Case Report
Extra-Dural Hematoma in a Hydrocephalus Patient with a Dysfunctional Shunt: Therapeutic Challenge

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ABSTRACT
The authors report a rare case of epidural hematoma occurred and hydrocephalus following a violent head trauma in a patient of 17 years old. The patient had received at the age of 6 months a ventriculoperitoneal shunt for triventricular hydrocephalus. Three months before the last injury he had accidentally broken his valve without any clinical manifestation. An external ventricular drain to deal with hydrocephalus was decided before the non-surgical nature of the epidural hematoma. It was followed by an increase in the volume of epidural hematoma. This necessitated an evacuation associated with a decrease in the flow rate of CFS in the pouch. 48 hours after this action, the extradural hematoma is reconstituted so as hydrocephalus that required discharge of the hematoma and increased flow rate of CSF. After stabilization, internalization of the valve has been made. Brain CT scan showed normal sized ventricles and lack of hematoma. The magnetic resonance imaging (MRI) has objectified diffuse axonal injury. Two years later, the patient presented GOS 3. We discuss what to do facing this association epidural hematoma, post-traumatic hydrocephalus in a stabilized hydrocephalus patient who broke his valve and the "seesaw phenomenon" that entails.

INTRODUCTION
The association of post traumatic epidural hematoma and hydrocephalus with a dysfunctional shunt has not been reported in literature so far to our knowledge. What to do in such a situation is a real therapeutic challenge. We present a case report and share our management experience.

OBSERVATION
A 17 years old patient with a history of triventricular hydrocephalus who underwent ventricular peritoneal shunt at the age of 6 months, suffered from a severe head injury by road traffic accident involving a 2 wheeled engine. He also had minor cranial injury without significant clinical manifestations 3 months prior in which the CT scan with 3D reconstruction showed a disconnected shunt valve at the cervical level (Figure 1).

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Fig.1 a&b: a: 3D head CT scan showing the disconnection of the drain. b: CT brain scan showing an epidural hematoma blade of the right temporal fossa.
At day 1 of the second trauma he presented on examination with an estimated Glasgow coma scale of 7 with intermediate size reactive pupils without sensorimotor deficit. He was on assisted ventilation. The CT scan performed showed the presence of a small right temporal nonsurgical extradural hematoma associated with ventricular dilation. We proceeded to externalizing the drain at the neck and connecting it to the external ventricular bypass pouch (EVB). We do not have the possibility of measuring the intracranial pressure.

On the 2nd day we observed a worsening of symptoms with decerebrate rigidity. CT scan performed objectified an increase in the volume of the epidural hematoma with mid-line deviation and an almost complete disappearance of the ventricular system forming a slit ventricle (Figure 2).

We evacuated the epidural hematoma by performing a temporal parietal window and decreased the rate of drainage.

On the 3rd day we noted an improvement in the patient's clinical condition. It deteriorated on the 4th day motivating another brain scan which showed the reconstitution of the epidural hematoma and this time with ventricular dilatation (Figure 3).

A second extradural hematoma evacuation was performed with an increase in the drainage rate. The follow up imaging on the 6th day showed normal sized ventricles with an intra-ventricular drain in situ and disappearance of the epidural hematoma (Figure 4).
On the 8th day the drain was internalized with replacement of the peritoneal catheter.

At day 15 a CSF leak was found at the cervical level and managed by replacement of the reservoir. The patient was akinetic without ocular tracking with equines and a nasogastric tube for feeding.

Cerebral MRI performed because of poor improvement of the clinical condition did not show any epidural hematoma but diffuse axonal injury. Two years later he had major deficit requiring assistance for food.

DISCUSSION

The occurrence of post-traumatic epidural hematoma with valve disconnection is a rare association and we have not found in literature any previous description. The association epidural hematoma and bypass valve has been reported rarely. Only Spontaneous hematomas in a hyper drainage context are encountered.

Our patient had a disconnected valve three months prior but was stable clinically. No surgical measures had been undertaken for this. The Clinical condition after the second accident had motivated the surgical procedure of externalizing the valve as the small hematoma did not require surgery. This move led to a deterioration of the clinical condition resulting from the volume increase in epidural hematoma is probably related to a phenomenon of hyper drainage with extension of detachment of the dura matter from the endo-cranium. There would have been a collapse of the cortex that is associated with the externalization of the valve, which would according to Noleto lead to the appearance of traction forces on the middle meningeal artery and its branches leading to rupture. This could apply to our patient except that the rupture occurred before the drainage. But this theory remains valid for the increased bleeding. For Seyhanoglu et al, in some patients, adhesions between the dura matter and the endo-cranium are less significant than those between the dura and arachnoid, this could, in case of hyper drainage lead to the formation of epidural rather than acute subdural hematoma.

In light of this, an evacuation of the hematoma was decided and a decrease in flow rate of the CSF to reduce hyper drainage. An improvement in the clinical condition of the patient was noted the next day; but for only 24 hours because on the 4th day reconstruction of the hematoma was observed probably due to the persistence of bleeding as well as hydrocephalus-related reduced drainage flow. It was then decided to re-evacuate the hematoma and increase the drainage rate; this stabilized the patient's condition. Follow up imaging was satisfactory, but the patient's clinical condition: akinetic raised the need for MRI which showed diffuse axonal injury. They have a poor prognosis, two years after the patient is at GCS 3.

Would it have been wise from the beginning to replace the ventricular catheter to restore ventricular-peritoneal circuit? This maneuver we would not protect us from epidural hematoma expansion because of the few similar cases of formation of epidural hematomas after ventricular peritoneal shunt have been reported. The absence of parenchymal counter pressure due to hyper drainage caused hemostasis to fail. A measurement of intracranial pressure (ICP) at the beginning of externalization with a strict monitoring would have permitted the close to follow the evolution of ICP to the normal limits and decide to internalize with replacement of the ventricular catheter. This procedure would not prevent the increase in the volume of the hematoma because we use non-modular valves of "Chabbra," type and believe that the evacuation of the CSF would give way to bleeding because compression would have been cancelled. Should Hemostasis not have
been effective after the first evacuation of the hematoma?

Early MRI would not have changed the situation because management of diffuse axonal injury being medical would not interfere with those of hydrocephalus and epidural hematoma which are surgical. Would it not have been better to restore ventricular-peritoneal drainage of hydrocephalus and systematically emptying the hematoma albeit minimum?

CONCLUSION

The occurrence of extradural hematoma with valve disconnection is unknown and raises management challenges. We advocate for such patients the simultaneous evacuation of the hematoma and revision of ventricular peritoneal shunt.

Declaration

The author(s) declare no conflict of interest or any financial support and confirm the approval of the submitted article by the concerned ethical committee.

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