Unusual association of diseases/symptoms

Bilateral metastatic melanoma to the extraocular-muscles simulating thyroid eye disease

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Summary

We report a case of bilateral metastatic melanoma to the extraocular muscles that simulated thyroid eye disease. A 71-year-old man presented with bilateral painless axial proptosis, lid retraction and left gaze restriction. Orbital CT scan demonstrated enlargement of the extraocular muscles with tendon sparing, consistent with thyroid eye disease. However, thyroid function tests and antithyroid antibodies were normal. Systemic review including orbital MRI scan determined the correct diagnosis of metastatic melanoma to the orbit. Metastatic melanoma to the orbit can simulate thyroid eye disease.

BACKGROUND

Metastases to the orbit are rare, comprising 1–13% of all orbital tumours and occurring in 2–3% of patients with systemic cancer.¹ Most are carcinomas and over 90% are unilateral.¹ Melanoma represents only 5.3–15% of all metastases to the orbit.^{1–4} The primary site includes skin, contralateral uveal tract and unknown origin.³ Herein we describe a case of bilateral metastatic melanoma to the extraocular muscles (EOM) that simulated thyroid eye disease (TED).

CASE PRESENTATION

A 71-year-old white man presented with a 1-month history of painless eyelid swelling and red eyes. There were no associated systemic symptoms. His medical history included a single metastatic melanoma brain lesion of unknown primary that was surgically excised 6 months prior. No primary or other secondary lesions had been detected.

On examination, visual acuity was 20/40 in his right eye (oculus dexter (OD)) and 20/20 in his left eye (oculus sinister (OS)). Bilateral axial proptosis, (Hertel exophthalmometry 24 mm OD and 23 mm OS), mild conjunctival hyperaemia, upper eyelid retraction and left gaze restriction confirmed by forced duction testing were present. Intraocular pressures were 15 mm Hg in both eyes on primary gaze and 20 mm Hg OD, 21 mm Hg OS in left gaze. Funduscopy was normal. There was no exposure keratopathy and optic nerve function including pupillary responses and colour vision was intact (figure 1).

INVESTIGATIONS

Levels of thyroid stimulating hormone (TSH) and free T4 were within normal values and thyroid autoantibodies (anti-TSH receptor, thyroid-binding inhibitory immunoglobulins, thyroid-stimulating immunoglobulins and antimicrosomal antibody) were negative. Orbital CT scan showed bilateral homogenous fusiform EOM enlargement sparing the tendons reported as TED

(figure 2A). Orbital MRI disclosed heterogeneous hyperintensity of the EOMs on T1-weighting and hypointensity on T2-weighting compatible with melanoma metastases (figure 2B). Further imaging revealed disseminated metastasis to the gastrointestinal tract, lung, lymph nodes and brain. Cervical lymph node biopsy confirmed melanoma metastasis.

DIFFERENTIAL DIAGNOSIS

The differential diagnosis of bilateral EOM enlargement includes TED, idiopathic orbital inflammatory disease, carotid-cavernous fistula, lymphoma and metastases.^{5–7}

Figure 1 (A) Clinical photograph of a patient with thyroid eye disease showing bilateral proptosis, mild conjunctival hyperaemia and upper eyelid retraction more evident on the left. (B) Side view highlighting the proptosis.

Figure 2 (A) Non-contrast axial orbital CT showing bilateral homogenous fusiform muscle enlargement sparing the tendons. (B) T1-weighted MRI reveals the heterogeneous nature of the lesion within the muscle.

Bilateral painless axial proptosis, eyelid retraction, gaze limitation and tendon-sparing enlargement of the EOM on non-contrast orbital CT are all features typically found in patients with TED which is one of the most common causes of EOM enlargement. However, the patient's gender, age, normal thyroid function and absence of auto-antibodies as well as the heterogeneity of the lesions on MRI are against this diagnosis.

