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POSTERIOR FOSSA (FOURTH VENTRICULAR) EPENDYMOMA IN A 40-YEAR-OLD MALE: A CASE REPORT.

Neurosurgery

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ABSTRACT

Posterior fossa ependymomas are rare intracranial tumors in adults and present significant diagnostic and surgical challenges due to their proximity to critical brainstem structures and cerebrospinal fluid pathways. These tumors commonly manifest with symptoms related to raised intracranial pressure and cerebellar dysfunction. We report the case of a 40-year-old male who presented with a three-month history of progressive headache, dizziness, gait instability, and intermittent nausea and vomiting. Neurological examination revealed mild cerebellar ataxia and nystagmus without focal motor or sensory deficits. Neuroimaging demonstrated a mass lesion within the fourth ventricle causing obstructive hydrocephalus, consistent with a posterior fossa tumor. The patient underwent surgical intervention, and gross total resection was achieved. Despite an initially stable postoperative course, the patient experienced sudden neurological deterioration and died on the first postoperative day. This case underscores the potential for unpredictable and fatal postoperative complications in posterior fossa tumors, even following apparently successful surgical resection, and highlights the importance of vigilant perioperative monitoring.

KEYWORDS

Neurosurgery, Adult Ependymoma, Fluorescein-Guided Surgery, Fourth Ventricular Ependymoma, Posterior Fossa Tumor.

INTRODUCTION

Ependymomas are neuroectodermal tumors arising from ependymal cells lining the ventricular system and central canal of the spinal cord, represent a significant subset of central nervous system neoplasms [1]. While they can occur throughout the neuroaxis, posterior fossa ependymomas, particularly those located within the fourth ventricle, pose unique challenges in diagnosis and management. These tumors, derived from the glial cells lining the ventricles, exhibit variable biological behavior, ranging from slow-growing, well-differentiated lesions to aggressive, high-grade malignancies. The accurate diagnosis and comprehensive management of posterior fossa ependymomas necessitate a multidisciplinary approach involving neurosurgeons, neuro-oncologists, radiation oncologists, and neuropathologists. Ependymomas are more common in children, posterior fossa location in adults is relatively rare [2]. Here, we present a case report of a 40-year-old male with a fourth ventricular ependymoma, focusing on the clinical presentation, diagnostic imaging, surgical intervention, histopathological analysis, and postoperative management strategies employed in this case. The clinical presentation of fourth ventricular ependymomas can be insidious, often manifesting with symptoms related to increased intracranial pressure and cerebellar dysfunction [3].

Gross total resection of the fourth ventricular ependymoma was the target. However, despite successful resection, the patient unfortunately succumbed on postoperative day one. This unfortunate outcome underscores the inherent risks associated with complex neurosurgical procedures in eloquent brain regions and necessitates a thorough examination of potential contributing factors, including perioperative complications, cerebral edema, or undetected cardiovascular events. Factors such as severe meningitis, multi-organ failure, or even an intratumoral hemorrhage compounded by ventricular drainage could precipitate such a rapid decline post-surgery [4]. The proximity of these tumors to critical neurovascular structures and brainstem nuclei renders complete resection challenging, often increasing the risk of neurological deficits. Such complications are particularly perilous in the posterior fossa, a confined space where even minor edema can exert significant pressure on vital brainstem centers controlling cardiorespiratory function [5]. Furthermore, intraoperative complications, such as cerebrospinal fluid leaks, can exacerbate postoperative morbidity and mortality, necessitating meticulous surgical technique and vigilant postoperative monitoring. Given the patient's rapid demise, a comprehensive post-mortem analysis would have been crucial to ascertain the precise cause of death and identify any unforeseen complications, such as undetected hemorrhage or brainstem compromise [6]

Case Study

A 40-year-old male presented to our institution with a three-month history of progressive headache, dizziness, and gait instability. Neurological examination revealed mild cerebellar ataxia and nystagmus, with no focal motor or sensory deficits. The patient also reported intermittent nausea and occasional vomiting, suggestive of raised intracranial pressure.

