




Small-Cell Glioblastoma in the Craniovertebral Junction Mimics Meningioma

Kraniovertebral Bileşkede Menenjiomu Taklit Eden Küçük Hücreli Glioblastom

 Mesut METE,^a
 Gülgün OVALI,^b
 Aydın İŞİSAĞ^c

Departments of
^aNeurosurgery,
^bRadiology,
^cPathology,
 Manisa Celal Bayar University
 Faculty of Medicine,
 Manisa, TURKEY

Received: 11.05.2018

Accepted: 27.09.2018

Available online: 03.12.2018

Correspondence:

Mesut METE
 Manisa Celal Bayar University
 Faculty of Medicine,
 Department of Neurosurgery, Manisa,
 TURKEY/TÜRKİYE
 dr.mmte@hotmail.com

ABSTRACT Glioblastome multiforme (GBM) is the most common primary central nervous system tumor and can mimic various pathologies, such as meningioma, arteriovenous malformation, metastatic disease, lymphoma, and infection. Here, we report a case of GBM in a female patient with radiological features suggestive of a more common benign lesion such as meningioma in craniovertebral junction. The lesion was completely excised and the histopathological study was consistent with small-cell GBM.

Keywords: Glioblastome multiforme; meningioma

ÖZET Glioblastom multiform (GBM) en sık görülen primer santral sinir sistemi tümörü olup menenjiom, arteriyovenöz malformasyon, metastatik hastalık, lenfoma ve enfeksiyon gibi çeşitli patolojileri taklit edebilir. Bu çalışmada, bir kadın hastada, kraniovertebral bileşkede yerleşmiş ve radyolojik özellikleri menenjiom gibi daha sık görülen benign bir lezyonu düşündüren GBM olgusunu sunuyoruz. Lezyon tamamen eksize edildi ve histopatolojik çalışma küçük hücreli GBM ile uyumlu olarak bulundu.

Anahtar Kelimeler: Glioblastom multiform; menenjioma

The craniovertebral junction (CVJ) is a funnel-shaped structure that includes the foramen magnum, clivus, and atlantoaxial vertebrae. Anatomically, the CVJ encompasses the medulla, the cervicomedullary junction, and the upper cervical spinal cord. Neoplasms that arise in the CVJ include osseous tumors, soft tissue tumors, and tumors originating from nervous system structures in the CVJ.¹ Tumors such as meningiomas, schwannomas, chordomas, chondrosarcomas, plasmacytomas, osteoblastomas, fibrous dysplasia, giant-cell tumors, and metastatic tumors are more common in this region.¹ Complex regional anatomy and tumor pathology in relation to neighboring vascular and neural structures may lead to a false diagnosis.¹ Here, we report a case of glioblastoma multiforme (GBM) in a female patient with radiological features suggestive of a more common benign lesion such as meningioma. The lesion was completely excised and the histopathological study was consistent with small-cell GBM.

CASE REPORT

A 46-year-old female patient presented with head and neck pain for the last 45 days. She was seen at an outside hospital emergency department where a head computed tomography (CT) scan revealed a tumor with calcification foci extending from the cerebellum to the C2 level in the CVJ (Figure 1 A). Magnetic resonance imaging (MRI) revealed a lesion of approximately 5 x 3 cm compressing the fourth ventricle. The tumor was well-circumscribed with heterogeneous contrast enhancement and extended from the cerebellum to the C2 vertebral level (Figure 1 B, C). MR spectroscopy revealed reduced N-acetyl-aspartate levels and an elevated choline peak. Diffusion MRI revealed significantly restricted diffusion in the cellular com-

ponents of the lesion. The preoperative neurological examination was normal. The patient underwent suboccipital craniectomy and C1 posterior arcus laminectomy. The tumor was gray in color with sharp cleavage planes and small foci adherent to the cervicomedullary junction, and extended into the right cerebellar tissue. Gross total resection was performed. Histopathological evaluation revealed grade II–III astrocytic as well as grade II–III oligodendroglioma-like areas with dense calcification. Abundant necrosis without palisades, diffuse glial fibrillary acidic protein (GFAP) staining throughout the tumor, and the absence of isocitrate dehydrogenase 1 staining lead to the diagnosis of a small-cell variant of GBM (Figure 2). The postoperative period was uneventful. The patient was discharged on postoperative day 5 and

