CASE REPORT

Orbital metastasis as initial manifestation of a widespread papillary thyroid microcarcinoma

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SUMMARY

Papillary thyroid carcinomas (PTCs), particularly microcarcinomas, rarely metastasise to the orbit. We report a case of a 49-year-old woman with a right supraorbital mass and unremarkable physical examination of the thyroid gland region. Orbital CT scan showed an expansile lytic lesion in the orbital plate of the frontal bone with a soft tissue component. An incision biopsy revealed metastatic well-differentiated thyroid carcinoma. Thyroid ultrasound was normal except for a subcentimetre nodule in the right lobe. The patient underwent total thyroidectomy where histopathology showed a subcentimetre follicular variant PTC. She subsequently received radioactive iodine therapy. Post-therapy whole body scan revealed metastatic thyroid tissues in the right orbital and posterior parietal, and left shoulder and hip areas. Although infrequent, metastatic thyroid carcinoma should be considered in patients with orbital metastasis even when neck examination is normal. In rare cases, this may be the initial manifestation of a widely metastatic papillary thyroid microcarcinoma.

BACKGROUND

Papillary thyroid carcinoma (PTC) is the most common type of differentiated thyroid carcinoma (DTC) comprising 85% of all cases.¹ It most often presents as a thyroid mass and occasionally metastasises locally and distally. Besides locoregional lymph nodes, PTC commonly metastasises to the lungs and bones, but metastases are rarely observed at the time of clinical presentation. PTC metastasising to the orbit is rare.² Metastatic orbital tumours account for 5–6% of all orbital neoplasms with breast, lung and prostate carcinomas being the most common sources^{2–6} and only 3% of these originate from the thyroid.² Orbital metastasis as an initial presentation of PTC is even rarer but cases have been reported in the literature.^{2–4 7–13} Unique to this case is the subcentimetre (non-palpable) size of the primary tumour (microcarcinoma). We report a case of a 49-year-old Filipino woman who presented with a right orbital mass leading to eventual discovery of a non-palpable subcentimetre follicular variant of PTC (FVPTC).

CASE PRESENTATION

A 49-year-old woman consulted for a slowly enlarging right supraorbital mass of 2 years duration with no associated blurring of vision, diplopia, tearing and tenderness. She had a history of hypertension controlled with losartan and hydrochlorothiazide.

She also underwent total abdominal hysterectomy in 2005 for myoma uteri. On examination, the right supraorbital mass was 4.0×3.2 cm in size, firm and non-tender, displacing the globe inferolaterally (figure 1A). There was also ptosis and minimal limitation on upward gaze. Visual acuity of the right eye was 20/40 and 20/25 on pinhole. Examination of the left eye was unremarkable. The rest of the physical examination including the thyroid region was unremarkable.

DIFFERENTIAL DIAGNOSIS

Various pathologies can produce space-occupying lesions in and around the orbit. These include benign and malignant neoplasms, vascular lesions, inflammatory diseases, congenital lesions and infections, among other causes.¹⁴ Because the patient's history seemed to point to a new growth in the orbital region, congenital lesions could easily be ruled out. Our patient also presented with a firm and non-tender supraorbital mass, which may signify bony involvement (and is not typical of vascular lesions), and absence of inflammation, making inflammatory diseases and infections unlikely. Neoplasms involving the orbit can be primary or metastatic. Primary neoplasms involving the bone and cartilaginous structures of the orbit include osteoma, osteogenic sarcoma, chondroma, chondrosarcoma and fibrous dysplasia. Among these, osteoma, fibrous dysplasia and osteogenic sarcoma are most common,^{15 16} with the latter frequently seen in those with a history of previous irradiation.¹⁶ Among metastatic tumours in women, breast, melanoma, lung and renal cell carcinoma are more common.¹⁵ To aid in determining the diagnosis for this patient, an incision biopsy was indicated.