Table – 1 Cerebrospinal Fluid Test Results

Cerebrospinal fluid test parameter			
	Result	Reference range	Interpretation
Color	Colorless	Colorless	Normal
Appearance	Clear	Clear	Normal
WBC	3 cells per microliter (µL)	0 to 5 cells per microliter (µL)	Normal
Protein levels	Elevated	-	Abnormal -
RBC	2 cells per microliter (µL)	0 to 5 cells per microliter (µL)	Normal
Meningitis/Encephalitis panel	Negative		Normal
CSF Cytology	Positive		Abnormal

Source: original data from present study.
WBC: White Blood Cells; RBC: Red Blood Cells;

The patient's respiratory viral screening panel, blood culture, and urine culture were negative. Lumbar puncture revealed clear, colorless cerebrospinal fluid with a white blood cell count of 3 cells/µL and a red blood cell count of 2 cells/µL. Protein levels were elevated. Screening for meningitis and encephalitis, as well as cerebrospinal fluid culture, were negative. However, cerebrospinal fluid cytology was positive. The detailed cerebrospinal fluid analysis is summarized in Table 1.

Table 2: Blood Investigations

Blood investigations			
WBC	12.900 × cells/µL	6–18,000 × cells/µL	WBC
Hemoglobin	14.6 g/dL	11.1–14.1 g/dL	Hemoglobin
CSF for AFB	negative		CSF for AFB
CSF culture and senstivity	No Growth		CSF culture and senstivity
CBNAAT	negative		CBNAAT
PT	13.0 seconds	11.5–15.3 seconds	PT
INR	1.0	0.86–1.22	INR

Blood investigation	Results	Reference range	Blood investigation

Source: original data from present study.
WBC: white blood cells; PT: prothrombin time; INR: international normalized ratio; aPTT: activated partial thromboplastin time;CBNAAT: Cartridge-Based Nucleic Acid Amplification Test; AFB: Acid Fast Bacilli; CSF: Cerbro Spinal Fluid.

Baseline blood investigations showed no significant abnormalities. The white blood cell count was 12,900 cells/μL, and hemoglobin level was 14.6 g/dL. Coagulation parameters, including prothrombin time and international normalized ratio, were within normal limits. Additional investigations, including cerebrospinal fluid culture, acid-fast bacilli staining, and cartridge-based nucleic acid amplification testing, were negative. These findings are summarized in Table 2

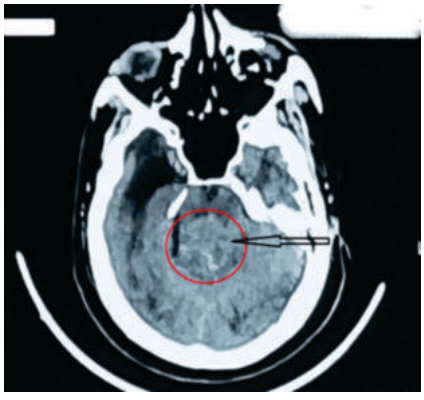

Figure 1: CT of the Brain (Axial Plane) Showing Fourth Ventricular Ependymoma.
Sources: original data from present study.

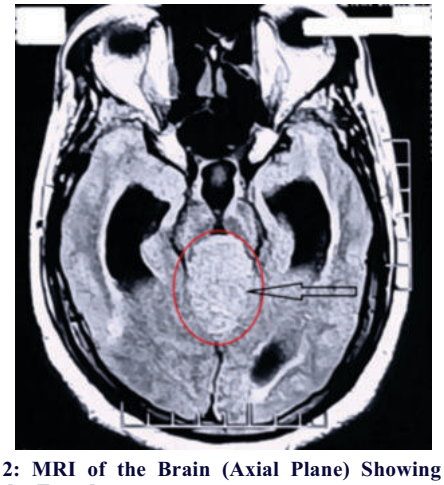

Figure 2: MRI of the Brain (Axial Plane) Showing Fourth Ventricular Ependymoma.
Sources: original data from present study.

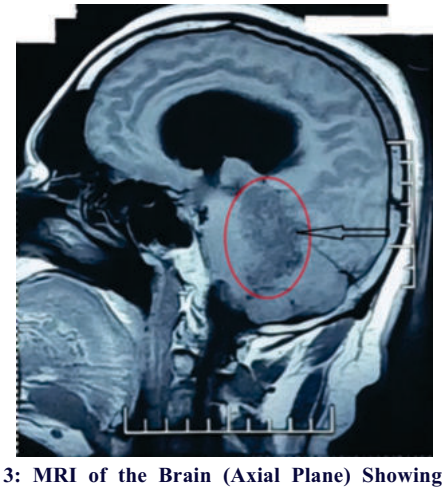

Figure 3: MRI of the Brain (Axial Plane) Showing Fourth Ventricular Ependymoma.
Sources: original data from present study.