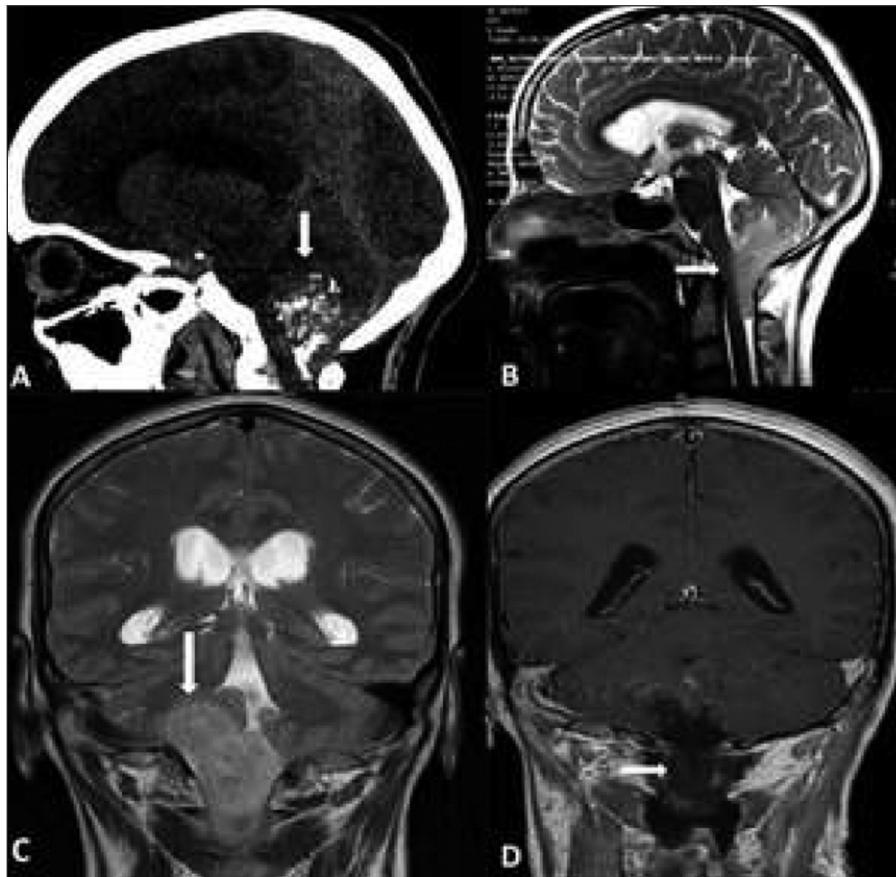


FIGURE 1: CT scan showed a tumor with calcification foci extending from cerebellum to C2 vertebral level (A). Sagittal and coronal MRI revealed, a lesion of approximately 5 x 3 cm compressing the fourth ventricle. Tumor was well-circumscribed with heterogenous contrast enhancement and originating from right dentate nucleus of the cerebellum and extending to C2 vertebral level (B-C). Postoperative coronal MRI demonstrated gross total resection of tumor (D).

