Uncovering an optic nerve sheath meningioma using Ga-68-DOTATATE PET/CT

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Abstract

A 56-year-old woman was initially diagnosed with optic neuritis. However, several “red flags” were present: older age at presentation, no multiple sclerosis suspicious findings on magnetic resonance imaging, negative oligoclonal bands. ^{68}Ga-DOTATATE PET/CT confirmed the differential diagnosis of an optic sheath meningioma. Our case stresses the value of the somatostatin receptor (SSTR) ligand PET/CT in patients with suspected optic neuritis if the diagnostic workup does not support immune-mediated pathogenesis.

Keywords: optic neuritis, somatostatin receptor, multiple sclerosis

Figure legend 1

A 56-year-old woman presented with a one-week history of vision loss in her left eye upon awakening. She reported left-sided, movement-associated ocular pain, a feeling of ocular pressure, and disturbed red colour vision. On examination, the left eye’s visual acuity was 0.3 (right eye, 1.0), with a relative afferent pupillary defect. Fundoscopy and perimetry were unremarkable. FLAIR-weighted MRI of the brain showed unspecific periventricular white matter lesions and hyperintense signal alteration of a distended left optic nerve (red arrow in Fig. 1A). A T1-subtraction map on contrast-enhanced MRI revealed slight and homogeneous contrast enhancement predominantly of the left optic nerve sheath (red arrowheads in Fig. 1B), and optic neuritis was assumed. Laboratory blood tests, including autoantibodies such as anti-nuclear, anti-neutrophil cytoplasmic, anti-aquaporin 4, and anti-myelin oligodendrocyte glycoprotein antibodies, were unremarkable. CSF findings (cell count, protein chemistry, glucose, oligoclonal bands) were normal. Besides, pathogen diagnostics in serum and CSF for viral and bacterial neurotropic infections were negative. The patient was started on intravenous prednisolone (1250 mg/d for five days) with subsequent

oral tapering for eight days. After initial slight improvement, the patient's visual acuity deteriorated 20 days later (visual acuity of the left eye, 0.2), while the pain with ocular movement and the relative afferent pupillary deficit remained unchanged. A second examination of serum and CSF remained unremarkable, and contrast-enhanced MRI with focus on the orbit remained unchanged, consistent with the left optic nerve inflammatory process. The patient was re-treated with intravenous prednisolone (2500 mg/d for five days), and visual acuity slightly improved (0.5). Seven months later, the patient's visual acuity deteriorated further to 0.16, and both the ocular movement pain and the relative afferent pupillary deficit persisted. However, there was no change in imaging findings on conventional MRI.

"Red flags" that questioned the diagnosis of optic neuritis from the beginning were the woman's age at presentation, no dissemination in space on MRI suspicious of multiple sclerosis, negative CSF oligoclonal bands, and no autoantibodies supporting the diagnosis of neuromyelitis optica spectrum disorder. Since the clinical symptoms were progressive and MRI showed persistent contrast enhancement indicating an inadequate response to repetitive steroid therapy, thin-layer orbital CT was performed, revealing little spots of calcifications in the optic sheath (red arrowheads in Fig. 1C), suggestive of a meningioma. To further corroborate the diagnosis of a meningioma[1, 2-4], positron emission tomography (PET) with the radiolabelled somatostatin receptor ligand ^{68}Ga-DOTATATE was performed. The majority of meningiomas present an overexpression of somatostatin receptors[5], while other lesions associated with the optic nerve such as neurinomas or gliomas show typically no overexpression[6, 7]. PET/CT imaging findings in our patient revealed tracer-uptake along the left optic nerve, strongly supporting the diagnosis of an optic sheath meningioma (Fig. 1D, red arrow; red arrowhead points at the pituitary gland that exhibits physiological high SSTR

expression) and prompted the initiation of radiotherapy[8]. Following radiotherapy, ocular movement discomfort was relieved within a few weeks.

