



A CASE REPORT: POSTOPERATIVE EPIDURAL HEMATOMA AFTER MENINGIOMA RESECTION

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ABSTRACT

Postoperative Epidural Hematoma (PEDH) is a rare but potentially life-threatening complication following craniotomy for intracranial tumor resection, particularly in elderly patients. The incidence of postoperative epidural hematoma is estimated to be approximately 1-2% of intracranial surgeries, and its development is often attributed to rapid reductions in intracranial pressure, excessive cerebrospinal fluid drainage, or coagulation abnormalities. This report presents a 71-year-old female who developed PEDH following craniotomy for meningioma. The patient initially showed stable postoperative recovery but experienced sudden neurological deterioration, prompting an urgent CT scan that revealed an epidural hematoma. Immediate surgical intervention was performed to evacuate the hematoma, leading to gradual neurological improvement. This case highlights the importance of early detection, rapid intervention, and careful perioperative management to optimize outcomes in patients with PEDH.

KEYWORDS

Postoperative epidural hematoma, Meningioma, Patient, Tumor

INTRODUCTION

Meningiomas are among the most common primary cerebral tumors, particularly among older people. These slow-growing tumors frequently require surgical resection, although postoperative complications such as epidural hematomas can occur with profound implications (Ogasawara et al., 2021). Multiple causes have been linked to the formation of postoperative epidural hematoma, including fast decreases in ICP, excessive CSF drainage, and coagulation problems. The specific mechanism is unknown, but studies suggest that rapid changes in brain tissue and disruption of dural arteries play essential roles (Buerki et al., 2018). Reports indicate that PEDH can occur either at the surgical site or in remote areas, making vigilant postoperative monitoring crucial. This report details a case of postoperative epidural hematoma in a 71-year-old patient, emphasizing the need for early diagnosis and prompt surgical management.

MATERIALS AND METHODS

The research method used in this paper is a case report with a descriptive approach. The actions taken include anamnesis to assess the patient's main complaints of progressive headache, right-sided weakness, and cognitive decline, followed by physical and neurological examinations on admission. Supporting examinations in the form of non-contrast and contrast-enhanced CT scans of the head were performed to evaluate tumor characteristics, mass effect, and postoperative complications. The patient subsequently underwent surgical intervention through left parietal craniotomy and hematoma evacuation, with intraoperative and postoperative findings documented. The patient's clinical, radiological, and surgical data were then comprehensively reviewed and compared with the latest literature, the WHO classification of central nervous system tumors, and current guidelines on meningioma management to assess the compatibility of the case findings with existing scientific evidence and to determine the clinical implications for prognosis and postoperative outcomes.

RESULTS

A 71-year-old female was brought to the emergency department after being found confused and disoriented at home. According to her family, she had experienced frequent headaches, which had worsened over the past month, becoming more persistent and occasionally associated with nausea. Over the last few weeks, she had developed increasing difficulty with fine motor tasks, such as buttoning clothes, and reported a sensation of weakness and clumsiness in her right hand. Her family also noted that the right upper and lower extremities had become progressively weaker in the past three days. On the day of admission, she became increasingly confused and had difficulty responding to questions appropriately.

Upon arrival, her Glasgow Coma Scale (GCS) score was 11 (E4V3M4), indicating a moderately decreased level of consciousness. Her blood pressure was 154/80 mmHg, heart rate 86 bpm, respiratory rate 20 breaths per minute, and oxygen saturation 97% on room air. A neurological examination revealed right-sided hemiparesis and slurred speech. No external signs of head trauma or masses were observed on physical examination.

