



Case Report

Successful conservative management of a large acute epidural hematoma in a patient with arrested hydrocephalus: A case report

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ABSTRACT

Background: Arrested hydrocephalus is a condition wherein congenital hydrocephalus spontaneously ceases to progress due to a balance between production and absorption of cerebrospinal fluid. These patients rarely present with pressure symptoms so conservative treatment may be instituted. There are, however, little data on the long-term outcomes of these patients and how they present in the presence of other intracranial pathologies as they transition into adulthood. We aim to add to the growing knowledge about the management of patients with arrested hydrocephalus who have sustained traumatic hematomas.

Case Description: To the best of our knowledge, we present the only reported case of a 34-year-old female with arrested hydrocephalus who sustained an acute epidural hematoma secondary to a fall and underwent a conservative management. She was asymptomatic except for mild headache that started on the 3rd day postinjury and was thus treated conservatively with favorable outcomes. A review of literature showed that adults with arrested hydrocephalus may develop intracranial hematomas after head injuries despite them manifesting with little or no symptoms. The hydrocephalus may have provided them with a form of internal decompression thus delaying symptomatology.

Conclusion: Clinicians should be vigilant as these patients will present with either delayed or completely without neurologic symptomology. Tailored and individualized management of other intracranial pathologies should be adapted in this subset of patients.

Keywords: Acute epidural hematoma, Arrested hydrocephalus, Traumatic brain injury, Untreated congenital hydrocephalus

INTRODUCTION

Hydrocephalus is a complex neurologic disorder characterized by an increased amount of cerebrospinal fluid (CSF), enlargement of the cerebral ventricles, and raised intracranial pressure.^[7] In children, a balance between CSF production and absorption may be achieved after an initial active phase of ventricular dilatation, and in rare cases, hydrocephalus may spontaneously cease to progress. This condition is called arrested hydrocephalus.^[7] It is frequently viewed as a stable condition as patients rarely present with symptoms of raised intracranial pressure.^[6] No surgery may be necessary and a conservative approach may be adapted.^[7-9]

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There are little data on the long-term outcomes of patients with arrested hydrocephalus.^[7] Even less data exist on how these patients manifest in the presence of other lesions such as a traumatic hematoma. This issue becomes significant as the child with arrested hydrocephalus survives and grows into adulthood, with the potential to encounter other intracranial pathologies.

Here, we present a unique case of an adult woman with arrested hydrocephalus who had a large acute epidural hematoma from a blunt head injury that was managed conservatively and had a good outcome.

CASE DESCRIPTION

A 34-year-old female was admitted for traumatic brain injury. She slipped on the bathroom floor and fell, resulting in loss of consciousness. She regained consciousness after a few minutes but did not seek consult. She was initially well but started to complain of intermittent right-sided headache 3 days postinjury, prompting consult at a general clinic. Cranial CT scan showed a large acute epidural hematoma on the right temporal area, measuring 41 cc in volume and resulting in a midline shift of 0.4 cm. The lateral and third ventricles were enlarged but did not exhibit transependymal effusion, and the cerebral sulci were effaced. There was also a linear and nondisplaced right temporal bone fracture [Figures 1a-d]. She was advised to seek neurosurgical consult

at the emergency room but did not comply until the 5th day postinjury.

Her medical history was significant for a diagnosis of congenital hydrocephalus from aqueductal stenosis, but she did not undergo surgery. She was also an epileptic maintained on phenobarbital, with the last seizure episode occurring about 15 years ago. She had a recent history of mild COVID-19 infection 5 months prior. Despite having hydrocephalus, she did not exhibit developmental delays as a child and underwent schooling at the proper age. She finished high school at the top of her class, earned a bachelor's degree at age 20, and is currently pursuing a master's degree while employed full time.