Although idiopathic orbital inflammatory disease may involve any orbital structure either focally or in a diffuse manner, the absence of pain and bilateral nature are against this condition.⁸ Also, the most common presentation is usually unilateral with single-muscle inflammation and tendon involvement.⁹ On MRI, inflammatory orbital masses are isointense to fat tissue on T2-weighted images and become hypointense or unchanged in relation to T1 images.¹⁰

The absence of corkscrew episcleral blood vessels, conjunctival chemosis, pulsating proptosis, thrill or bruit along with the normal fundus and lack of dilated superior ophthalmic vein or enlarged cavernous sinus in the CT and MRI make the diagnosis of carotid-cavernous fistula less likely.

In an older male patient with proptosis, diplopia and no systemic thyroid signs or symptoms, the possibility of an orbital tumour ought to be considered. Lymphoma has a predilection for older patients,^{10 11} but the infiltration of EOM is quite rare and CT scan images usually show a

uniformly dense mass that is distinctively contoured to the globe and orbital bone.¹² On MRI, orbital lymphoma presents as a hyperintense mass in relation to fat tissue on T2-weighted images and is brighter in relation to T1-weighted images.¹⁰ In this patient, the medical history of melanoma, the multiple EOM involvement and the MRI characteristics all point to metastatic melanoma as the most probable diagnosis.

OUTCOME AND FOLLOW-UP

After three cycles of chemotherapy, there was almost complete recovery of ocular symptoms and improvement of proptosis and left gaze restriction. However, the patient died 5 months after initial presentation due to acute respiratory insufficiency secondary to lung melanoma metastases.

DISCUSSION

Although melanoma has a particular tropism for metastasising to EOMs,^{3 13} we are aware of only three prior reported cases of bilateral EOM involvement.^{7 14 15} Our case is unusual in that the features of bilateral painless axial proptosis, eyelid retraction, gaze limitation and tendon-sparing enlargement of the EOM on non-contrast orbital CT are all consistent with TED.

Determining the correct diagnosis in our patient relied on correct interpretation of imaging and the detection of disseminated metastases. EOM enlargement in TED typically occurs in the following descending order of size: inferior rectus, medial rectus, superior rectus and lateral rectus.¹⁶ In our case the medial and lateral rectus muscles were most enlarged. Orbital MRI in TED usually shows isointense EOMs on T1-weighted images and isointensity to minimal hyperintensity on T2-weighted images.¹⁷ In contrast, the EOMs in our patient were hyperintense on T1, and hypointense on T2, consistent with the paramagnetic properties of melanin found in melanoma.¹⁵

The most common primary sites of metastases to the orbit in men include lung, unknown primary and prostate, with breast carcinoma featuring highest in women.^{1 2} Cutaneous melanoma accounts for 6% of cases.^{1 2} The most frequent clinical findings of orbital metastases include limited ocular motility (54%), proptosis (50%) and a palpable mass (43%).¹ Melanoma metastasis to the ocular structures typically occurs in the setting of advanced metastatic disease, as illustrated in our patient.¹³ Approximately 89% of patients have at least one other non-ocular distant melanoma metastasis at the time of ocular presentation.¹³ Patients with metastatic isolated extraocular metastases survive an average of only 7.5 months.¹³ Management of ocular metastatic melanoma therefore depends on the patient's systemic health and life expectancy. Symptom palliation is the main therapeutic goal, with the aim to maximise visual function and minimise any discomfort.

In summary, melanoma metastatic to the EOMs can mimic TED. Careful review of clinical findings and imaging can assist in differentiating these conditions.

Learning points

- The differential diagnosis of bilateral extraocular muscle enlargement includes thyroid eye disease, idiopathic orbital inflammatory disease, carotid-cavernous fistula, lymphoma and metastases.
- Metastatic melanoma has an affinity for extraocular muscles, although bilateral involvement is rare.
- Metastases to the orbit should be considered in patients presenting with symptoms and signs of thyroid eye disease and a history of malignancy.

Competing interests None.

Patient consent Obtained.

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