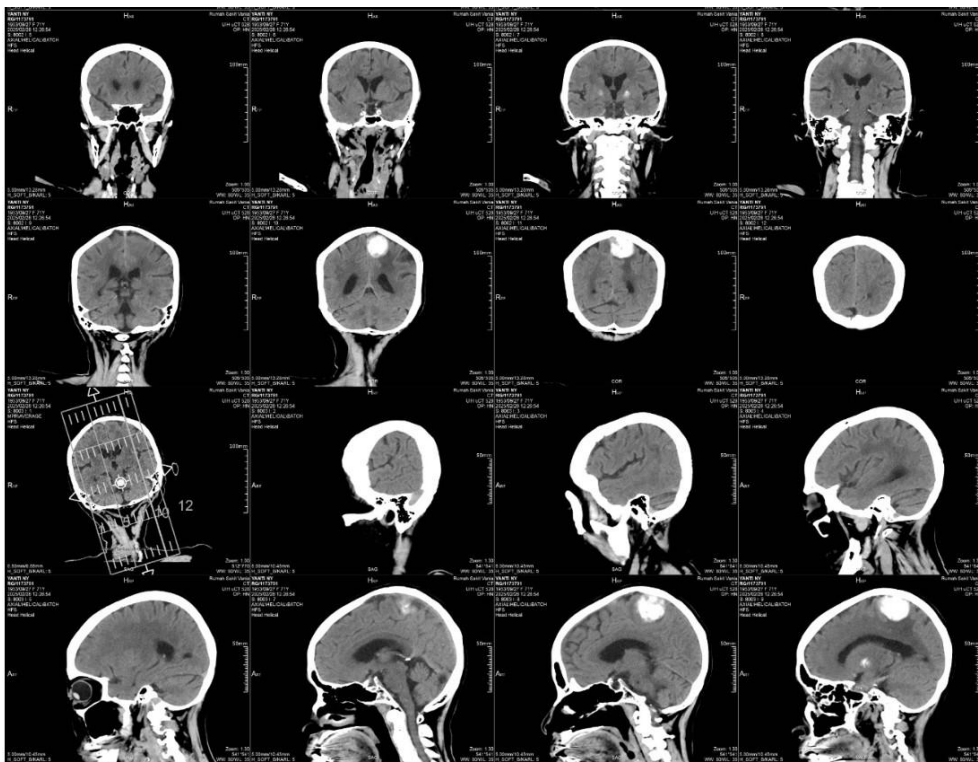


Figure 1. CT scan of the patient's head

A non-contrast computed tomography (CT) scan of the brain revealed a well-defined, extraaxial mass in the left parietal region, measuring approximately $3.55 \times 3.37 \times 3.05$ cm. The lesion demonstrated regular borders with intense contrast enhancement, consistent with meningioma. Significant perifocal edema was present, leading to mild compression of adjacent brain structures. A midline shift of 0.47 cm toward the right side was observed. These findings, along with the patient's symptoms of progressive right-sided sensory and motor deficits, were consistent with a diagnosis of a left parietal meningioma.

The patient underwent a left parietal craniotomy for tumor resection. Intraoperatively, a firm, well-demarcated, moderately vascularized mass was identified, adherent to the dura, but did not significantly infiltrate the adjacent brain parenchyma. The tumor was carefully dissected and successfully removed in a gross total resection.

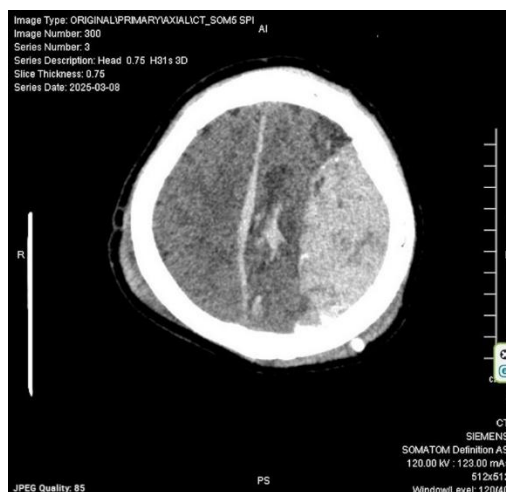


Figure 2. Head CT scan postoperative meningioma resection.

Approximately one day after surgery, the patient exhibited a sudden deterioration in neurological status, with a drop in GCS to 7 (E2V1M4). An urgent postoperative CT scan revealed a new epidural hematoma (EDH) at the craniotomy site, approximately 30 cc in volume, located in the left parietal region. The patient was immediately taken back to the operating room for hematoma evacuation. After clot removal and hemostasis, her condition stabilized, though she required prolonged intensive care monitoring due to the risk of recurrent hemorrhage and cerebral edema.

This case highlights the clinical challenges of diagnosing and managing meningiomas in elderly patients, particularly those in the parietal lobe, where symptoms may include fine motor deficits and spatial disorientation. Additionally, it underscores the importance of monitoring postoperative complications such as EDH, emphasizing the need for careful perioperative management and early intervention to optimize patient outcomes.

DISCUSSION

This case describes a 71-year-old female presenting with altered mental status, headache, and paralysis. Meningiomas are the most common primary intracranial tumors in adults, accounting for approximately 36,4% of all central nervous system (CNS) tumors and 54,5% of non-malignant brain tumors. These tumors originate from the meningotheial cells of the arachnoid layer and are typically slow-growing and well-circumscribed. Although most meningiomas are benign, approximately 10% exhibit malignant histological features and aggressive growth patterns (Ogasawara *et al.*, 2021; Alruwaili & De Jesus, 2025). Their growth can lead to compression of adjacent brain structures, resulting in neurological symptoms such as headaches, seizures, cognitive impairment, and focal deficits, which vary depending on the tumor's size and location (Durand *et al.*, 2009).

In this case, the meningioma was located in the left parietal lobe and is associated with spatial awareness, sensory integration, and fine motor coordination. The patient's symptoms of progressive right-sided weakness, difficulty with fine motor tasks, and slurred speech (dysarthria) align with the typical presentation of parietal lobe meningiomas affecting the dominant hemisphere (Modha & Gutin, 2005; Mittal *et al.*, 2017). The presence of headaches and cognitive decline over several months before admission highlights the insidious nature of meningiomas in elderly patients. These subtle, progressive symptoms can lead to delayed diagnosis, as they are often misattributed to age-related cognitive decline (Chung *et al.*, 2015). This underscores the importance of early neuroimaging in elderly patients presenting with neurological deterioration, as meningiomas remain a crucial differential diagnosis.