INVESTIGATIONS

Imaging of the orbital area using CT showed an expansile lytic lesion in the orbital plate of the frontal bone with a soft tissue component. Its most inferior extent was abutting and causing slight displacement of the ipsilateral globe inferiorly. Optic nerves were unremarkable (figure 1B). An incision biopsy of the mass was carried out revealing thyroid tissue consistent with a well-differentiated thyroid carcinoma, probably follicular thyroid carcinoma (FTC; figure 2A). Neck ultrasound showed normal-sized thyroid lobes and a hypoechoic nodule in the inferior pole of the right lobe measuring 0.4×0.4×0.4 cm. Thyroid stimulating hormone and free thyroxine (FT4) were both

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Figure 1 (A) Patient with right supraorbital mass (note the inferiorly displaced right eye). (B) Orbital CT scan showing lytic lesion in the orbital plate of the right frontal bone with soft tissue component.

normal (0.4 (normal value (NV) 0.3–3.8 μ IU/mL) and 16.3 (NV 11–24 pM), respectively). Chest radiograph and liver ultrasound were unremarkable as well.

TREATMENT AND OUTCOME

The patient underwent total thyroidectomy 2 months after initial presentation. Histopathology showed FVPTC (figure 2B) at the inferior pole of the left lobe measuring 0.5×0.5×0.5 cm. She then underwent 200 mCi of radioactive iodine-131 (RAI) therapy for ablation and treatment of metastasis. Post-therapy whole body scan revealed metastatic thyroid tissues in the right orbital, right posterior parietal, left shoulder and left hip areas (figure 3). The patient is currently doing well and is maintained on levothyroxine at suppressive doses along with calcium supplements. Six months after her initial RAI therapy, unstimulated thyroglobulin and antithyroglobulin were 183.4 ng/mL and 0 IU/mL, respectively. She is scheduled for another RAI treatment.

DISCUSSION

Neoplasms of the thyroid gland account for only 1% of all new malignancies.¹⁷ However, for the past four decades, its incidence has increased by 2.4-fold, which is mainly attributable to an increase in incidence of PTC. This increasing trend, however, does not seem to reflect an increase in the true occurrence of the disease but rather an increase in detection of subclinical disease,¹⁸ such as a microcarcinoma, as seen in this case. In an old series by Ferry and Font¹⁹ involving 227 patients with orbital metastasis, only 1 case was due to thyroid carcinoma, whereas Henderson²⁰ reported 4 of 83 cases. However, in two

Figure 2 (A) Orbital mass incision biopsy showing abortive, well-formed thyroid follicles and occasional papillary structures. (B) Thyroid nodule histopathology showing generally well-formed follicles invading a desmoplastic stroma lined by atypical thyrocytes with 'Orphan Annie' nuclei and occasional nuclear grooving.

recent surveys involving 244 Japanese patients with orbital tumours and 1264 patients in an oncology referral centre in the USA with orbital tumours and simulating lesions, while metastatic tumours represented 2% and 7% of cases, respectively, none came from a thyroid carcinoma.^{15 21} Although orbital metastases of thyroid carcinomas are uncommon, thyroid carcinoma has to be considered as a potential primary tumour in a patient with orbital metastasis.

Thirteen cases have been reported in the literature to have DTC with orbital metastasis; four with FTC, four with FVPTC, three with PTC, one with Hurthle cell thyroid carcinoma, and one reported to be non-specific (thyroid carcinoma of follicular cell in origin). Of these cases, 10 presented initially with orbital metastasis, similar to our case. This supports the notion that orbital metastasis, when present, is usually the presenting rather than a later manifestation of thyroid carcinoma.^{4 20} Most, if not all, of these reported cases have either a goitre or palpable nodule/s on physical examination. Presence of this important physical examination finding may aid in determining the origin of the metastasis. At the time of onset of ocular symptoms, the vast majority of patients had a long history of thyroid malignancy and evidence of widely disseminated metastatic disease. The importance of this case is due to its unusual presentation, which emerged as a primary clinical manifestation. Our patient

