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A Rare Case of Cerebellar Glioblastoma Mimicking Acute Stroke in an Elderly Patient

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

ABCDEF 1 Maleeha Zahid
ABCDEF 1 Laura Yapor
ABCDEF 2 Masooma Niazi
ABCDEF 3 Muhammad Adrish
ABCDEF 4 Ahmad Hanif

1 Department of Medicine, Bronx Care Health System, Affiliated with Icahn School of Medicine at Mount Sinai, Bronx, NY, U.S.A.
2 Department of Pathology, Bronx Care Health System, Affiliated with Icahn School of Medicine at Mount Sinai, Bronx, NY, U.S.A.
3 Division of Pulmonary and Critical Care Medicine, Department of Medicine, Bronx Care Health System, Affiliated with Icahn School of Medicine at Mount Sinai, Bronx, NY, U.S.A.
4 Division of Hematology, Department of Medicine, Bronx Care Health System, Affiliated with Icahn School of Medicine at Mount Sinai, Bronx, NY, U.S.A.

Corresponding Author: Muhammad Adrish, e-mail: aadrish@hotmail.com
Conflict of interest: None declared

Patient: Female, 82-year-old
Final Diagnosis: Cerebellar glioblastoma
Symptoms: Dizziness
Medication: —
Clinical Procedure: —
Specialty: Neurology

Objective: Unusual clinical course

Background: Glioblastoma (GB) is a common brain tumor that usually presents in the cerebral hemisphere. Very rarely, these tumors can present in the cerebellum. The tumor tends to have a diffuse infiltrative growth that follows the white-matter pathway. Cerebellar GB is often difficult to diagnose on imaging and a biopsy is often needed for diagnosis. Here, we present the case of an elderly woman who presented with symptoms suggestive of acute stroke.

Case Report: An 82-year-old woman presented for intermittent dizziness that started 2 weeks prior to the presentation and had been progressively worsening. She had a prior history of stroke and was noted to have decreased motor strength and sensation to touch on the left side. A cranial nerve examination was normal, as was finger-nose testing. Magnetic resonance imaging (MRI) of the brain with and without contrast showed an enhancing lesion in the left posterior cerebellum producing a mass effect in the left lateral ventricle. The differential diagnosis included cerebellitis with abscess, neoplastic process with necrosis, and, less likely, a sub-acute infarction A suboccipital craniotomy with cerebellar biopsy-diagnosed cerebellar GB.

Conclusions: We report the unique presentation of cerebellar GB in an elderly woman who presented with left-sided weakness, elevated blood pressure, dizziness, vasogenic edema in the left cerebellum, and a mass effect on the fourth ventricle, mimicking acute stroke.

MeSH Keywords: Cerebellar Neoplasms • Glioblastoma • Stroke

Full-text PDF: https://www.amjcaserep.com/abstract/index/idArt/927031

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Background

Glioblastoma (GB) is a common and very aggressive type of brain tumor in adults. [1] Approximately two-thirds of these cases are seen in adults in their sixth decade, with the first decade being the second most common age group [2–5]. The tumor is usually located in the cerebral hemisphere. Less common sites include the brain stem and spinal cord. Very rarely, this tumor occurs in the cerebellum [6]. The tumor tends to present with diffuse, infiltrative growth that follows the white-matter pathway. Cerebellar GB is also difficult to identify preoperatively, and surgical biopsy is often needed to diagnose this tumor [7]. Multiple case series have suggested a worse prognosis for cerebellar tumors compared to supratentorial GB, thus making it essential to diagnose this tumor in a timely manner [8–10].

Here, we present a unique case of an elderly woman with prior history of stroke who presented with uncontrolled blood pressure, intermittent dizziness, vasogenic edema in the left cerebellum, and mass effect on the fourth ventricle, suspicious for acute stroke. Cerebellar GB was diagnosed by biopsy.