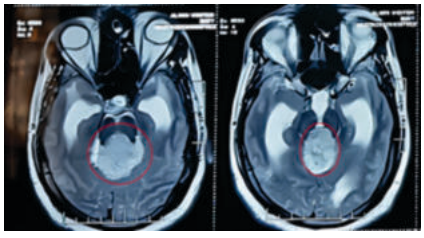

Figure 4: MRI of the Brain (axial plane) Showing Fourth Ventricular Ependymoma.
Sources: original data from present study.

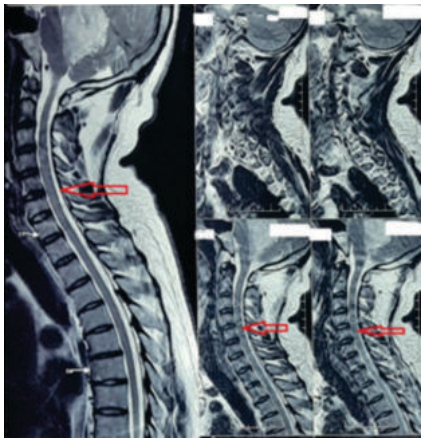

Figure 5: MRI Cervical Spine.
Sources: original data from present study.

CT of the brain showed features of space occupying lesion located around the fourth ventricle. Various MRI sequences were studied in order to locate the lesion, verify the extent and size of the lesion and formulate pre-operative planning (Figures 1-5). However, the lesion was not extending to spinal cord which was confirmed using MRI cervical spine with whole spine screening.

DISCUSSION

Posterior Fossa (4th Ventricular) Ependymoma are more commonly observed in pediatric populations, representing the third most common central nervous system tumor in children, their occurrence in adults, particularly within the posterior fossa, presents a distinct clinical entity [7]. The rarity of adult posterior fossa ependymomas underscores the importance of detailed case reporting to enhance understanding of their clinical behavior, optimal management strategies, and long-term outcomes.

Computed tomography and magnetic resonance imaging are crucial for confirming the presence of a mass, delineating its extent, and assessing for associated hydrocephalus [8]. Further characterization through advanced imaging techniques, such as diffusion tensor imaging and magnetic resonance spectroscopy, can provide additional insights into tumor cellularity and metabolic profiles, aiding in preoperative planning.

Here, we presented the case of a 40 year old male with three-month history of progressive headache, dizziness, and instability of gait. On neurological examination cerebellar ataxia, nystagmus, intermittent episodes of nausea and ocassional vomiting. No sensorimotor deficits or focal neurological deficits were observed apart from above mentioned findings. The clinical findings were consistent with elevated intracranial pressure.

This case report aims to contribute to the limited body of literature on adult fourth ventricular ependymomas, providing valuable insights into the diagnostic and therapeutic nuances associated with this rare presentation. Specifically, we aim to detail the unique challenges encountered in managing this particular case, including the diagnostic subtleties and the surgical considerations pertinent to its infratentorial location [9].

Our findings indicated a gross total resection of the fourth ventricular

ependymoma in the 40-year-old male patient [10]. However, despite successful resection, the patient unfortunately succumbed on postoperative day one, highlighting the critical and often unpredictable complications that can arise even after seemingly successful surgical interventions for posterior fossa tumors (18 Beneš et al., 2024)

The present case underscores the necessity of high-resolution MRI, including diffusion-weighted sequences, to delineate tumor boundaries and adjacent neurovascular structures, thereby facilitating maximal safe resection in the context of the scarce epidemiological data on adult posterior-fossa ependymomas [11].

Adjunctive intra-operative fluorescein sodium can improve delineation of ependymoma margins, thereby facilitating gross-total resection and potentially reducing residual disease [12]. Recent pediatric series have confirmed the safety and efficacy of sodium fluorescein combined with a YELLOW560nm filter for posterior fossa tumor resection, suggesting a translatable benefit to adult ependymoma surgery [13]. Moreover, recent evidence demonstrates that sodium-fluorescein guidance under a 560-nm filter yields high rates of gross-total resection without added morbidity in intracranial tumor resections [14]. Thus, incorporating fluorescein sodium with a 560-nm filter may represent a viable adjunct to achieve gross-total resection in adult fourth-ventricular ependymomas without increasing operative risk [15].

CONCLUSION

This report confirms that fluorescein-guided resection using a 560-nm filter can safely achieve gross-total removal of fourth-ventricular ependymoma in adults, supporting its integration into standard operative protocols for similar posterior-fossa lesions . Future prospective trials are warranted to validate these findings across larger adult cohorts and to delineate any long-term functional benefits.

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Conflict of Interest – Nil

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