On examination, the patient had a Glasgow Coma Scale (GCS) of 15 with equal and briskly reactive pupils. She was slightly macrocephalic, and her head circumference of 59 cm was in the upper 97th percentile when plotted against her height.^[2] Her visual acuity was 20/25 bilaterally, and fundoscopic examination did not show papilledema. She did not have any craniopathies or sensory or motor deficits. A repeat cranial CT scan [Figure 1e] performed on the 5th day postinjury showed stable size of the hematoma. She still had mild headache, but it was markedly decreased in severity compared to 2 days prior.

Because the patient was asymptomatic except for mild headache and was already on the 5th postinjury day, it was

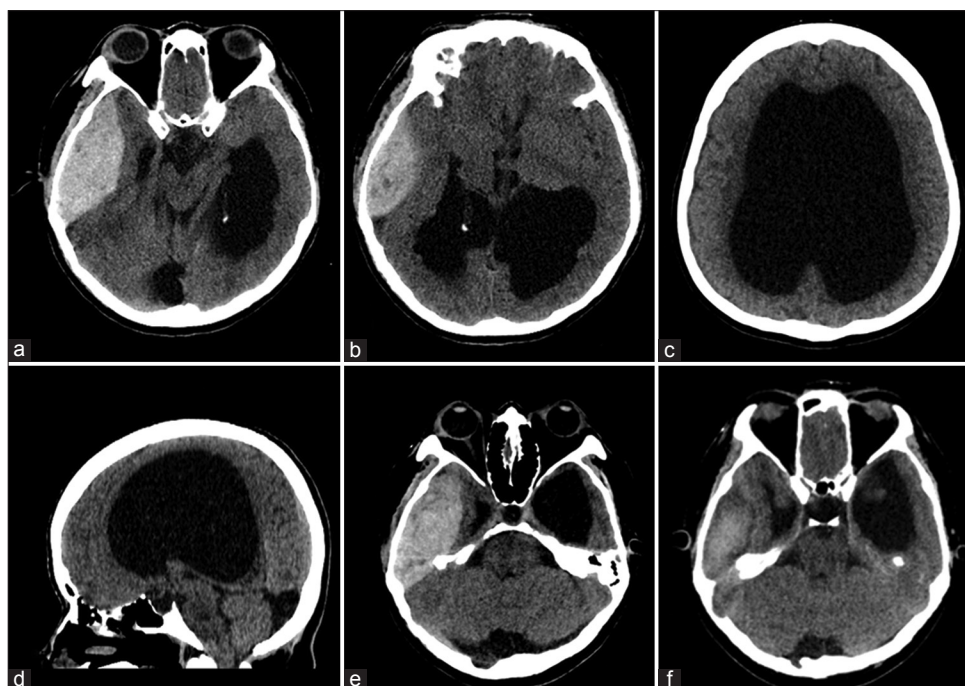


Figure 1: Axial (a-c) and sagittal (d) day 3 postinjury plain cranial CT scan showed a right temporal acute epidural hematoma measuring $8.5 \times 3.1 \times 3.1$ cm (41 cc), obstructive hydrocephalus without transependymal effusion and with an Evan's Index of 0.5, absent septum pellucidum, tectal beaking, and a small posterior fossa cyst; day 5 postinjury cranial CT scan (e) showed no progression of the hematoma; and 3-week postinjury cranial CT scan (f) showed the resolving hematoma.

decided to treat the patient conservatively with analgesics and close clinical monitoring at the neurosurgical ward. The patient's headache resolved and she did not develop any deficits; thus, she was sent home on the 8th day postinjury.

A repeat cranial CT scan [Figure 1f] was performed 3-week postinjury, which showed a decrease in the size and attenuation of the epidural hematoma. A transcranial Doppler study revealed that the pulsatility indices of all the intracranial arteries were within normal limits and did not show signs of increased intracranial pressure.

The patient's latest follow-up was at 10-month postinjury. She continued to be well and asymptomatic and did not have any new complaints.