Meningiomas are extra-axial tumors arising from arachnoid cap cells, typically displaying well-circumscribed margins and intense contrast enhancement on imaging. In this case, CT imaging revealed a 3.55×3.37×3.05 cm extra-axial mass in the left parietal region with regular borders and intense contrast enhancement. Significant perifocal edema was noted, leading to mild compression of adjacent brain structures and a midline shift of 0.47 cm toward the right side. These radiological features align with established imaging characteristics of meningiomas, where substantial peritumoral edema suggests increased tumor-associated vascularity. Unlike malignant meningiomas, which often exhibit

irregular borders, heterogeneous enhancement, and invasive behavior, this case demonstrated imaging features more indicative of a benign lesion with mass effect primarily due to edema rather than direct brain invasion (Durand *et al.*, 2009).

Postoperative epidural hematoma (PEDH) is a rare but serious complication of craniotomy, occurring in approximately 1%–2% of cases (Bailo *et al.*, 2019). The development of PEDH is strongly linked to a rapid reduction in intracranial pressure (ICP) following tumor removal, leading to dural detachment and rupture of epidural vessels (Minghui *et al.*, 2024). This phenomenon is particularly relevant in the context of meningioma resection due to the significant mass effect these tumors often exert on the brain preoperatively (Bailo *et al.*, 2019). Additionally, elderly patients exhibit increased cerebral atrophy, reducing brain compliance and allowing for greater postoperative brain shift, which further predisposes them to hematoma formation (Chung *et al.*, 2015).

Other contributing factors to PEDH include excessive cerebrospinal fluid (CSF) drainage, preexisting hypertension, coagulopathy, and intraoperative hemodynamic fluctuation (Chung *et al.*, 2015). This patient, a 71-year-old female, was at an elevated risk due to age-related vascular fragility, which may have increased her susceptibility to hemorrhagic complications post-surgery. The clinical presentation of PEDH is characterized by altered consciousness, worsening headaches, and focal neurological deficits. In this case, the patient initially appeared stable postoperatively but exhibited rapid neurological deterioration within one day, emphasizing the need for vigilant postoperative monitoring in high-risk patients (Korrel & Fideler, 2025).

The pathophysiology of PEDH following meningioma resection primarily involves abrupt ICP changes leading to dural vessel rupture (Minghui *et al.*, 2024). Studies indicate that rapid CSF drainage and subsequent brain shift are pivotal in PEDH formation. Computed tomography (CT) remains the gold standard for diagnosis, allowing rapid assessment of hematoma size, location, and associated mass effect (Vilela & Wiesmann, 2020). In this case, immediate recognition of neurological deterioration prompted urgent imaging and surgical evacuation, likely contributing to the patient's favorable recovery (Chung *et al.*, 2015).

Postoperative management includes strict blood pressure regulation, careful fluid management, and neuroprotective strategies such as head elevation and osmotic therapy¹⁰. The prognosis of PEDH depends on several factors, including hematoma volume, the degree of midline shift, and the timing of intervention. Research indicates early surgical evacuation improves functional outcomes, whereas delayed intervention increases mortality (Shabana *et al.*, 2025). In elderly patients, rehabilitation plays a crucial role in long-term recovery, addressing cognitive and motor deficits that may persist postoperatively (Minghui *et al.*, 2024). In this case, the patient demonstrated a gradual neurological improvement following hematoma evacuation. However, given the high-risk nature of elderly meningioma patients, continued research is necessary to refine perioperative strategies (Chung *et al.*, 2015).

CONCLUSIONS

This case underscores the importance of careful perioperative planning and vigilant postoperative monitoring in elderly patients undergoing meningioma resection. The interplay of tumor-induced mass effect, rapid ICP shifts, and age-related vascular fragility necessitate a comprehensive approach to surgical and postoperative management. Early diagnosis, timely surgical intervention, and meticulous perioperative care remain key to optimizing patient outcomes. Future research should focus on improving surgical techniques, enhancing neuroprotective strategies, and developing minimally invasive interventions to mitigate the risk of PEDH in elderly neurosurgical patients.

Acknowledgement

The authors declare no funding support from external sources. Moreover, the authors would like to thank the Dean of Faculty of Medicine, Universitas Pembangunan Nasional Veteran Jakarta, for supporting this research.

Funding Source

This study was fully financed by the researchers themselves, with no external funding or sponsorship involved. All expenses related to carrying out the research and preparing the manuscript

were covered independently by the researchers, including costs for data collection, analysis, and report writing. Consequently, no outside parties had any influence on the research process. are requested to identify who provided financial support for the conduct of the research and/or preparation of the article and to briefly describe the role of the sponsor(s) in the whole research process.

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