Case Report

Our patient was an 82-year-old woman who presented for intermittent dizziness. Her symptoms started 2 weeks prior to the presentation and had been progressively worsening. The dizziness was exacerbated by walking and was associated with vertigo and nocturnal headaches. She denied any new focal neurological deficits, bowel or bladder incontinence, or constitutional symptoms. Her past history was significant for plasma cell dyscrasia, hypertension, diabetes mellitus, and cerebrovascular accident with left-sided residual weakness. She was a non-smoker and used to drink alcohol occasionally. At the time of presentation, she had a temperature of 36.7°C, heart rate 97 per min, blood pressure 156/78 millimeter of Hg, and respiratory rate of 12 per min. On physical examination, there was no rash, jaundice, or palpable cervical lymphadenopathy. A neurological examination revealed an alert elderly woman who was oriented to place, person, and time. Her motor strength was normal on the right side but she had weakness of 4/5 in the left upper extremity and 3/5 in the left lower extremity. Sensation to painful stimuli and light touch was minimally decreased on the left side compared to the right side. A cranial nerve examination was normal, as was finger-nose testing. The lungs were clear and the cardiac examination was normal. There was no tenderness or hepatosplenomegaly on the abdominal examination. Computed tomography (CT) of the head showed new hypoattenuation in the left cerebellum, predominantly involving the white matter, with a mass effect on the fourth ventricle, and appearance of vasogenic edema. No acute hemorrhage or midline shift was seen on this imaging (Figure 1). She was started on statins for suspected acute stroke and intravenous dexamethasone for brain edema and was admitted to the intensive care unit for closer neurological monitoring. Magnetic resonance imaging (MRI) of the brain with and without contrast was performed, showing an enhancing lesion in the left posterior cerebellum producing a mass effect in the left lateral ventricle. An old lacunar infarct in the right pons and chronic white matter ischemic changes were also seen (Figures 2–4). At this time, the differential diagnosis included cerebellitis with abscess, neoplastic process with necrosis, and, less likely, sub-acute infarction. The patient underwent suboccipital craniotomy with cerebellum tumor biopsy, which showed a glial neoplasm infiltrating the cerebellum, with highly atypical and pleomorphic tumor cells containing irregular hyperchromatic nuclei and distinct nucleoli (Figure 5). A few mitotic figures, including atypical mitotic figures, were also seen along with tumor necrosis and robust micro-vascular proliferation. The Ki67 proliferation index was variably increased, with up to 40% of tumor cells staining positive. The immune-histochemical profile of the neoplasm showed positivity for alpha thalassemia/mental retardation syndrome X-linked (ATRX), glial fibrillary acidic protein (GFAP), platelet-derived growth factor receptor alpha (PDGFR-A), oligodendrocyte transcription factor (Olig-2), and p-53. Tumor cells were negative for creatine kinase (CK) and mutated isocitrate dehydrogenase-1 (IDH-1; R132H mutation). The tumor was also negative for EGFR amplification and

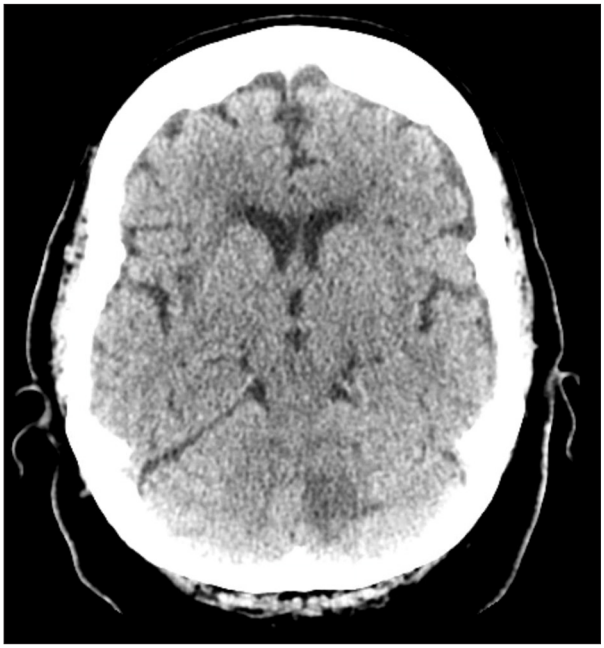

Figure 1. Computed tomography of the head, showing hypoattenuation in the left cerebellum, predominantly involving the white matter, with mass effect on the fourth ventricle and appearance of vasogenic edema.

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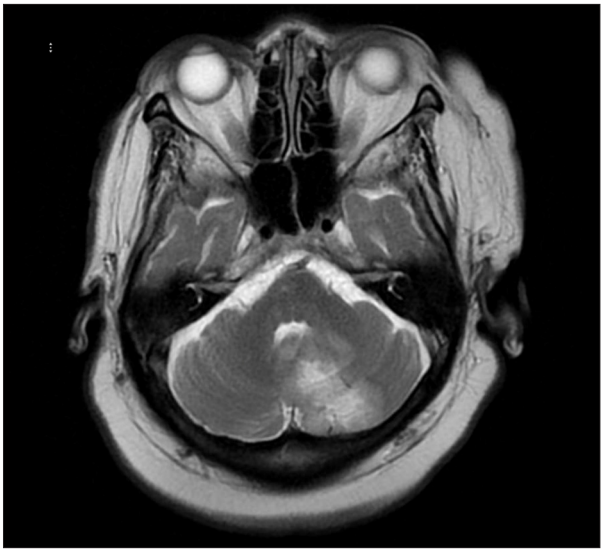

Figure 2. Magnetic resonance imaging of the brain (T2 Propeller image) showing abnormal signal in the left posterior inferior medial cerebellum. The area measures 4×2.6×2.7 cm and is producing a mass effect in the fourth ventricle.

