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Case Report

Cystic Glioblastoma of the Third Ventricle: Diagnostic Challenges and Poor Functional Outcome Related to Cystic Haemorrhage

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Abstract: *Background:* Glioblastoma multiforme (GBM) is the most common intra-axial primary brain tumour in adults, and prognosis is poor. Spontaneous haemorrhage is an uncommon but recognized initial presenting sign of primary brain tumour. Moreover, intra-cystic haemorrhage is frequent, further can affect functional outcome and even reducing survival duration. Most GBM tumours arise in the frontotemporal region, haemorrhagic cystic GBM arise in the third ventricle of the brain is very rare and create a diagnostic dilemma and surgical challenges. Third ventricular GBM can arise from structures on or near the third ventricle wall. Patients with massive intra-cystic haemorrhage can present with a wide spectrum of clinical signs and symptoms related to increased intracranial pressure (ICP), ranging from headache to sudden acute neurological deterioration, coma, and death. Acute deterioration frequently results from massive acute haemorrhage inside the cystic component leading to hydrocephalus, especially when the tumour mass obstructs the foramen of Monro. Due to high tumour-related mortality and sudden death related to acute hydrocephalus, A high index of suspicion is required to avoid misdiagnosis and delayed surgical treatment due to the atypical anatomic and radiologic presentation of cystic haemorrhagic GBM. This case presentation highlights the significant role of haemorrhage inside the GBM cystic component on both diagnosis and clinical course of the disease.

Keywords: Third Ventricle, Glioblastoma Multiforme, Haemorrhagic, Acute Hydrocephalus, Cyst

1. Introduction

Glioblastoma multiforme (GBM) is the most aggressive central nervous system tumour, and prognosis is still dismal, with a 3-year survival rate of only approximately 10% [1]. While GBM can be found anywhere in the white matter, it most frequently arises in frontotemporal cortex [2] In contrast, central nervous system tumours are rarely found in the ventricular system as the primary site. Ventricular GBM is very rare, accounting for only 2.2% of all cases [3], and both the unusual anatomical location and the presence of intra-tumoural haemorrhage can delay diagnosis, thereby further reducing survival duration [4]. This report describes a rare case of isolated haemorrhagic GBM of the third ventricle and briefly reviews previously reported cases for treatment guidance.

1.1. Objective

Significant of haemorrhage inside cystic component of third ventricle glioblastoma on diagnosis and clinical course of the disease in relation to existing literature.

1.2. Method

In addition to clinical management, an extensive literature review of PubMed and Google scholar was conducted using the keywords 'Glioblastoma multiforme', 'third ventricle', 'haemorrhagic/non-haemorrhagic GBM' and 'acute hydrocephalus'.

1.3. Result

The patient described in this case report received emergency biventricular external ventricular drainage (EVD) through the frontal approach at a local hospital to relieve intracranial pressure (ICP), and radiological evaluation revealed a haemorrhagic cystic mass obstructing the third ventricle. The patient was immediately transferred to a higher medical centre for tumour excision. Biopsy and surgery were conducted using a transcallosal approach. Histopathology revealed highly malignant glial cells consistent with GBM and chemotherapy was started. Unfortunately, the patient become quadriparesis, memory loss, on tracheostomy and feeding through nasogastric tube. He died two months post-surgery before completing chemotherapy.

2. Clinical Presentation

A 39-year-old male known to have diabetes mellitus on regular medication, no past-hisotry of haematological disorders or using anticoagulant or blood thinner medications. He experience a one-year history of severe intermittent headache relieved by lying flat on the bed not associated with any symptoms or signs of increased ICP received a diagnosis of a tension headache at a local medical centre. On the day of hospital admission, he experienced severe headache associated with projectile vomiting, and was taken by his family to an Accident &Emergency department. While initially able to walk, he suddenly collapsed during the ER visit. At this time, Glasgow Coma Score was 10/15, both pupils were 3 mm and reactive to light, blood pressure was 140/90 and random blood glucose was 5.9 mmol/L. Brain computed tomography (CT) showed an acute haemorrhagic cystic lesion obstructing the third ventricle with ventricular dilatation, measuring about 3x3 mm (Figure 1a). The patient was immediately transferred to the operating room for biventricular EVD, which resulted in the ejection of cerebrospinal fluid under pressure through the EVD tubes. On the second post-operative day, the patient regained full consciousness and post-operative brain CT (Figure 1b) showed collapse of the haemorrhagic cyst. Brain magnetic resonance image without contrast (Figure 2a & 2b) showed soft tissue mass lesion at anterior region of the third ventricle, measuring about 25x21 mm showing high signal in T1, T2 and FLAIR image with variable degree of diffusion restriction. Evident blooming artifact noted within, likely representing bleeding products. Patient was refaired to higher center due to unavailable facilities in our hospital.

