

## Unusual accident during proximal ventricular shunt catheter removal in an infant: a case report

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### Abstract

Hydrocephalus is a common condition of accumulation of cerebral spinal fluid in the ventricular system. Generally, infants show with progressive macrocephaly or signs and symptoms of intracranial hypertension. The ventricular shunt represents a common and important treatment of hydrocephalus. However, it can occur some complications. The authors report a case of an accident of catheter removal in an infant, which the choroid plexus was removed by accident, and discuss how to diagnose and how to prevent it.

**Keywords:** Ventricular shunt; Hydrocephalus; Complications.

### Introduction

Hydrocephalus is a condition in which an accumulation of cerebrospinal fluid (CSF) occurs within the ventricular system; it's supposed that 1:1.000 newborns could have this disease. However, some conditions in infants allowed hydrocephalus, like infections, post hemorrhagic or tumors. The standard approach for these problems is

to insert a shunt between ventricular and peritoneal space, ventricular shunt (VS).

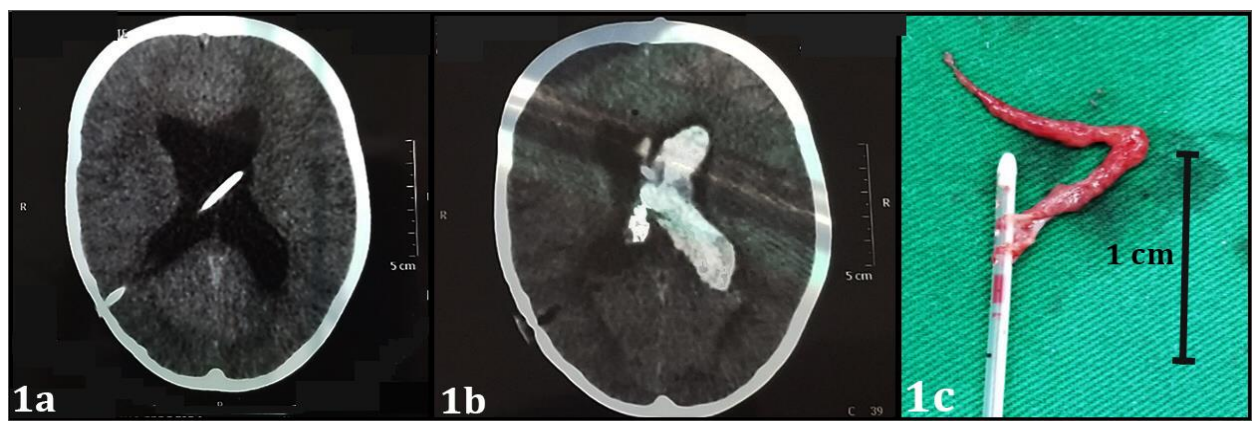
This shunt has a huge rate of complications, among them, there is the shunt malfunction. It usually occurs 50% per year [1]. During revision surgeries, there are clinical and surgical problems, one of the surgical problems is intraventricular bleeding [1]. We intended to describe a case report which

the choroid plexus was removed by accident, a severe surgical complication.

## Case report

Through a medical record review, we describe a case report of a 4-year-old child with an infant communicating hydrocephalus. At 6 months of life, the cephalic perimeter was above the 95%

percentile predicted to age, treated with VS. Within 3 days, the patient presented a sudden change of consciousness along with irritability and vomiting. After hospitalization, to perform a tomographic study (Figure 1A), presented bradycardia and hemodynamic instability.



**Figure 1.** A. Cranial computed tomography (CT). B. Cranial CT with major bleeding. C. Choroid plexus removed by accident.

There was an immediate review of the VS, during the surgical procedure, after distal catheter removal and valve in the right parietal incision, a compression fracture of the hemostatic forceps of the proximal catheter next to the skull cap osteotomy occurred. Therefore, the proximal catheter was removed due to risk of massive cerebrospinal fluid leakage, important intracranial hypertension, and catheter interiorization. During the removal procedure, a brain tissue removal accident occurred (Figure 1C). It was opted for an external VS through the

same orifice previous and observation of the intraventricular bleeding.

The patient was dispatched to the ward to the spontaneous resolution of minor intraventricular bleeding, constant in the external VS. However, it was observed on tomography on the 3rd day postoperative day that the bleeding increased (Figure 1B). After 20 days of surgical revision, the liquor drainage was practically negative for red blood cells, negative cultures and low proteins, being possible to replace the VS.

During hospitalization, the patient received prophylactic antibiotics

for the VS, despite negative cultures. In addition, hematocrit decreased and hemotransfusion was necessary. After the 4th postoperative day of definitive VS implantation, the patient was discharged home.

## Discussion and Conclusion

In general, a multimodality approach is necessary for the diagnosis of shunt malfunction, it is needed to set images (tomography, magnetic resonance, ventriculography), laboratory and clinical exams. The most notable signs and symptoms of shunt failure are nausea and vomiting, irritability, decreased level of consciousness and a bulging fontanel. These signs and symptoms gathered elevated up to 100% positive predictive value test [2]. The two most likely sites of obstruction are the ventricular/proximal catheter, which can be blocked by choroid plexus, and the shunt valve, which can be blocked by blood and debris. Other substances could be the origin of the bulk, like protein, brain parenchyma, ependymal cells, glial tissue, connective tissue and leptomeninges [3].

Some shunt taps have a rescue system to avoid CSF blockage, neurosurgeons could use it. When they need to remove the shunt system, careful movements are required. In rare events, the proximal catheter that was removed from the ventricular place could provoke

intracerebral bleeding, which happened in the case reported. This bleeding is resolved by external shunt, it is possible the CSF hemorrhage lasts several days until stopped permanent.

Other strategies are open craniotomy, decompressive craniectomy, neuroendoscopy, and minimally invasive catheter evacuation followed by thrombolysis. These surgeries have a serious impact on patient prognostic [4]. There are some tips to predicted proximal catheter misplacement: 1- deeper proximal catheter localization, 2- previous history of infection or hemorrhage, 3-slit-ventricle syndrome, 4- coagulation disorders, 5- proximal catheter jammed [5].

We concluded that the neurosurgeons could avoid careless maneuvers during surgeries and be aware of catheter misplacement which could be jammed deeper in the choroid plexus.

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