Case report

Acute subdural hematoma post ventricular puncture in infants: A case report and review of the literature

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Abstract

Introduction and importance: Acute subdural hematoma in infants is often due to non-accidental causes such as shaken baby syndrome or abuse. Occasionally, a rupture of the cerebral bridge veins after ventricular puncture can lead to a subdural hematoma in infants. In this article, we report the very first case of acute subdural hematoma after ventricular puncture of cerebrospinal fluid.

Case presentation: It is a 40-day-old male infant received at the pediatric emergency room for an infectious syndrome. An etiological assessment was carried out including a ventricular puncture of the cerebrospinal fluid. Two days after the puncture, the child developed a sudden alteration of consciousness during hospitalization, with a Blantyre coma score of 3/5. The CT scan performed showed a right subdural parieto-temporal hematoma associated with a right fronto-temporal parietal parenchymal hypodensity. A right temporo-parietal decompressive craniectomy was performed with evacuation of the acute subdural hematoma. Clinical improvement was obtained and the child was discharged after 3 weeks of hospitalization.

Clinical discussion: Acute subdural hematoma post ventricular puncture is rarely reported in the literature. The mechanism would probably be a rupture of the bridging veins by sudden collapse of the parenchyma following rapid and excessive aspiration of cerebrospinal fluid. Its management is medico-surgical. This manuscript further demonstrates the importance of mastering the ventricular puncture technique which must be performed by an experienced neurosurgeon.

Conclusion: The ventricular puncture remains a delicate gesture which must be carried out by a qualified neurosurgeon because of the risks of complications such as an acute subdural hematoma.

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1. Introduction

Subdural hematoma in infants is distinct from that occurring in children or adults due in particular to their mechanism of occurrence [1]. The aetiologies are mainly traumatic and among these are non-accidental causes such as shaken baby syndrome or abuse. A rupture of the cerebral bridge veins is also described [2]. In this article, we report the very first case of an acute subdural hematoma post ventricular cerebrospinal fluid puncture (CSF), in a 40-day-old infant, treated at the Fann University Hospital in Dakar. We will discuss the mechanism of hematoma formation and treatment. This case report has been reported in line with the SCARE 2020 Criteria [3].

2. Case presentation

This is a 40-day-old male infant with up-to-date vaccination status, no medical and family history of illness, or surgery; received at Fann’s pediatric emergency room, for a febrile convulsion. The initial general examination found a temperature of 38.2 °C, a weight of 4500 g, a height of 60 cm, a BMI at 25.51Kg/m2, a heart rate at 150 Bpm and a frequency respiratory at 37 cpm. The remainder of the examination found an anterior fontanel that was slightly strained and a neck that is soft on examination. The full blood count performed initially was normal, the C-Reactive protein was 32.20 mg/L. The procalcitonin assay showed a slightly elevated level at 2.41 mg/ml (normal less than 0.5 mg/ml). The chest x-ray was normal. A complement of the etiological assessment was carried out including a ventricular puncture of the CSF with cytochemical and bacteriological analysis. Then was put on medical treatment. Two days after the puncture, the child had developed a sudden alteration of consciousness during hospitalization. Neurological examination revealed a Blantyre coma score of 3/5, pupils...
of normal sizes not very reactive to lights stimulation, he had a mobilization of the 4 limbs to the stimulation which was easier on the right, the reflexes were present and normal. The rest of the exam was normal. The brain scan performed showed a right subdural parieto-temporal hematoma associated with a right fronto-temporo-parietal parenchymal hypodensity with mass effect on neighboring cerebral structures (Fig. 1a). The infant was immediately taken to intensive care unit. An indication of evacuation of the hematoma was asked and performed on the same day after obtaining a signed informed consent of his parents. The time between the last clinical presentation and the surgical intervention was 3 h. The infant, under general anesthesia and nasotracheal intubation, was covered and placed in the supine position. He was operated on by an assistant clinical chief neurosurgeon. He underwent a decompressive craniectomy with evacuation of the hematoma and duroplasty without conservation of the flap. Intraoperatively, he received a blood transfusion. The postoperative period was marked by a slight delay in waking up. On examination, the child was hemodynamically and respiratory stable, the Blantyre score was 4/5, the pupils were intermediate and reactive. The early control CT scan showed sequelae right hemispherical ischemia, a cerebral herniation associated with an intraparenchymal hematoma (Fig. 1b). Clinical improvement was obtained later and the infant was discharged after 3 weeks of hospitalization with regular follow-up. At 4 months of follow-up, the neurological examination found a good Blantyre score of 5/5, the pupils were reactive, he spontaneously mobilized his 4 limbs. Examination of the cephalic extremity found a scar on the area of decompressive craniectomy (Fig. 1c). The control cerebral CT scan showed right hemispherical sequelae ischemia without mass effect, a cerebral herniation and a ventricular dilation (Fig. 2). After 4 months of follow-up, the parents expressed their satisfaction with the care of their child.

