Abducens (sixth) nerve palsy presenting as a rare case of isolated brainstem metastasis from a primary breast carcinoma

Reyes K B, Lee H Y, Ng I, Goh K Y

ABSTRACT

Most isolated abducens (sixth) nerve palsies are ischaemic in nature. However, there are other causes that can mimic an abducens nerve palsy, which requires aggressive diagnostic management. A 56-year-old hypertensive woman presented with a right abduction deficit. Her past history revealed that she had undergone a mastectomy and completed a course of chemo- and radiation therapy for breast carcinoma. She was well until she developed binocular diplopia five months later. Magnetic resonance imaging showed a right pontine mass. Stereotactic biopsy was performed, and histopathology revealed a metastatic carcinoma that was compatible with an origin from the breast primary. We conclude that identifying and managing patients with metastatic lesions involves a multidisciplinary approach. Thorough history-taking and neuro-ophthalmologic evaluation would help physicians in establishing the primary differentials, which could not only be sight-saving but life-saving as well.

Keywords: abducens (sixth) nerve palsy, brainstem metastasis, breast carcinoma, lateral rectus palsy

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INTRODUCTION

Most isolated abducens (sixth) nerve palsies occurring in the middle-aged group are ischaemic in nature, especially in patients with vasculopathic comorbidities such as diabetes mellitus, hypertension and atherosclerosis.[1] Patients classically present with binocular horizontal diplopia, and clinical examination would reveal an abduction deficit in the affected eye. Ischaemic abducens nerve palsies usually recover within two to six months, warranting only observation and medical control of the ischaemic cause. Imaging is indicated only when there is no spontaneous improvement after three months.[2] However, there are other causes that can mimic abducens nerve palsy. Some of these require aggressive diagnostic and therapeutic management, as delayed treatment may lead to increased morbidity and/or mortality.

CASE REPORT

A 56-year-old Chinese woman presented at the neuro-ophthalmology clinic with a two-week history of doubling of vision on right gaze. She had a medical history of hypertension and was non-diabetic. Five months prior to the presentation, she had a right mastectomy for carcinoma of the breast, followed by chemo- and radiation therapy, which was completed two months prior to presentation. She was well with no other systemic symptoms until a sudden onset of binocular diplopia.

Ophthalmic examination showed a corrected visual acuity of 6/7.5 (right eye) and 6/9 (left eye). Ishihara colour tests and confrontational visual fields were full. Ocular motility revealed an abduction deficit in the right eye. Forced duction test revealed no restriction on the right lateral rectus. The rest of the anterior and posterior segments of the eye were within normal limits. Neuro-ophthalmologic examination showed that the other cranial nerves were intact.

The clinical impression was that of right abducens nerve palsy. Given the patient's history of breast carcinoma, a metastatic cause was favoured over an ischaemic cause. Hence, magnetic resonance (MR) imaging of the brain was immediately performed. The MR image showed a solitary brain lesion that was heterogeneously enhancing, with susceptibility foci in the right pons. The imaging differentials included metastasis or a high-grade astrocytoma (Figs. 1 & 2).

The patient was referred to the neurosurgery department for further evaluation and management, where she was advised to undergo stereotactic biopsy to confirm the diagnosis. Biopsy from the pons revealed cohesive clusters of epithelioid cells with enlarged pleomorphic vesicular nuclei, prominent nucleoli and

Neuro-Ophthalmology Service, Tan Tock Seng Hospital, 11 Jalan Tan Tock Seng, Singapore 308433

Reyes KB, MD, DPBO
Clinical Fellow

Department of Pathology

Lee HY, MBBS, FRCPath
Consultant

Department of Neuro-Ophthalmology, NHG Eye Institute

Goh KY, MBBS, FRCSE, FRCOphth
Senior Consultant

Department of Neurosurgery, National Neuroscience Institute

Ng I, MBBS, FRCS, FAMS
Consultant

Correspondence to:
Dr Reyes Karen Bulan
Tel: (65) 9710 0778
Fax: (65) 6357 7649
Email: kurr_b_reyes@yahoo.com

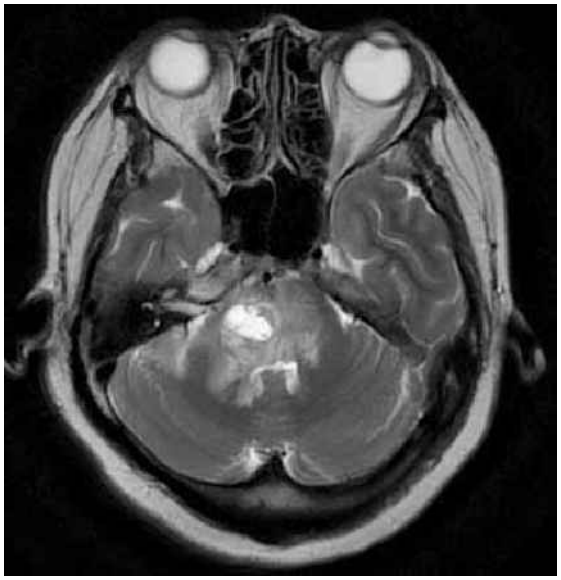

Fig. 1 Axial T2-W MR image shows a hyperintense lesion in the right pons.

