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CASE REPORT - PITUITARIES

Diabetes insipidus—an extremely rare complication from replacement of an external ventricular drain

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Abstract

Insertion of an external ventricular drain (EVD) is one of the most common and most important lifesaving procedures encountered in the neurologic intensive care unit, but often done by the junior members of the team. A good number of complications may follow the insertion of EVD. In the available literature, only one case was reported with the placement of EVD in suprasellar cistern. There is no report of insertion or replacement of an EVD in the sella. Diabetes insipidus (DI) is also an unheard of complication of EVD. Here, we report a case where a patient with subarachnoid haemorrhage (SAH) with acute hydrocephalus needed CSF diversion and had an EVD, during replacement of which through the same tract, the new EVD went into the sellar floor and she developed diabetes insipidus (DI) eventually. The catheter was pulled out and the DI settled. DI may occur as a consequence of SAH. The rationale behind reporting this case is to differentiate the cause of DI; as following insertion of EVD in a patient of SAH, the development of DI should raise the suspicion of misplaced EVD, should not be left as a consequence of SAH and appropriate imaging should be obtained. To prevent this happening, preoperative verification of CT, image-guided insertion, measurement of the length of the tubing and careful anchorage of EVD to surrounding tissue are necessary.

Keywords Diabetes insipidus · External ventricular drain

Introduction

Insertion of an external ventricular drain (EVD) is one of the most common and most important lifesaving procedures encountered in the neurosurgical intensive care unit. Various types of acquired brain injury, which may disrupt the flow of cerebrospinal fluid (CSF), such as intracranial haemorrhage with intraventricular extension, subarachnoid haemorrhage, traumatic brain injury and bacterial meningitis, may benefit from EVD insertion [2]. Insertion of EVD is a core neurosurgical procedure that is commonly taught to and performed by junior trainees [14].

Indeed, it is an essential part of the UK [6] and US [1] neurosurgical training curricula. Nevertheless, complications are not uncommon. Here, we present a case of diabetes insipidus, which was not found in the literature as a complication of replacement of an external ventricular drain so far.

Case report

A 56-year-old lady presented acutely with a WFNS grade 1 SAH due to rupture of the anterior communicating artery aneurysm, which was coiled the next day of the ictus. She was found to have left-sided weakness on the fourth day of the coiling. CT scan was done and that showed hydrocephalus and a right parietal infarct presumed to be from vasospasm. To manage the acute hydrocephalus, a right frontal EVD was inserted.

After 2 weeks, the output from the EVD remained significant. CSF was sampled and high cell count was noted. To reduce the risk of infection, a plan was made to replace the EVD, which was carried out in the afternoon. Peroperatively, the drain was inserted as a soft pass along the previous tract in the right frontal region. The operation was uneventful and the patient returned to observation bay. About 6 h later, the nurse noticed that she passed a significant amount of urine for 3

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consecutive hours. Glasgow Coma Scale (GCS) remained unchanged.

An urgent CT scan of head was requested and the blood was sent for checking urea and electrolytes. CT head showed tip of the ventricular catheter was on the sellar region (see Figs. 1 and 2). It was then pulled out about 3 cm (see Fig. 3). The urine output dramatically dropped down to 100 ml in the next hour and reduced further. Her serum sodium level went up and hit 160 mmol/L at one point. Her urine specific gravity remained within normal range. To treat the high urine output, she needed one microgram of subcutaneous desmopressin. She did not need any long-term treatment and did not need any further complication from this event.

Discussion

The complications of EVD placement are well established, including dislocation, infection and haemorrhages [8]. Most studies emphasised the infection and haemorrhage, as known as the two most common complications of EVD placement [3]. Only few studies discussed the accuracy of EVD placement.

The frontal horn anterior to the foramen of Monro is ideal target for ventricular catheter placement because there is no choroid plexus anterior to the foramen of Monro [9]. When the ipsilateral frontal horn or third ventricle is considered as the final location of the catheter, the inaccuracy ranged from 20 to 36% in the published literatures [7]. Of the 212 catheters analysed, Saladino et al. reported 12.3% was considered misplaced [12]. The most misplaced catheter was intraparenchymal, where the contralateral or ipsilateral basal ganglia were the most common misplaced location [13].

To reduce the incidence of misplaced EVD, in our centre, we use Brainlab or Stealth guidance or ultrasound guidance. In this case, the long-standing EVD tract was used and image guidance was not. But the length was not properly looked at during final anchoring and transferring the patient to the ward.

