# CASE REPORT

# Glioblastoma multiforme presenting as a haemorrhagic minimally enhancing mass of the trigone

<sup>1</sup>N M HAMBLY, MBBCHBAO, MRCPI, FFRRCSI, <sup>2</sup>M A FARRELL, MBBCHBAO, MRCPath, <sup>1</sup>T G SCANLON, MBBCHBAO, MRCPI, FFRRCSI, <sup>3</sup>A MCERLEAN, MBBCHBAO, MRCPI, FFRRCSI and <sup>1</sup>E C KAVANAGH, MBBCHBAO, MRCPI, FFRRCSI

<sup>1</sup>Department of Radiology, Mater Misericordiae University Hospital and Departments of <sup>2</sup>Neuropathology and <sup>3</sup>Radiology, Beaumont Hospital, Dublin, Ireland

**ABSTRACT.** Tumours of the trigone are rare, representing less than 2.5% of all intracranial tumours. The most common cause in adults is a meningioma. Glioblastoma multiforme of the trigone is extremely rare, with only six cases reported in the literature. We present a case of a gliobastoma multiforme of the trigone presenting in a 57-year-old man with temporal lobe seizures. Imaging revealed a haemorrhagic minimally enhancing mass of the trigone. Histology showed a high-grade malignant glial-derived neoplasm of World Health Organization Grade IV.

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Tumours of the trigone are rare, representing less than 2.5% of intracranial tumours [1–4]. There is a broad range of differential diagnoses, with the most common causes in adults being meningioma and metastases [1, 2, 5, 6]. Intraventricular meningiomas constitute less than 2% of all intracranial meningiomas but they represent the vast majority of trigonal tumours in adults [1, 3–5]. Glioblastoma multiforme (GBM) of the trigone is extremely rare, with only six cases having been reported in the literature [3, 4, 7, 8]. We present a rare case of a GBM of the trigone of the lateral ventricle presenting as a haemorrhagic minimally enhancing mass.

# **Case report**

A 57-year-old man with no previous medical history presented to accident and emergency following an episode of collapse with associated urinary incontinence preceded by a gustatory hallucination. No definite tonic clonic seizure activity was noted. The patient reported a 2-year history of intermittent episodes of "a strange taste followed by loss of concentration".

Neurological examination was normal on presentation. A non-contrast CT brain scan performed 3 h after presentation revealed a normal brain parenchyma and ventricular system, with no intraventricular masses identified (Figure 1).

Electroencephalography (EEG) at presentation showed intermittent disturbances of predominantly left temporal lobe function. The patient was commenced on oral

Address correspondence to: Niamh Hambly, Knockrickard, Claremorris, Co Mayo, Ireland. E-mail: niamhhambly@yahoo.co.uk

anticonvulsant medication and discharged for MRI brain and neurology review as an outpatient.

He underwent an outpatient MRI brain 2 months after initial presentation (Figure 2a–d). This showed a 3 cm well-circumscribed mass in the left lateral ventricle centred on the trigone. The mass demonstrated mild peripheral enhancement and marked susceptibility artefact on gradient echo sequences. Owing to the marked interval change since the earlier normal CT brain scan, this was felt to represent haemorrhage rather than calcification. A pre- and post-contrast CT brain scan was performed, which showed a 3 cm hyperdense mass in the trigone of the left lateral ventricle with minimal enhancement and no associated hydrocephalus (Figure 3).

The patient reported no new symptoms, and neurological examination remained unremarkable. He was referred for urgent neurosurgical evaluation and transferred to the National Neurosurgical Unit where he underwent a left temporal burrhole biopsy with stealth navigation.

Histology showed appearances consistent with a highgrade malignant glial-derived neoplasm of World Health Organization (WHO) Grade IV with rare oligodendroglial areas. Histology also confirmed the presence of haemorrhage but no calcification (Figure 4).

The patient was reviewed by clinical oncology and radiation oncology, and was discharged on oral steroids and anticonvulsant medication for palliative radiotherapy as an outpatient.