Figure 3 Post radioactive iodine-131 therapy whole body scan showing metastatic thyroid tissues in the right orbital, right posterior parietal, left shoulder and left hip areas.

did not have any abnormal findings on physical examination of the neck, unlike most reported cases. The thyroid gland origin was only suspected after the result of incision biopsy became available. It has been postulated that there is greater propensity for thyroid carcinoma to metastasise to the orbit than to the globe in contrast to other malignancies metastasising in that region, which probably may be due to lymphatic channel connections between the thyroid gland and the orbit, as demonstrated by a study using radioisotope thyroidolymphography and orbitolymphography.⁶

In a review by Besic and Luznik²² involving nine patients with thyroid carcinoma with orbital metastasis, proptosis (56%) and diplopia (44%) were the most common presentation. Pain (22%), decreased vision (22%) and ptosis (11%) were, likewise, prevalent. This is in contrast to primary orbital tumors^{6 20} and choroidal metastasis from thyroid carcinomas,²² where decreased vision is the most common symptom. Our patient presented with symptoms of mild proptosis, ptosis and limitation of upward gaze, which may signify minimal involvement of EOMs, as the lesion was primarily lytic to the orbital bones. The patient's minimal decrease in vision was attributable to error of refraction as it was improved with a pinhole.

Contrast-enhanced CT is the imaging modality of choice,^{6 23} and the diagnosis can be established through biopsy. When a tumour presents initially as an orbital mass, a fine-needle aspiration biopsy may be performed to find out the origin of the primary tumour. It seems to be the most useful diagnostic tool, as it is safe and reliable. This is particularly true in our case, as the diagnosis of metastatic thyroid carcinoma was made after an incision biopsy.

Currently, there are no clear guidelines on the treatment of DTC with orbital metastasis apart from surgical removal of the primary tumour followed by RAI therapy ablation typical of all DTCs. These procedures were carried out in our patient. Regression of the mass and normalisation of thyroglobulin levels may take 1–2 years to occur.⁴ However, if possible, surgical excision is the treatment of choice for metastases of thyroid carcinomas to the eye.²⁴ This may provide benefit in enhancing

disease control.² Surgical tumour debulking should be performed in cases of sudden decrease in vision due to mass compression of the optic nerve,^{4 22} very large orbital masses and intractable orbital pain.⁴ None of these conditions were present in our patient. Because of the extent of the orbital lesion, surgical removal was deemed invasive and disfiguring by the patient. External beam radiation therapy (EBRT) is another treatment option, especially in patients with a solitary orbital metastasis that is either diffuse or that involves an important structure, such as the muscle, globe, or nerve. EBRT is also indicated for unresectable, residual, or metastatic DTC that does not concentrate iodine-131.⁴ The other treatment options are brachyradiotherapy using iodine-125 episcleral radioactive plaque insertion,²⁵ chemotherapy, and targeted therapy with monoclonal antibodies²⁶ and small molecules.^{22 24}

Learning points

- ▶ Although infrequent, thyroid carcinomas should be included in the differentials of patients with orbital metastasis even if examination of the neck is unremarkable.
- ▶ Proptosis and diplopia are the most common symptoms of orbital metastasis from thyroid carcinomas.
- ▶ Currently, there are no clear guidelines on the treatment of differentiated thyroid carcinoma (DTC) with orbital metastasis apart from surgical removal of the primary tumour followed by radioactive iodine-131 therapy ablation typical of all DTCs.
- ▶ Surgical tumour debulking of orbital metastasis should be performed if presented with a very large orbital mass, with sudden decrease in vision and with intractable orbital pain.

Contributors DAP was in-charge of the patient care and wrote the article. AHIA was the senior fellow taking care of the patient and supervised the writing of the article. MPDDM was the consultant in-charge of taking care of the patient and supervised the writing of the article.

Competing interests None.

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