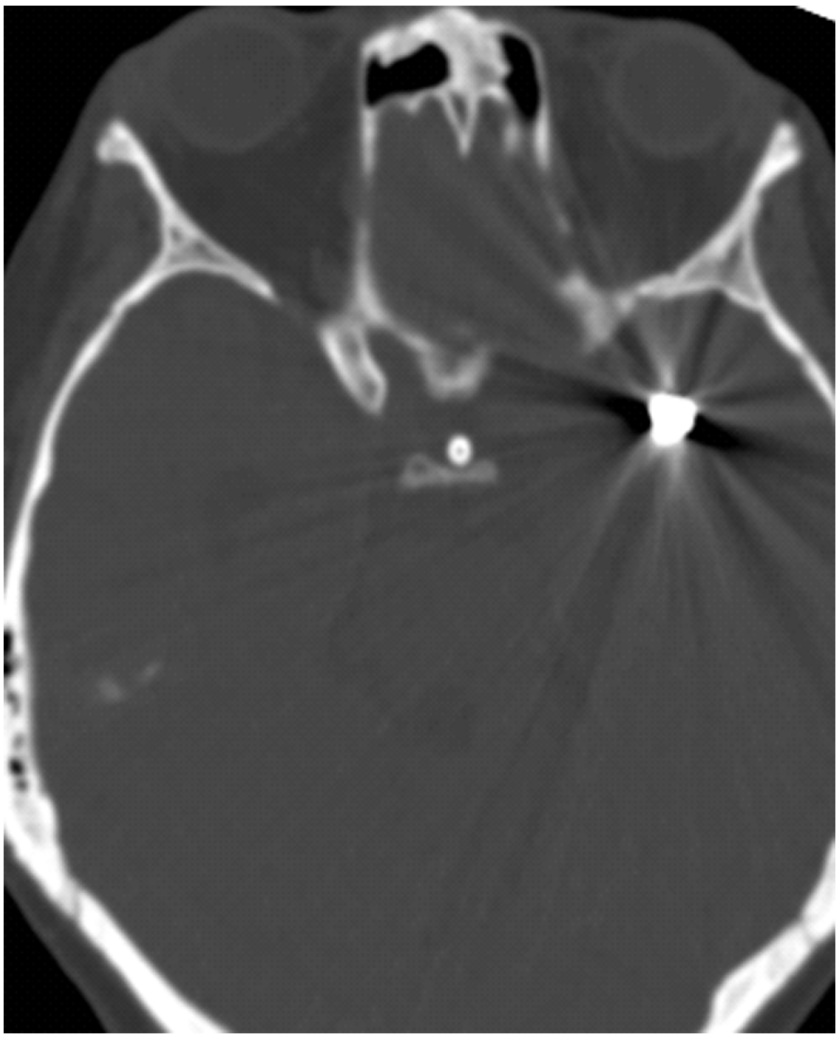

Fig. 1 Axial CT scan (bony window) showing the tip of the drain in the sellar floor

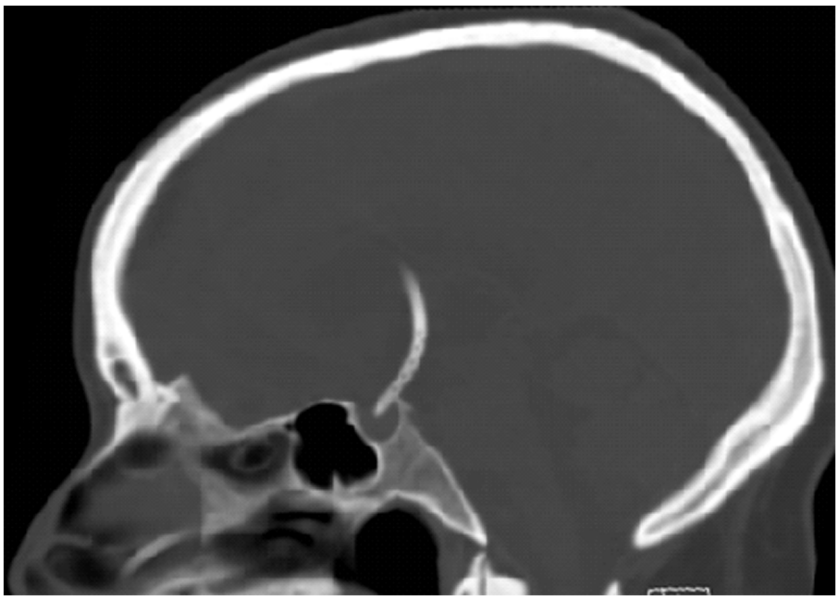

Fig. 2 Sagittal CT scan showing the tip of the drain in the sellar floor

Hsia CC et al. reported a series of 129 emergency EVDs were emergently placed. There were 18 misplaced catheters in 14% of 129 EVD placements, including 7 in basal ganglion, 5 in thalamus, 3 in cerebrum, 2 in suprasellar cistern and 1 in corpus callosum. This study did not have any known neurological complications from