#### Discussion

Intraventricular tumours are rare, accounting for up to 10% of all cerebral neoplasms. 50% of intraventricular



Figure 1. A 57-year-old man presenting with an episode of collapse. Non-contrast CT shows normal ventricles.

tumours in adults occur in the lateral ventricle and, of these, less than 50% are located in the trigone [1–5].

Intraventricular tumours may arise from the lining of the ventricle (the ependymal cells and supependymal plate of glial cells), the choroid plexus or the adjacent brain parenchyma. Metastases may also present in the venticles. Masses are considered intraventriclular on radiological studies if they are centred completely or predominantly in the ventricle (with little extraventricular extent) and if they expand or conform to the shape of the ventricle. MRI is superior to CT in defining the exact tumour location, margins and extent [1].

There is a broad differential for mass lesions arising within the lateral ventricle, including meningioma, choroid plexus papilloma, choroid plexus carcinoma, subependymoma, subependymal giant cell astrocytoma, metastases, lymphoma, ependymoma, dermoid cyst, astrocytoma, central neurocytoma, oligodendroglioma, primitive neuroectodermal tumour, teratoma, vascular malformations, cysticercosis, ependymal and arachnoidal cysts, sarcoma, xanthogranulomatous degeneration of the choroid and GBM [1–9].

The imaging features of most intraventricular tumours are non-specific, and the differential can be guided by demographic features such as patient age and sex. Intraventricular tumours may be subdivided into those arising in the atrium or trigone, the body and the frontal horn. The frequency of tumours varies with location and is a useful diagnostic indicator.

Trigonal tumours tend to be relatively asymptomatic and can reach a large size before diagnosis. Most tumours present with headache; other symptoms include nausea and vomiting, episodes of collapse, memory loss, seizures, mental status changes, ataxia and focal motor deficits [7, 8].

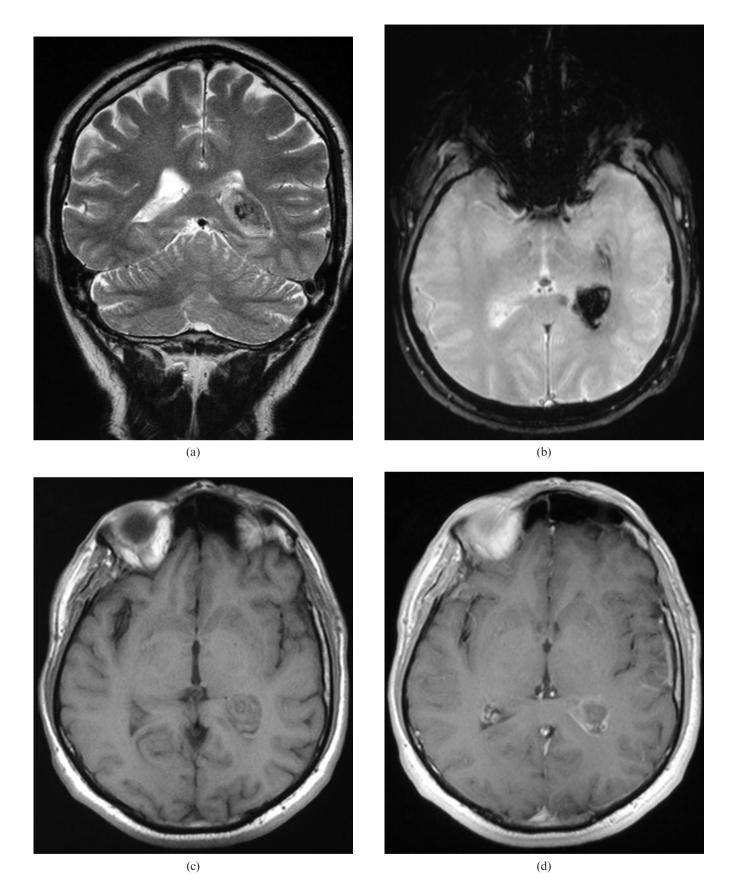
In adults over 40 years of age, the most common trigonal tumour is a meningioma, representing up to 100% of trigonal tumours in one series [1]. Intraventricular meningiomas constitute less than 2% of all intracranial meningiomas, with the most common location being the trigone [1, 3-5]. In adults, the other main differential is metastases. Intraventricular metastases are rare, accounting for 0.9-4.6% of all cerebral metastases, and most commonly arise from renal or lung cancer. The most common site is the lateral ventricle [1-5]. Intraventricular GBMs of the lateral ventricle are rare and, when they occur, the most common site is the body of the lateral ventricle [1, 2]. They are thought to arise from glial cells adjacent to the ventricle. GBMs of the trigone are extremely rare, with only six previous cases reported in the literature [3, 4, 7, 8].

