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Brief Report

Cranial Migration of a VP Shunt—A Routine Procedure with a Rare Complication!

Aman Singh[1] Awadhesh Yadav[1] Pritesh Yadav[1] Bal Krishna Ojha[1]

[1] Department of Neurosurgery, King George's Medical University, Lucknow, Uttar Pradesh, India

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Address for correspondence Aman Singh, MS, Department of Neurosurgery, King George's Medical University, Lucknow, UP 226003, India (e-mail: amanshivendra92@gmail.com).

Abstract

Ventriculoperitoneal shunt is one of the commonest neurosurgical procedures associated with a high-rate complication. Moreover, the variety of complications are nonetheless astonishing. Shunt malfunction is considered the most common complication of this procedure, but a cranial migration of shunt leading to malfunction is extremely rare. We present a case of a 6-month-old male child who was initially managed with a right-sided medium-pressure ventriculoperitoneal shunt for aqueductal stenosis with hydrocephalus at the age of 3 months and presented to us with features of shunt malfunction owing to a cranial migration of the shunt assembly. Cranial migration of a ventriculoperitoneal shunt is an extremely rare complication. Its possible mechanism includes a large subgaleal space for the chamber, larger size burr hole, inadequate anchorage of the shunt assembly, and excessive neck movements of the child in the postoperative procedure.

Keywords

- cranial migration
- shunt malfunction
- VP shunt

Introduction

Ventriculoperitoneal (VP) shunting has been one of the commonest neurosurgical procedures since ages to manage hydrocephalus in almost all age groups. Many upcoming endoscopic procedures have been introduced, aimed at substituting shunting, but nonetheless VP shunting continues to be the most widely accepted procedure till date by most of the neurosurgeons worldwide. Despite the considerable rates of complications of VP shunting including shunt failure, shunt migration, and shunt infection, cranial migration of the shunt assembly is an extremely rare complication.

Narrative

A 6-month-old male child who was initially managed with a right-sided medium-pressure VP (Chhabra) shunt for congenital hydrocephalus due to aqueductal stenosis at the age of 3 months presented to us with a swelling (pseudomeningocele) at the cranial wound site with excessive cry and bulging anterior fontanelle (►**Fig. 1**). On clinical examination, the shunt chamber could not be palpated and the lower tip of the shunt could be appreciated at the level of xiphisternum, around 6 cm above the site of insertion of the lower end. There were no signs of inflammation along the shunt tract.

X-ray shunt series revealed an abnormal cranial migration of the shunt with the shunt chamber lying withing the cranium. A noncontrast computed tomography head (►**Fig. 2**) revealed coiled loops of shunt within the ventricles (more in the left lateral ventricle) with a pseudomeningocele formation at the site of previous cranial incision. Cerebrospinal fluid study did not reveal any trace of meningitis

A left Kocher's burr hole was made and a rigid pediatric endoscope was inserted to identify the loops of cranially migrated shunt with the chamber (►**Fig. 3**). The shunt was

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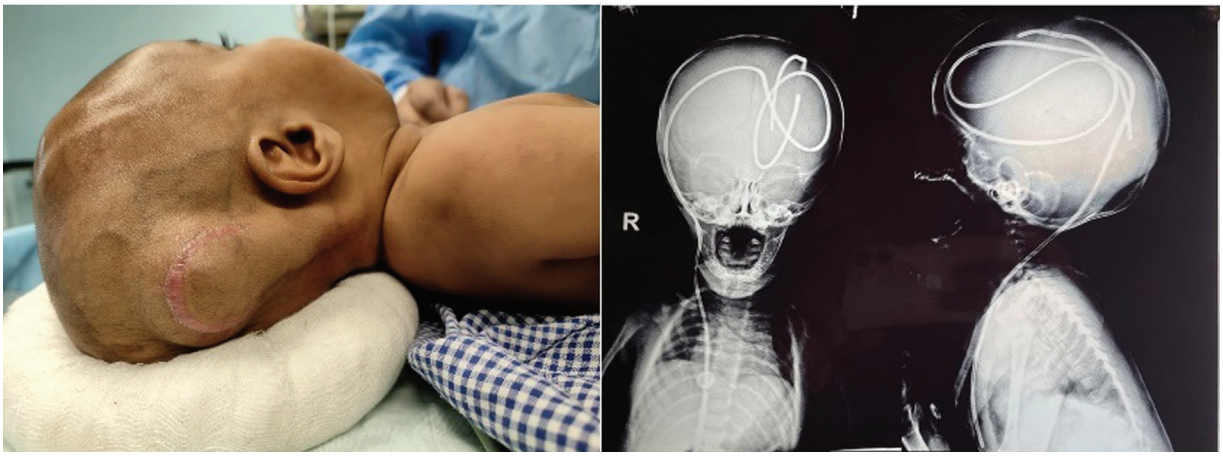