DISCUSSION

This is a report of a patient with arrested hydrocephalus who was found to have a large acute epidural hematoma after sustaining a blunt head injury after a fall. Despite the large size of the hematoma, which would usually cause symptoms and require surgical evacuation,^[1] the patient did not have any neurologic deficits and only had a mild headache. Due to the patient's mild symptoms and good neurologic status, as well as the fact that she was already on her 5th day postinjury, she only underwent conservative management, with favorable results.

A few case reports of patients with arrested hydrocephalus and traumatic intracranial hematomas have been reported in the literature. They included a 34-year-old male who became symptomatic from a 700 cc subdural hematoma 10 weeks after a fall;^[13] a 25-year-old male with a 200 cc right subdural hematoma and a 175 cc left epidural hematoma who deteriorated clinically 5 days after a fall;^[13] a 36-year-old male who became symptomatic from a 200 cc epidural hematoma 4 days after a head injury;^[11] and a 39-year-old female who became symptomatic from a large subdural hematoma occupying the entire left cerebral hemisphere after 6 weeks of repeated falls.^[10] Unlike our patient, however, these four patients underwent surgical evacuation of hematoma due to signs of increased intracranial pressure.^[10,11,13]

Neurologic symptomatology or deterioration usually occurs within the first 24 h of injury.^[4] The incidence of delayed neurologic symptomatology that is not initially present on admission is reported to occur in only 1–4% of all patients with mild head injury.^[3,4] Furthermore, in the absence of certain criteria (vomiting, confusion, restlessness, severe headache, and focal temporal blow), only 0.6% of patients who were initially GCS 15 will require any neurosurgical intervention.^[5] However, our patient and the others cited above^[10,11,13] showed that these patients with arrested hydrocephalus who sustained a head injury presented with neurologic symptoms well after the 24 h period, ranging from 3 days to 10 weeks after the injury. It has been postulated that

in patients with longstanding hydrocephalus, a decrease in brain elastance augmented with the thin cortical parenchyma would allow traumatic hematomas to grow to a large size before becoming symptomatic.^[10] The large ventricles could also have collapsed to permit the nearly symptomless accumulation of the thick hematomas.^[13]

If the postulated mechanism was true, patients with arrested hydrocephalus should be aware of the possibility of developing clinically asymptomatic hematomas if they sustain traumatic brain injuries. As such, the Canadian Head CT Rule, which guides clinicians in the emergency department on the indications for ordering cranial imaging after minor head trauma,^[12] may not hold true for patients with arrested hydrocephalus. According to this rule, cranial CT is only required for patients with a witnessed loss of consciousness, definite amnesia, GCS score below 15 at 2 h postinjury, suspected open, depressed, or basal skull fracture, vomiting, age above 65 years old, or a dangerous mechanism of injury.^[12] These criteria may not be applicable for patients with arrested hydrocephalus as they seem to develop delayed symptomatology compared to the general population. Clinicians should thus be vigilant and have a lower threshold for requesting cranial imaging in these cases, even if the patient presents with a benign clinical course and lack of neurologic “red flags” during the acute phase of injury, because they might already be developing large hematomas that may warrant surgical intervention.

In fact, the authors still believe that surgical evacuation is still the gold standard for large traumatic hematomas even in the present of arrested hydrocephalus. It should be emphasized that a conservative management was indeed illustrated by the above case, but larger retrospective or prospective studies are required to fully recommend the similar management.

This case report adds to the growing knowledge about the management of traumatic hematomas in patients with arrested hydrocephalus. Tailored and individualized management of other intracranial pathologies should be adapted in this subset of patients.

CONCLUSION

Clinicians should be vigilant as patients with arrested hydrocephalus may present with either delayed or completely without neurologic symptomatology. The patient's hydrocephalus may have provided them with a form of internal decompression. Individualized management of other intracranial pathologies should be adapted in patients with arrested hydrocephalus.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

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