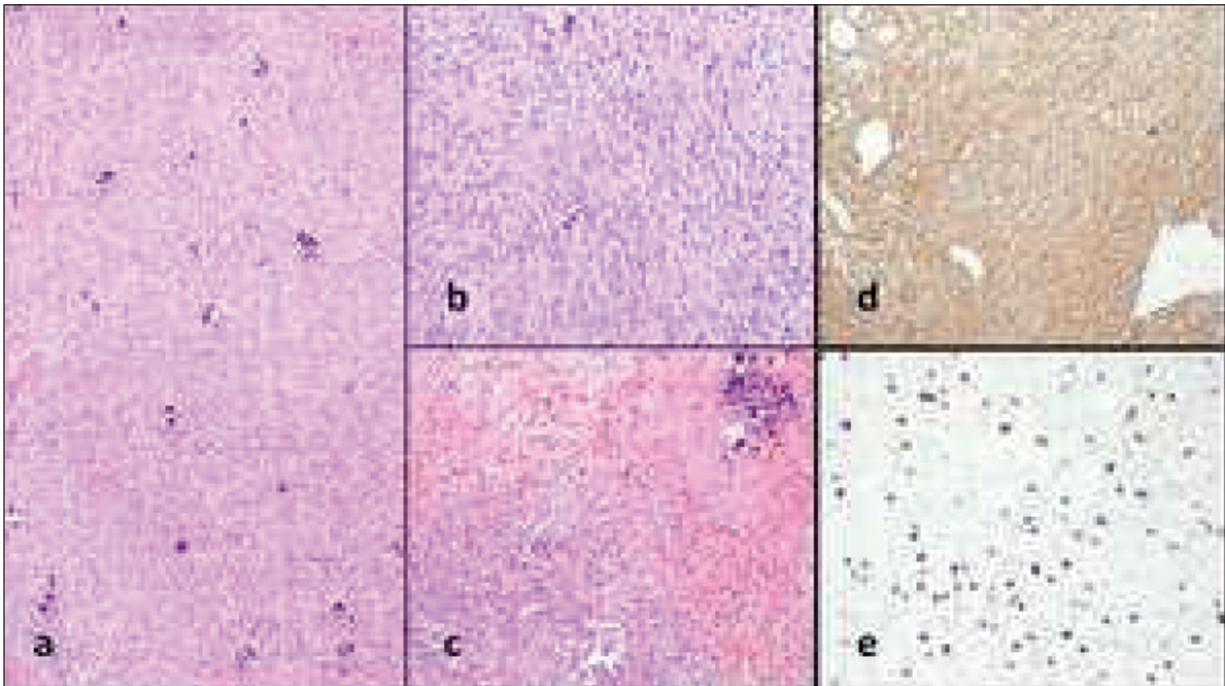


FIGURE 2: (a) Oligodendroglioma-like areas with rhythmic arrangement of tumoral cells, delicate vascular pattern and calcification foci (H&E, x100); (b) a grade III area consisted of relatively small cells with increased cellularity, pleomorphism and mitoses (H&E, x200); (c) calcification and necrosis without palisade in the vicinity of living tumoral cells (H&E, x100); (d) strong GFAP positivity was observed throughout the tumor (DAB, x100); (e) high Ki-67 proliferation index was generally around 35-40% and in some areas extremely high-up to about 70-80% (DAB, x400).

was referred to medical and radiation oncology departments for radiotherapy and chemotherapy treatment.

DISCUSSION

GBM is the most common primary central nervous system (CNS) tumor and accounts for 15 to 20% of all intracranial tumors; however, localization in the CVJ has not been reported previously.² GBM can mimic various pathologies, such as meningioma, arteriovenous malformation, hemorrhage from ischemic stroke, cerebral contusion, metastatic disease, lymphoma, and infection.³ On MRI, GBM appears as an intra-axial mass with peripheral and/or nodular enhancement with a central heterogeneous signal due to necrosis or intratumoral hemorrhage. The lesion usually has irregular margins with vasogenic edema. Common differential diagnoses include cerebral abscess, metastases, lymphoma, and tumefactive demyelination.³ However, meningiomas are the most frequently reported primary CNS tumors, comprising approximately 36%

of all CNS tumors. These tumors originate from arachnoid meningeothelial cells and, as such, are classified as intracranial extra-axial neoplasms. Meningioma presents as a lobular, extra-axial mass with well-defined boundaries and homogeneous enhancement on MRI. Frequently, the tumor has a dural tail and inward displacement of the cortical gray matter. CT scans show calcification in 25% of all meningiomas.⁴ In our case, CT and MRI findings such as extra-axial mass, calcification foci, and localization, suggested a primary diagnosis of meningioma; however, the final pathological diagnosis was GBM, which suggested that the tumor originated from the right dentate nucleus of the cerebellum and then extended to the C2 vertebral level.

The small-cell variant of GBM constitutes 10% of all GBM cases. Its pathology is characterized by highly proliferating monomorphic small glial tumor cells, and markedly elevated mitotic count is a characteristic feature. Necrosis and microvascular proliferation are observed; however, their appearance and immunoreactivity for GFAP may be

minimal.⁵ Microscopic evaluation revealed small cells with increased cellularity, pleomorphism, and mitoses in our patient. Additionally, we detected necrosis, strong GFAP positivity, and a high Ki-67 proliferation index.

As a conclusion; although MRI findings of extra-axial masses in the CVJ suggest a diagnosis of meningioma, clinicians should keep in mind that GBMs may occur in this region. However, further clinical, histopathological, and neuroradiological studies are needed for definitive diagnosis.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct

connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: Mesut Mete; **Control/Supervision:** Mesut Mete; **Analysis and/or Interpretation:** Gülgün Ovalı, Aydın İşisığ; **Literature Review:** Mesut Mete; **Writing the Article::** Mesut Mete; **Critical Review:** Mesut Mete.

REFERENCES

1. Menezes AH, Traynelis VC, Fenoy AJ, Gantz BJ, Kralik SF, Donovan KA. Honored guest presentation: surgery at the crossroads: craniocervical neoplasms. *Clin Neurosurg* 2005;52:218-28.
2. Patnaik A, Mishra SS, Senapati SB. Intraventricular glioblastoma multiforme mimicking meningioma and review of the literature. *Asian J Neurosurg* 2017;12(1):75-7.
3. Patel M, Nguyen HS, Doan N, Gelsomino M, Shabani S, Mueller W. Glioblastoma mimicking meningioma: report of 2 cases. *World Neurosurg* 2016;95:624.e9-624.e13.
4. Nowosielski M, Galldiks N, Iglseder S, Kickingereder P, von Deimling A, Bendszus M, et al. Diagnostic challenges in meningioma. *Neuro Oncol* 2017;19(12):1588-98.
5. Takahashi K, Tsuda M, Kanno H, Murata J, Mahabir R, Ishida Y, et al. Differential diagnosis of small cell glioblastoma and anaplastic oligodendroglioma: a case report of an elderly man. *Brain Tumor Pathol* 2014;31(2):118-23.