Fig. 1 Noncontrast computed tomography head on presentation.

divided at the proximal most entry point into the ventricles and cranial part removed. A separate stab incision was given at the lower most tip of the shunt that was then slowly pulled to retrieve the remaining part of shunt. The endoscope was negotiated further through the foramen of Monro, but the visualization of floor of third ventricle was found to be obscured by multiple thin fibrous membranes and hence endoscopic third ventriculostomy was abandoned. Improvisations done in the second shunt procedure were as follows:

1. A narrow opening in the pericranium was made only to incorporate the small size of burr hole.
2. A small burr hole (0.5 cm) was made over left keen's point.
3. Cautious creation of appropriate-size pocket for the shunt chamber was made.
4. An opening through the dura was made sizeable to the diameter of the ventricular tip prior to insertion.

Discussion

VP shunting is a deceptively simple operation with a wide range of complications including shunt failure, shunt infection, and shunt migration. A wide array of shunt migration has been described in the literature including gallbladder, anus, liver, umbilicus, colon, and scrotum thorax; however, complete migration of VP shunt intracranially is rarely reported.[1,2] Although the etiology of this complication is unknown, it has been reported only in children till date with various theories being proposed for the possible explanation of such a rare incident. It is proposed that such a complication usually occurs within 3 months of initial shunting that may favor the mechanism of the sucking effect due to the sudden drop in the intraventricular pressure or a sudden increase in the intra-abdominal pressure (pushing effect) following shunting.[3] Others have proposed faulty surgical techniques including a large burr hole, broader subgaleal space for the chamber, wider dural opening, and improper anchoring of the chamber to the pericranium.[4] Some have also proposed excessive neck movements in a small, malnourished child with thin cortical mantle leading to a windlass effect as a causative factor for cranial migration of the shunt assembly.[5] It is quite interesting to note that the age group of patients presenting with such complication is of usually less than 2 years with congenital type of hydrocephalus and with thin cortical mantle. The usual methods proposed for prevention of such complications include appropriate surgical technique and an adequate postoperative care. A high suspicion of such complication in the above-mentioned group of patients needs to be kept in mind while performing the procedure.

Patient Perspective

The child tolerated the procedure well. The swelling over the scalp gradually settled and the child was discharged after 8 days following suture removal. No postoperative complications were seen and the child was followed for 3 months that did not reveal any complications associated with the procedure.

Conclusion

Cranial migration of the shunt assembly is a rare and an unexpected complication following VP shunting. The best possible strategy to mitigate such a complication would be to be cautious while performing the procedure in a child with a thin cortical mantle and provide a good anchorage for the chamber. Adequate care of the child to avoid excessive neck movements with the possible red flag signs for all the possible complications of VP shunt should be explained to the parents.

Authors' Contribution
A.Y. contributed for surgery and procedure. A.S. contributed for case Report. P.Y. contributed to compilation of data and review of literature. B.K.O. contributed to discussion and analysis.