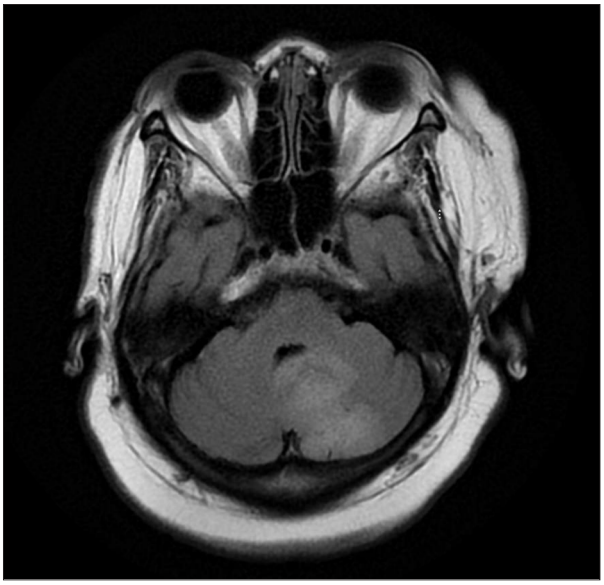

Figure 3. Magnetic resonance imaging of the brain (T2 flair image) showing abnormal signal in the left posterior inferior medial cerebellum, which showed bright signal intensity on T2 and flair.

no MGMT promoter methylation was detected. These findings were consistent with the diagnosis of cerebellar GB. After detailed discussion with the medical team, the patient and her family declined any further treatment for the tumor and she was discharged on oral steroids.

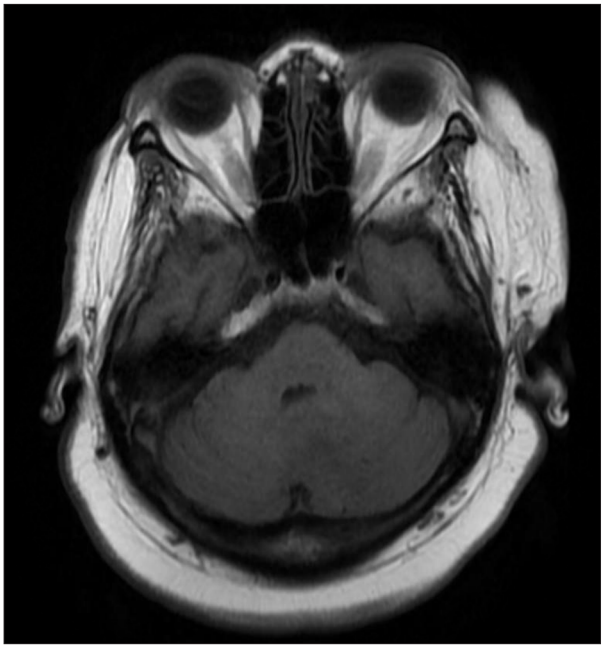

Figure 4. Magnetic resonance imaging of the brain (T1 Axial image) showing low signal intensity on T1.

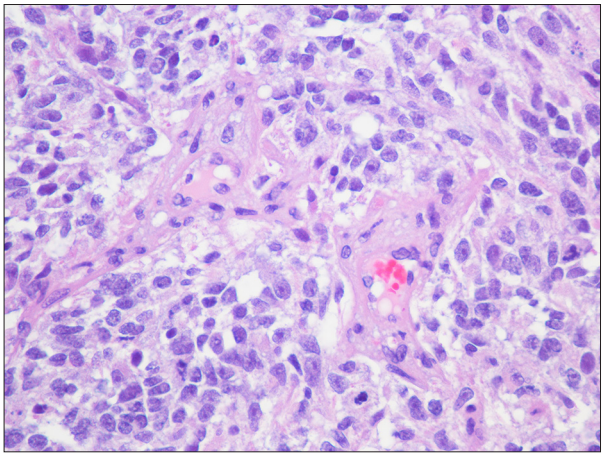

Figure 5. Histopathologic findings from left cerebellar biopsy (hematoxylin and eosin staining), showing infiltrating glial neoplasm with highly atypical and pleomorphic tumor cells containing irregular hyperchromatic nuclei and distinct nucleoli.