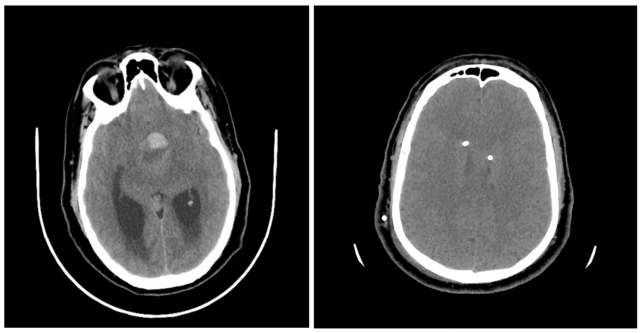

Figure 1. *Computed tomography scans acquired on admission (a) and following emergency biventricular external ventricular drainage (b). A cystic mass was found in the third ventricle (arrow in a) that partially collapsed following drainage.*

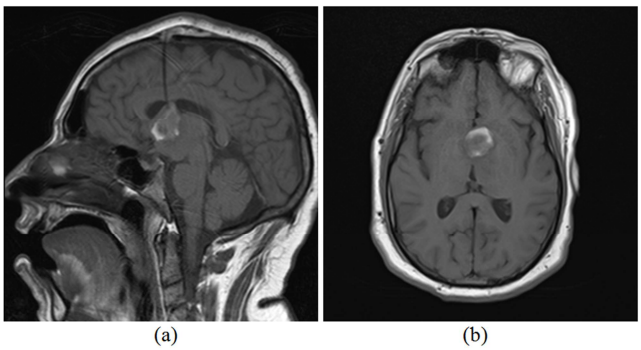

Figure 2. *T-1 weighted magnetic resonance images in the sagittal plane (a) and axial plane (b) showing a cystic tumour mass in the third ventricle.*

3. Discussion

Tumours of the third ventricle are usually surrounded on all sides by vital vascular and eloquent structures. While the majority of interventricular tumours are benign, 13% are malignant [5]. The third ventricle is an unusual site for GBM, and such tumours have dismal prognosis compared to brain tumours at other sites [6]. Many theories have been postulated regarding origin of these tumor at the third ventricle of the brain which consider a typical location, according to final histopathology report and proof of single mass by radiology, we accept one hypothesis, third ventricle GBM can arise de novo or it can be upgraded from previously low grade glioma at same site [16]. A GBM located within the ventricular system is considered a primary interventricular tumour when it arises from the ventricular wall or structures within the wall and secondary when originating from structures close to the wall and exophytically grows into the ventricle [7]. Like any GBM in white matter, these lesions are usually composed of cystic and solid components. A previous study reported that survival outcome is better in cases with a cystic component than in non-cystic glioblastoma multiforme due to a narrower peri-cystic glioblastoma mass and limited infiltration [8]. On the other hand, the one-month mortality rate of GBM

complicated by intra-cystic haemorrhage may be as high as 22%–31% [9], 48–75% experience partial or complete independence in short term prognosis while in the long-term prognosis of haemorrhagic GBM 78% mortality at 1 year [10]. Massive haemorrhage inside the cyst which result from growth of abnormal neo-capillaries both structurally and functionally in the tumor which invade normal parenchymal blood vessels and cause bleeding [17] reflects the invasiveness and aggressiveness of the tumour and consider an unresolve issue due to repeated bleeding from both normal parenchymal capillaries and abnormal new capillaries leading to acute neurological deterioration with significant worse in both functional outcome and survival duration due to interruption of normal blood supply to ventricular system of the brain and eloquent neural structures that surrounding third ventricle of the brain. When hematoma volume is relatively larger than tumour volume [11] as in our case. The cyst may expand and induce hydrocephalus, or it may rupture and disseminate contents into the intraventricular space, and this could lead to chemical meningitis, more serious than meningitis is staining of ventricular system of the brain with the blood which has indesirable outcome. GBM can present with interventricular haemorrhage [12], can also mimic arteriovenous malformations and cerebral contusions in their presentation and radiological study [13, 14]. In addition to futher, haemorrhage inside the cyst can led to expansion and obscure the tumour margins and become mimic a haemorrhagic colloid cyst, as in the current case, potentially leading to misdiagnosis or delayed diagnosis and treatment. Moreover, large bleeding inside cystic component can cause diagnostic challenge in neurosurgical specimen due to difficulty to find neoplastic cell due to necrosis of tumour cells and deposition of blood contents. Magnetic resonance imaging can assist in distinguishing spontaneous intracerebral haemorrhage from tumour haemorrhage, but this technology is not always immediately available [15]. On the other hand, anatomical limitation of the area due to very important neural structures, intra-cystic hemorrhage due to abnormal vasculature of the tumor make a true surgical challenge that could end by poor functional outcome.

4. Conclusion

Glioblastoma multiforme should be considered in the differential diagnosis of third ventricle tumours. Interestingly, the aspect of tumor vasculature need to be considered in tumors classifications for purpose of prognosis and clinical course.

Disclosure of Interest

The authors declare that they have no competing interests.

Data Availability Statement

The data for this case report is available with the author.

Consent for Publication

Written consent for publication was obtained from patients' family.

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