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Case Report

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Accidental EVD Fall in Carcinomatous Hydrocephalus Resulting in IVH: A Case Report

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ABSTRACT

EVD placement is a very common neurosurgical procedure that reduces ICP in emergency situations with minimal surgical time. Correct placement of this drain, along with proper management, is of great importance. Any issue in placement or management of drain can lead to severe consequences. Intraventricular hemorrhage is one of a rare consequence caused by EVD fall. In this case report, we present case of accidental fall of Extra Ventricular Drain that resulted in IVH in 54-year-old female with diagnosis of carcinomatous hydrocephalus.

Furthermore, emphasizes the need for heightened vigilance and tailored protocols for EVD care in geriatric patients in malignant hydrocephalus. Careful monitoring and meticulous management of CSF pressure are paramount to prevent fatal outcomes in this high-risk.

Keywords:

Intraventricular Hemorrhage (IVH), Geriatric population, Malignant hydrocephalus, EVD fall, Magnetic Resonance Imaging (MRI).

Introduction

External Ventricular Drains (EVDs) are widely used in neurosurgery to manage elevated intracranial pressure from conditions such as subarachnoid hemorrhage, traumatic brain injury, tumors, or acute hydrocephalus. Despite their critical role, EVD use carries risks like infections and hemorrhagic complications. It is suggested that hemorrhage after EVD placement is likely a more common event than previously reported , in part because of the presumption that small hematomas are often overlooked or undetected, reported at rates up to 18-41% in some studies [1,2].

The true incidence remains poorly quantified, but existing studies highlight rates of EVD-related hemorrhage. In retrospective cohort study conducted in 2009 suggested that new hemorrhage was observed on imaging studies in 41.% of the 188 patients with EVDs after either placement or removal. In 51.9% of these patients, the hemorrhages were insignificant (punctate intraparenchymal, trace SAHs). 32.5% of these hemorrhages were only seen on post-procedural (after catheter removal) images. 19.7% of all EVDs were associated with larger hemorrhages, none of which occurred with removal. Only 1 lesion (an SDH) required surgical intervention [3].

Risk factors identified include co-morbs (HTN), deranged hematological parameters (reduced platelet levels), larger gauge catheters and multiple attempts at EVD placement [4,5].

This case report aims to highlight such an event, detailing the clinical presentation, diagnostic findings, and management strategies employed for an elderly patient who experienced EVD dislodgement leading to an intraventricular hemorrhage .This report further emphasizes the need for heightened vigilance and tailored protocols for EVD care in geriatric patients, who may exhibit atypical responses to such neurosurgical interventions.

Case Presentation

A 54-year-old female with a past medical history significant for treated carcinoma of the breast diagnosed in 2019 was admitted under oncology services. She presented with headache and an altered level of consciousness for two days prior to admission. On initial examination, her Glasgow Coma Scale (GCS) score was E3V3M6, and her pupils were 2 mm bilaterally and reactive. MRI brain with and without contrast was done to see any possible brain metastasis. However, the scan showed hydrocephalus with no brain metastatic deposits Figure 1. Hydrocephalus was taken as a reason for her altered conscious level hence an urgent EVD was performed. Eventually, the patient's GCS improved to E3V4M6. She was planned for the Ventroperitoneal shunt placement, and underwent the procedure. Her CSF cytology was done which showed malignant cells.

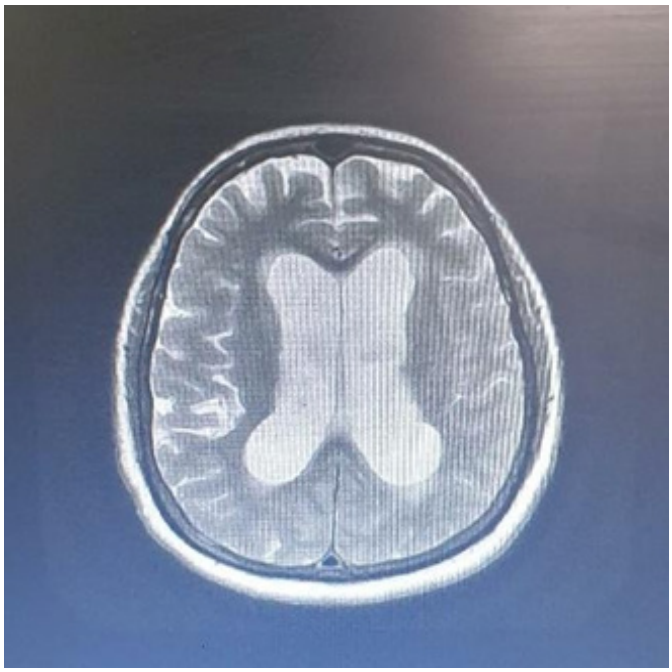

Figure 1: MRI brain screening showed dilated ventricles.

The patient's GCS dropped again to E3V3M5 and an urgent CT was done, showing recurrence of hydrocephalus with ballooning of third ventricle, Figure 2 however the shunt refill was normal. Thus, another External Ventricular Drain (EVD) was placed. After drain placement her GCS was then E3 V3 M6. GCS improved transiently on draining CSF.