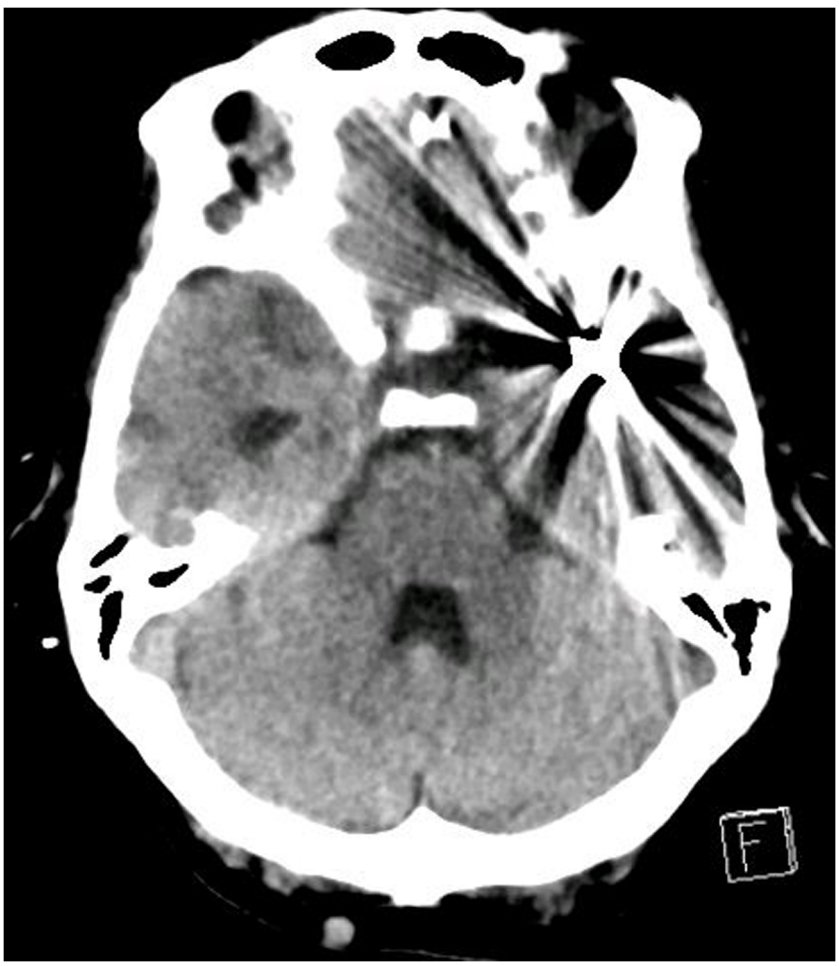

Fig. 3 CT scan following pulling the drain out of the sellar floor

the misplaced catheter, although the 18 catheters were misplaced [5].

Most of the misplaced EVDs did not have any significant clinical sequelae, but about 4% of these EVDs did require replacement. A misplaced catheter may cause haemorrhage with or without a neurologic deficit, may drain suboptimally and may be associated with infection. DI resulting from EVD was not found in the available literature. There is no report of misplacement of an EVD during replacement. In our case, the replacement went wrong and caused the diabetes insipidus.

Diabetes insipidus occurs acutely in 15% of cases of SAH and in one small study was associated with worse prognosis and increased mortality [10]. In survivors of SAH, diabetes insipidus is usually transient but can persist up to 3 months after discharge in up to 8% of patients [11]. The incidence may be higher after haemorrhage from anterior communicating artery aneurysms, putatively because of a higher risk of compromising perfusion of the anterior hypothalamus with these lesions [4].

As misplacement of EVD is a common complication, any change in the clinical status should be properly investigated and should not only be kept as the sequelae of the primary pathology.

Conclusion

Insertion of EVD in the sella is an extremely rare case and this is more so in case of replacement. DI, as a resultant effect of this misplacement, is rare undoubtedly. Any change in clinical status following any surgical procedure warrants appropriate investigation. To prevent the misplacement of EVD, preoperative verification of CT, image-guided insertion, measurement of the length of the tubing and careful anchorage of EVD to surrounding tissue are necessary.

Compliance with ethical standards

Patient's consent The next of kin, her mother in her case as she is not fully compos mentis, has consented to the submission of the case report for submission to this journal.

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