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Case Report

Bilateral posterior fossa chronic subdural hematoma as a cause of hydrocephalus

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ABSTRACT

Background: Infratentorial chronic subdural hematoma (cSDH) is still a rather elusive neurosurgical entity, which, due to its proximity and likely compression of the cerebellum and brainstem, can lead to devastating consequences. To establish standardized treatment, more studies and reports regarding its therapy are needed. We report a case of a simultaneous unilateral supratentorial and bilateral infratentorial cSDH, with the latter causing hydrocephalus and successfully treated with a bilateral burr-hole trepanation of occipital bone and placement of subdural drains.

Case Description: A 71-year-old man with gait disturbance, Glasgow Coma Scale 12, and a radiologically verified unilateral supratentorial and bilateral cSDH of the posterior fossa causing cerebellum, brainstem, and fourth ventricle compression with obstructive hydrocephalus, underwent surgical evacuation of infratentorial hematoma with a bilateral burr-hole trepanation. The postoperative course was uneventful, with a control head computed tomography scan showing the resolution of the hematoma and hydrocephalus. The patient was discharged with no newly acquired neurological deficits.

Conclusion: Due to a limited number of reports and studies involving infratentorial cSDHs causing hydrocephalus, decision-making and optimal surgical treatment remain unclear. We recommend a timely surgical evacuation of the hematoma if the patient is symptomatic while avoiding placement of external ventricular drainage.

Keywords: Burr-hole trepanation, Chronic subdural hematoma, Hydrocephalus, Infratentorial, Posterior fossa

INTRODUCTION

Chronic subdural hematoma (cSDH) is a liquefied hematoma inside the dural border cell layer. Although its incidence is around 5/100,000 individuals per year, it will likely rise due to the aging population and increased use of anticoagulants.[3,7] On the other hand, infratentorial cSDH is an unusual and rare neurosurgical entity that arises either due to bridging veins injury, blood extension from a cerebellar contusion into the subdural space, or spontaneously in patients under anticoagulant and/or antiplatelet therapy.[1,2,4-6,8] It can also be a result of an acute subdural hematoma (aSDH) transformation, although patients with aSDH usually present with symptoms that progress rapidly, even to death. Other articles

report infratentorial cSDHs occurring after an aneurysm or arteriovenous malformation rupture in the posterior fossa.[6] Due to its rarity, patients with posterior fossa cSDH do not have a unanimous, agreed-on treatment algorithm such as those with aSDH, epidural hematoma, or traumatic intracerebral hemorrhage. Herein, we present a case of a simultaneous unilateral supratentorial and bilateral posterior fossa cSDH causing obstructive hydrocephalus. We assumed that after bilateral burr-hole trepanation and cSDH evacuation, there would be no need to address the hydrocephalus separately.

CASE DESCRIPTION

A 71-year-old man under anticoagulation therapy for atrial fibrillation presented with complaints of malaise and headache, which were getting worse over the past seven days (August 2020). He reported no head trauma, and his neuro examination was inconspicuous except for a residual mild, right-sided hemiparesis from a previous, conservatively managed aSDH. Coagulation studies confirmed improper intake of anticoagulants with an international normalized ratio (INR) amounting to 10.6. Head computed tomography (CT) scan revealed a mostly lamellar aSDH over the left hemisphere without any compression on the brain parenchyma [Figure 1]. Bilateral aSDH was verified infratentorially, with some compressive effect on the cerebellum and the fourth ventricle, but without any signs of hydrocephalus. The patient was managed conservatively, with regular neuro checks and control CT scans, and was discharged home with the recommendation of routine follow-up. Two weeks after his discharge (September 2020), he returned due to gait disturbance ataxia, with Glasgow Coma Scale (GCS) 12. A new head CT scan [Figure 2] verified the conversion of aSDH to cSDH, with partial regression of the supratentorial part. At the same time, the infratentorial subdural hematoma increased its width, causing a significant mass effect on the fourth ventricle, cerebellum, and brainstem while simultaneously leading to the development of obstructive hydrocephalus.

The patient was operated on [Figure 3] under general anesthesia, in a supine position with the head turned to the left side. Two burr holes were placed on the occipital bone, the hematoma was evacuated, copious irrigation was done with saline solution, and two subdural drains were placed in their respective burr holes. A control head CT scan done the day after the procedure confirmed a satisfactory position of subdural drains with a regressive dynamic of posterior fossa cSDH and hydrocephalus [Figure 4].

