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Bilateral Chronic Subdural Hematoma after Endoscopic Third Ventriculostomy in a Child: A Case Report and Review of the Literature

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Abstract

Hydrocephalus had been managed by ventriculoperitoneal shunt (VPS) or endoscopic third ventriculostomy (ETV) since several years. But these two different technics had some complications that must be managed promptly to avoid eventual fatal evolution. Chronic subdural hematomas after ETV is among these complications and is a very rarely situation observed in our department. This rare event associated with malaria in a child is considered to have a high mortality. Here we report a rare case of bilateral chronic subdural hematoma occurring in a 4-month-old boy after ETV and we discuss the likely pathogenesis and the difficulties of management.

Keywords

Hydrocephalus, ETV, Chronic Subdural Hematoma, Malaria

1. Introduction

The term "hydrocephalus" is from the Greek and means roughly "water in the head". In our team, it is defined like an excessive of cerebrospinal fluid (CSF) in the ventricles. This entity, usually known in our pediatric practice and commonly managed by ventriculoperitoneal shunt (VPS), was firstly introduced in 1908 by Kausch [1]. This popular technic had some common complications such as shunt malfunctions, shunts infections, over- or underdrainage... etc. That is why in the last two decades, many neurosurgeons try to manage these hydroce-

phalus by Endoscpic Third Ventriculostomy (ETV) that lead to a little complications. The pionner of this innovation was Jason Mixter, who first performed ETV in 1923 on the basis on the ideal approach demonstrated by Dandy in 1922 [2] [3]. Bilateral chronic subdural hematoma (CSDH) within this procedure as first intention had been ever related before. Herein we firstly reported this unusual complication in a 4 months-old boy and we discuss the likely pathogenesis and the difficulties of the management.

2. Case Report

A 4 months-old boy, first born in his family, with no past medical history, had been admitted within our department for a progressive enlargement of his head since two months. In interrogatory, this child was born from a singleton pregnancy full-term and no consanguinity was found in the parents. His parents reported the enlargement of his head, and his refusal to eat nothing. Neurological examination found a lethargic child with 45 cm head circumference (2.4 cm above the 97th percentile) and crying sometimes without an identifying cause. The anterior and posterior fontanelles were largely open. The ophthalmological test found a bilateral papilledema. The rest of his somatic examination was normal. Initial brain CT scan done at admission show a marked triventricular hydrocephalus with no space occupying lesions (**Figure 1(a)**).

The diagnosis of obstructive hydrocephalus was made. The laboratory investigations including coagulation tests were normal. He had been managed by ETV (Karl Storz Flexible endoscope) with no immediate complications (**Figure 1(b)**). During the procedure, physiological saline serum was used for flushing and no bleeding was observed. Six months later, he had been readmitted in our department for the same signs noted above associated to "eyes in sunset". CT scan done in emergency showed a bilateral subdural hematoma (**Figure 2**). We decided to irrigate these subdural hematomas by one burr hole in each side. Clinically in postoperative course, the child status was immediately satisfactory. But two months later, despite our previous open ventriculostomy, the patient status worsened again. At admission, he was slightly febrile at 38.2˚C with no papilledema on ophtalmological test. The CT scan showed a huge triventricular hydrocephalus associated to a thin cerebral mantle without any collected hematoma (**Figure 3**). There was no meningitis on CSF analysis, but the patient was positive of plasmodium falciparum (150/µl).

The parents decided to do just a medical therapy despite our obsession to seek what happened to our fenestration. Elsewhere, according his clinical and imaging data, we thought there was no high intracranial pressure, the cerebral tissue was only destroyed, leading to ventricles enlargement. And besides, right now we were not able to propose another neurosurgical procedure to this child. Despite our effort and antimalarial drugs administration, our patient died seven days later, perhaps from malaria. There was no anaemia or respiratory distress syndrome explaining this fatal evolution.

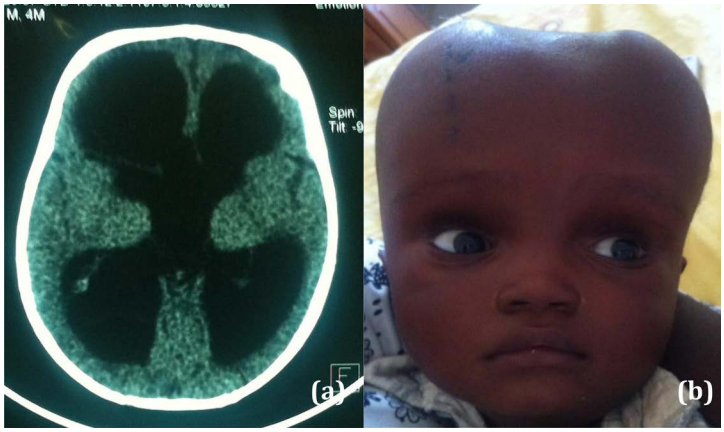

Figure 1. (a) Pre-operative CT scan shown a marked triventricular hydrocephalus. (b) Post operative view showing a depressive anterior fontanelle (published after parents' agreement in all cases).