In patients aged 10–40 years, the most common trigonal lesions are astrocytomas, ependymomas and vascular malformations. The most common trigonal lesion in the first decade is the choroid plexus papilloma or choroid plexus carcinoma [1, 2, 5, 6].

Intraventricular meningiomas usually present as wellcircumscribed hyperattenuating masses, which demonstrate intense enhancement and are calcifed in approximately 50% of cases [1, 5]. Intraventricular metastases also usually demonstrate intense contrast enhancement. In our case, the mass demonstrated only mild peripheral contrast enhancement. The imaging features of intraventricular GBM should be the same as those elsewhere in the central nervous system, *i.e.* inhomogeneity, contrast enhancement and an infiltritive appearance. However, three of the previous case reports describing the imaging features of trigonal GBMs also described only minimal enhancement [4, 7, 8]. In the other three cases, the imaging features were not described [3]. The mass in our case was relatively well circumscribed, a feature also described by Park et al [8]. The other two cases that described imaging features demonstrated lobulated irregular margins [4, 7].

Another differential for a minimally enhancing wellcircumscribed mass of the choroid plexus in adults is xanthogranulomatous degeneration of the choroid. This is a rare benign lesion occurring almost exclusively in adults, and it is frequently an incidental finding. CT usually demonstrates symmetrical tumefactions of the choroid plexus with peripheral calcifications and central low density, and the masses usually demonstrate  $T_2$ weighted hyperintensity on MRI. Most do not enhance but marginal enhancement has sometimes been reported [10].

None of the other trigonal GBMs described in the literature demonstrated intratumoural haemorrhage. The overall incidence of haemorrhage in brain tumours is 5.1%, with the highest incidence being in pituitary adenomas (15.8%). Of those lesions occurring in the choroid plexus, choroid plexus papillomas are the most likely to demonstrate haemorrhage, with an incidence of 16.7%. Although the incidence of haemorrhage in GBMs is relatively high at 7.8%, it has never been described in a trigonal lesion. Haemorrhage from a meningioma is rare, with an incidence of 1.3%. Other rare causes of haemorrhage in the choroid plexus include vascular malformations and vasculitidies [10, 11].



**Figure 2.** A 57-year-old man 2 months after an episode of collapse and left temporal lobe seizure. (a) Coronal  $T_2$  weighted, (b) axial gradient echo and axial  $T_1$  weighted (c) pre- and (d) post-contrast sequences show a haemorrhagic minimally enhancing mass in the trigone of the left lateral ventricle.



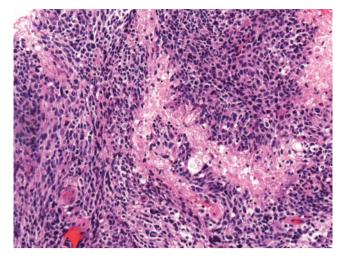
**Figure 3.** A 57-year-old man presenting with temporal lobe seizure. A pre-contrast CT brain scan shows a well-circum-scribed haemorrhagic mass in the trigone of the left lateral ventricle.

# Conclusions

GBM is a rare cause of a trigonal mass lesion in an adult patient, with meningioma and metastases being the most common tumours in this age group. However, all intraventricular mass lesions require neurosurgical referral and biopsy, as the imaging features are relatively non-specific.

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**Figure 4.** Representative image of a partly necrotic, densely cellular, glial-derived malignant brain tumour — glioblastoma multiforme (haematoxylin and eosin stain,  $\times 40$ ).

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