The patient was mobilized the 2nd day after the procedure. Subdural drains were removed three days after the operation,

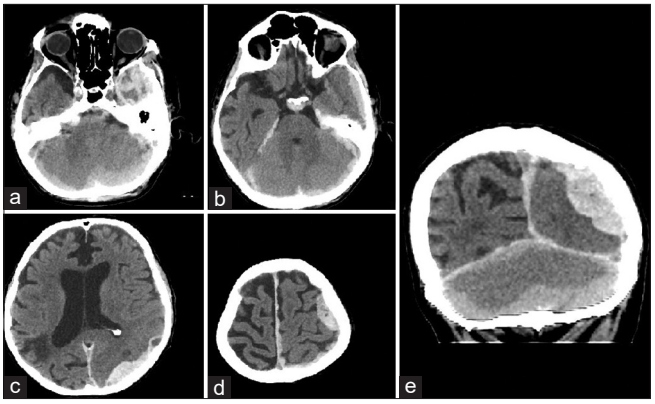

Figure 1: Non-contrast head computed tomography scan, axial slices: (a) infratentorial bilateral acute subdural hematoma (SDH) with SDH and possibly some subarachnoid hemorrhage left temporally, (b) infratentorial SDH with similar density as temporal part of supratentorial SDH, (c) parietooccipital part of SDH, (d) frontal part of SDH, and (e) non-contrast head computed tomography scan, coronal slice, different densities of intratentorial, and supratentorial SDH can be appreciated.

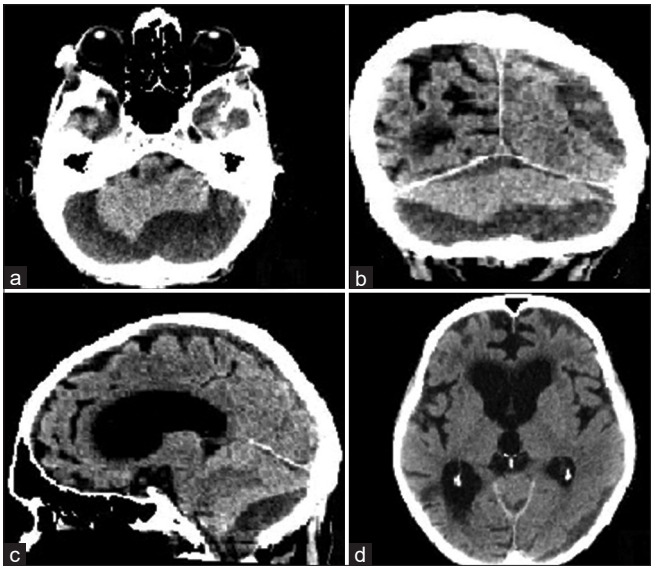

Figure 2: Non-contrast head computed tomography (CT) scan: (a) axial slice, bilateral chronic subdural hematoma (cSDH) in posterior fossa compressing cerebellum, fourth ventricle and brainstem, (b) coronal slice showing supratentorial and infratentorial cSDH, (c) sagittal slice CT scan showing infratentorial cSDH compressing cerebellum and brainstem, and (d) axial slice, ballooning of frontal horns of the lateral ventricles with transependymal effusion and rounding of the third ventricle.

and a control CT scan showed no signs of new bleeding [Figure 5]. After three more days, peroral anticoagulant therapy was reinstated. The patient was discharged with no newly acquired neurological deficits, and on his regular