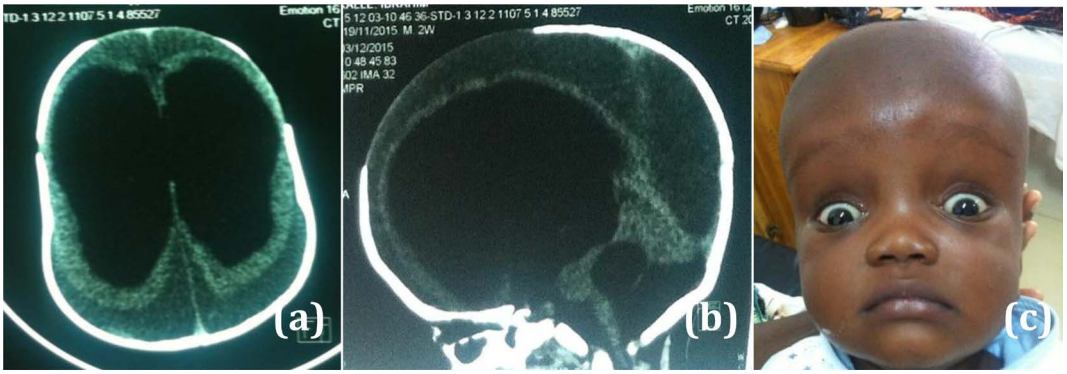

Figure 2. CT scan showing bilateral CSDH after ETV ((a), (b)) with photography of "eyes in sunset" and tendered anterior fontanelle (c).

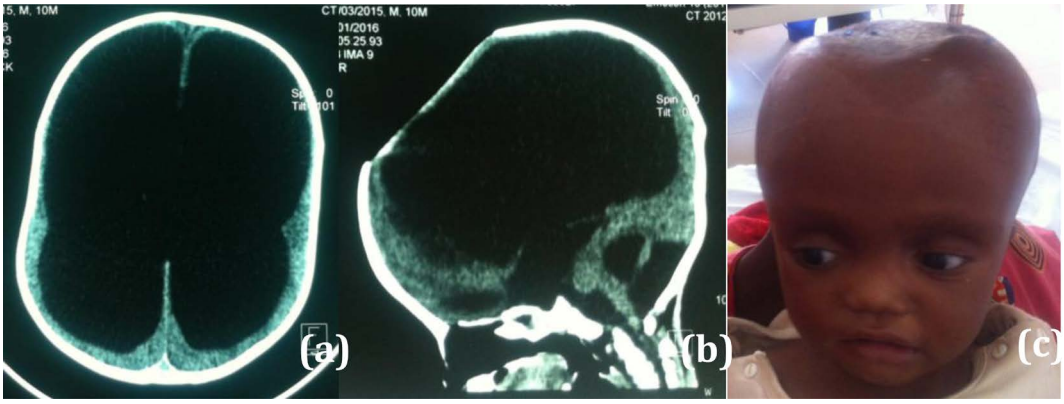

Figure 3. CT scan showed enlargement ventricle with thin cerebral mantle on a previous open ETV ((a), (b)) with no hematoma in a lethargic patient with malaria (c).

3. Discussion

Endoscopic third ventriculostomy (ETV) is generally accepted as the procedure of choice for the treatment of noncommunicating hydrocephalus [4] [5] [6]. This procedure has been one of the most frequently diverted methods used for hydrocephalus in our daily neurosurgical practice for the last two decades.

Technically, ETV is considered to be simple, fast and safe, compared to shunt diversion associated to few complications such shunt infections or malfunctions, under or over drainage, intracranial haemorrhage or hematoma, seizures or abdominal complications [7].

In the literature, some rare isolated complications following ETV have been reported such intracranial bleeding, CSF leak, infections (meningitis, ventriculitis), neuronal tissue damage (fornix, hypothalamus, and mildbrain) with consecutive memory deficit, hemiparesis, third cranial nerve paresis, hypothalamic dysfunction or arythmia with cardia arrest [6] [8] [9] [10] [11]. Subdural collections or hematomas are frequently observed after shunt placement or others neurosurgical procedures, but rarely reported after ETV. The real incidence rate of this complication in patients who have undergone ETV is around 1% - 2% [12] [13]. In the literature, more than 11 cases of symptomatic CSDH after ETV had been related, from which any case, not in previously shunted patients, in children had been ever reported, fortiori the bilateral collection [14] [15] [16] [17]. Our patient suffering from obstructive hydrocephalus, was managed by ETV and presented a bilateral subdural hematoma six months later. Why this situation occurs 6 months later and only in this case, on about 162 procedures included all ages managed in our department?

The real cause of this subdural collection in our case is not clear. However, two possible explanations of this complication had been related before by some colleagues**.** Abrupt drainage of CSF during the procedure may have created a space between the dura and the brain, which enabled gradual development of subdural collection or a sudden decrease in intracranial pressure in patients with long-standing elevated intracranial pressure changes the regulation of CSF formation [8] [18]. In other hands, Mohanty A *et al.* have suggested that ventricles collapse with the sudden reduction of CSF pressure and the occurrence of bleeding in the cortical veins may lead to subdural collection between the dura and the brain during CSF drainage, as observed in massive hydrocephalus after the refined brain shunt application similar to the ETV procedure [8]. Kurschel S *et al.* reported that covering the endoscopic space with fibrin glue after the completion of ETV and using hemostatic agents decreased subdural collection [19] [20].

In our case, we have done a very small corticotomy regarding the size of the flexible endoscope, flushed continuously with irrigation solution during all the procedure and closed immediately with surgicell and glue after endoscope removal. Perhaps, other factors may play a role in the slow formation and development of these late CSDH.

It will be better to have a CSF flow monitoring before and after ETV, or to have a system control on the stomy. Perhaps, this eventuality might be considered in the future. Indeed, a general infection like malaria, an infectious disease currently present in our area was noticed in our patient during hospitalization. This association was certainly leading the child in a lethargic condition and con-

tributed to this fatal evolution despite our effort and therapeutic limitations.

4. Conclusion

Bilateral CSDH after ETV for hydrocephalus can be a fatal complication, however associated to an infectious disease like malaria. This comorbidity might be in mind after an ETV in tropical regions and can decrease the rate of success of the procedure. The mechanism of this dysfunction due to this comorbidity might be elucidated in a future.

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Disclosure of Interest

The authors declare that they have no competing interest.

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