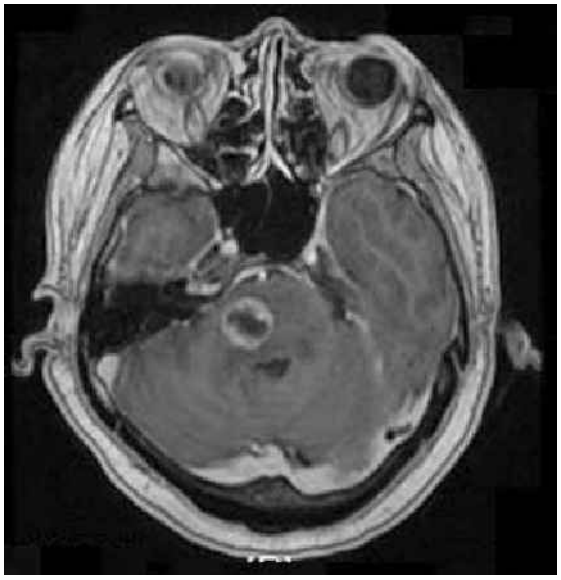

Fig. 2 Contrast-enhanced axial T-W MR image shows a hypointense lesion with significant perilesional oedema in the right pons.

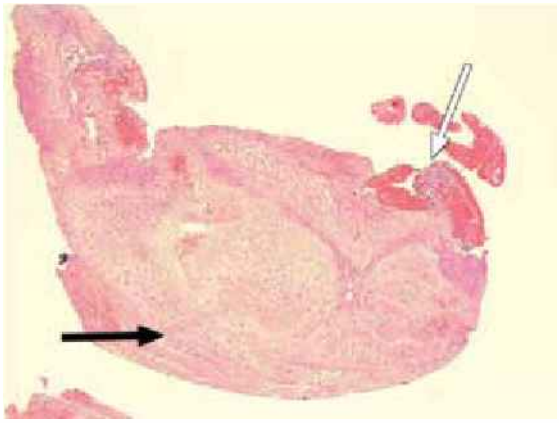

Fig. 3 Photomicrograph of paraffin section of one of the biopsy fragments shows a cluster of carcinoma cells (black arrow), pontine nuclei and transverse pontine fibres (white arrow) (Haematoxylin & eosin, × 40).

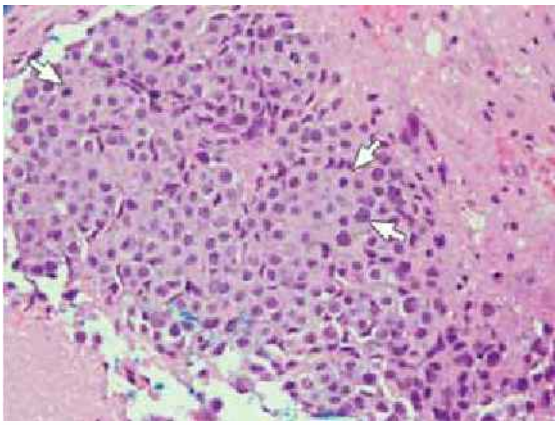

Fig. 4 Photomicrograph shows a high-power view of a cluster of carcinoma cells with enlarged nuclei, prominent nucleoli and frequent mitotic figures (arrowheads) (Haematoxylin & eosin, × 400).

pale eosinophilic vacuolated cytoplasm, which were compatible with a metastatic carcinoma (Figs. 3 & 4). Immunoperoxidase staining for cytokeratin Cam5.2 was strongly and diffusely positive in the tumour cells (Fig. 5). Gross cystic disease fluid protein was also positive (Fig. 6), while oestrogen receptor was negative. In line with the patient's history of breast carcinoma, the morphological features and immunoperoxidase staining profile of the tumour in the brainstem were consistent with derivation from primary carcinoma of the breast.

DISCUSSION

The incidence of brain metastasis is relatively frequent in the presence of systemic malignancy, ranging 8%–15%.[3-5] About 5% of patients with breast carcinoma would have brain metastasis over a five-year period.[3,5] However, the occurrence of a brainstem metastasis is relatively rare. Only about 5%–7% of brain metastasis would present in the brainstem.[3,6,7] The most common symptomatic presentation of a brainstem lesion is diplopia caused by abducens nerve palsy, as observed in this patient.

