Letter to Editor

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Why Flushing the Valve Cannot Be A Reliable Method to Evaluate the Ventriculoperitoneal Shunt Function?

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Most neurosurgeons or physicians are used to pump the shunt valve whenever they want to examine a patient with previous hydrocephalus having a kind of shunt system. If the patient is assessed during a regular follow up without any complaint we may find good emptying and filling or delayed filling. Even delayed filling is found at a normal functioning shunt in an asymptomatic patient, this finding does not confirm any abnormal situation.

In a patient with symptoms of shunt malfunction the situation is different; if pumping is abnormal it only confirms the clinical status and should be proved with shunt tap and neuroimaging. Actually there is currently no practical way to clinically measure detailed shunt performance (e.g., flow rate) in vivo. The current commonly used methods for evaluation of shunt function include computed tomography and magnetic resonance imaging, radioisotope injection, and plain radiographs [1].

But normal pumping in a shunted patient does not rule out a dysfunctioning situation. We encountered several situations in which the shunt testing was showing good functioning pump but the shunt was nonfunctional. Here we describe our experience in several circumstances when the shunt was not working well and the pumping gave the false impression of good functioning shunt. These situations contain:

- Disconnection or fracture especially at early stages can present good emptying because of the fibrous tract and the good flow of cerebrospinal fluid through this tract.
- In some patients the shunt is disconnected from the connector or has fracture at the reservoir neck (in burr hole type shunt) or there is fracture and dehiscence somewhere in the peritoneal catheter and the pumping seems to be acceptable but the shunt has a real failure.
- Sometimes in patients with high protein or the existence of blood in the cerebrospinal fluid, malfunction symptoms are prominent but pumping is doing normally and the symptoms are improved with repeated pumping. When cerebrospinal fluid is obtained with percutaneous shunt tap, there is excellent flow and immediately the symptoms recover. This phenomenon is due to sluggish flow which makes a condition like a partial obstruction and the correction of underlying cerebrospinal fluid abnormality results in the resolution of the symptoms.
- Rarely the openings in the tip of catheter are partially obstructed (only some holes are closed with tissue) and the child presents shunt malfunction symptoms but valve flushing is done normally and the symptoms are improved with repeated pumping. Brain imaging can show increased size of ventricles confirming malfunction. When cerebrospinal fluid is obtained with percutaneous shunt tap, there is near normal flow due to powerful aspiration and immediately the symptoms recover. These patients will recover after shunt revision.

Key words: ventriculo-peritoneal shunt; CSF; Shunt infection; Hydrocephalus

References

1. Ginsberg HJ, Drake JM. Physiology of cerebrospinal fluid shunt devices. In Youmans JR (ed): Neurological Surgery, 5th ed. Philadelphia, Saunders, 2004; pp 3374-86.

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