium and calcitriol supplementation were initiated to prevent hungry bone syndrome. The patient was started on levothyroxine replacement with a TSH-suppressive target appropriate for papillary carcinoma, and was planned for radioiodine ablation. Long-term follow-up with combined biochemical (serum calcium, PTH) and thyroid cancer (thyroglobulin, TSH, cervical ultrasound) surveillance was advised.

Discussion

Parathyroid carcinoma is a rare endocrine malignancy that constitutes less than 1% of all cases of primary hyperparathyroidism, in contrast with parathyroid adenoma and primary hyperplasia, which together account for over 95% of PHPT cases.[3,4] The synchronous occurrence of parathyroid carcinoma with differentiated thyroid carcinoma is a distinctly uncommon clinical entity: a review of the English literature identifies fewer than a dozen well-documented reports of true synchronous disease, and the case presented here appears to be among the few reported in an octogenarian.[6,7,10]

Etiology and Predisposing Factors

The precise etiology of parathyroid carcinoma remains poorly understood. Recognised predisposing factors include previous exposure to ionising radiation to the neck, long-standing secondary hyperparathyroidism (particularly in the context of chronic kidney disease), and evolution from a pre-existing parathyroid adenoma or hyperplastic gland.[3,7] Germline and somatic inactivating mutations in the HRPT2 gene (also known as CDC73), which encodes the tumour suppressor parafibromin, have been identified in a substantial proportion of sporadic parathyroid carcinomas and in familial syndromes such as hyperparathyroidism-jaw tumour syndrome.[8,9]

An increased risk of parathyroid cancer has been described in patients with a prior diagnosis of thyroid cancer or parathyroid adenoma, and part of this association has been attributed to shared HRPT2/CDC73 gene mutations.[9,11]

Whether shared genetic or environmental exposures underlie the synchronous occurrence in any individual patient remains speculative but is biologically plausible and merits genetic evaluation in selected cases.

Clinical Presentation and Diagnostic Challenges

The incidence of PHPT has increased since serum calcium measurement became a routine part of clinical practice, largely through the recognition of asymptomatic disease.[4,12] Because both parathyroid adenoma and parathyroid carcinoma may present with similar clinical and laboratory findings (hypercalcaemia, elevated PTH, non-specific systemic manifestations), preoperative distinction is challenging. Features that raise suspicion for parathyroid carcinoma include very high PTH levels (typically more than three to five times the upper limit of normal), severe hypercalcaemia (often greater than 14 mg/dl), a palpable neck mass, recurrent laryngeal nerve palsy, and evidence of local invasion on imaging.[35,7]

In the present case, the PTH level of 368.7 pg/ml (approximately six times the upper limit of normal), the palpable mass, and the presence of vocal cord palsy in an octogenarian with concurrent thyroid malignancy could be interpreted either as manifestations of advanced thyroid disease or as features of coexisting parathyroid malignancy. The presence of a dominant thyroid pathology can obscure the diagnosis further, as clinical and radiological attention is often focused on the more visible thyroid lesion, and the parathyroid malignancy may be discovered only intraoperatively, as illustrated here.

Management Considerations

En bloc surgical resection with preservation of tumour capsule integrity is the mainstay of curative treatment for parathyroid carcinoma; incomplete resection or intraoperative capsular breach substantially increases the risk of local recurrence and parathyromatosis.[3,7,10] In patients with synchronous thyroid malignancy, total thyroidectomy with appropriate neck dissection provides both oncological control of the thyroid tumour and adequate access for complete parathyroid resection. Intraoperative frozen section, as employed in this case, is a valuable adjunct when a suspicious parathyroid lesion is encountered, and it allows a single-stage resection rather than a staged reoperation with its attendant morbidity.

Postoperative surveillance for parathyroid carcinoma requires serial monitoring of serum calcium and PTH, as these are sensitive markers of persistent or recurrent disease.[3,10] Given the coexisting differentiated thyroid carcinoma, thyroglobulin monitoring, TSH suppression, radioiodine remnant ablation, and structural surveillance with cervical ultrasound should be pursued in parallel, as per standard protocols for well-differentiated thyroid cancer.[13]

Conclusion

Synchronous papillary thyroid carcinoma and parathyroid carcinoma is a rare clinical entity that poses a distinct diagnostic and surgical challenge. Preoperative recognition of coexisting primary hyperparathyroidism through routine estimation of serum calcium and parathyroid hormone in patients undergoing evaluation for thyroid nodules can prompt targeted parathyroid imaging and permit a planned single-stage resection. Intraoperative inspection of every parathyroid gland with liberal use of frozen section for any suspicious lesion, coupled with en bloc excision of the involved gland preserving capsular integrity, is recommended to optimise oncological outcomes. Long-term combined biochemical and thyroid cancer surveillance should be instituted in every such patient, and genetic evaluation for HRPT2 (CDC73) mutations should be considered where clinically appropriate.

Patient Consent

Written informed consent was obtained from the patient for the publication of this case report and any accompanying clinical details. A copy of the consent form is available with the corresponding author.

Ethical Approval

As per institutional policy, publication of an anonymised single case report does not require formal Institutional Ethics Committee approval; the report has been reviewed and approved by the head of the department.

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