Abducens nerve palsy in a middle-aged individual is commonly caused by a vasculopathic disorder. However, any lesion at the level of the cerebellopontine angle, particularly that involving the abducens nerve, can present as abducens nerve palsy. Other causes are tumours, trauma, inflammation and infection.[2] Without a history of trauma or any signs and symptoms pertaining to an infection, a tumour at the level of the pons is among the main differential. Common adult tumours in the cerebellopontine area are nasopharyngeal carcinoma, which is common in this region,[8] acoustic neuroma,

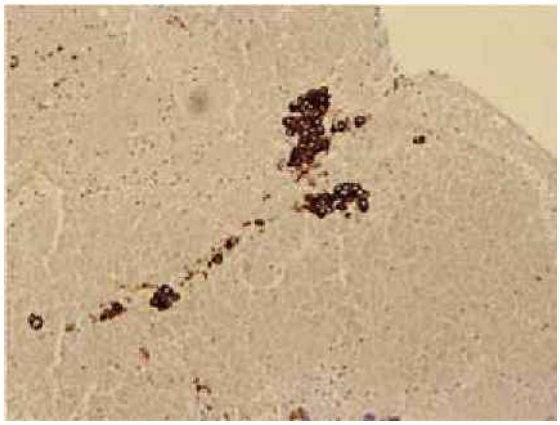

Fig. 5 Immunoperoxidase stain for low molecular weight cytokeratin cocktail Cam5.2. Photomicrograph shows strong cytoplasmic staining in the tumour cells (Cam5.2 stain, × 200).

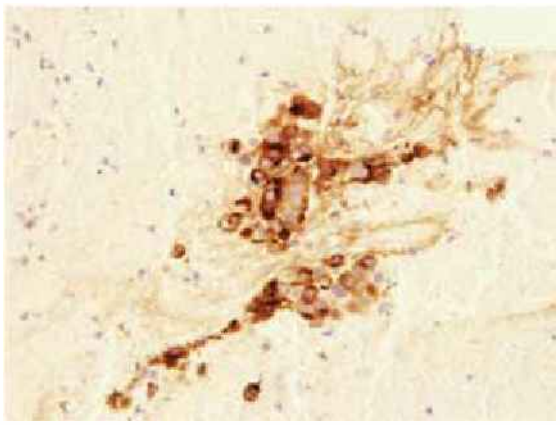

Fig. 6 Immunoperoxidase stain for gross cystic disease fluid protein-15, a marker of apocrine glandular differentiation in mammary epithelium. Photomicrograph of tumour cells shows cytoplasmic staining with dot-like paranuclear accentuation (GCDFP-15, × 400).

meningioma and metastasis. The cranial nerves in this area (facial and auditory nerves) may also be affected. Patients may have added signs and symptoms, such as decreased hearing loss (auditory nerve) and/or facial paralysis (facial nerve).

In the setting of a positive history of malignancy, as in this case, a metastatic tumour would be a prime consideration. Interestingly, the patient did not show any other signs suggesting involvement of the other cranial nerves at the level of the pons; she only presented with isolated abducens nerve palsy. Due to the known aggressive nature of a metastatic lesion, imaging studies were immediately undertaken, which revealed a lesion that was either a metastasis or an astrocytoma. Stereotactic biopsy was done to determine whether this was a primary brain tumour or a metastatic lesion, as this would greatly influence the choice of subsequent treatment.

With the histopathologic confirmation of metastatic breast carcinoma to the brainstem, radiation therapy was recommended. The patient was undergoing radiotherapy for the lesion at the time of this writing. Although the prognosis for advanced carcinoma of the breast with metastasis is poor, the currently available chemotherapeutic and radiation therapies offer prolongation of survival rates.[9,10]

Identifying and managing patients with metastatic lesions involves a multidisciplinary approach. Clinical symptoms may vary from patient to patient, as seen in this case; the patient presented with doubling of vision and first consulted with an ophthalmologist. Hence, it was the ophthalmologist who initially picked up the clinical sign. Upon further evaluation, it was found that this was a rare case of isolated brainstem metastasis from a breast carcinoma. Appropriate referrals to other services, such as the radiology, neurosurgery and pathology units, helped to determine the appropriate diagnostic and therapeutic procedures.

Isolated abducens nerve palsy is a common neuro-ophthalmologic consult. Thorough history-taking and neuro-ophthalmologic evaluation would help the physician in establishing the primary differentials, which could not only be sight-saving but life-saving as well.

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