Discussion

GB is a common tumor that accounts for 50% of primary intracranial tumors. These tumors are more commonly seen in the fifth and sixth decades of life and tend to spread quickly [11]. Cerebellar GB is a rare form of GB. Because of its rarity, the biological behavior is not as fully defined as that of supratentorial GB. This lack of understanding has led to management of cerebellar GB similar to that of supratentorial tumors. Nonetheless, adults with cerebellar GB tend to have shorter survival than

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those with supratentorial GB, with mean survival ranging from 8 to 10 months. GB can arise anywhere within the brain, but has a predilection for the subcortical white matter and deep grey matter of the cerebral hemispheres [12].

Differences also exist in the molecular characterestics of this tumor. Studies have reported frequent expression of p53 in cerebellar GB, suggesting a possible underlying TP53 mutation in the pathogenesis [13]. Endothelial growth factor receptor (EGFR) and isocitrate dehydrogenase (IDH) mutation are frequently absent in these cerebellar GB [14]. The absence of IDH mutation is common in elderly GB patients, but is present in the younger population with GB. IDH mutations are also most commonly seen in secondary GB as opposed to primary GB, and these patients tend to have a better response to treatment [15]. Supratentorial GB is also characterized by negative p53 activity and the presence of epidermal growth factor receptor (EGFR), in contrast to cerebellar GB, which is usually immunopositive for p53 and negative EGFR, as noted above [8].

In a study of 208 patients with cerebellar GB, patients were younger, had smaller average tumor size, and were less likely to be white when compared with patients with supratentorial lesions [6]. Similarly, Tsung and colleagues reported a median age of 39.9 years [16]. However, our patient was much older, in her 80s. Common presenting symptoms in patients with cerebellar GB include ataxia, vomiting, headache, and dizziness [17]. Our patient also presented with intermittent dizziness. Takahashi noted a 40% incidence of hydrocephalus and 10% incidence of brain stem involvement at presentation, which were not present in our patient, and found a lower mean Karnofsky performance status (KPS) score in patients with cerebellar GBs compared to those with supratentorial GB [17]. This score was lower for our patient as well (KPS score=50), due to significant disability because of her worsening dizziness. Cerebellar GB is also diagnosed in patients following an infarction, with radiologic features suggesting hemorrhage or necrosis rather than a brain mass [18]. In another case report, this tumor presented as a hypertensive cerebellar hemorrhage, which delayed the diagnoses, and the patient was diagnosed with cerebellar GB 1 month later [19]. Our patient also presented with elevated blood pressure, vasogenic edema, and compression of the 4th ventricle, suggesting possible acute stroke. Despite lacking the classical radiographic features of cerebellar GB, we proceeded with a biopsy, which led to the diagnosis of this tumor.

The current standard treatment for elderly patients with GB is surgical resection followed by radiotherapy and chemotherapy [20]. Suboccipital craniectomy is the most common surgical procedure used to resect these tumors. Most patients do well with surgery, but they continue to have ataxia [21]. Adjuvant therapy usually consists of radiotherapy combined with temozolomide (TMZ). Monotherapy with TMZ is usually considered in patients with MGMT (O6-methylguanine-DNA methyltransferase) mRNA activity on the biopsy. The combination of TMZ chemotherapy and surgical resection has been shown to improve overall survival.

Overall survival is significantly shorter in elderly patients with GB compared to younger patients after treatment [14]. Jeswani and colleagues compared survival between cerebellar and supratentorial glioblastoma patients and noted the median survival time for the matched cohort was 8 months, but the survival distributions differed (log-rank P=.04) between the 2 groups. Survival time for cerebellar glioblastoma *vs.* supratentorial glioblastoma at 2 years was 21.5% *vs.* 8.0%, and 12.7% *vs.* 5.3% at 3 years, respectively [22]. An important factor that determines prognosis in patients with cerebellar GB is the presence of brainstem invasion. In a retrospective study by Weber et al., survival was significantly affected by tumor volume, salvage treatment, extent of surgical resection, brain stem invasion, and treatment completion [23]. Other characteristics that have been linked to better survival are greater radiosensitivity, EGFR-negativity, and Asian or Pacific Islander race.

Conclusions

In conclusion, we present a unique case of an elderly woman who presented with elevated blood pressure, dizziness, vasogenic edema in the left cerebellum, and a mass effect on the fourth ventricle, mimicking acute stroke. Cerebellar GB was diagnosed via biopsy. One must maintain a high suspicion for these cerebellar tumors, as they often lack classic radiographic manifestations.

Conflict of interest

None.

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