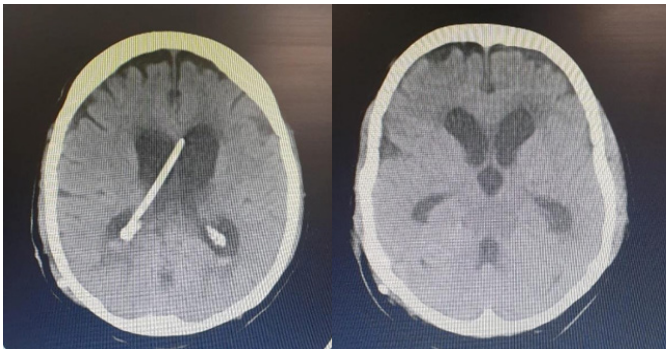

Figure 2: CT shows dilatation of ventricles with ballooning of 3rd ventricle.

Unfortunately, 3 days later, the patient had an incident involving a fall of EVD which caused rapid drainage of approximately 100 ml of CSF that resulted in an immediate decline in GCS to E2 V1 M1. She was intubated and transferred to the ICU, after stabilizing the patient CT brain was performed that showed intraventricular hemorrhage Figure 3 despite aggressive management with multiple neurosurgical procedures including EVD placements, VP shunt insertion, and revisions, the patient continued to decline neurologically. CT repeated again after 2 days showed IVH with ischemic changes to brain Figure 4. Ultimately, she suffered a sudden cardiopulmonary collapse and passed away despite resuscitation efforts.

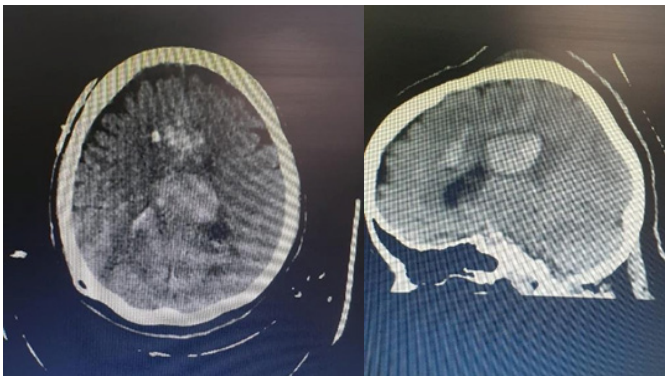

Figure 3: CT brain plain showed intraventricular hemorrhage.

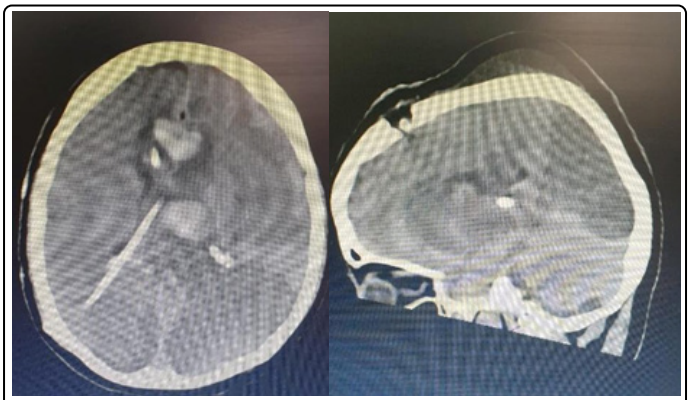

Figure 4: CT shows intraventricular bleed with ischemic changes in brain.

Discussion

Intraventricular hemorrhage following accidental EVD fall can arise from direct mechanical injury to the ependymal lining or ventricular vessels, as well as abrupt CSF volume shifts that cause shear forces and Intracranial Pressure (ICP) fluctuations. Rapid CSF loss, sometimes exceeding 50-100 ml within minutes, can destabilize fragile intraventricular vasculature, precipitating hemorrhage and acute hydrocephalus [6]. The neurological deterioration observed in such cases underscores the vulnerability of neurocritical patients to these mechanical insults [2,5,7].

This is compounded by rapid drainage of a large CSF volume, which can cause sudden changes in intracranial pressure dynamics, promoting vessel rupture and hemorrhage within the ventricles [8]. The resultant IVH can exacerbate hydrocephalus, induce cerebral ischemia as seen in this patient, and cause drastic worsening of neurological status. The patients underlying malignancy with malignant cells in her CSF could contribute to fragile vascular integrity and impaired healing, amplifying susceptibility to hemorrhagic complications [9,10]. Although no overt brain metastases were evident on MRI, carcinomatous meningitis often leads to CSF flow obstruction and increased risk of neurological sequelae. The management of hemorrhagic complications following EVD dislodgement is challenging. While minor hemorrhages may be clinically silent or stable, significant IVH can exacerbate brain injury, require prolonged intensive care, and increase mortality [2,11]. Neurosurgical approaches such as bilateral EVD placement to facilitate clot clearance or intraventricular fibrinolytic therapy have shown promise for IVH management but are complicated by the mechanical insult and instability caused by dislodgement events [12-14]. The described case, with progressive neurological deterioration despite multiple interventions, exemplifies the grave prognosis often associated with these complications.

Conclusion

Accidental EVD fall leading to IVH, though relatively uncommon compared to other EVD-related hemorrhages, represents a neurosurgical emergency with high morbidity. Heightened vigilance, standardized fixation and handling protocols, and prompt imaging following mechanical disturbances are crucial to improving patient safety and clinical outcomes.

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Conflict of Interest

The authors declared no potential competing interest with respect to the research, authorship and/or publication of this article.

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