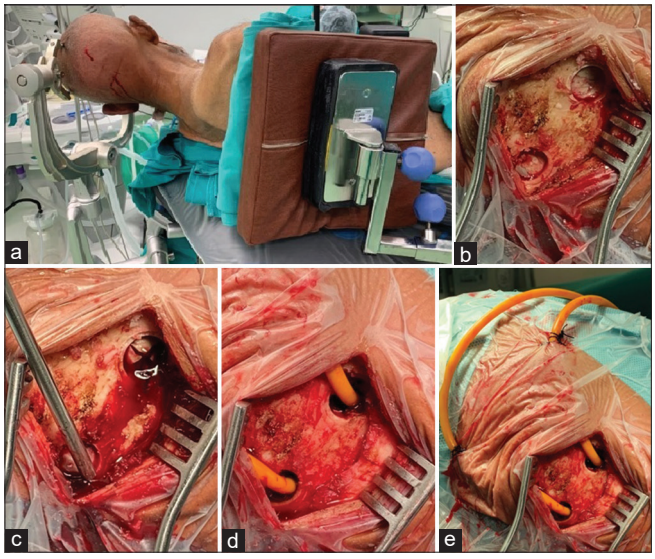

Figure 3: Neurosurgical procedure. (a) Patient positioned supine with head turned left, incision mark over the superior nuchal line, (b) two large burr-hole trepanations made each on its respective side, (c) cross-shaped dural incision with hematoma evacuation, (d) placement of subdural drains in their respective sides, and (e) subcutaneously tunneled subdural drains (at least 5 cm from the burr holes).

follow-up, a week after, a new control CT scan showed stationary intracranial status. He did not attend further recommended controls.

DISCUSSION

Infratentorial cSDHs are a very rare and unusual entity, especially those developing without a history of trauma.[1,2,4-6,8] The reported low incidence of infratentorial cSDH is probably due to a scarce number of bridging veins in the posterior fossa.[4,6,8] Patients with infratentorial cSDH usually present with cranial nerve deficits, headaches, vomiting, and cerebellar symptoms, but symptoms of obstructive hydrocephalus can also complicate its course.[1,8] Inoue *et al.* have concluded that around 64% of the reported posterior fossa cSDHs have no history of head trauma, while 71% have coagulopathies due to antiplatelet or anticoagulation therapy. Furthermore, 53% of all posterior fossa cSDHs occur bilaterally.[1] The characteristics above are identical to our case, where there was no history of head trauma, the patient was under anticoagulant therapy, and a bilateral posterior fossa cSDH was confirmed on the head CT scan. Our patient originally presented with a hyperdense hematoma of the posterior fossa, which is in accordance with an aSDH. Still, as he had practically no symptoms except for progressive headaches and malaise, it is more plausible that he initially had a cSDH with superimposed acute bleeding, which can be seen in cases of recurrent bleeding from the outer membrane of cSDH.

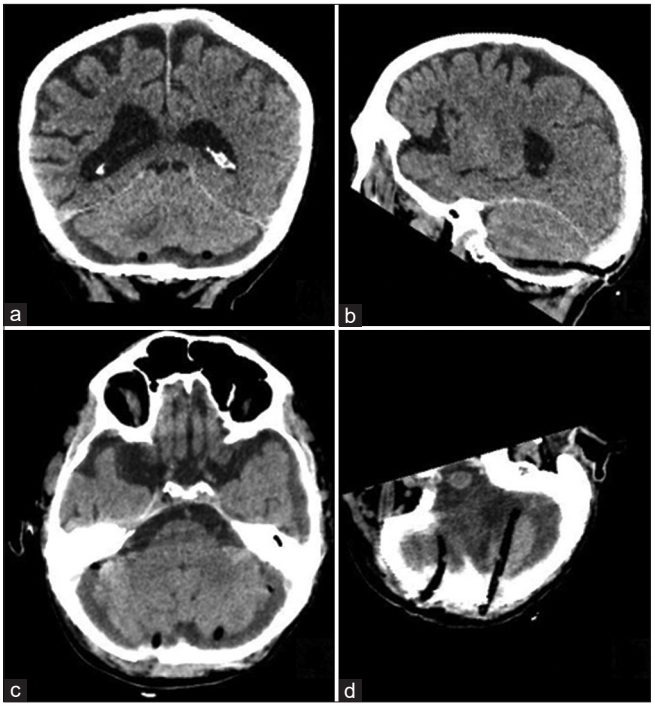

Figure 4: Non-contrast head computed tomography scan. (a) Coronal slice showing the position of subdural drains underneath the cerebellum bilaterally, (b) sagittal slice confirming the position of subdural drain underneath the cerebellum, (c) axial slice at the level of the fourth ventricle showing the initial phase of its reexpansion, subdural drains are placed bilaterally, posterior to the cerebellum, and (d) partial reconstruction of the posterior fossa showing the placement of subdural drains.