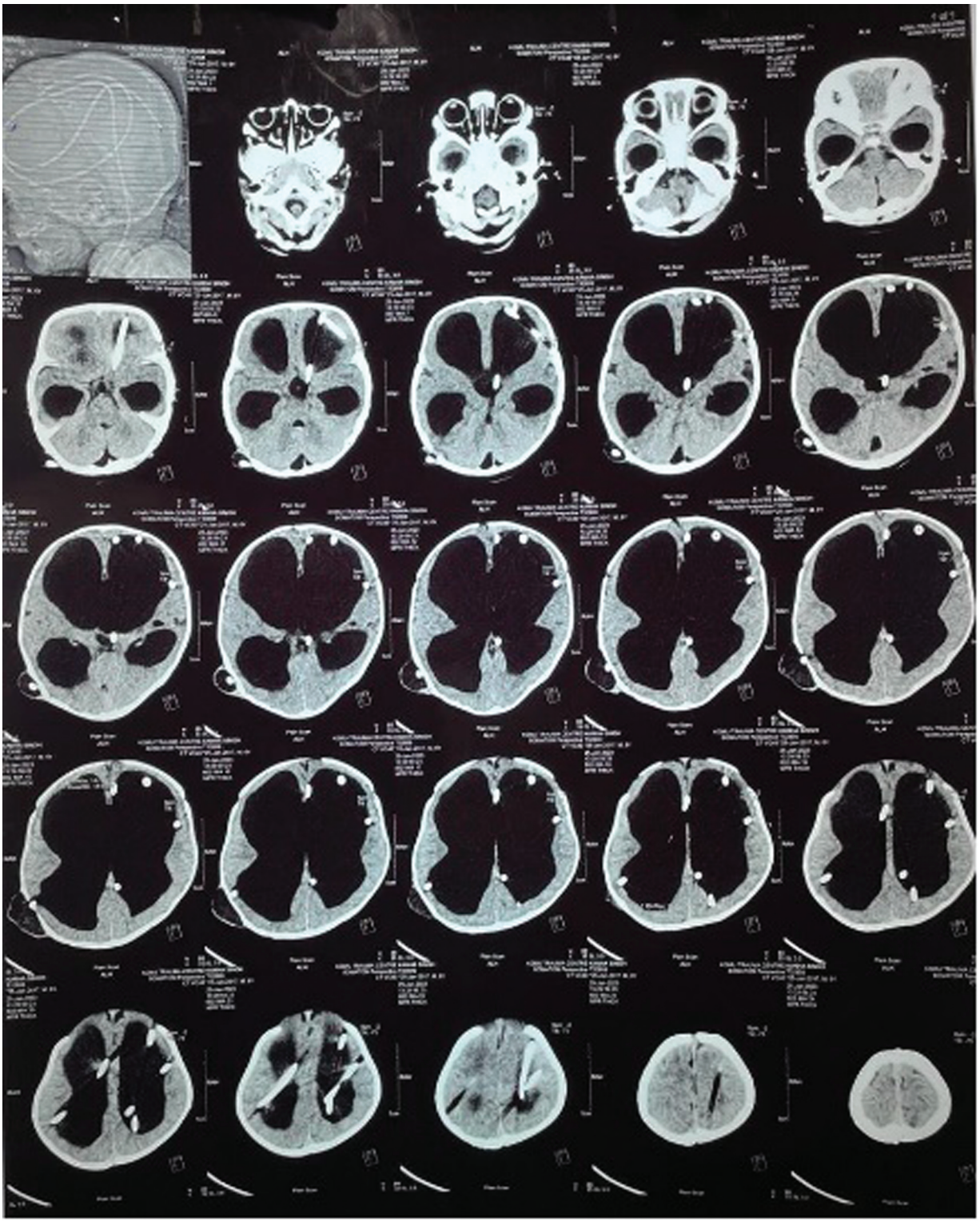

Fig. 2 Clinical image with shunt series X-ray.

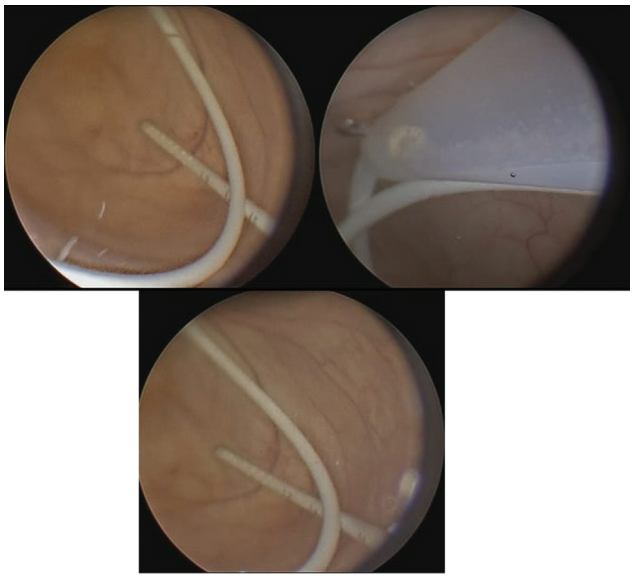

Fig. 3 Endoscopic view of coiled shunt within the lateral ventricles.

Conflict of Interest
None declared.

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