3. Discussion

Acute subdural hematoma in infants is frequently of traumatic origin. Non-accidental causes include shaken baby syndrome or child abuse. This results in severe brain lesions in the infant, of which the subdural hematomas occupy a considerable part [4]. Occasionally, the subdural hematoma may result from a rupture of the bridge veins [5]. In our case, the latter etiology was retained as the mechanism for the occurrence of the hematoma. Indeed, the infant underwent a ventricular puncture of CSF for laboratory analyses. Our hypothesis is a significant withdrawal of CSF having led to a collapse of the cerebral parenchyma causing the rupture of the veins bridge to dural destination thus forming the hematoma.

In infants, the subdural hematoma is clinically characterized by convulsive seizures, disorders of consciousness, retinal hemorrhage or apnea in moderate forms which can go as far as coma with hemiplegia or even death. [6]. If intracranial hypertension is associated with it, it leads to diffuse edema leading to cerebral ischemia [7]. In our case, the child presented consciousness disorders without neurological deficit. Usually the treatment of subdural hematoma in infants consists of a craniectomy with evacuation. This therapeutic strategy involves risks such as intraoperative hypovolemic shock and hematoma among others [8]. In our patient we noted after the evacuation of the subdural hematoma, postoperative complications such as intraparenchymal hematoma with fairly significant cerebral edema and mass effect on neighboring structures. We thus proceeded with success, with a decompressive craniectomy in order to prevent the installation of a cerebral ischemia, which would have been catastrophic. This article confirms that the CSF ventricular puncture, although being a simple procedure, is not without complications and should be strictly reserved for neurosurgeons only. In order to prevent accidents of hyper evacuation of CSF causing rupture of bridging veins by collapse of the cerebral parenchyma and the formation of a subdural hematoma.

4. Conclusion

Subdural hematoma in infants is often traumatic in origin. The rupture of the bridge veins is an uncommon cause of these hematomas. In the reported case, it follows a ventricular puncture of CSF. This simple gesture is not trivial and devoid of complications and should be performed by neurosurgeons only.
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Ethical approval

The study is exempted from ethical approval.

Consent

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Not applicable.

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Declaration of competing interest

The authors claims no conflicts of interests.

References

[1] N. Aoki, Acute subdural hematoma in infancy, Neurosurgery 17 (1985) 529–530.
[2] J. Caffey, On the theory and practice of shaking infants: its potential residual effects of permanent brain damage and mental retardation, Am. J. Dis. Child. 124 (1972) 161–169.
[3] R.A. Agha, T. Franchi, C. Sohrabi, G. Mathew, A. Kerwan, A. Thoma, et al., The SCARE 2020 guideline: updating consensus surgical CAse REport (SCARE) guidelines, Int. J. Surg. 84 (2020) 226–230.
[4] C.C. Duncan, L.R. Ment, E. Ogle, Traumatic Injury to the Developing Brain, Concepts Pediatr Neurosurg, Basel, Karger, 1989.
[5] S. Jayawant, A. Rawlinson, F. Gibbon, J. Price, J. Schulte, P. Sharples, et al., Subdural haemorrhages in infants: population based study, Brmj 317 (1998) 1558–1561.
[6] D.A. Lang, G.M. Teasdale, P. Macpherson, A. Lawrence, Diffuse brain swelling after head injury: more often malignant in adults than children? J. Neurosurg. 80 (1994) 675–680.
[7] J.K. Loh, C.L. Lin, A.L. Kwan, S.L. Howng, Acute subdural hematoma in infancy, Surg. Neurol. 58 (2002) 218–224.
[8] F.A. Gutierrez, A.J. Raimondi, Acute subdural hematoma in infancy and childhood, Pediatr. Neurosurg. 1 (1975) 289–290.