Due to its rarity and a limited number of reports, an optimal treatment plan is not yet unanimously elucidated. While symptomatic infratentorial cSDHs are surgically managed either with burr-hole craniostomy/trepanation, small craniectomy, or lateral suboccipital craniotomy, cases of infratentorial cSDH presenting with hydrocephalus remain controversial with ventricular drainage being placed in a minority of reported patients.[4] Our patient also presented with hydrocephalus, but we opted not to place external ventricular drainage as he was GCS 12, and the CT scan showed still patent cerebral sulci. Furthermore, external ventricular drainage always carries a certain risk in patients with posterior fossa mass lesions as it can promote upward transtentorial herniation. We assumed that in this scenario, the evacuation of cSDH would relieve the compression exerted on the brainstem, cerebellum, and fourth ventricle, consequently leading to the resolution of hydrocephalus. On the other hand, if the patient presents with GCS 8 or lower, we somewhat agree with the idea of placing external ventricular drainage. Our assessment was sound as the patient improved immediately after the procedure; he was extubated and, two days after, ambulatory on his own. The control head CT scan

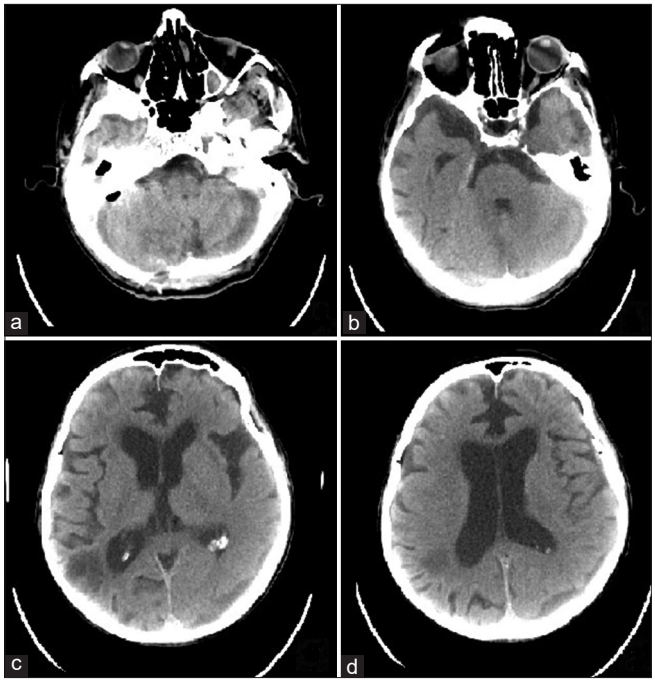

Figure 5: Non-contrast head computed tomography scan, axial slices: (a) regression of chronic subdural hematoma of the posterior fossa with a visible burr hole on the right occipital bone, (b) re-expanded fourth ventricle, and (c and d) regression of hydrocephalus.

revealed a satisfactory finding and subdural drains were removed three days after the procedure.

Having no dedicated specialists for neuroendovascular interventions in our hospital, middle meningeal artery (MMA) embolization as a stand-alone or adjunctive treatment, was not regarded as a treatment option, and surgical evacuation was performed. We opted for bilateral burr-hole trepanation/craniostomy of the occipital bone with hematoma evacuation, plenteous irrigation of the subdural space with saline solution, and placement of two separate subdural drains. However, some authors encourage the use of a single unilateral burr-hole trepanation. Inoue *et al*. performed a single (unilateral) burr-hole trepanation in a bilateral cSDH with niveau levels being different on each side.[1] We decided in favor of bilateral burr-hole trepanation as the hematoma was quite pronounced on both sides. Intraoperatively, both sides of cSDH were incised, and the liquid was under much pressure. There was no obvious connection between the two sides. Nevertheless, we concur that if the hematoma has a connection between both sides, a single (unilateral) burr-hole trepanation could suffice.

CONCLUSION

With the infratentorial cSDHs being extremely rare, standardized treatment protocols are still lacking for this neurosurgical entity. The mainstay of treatment should be a unilateral or bilateral burr-hole craniostomy. At the same time, possible accompanying hydrocephalus should be addressed with external ventricular drainage only in case of GCS 8 or lower. As case reports are limited and lack the possibility of generalizing, more studies are needed to generate the best possible management strategy for these patients.

Ethical approval

Not applicable.

Declaration of patient consent

Patient's consent not required as patient's identity is not disclosed or compromised.

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Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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