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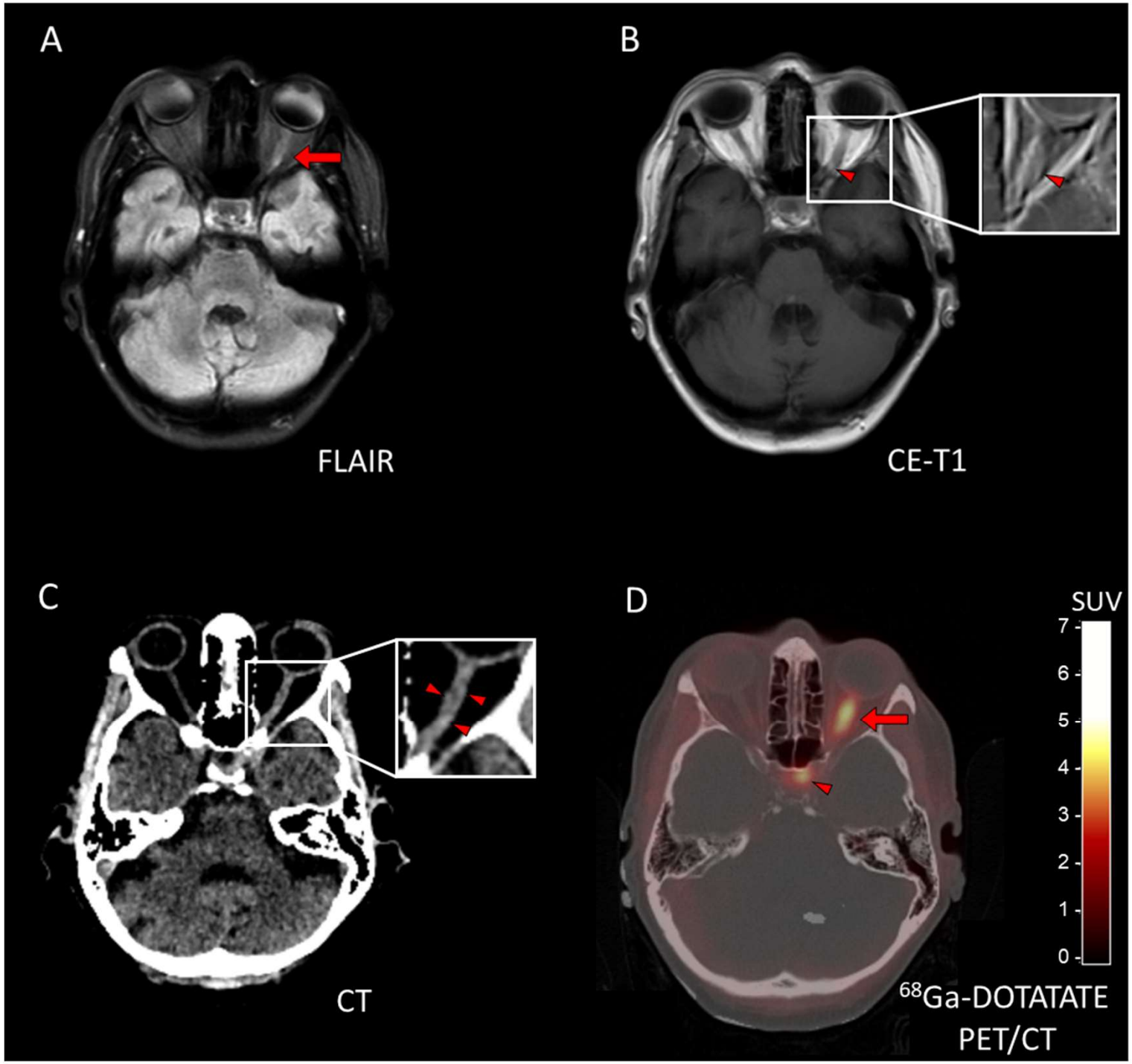
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68Ga-DOTATATE
PET/CT