Migration of a Lumboperitoneal Shunt Catheter into the Spinal Canal

—Case Report—

Takeshi SATOW, Yasushi MOTOYAMA, Naohiro YAMAZOE, Fumiaki ISAKA,
Kazushi HIGUCHI, and Sachio NABESHIMA

Department of Neurosurgery, Tenri Hospital, Tenri, Nara

Abstract

A 50-year-old female suffered upward migration of a lumboperitoneal (LP) shunt catheter into the spinal canal, manifesting as disturbance of short-term memory. Revision of the shunt confirmed that the tube had migrated into the spinal canal. The tube was pulled back into the peritoneal cavity and attached firmly to the fascia with a new anchoring device. LP shunts have the advantages of technical simplicity and extracranial procedure, but firm fixation is recommended since movements of the spine may cause proximal tube migration.

Key words: lumboperitoneal shunt, spinal migration

Introduction

Lumboperitoneal (LP) shunting is a cerebrospinal fluid (CSF) diversion procedure used mainly for the treatment of patients with communicating hydrocephalus, but also for pseudotumor cerebri, CSF fistula, bulging of craniotomy sites, syringomyelia, slit ventricle syndrome, cauda equina syndrome in ankylosing spondylitis, and so on.^{3,5-7,9-13,15)} Some surgeons use a LP shunt in preference to a ventriculoperitoneal (VP) or ventriculoatrial shunt, because of its technical simplicity and minimal intracranial complications.³⁾ LP shunts also have a lower incidence of complications associated with shunting, such as obstruction and infection, than VP shunts in a large series.³⁾ However, LP shunt is performed less frequently than VP shunt, because evidence of communication must be present between the spinal subarachnoid space and the intracranial subarachnoid space. Complications associated with LP shunting include acute subdural hematoma due to minor head trauma,⁴⁾ tonsillar herniation, or acquired Chiari malformation,^{8,16)} disc space infection,⁷⁾ myelopathy and radiculopathy,³⁾ orthopedic complications (especially in

pediatric patients),⁹⁾ and distal migration of the peritoneal tube. However, upward migration of the LP shunt into the spinal canal is very rare.^{1,2,12)} We report a case of migration of the LP shunt catheter into the spinal canal after treatment for hydrocephalus following aneurysm rupture.

Case Report

A 50-year-old female suffered sudden onset of severe headache on January 18, 1999, and visited the nearest hospital on foot. Computed tomography (CT) of the brain disclosed subarachnoid hemorrhage, and cerebral angiography revealed a right middle cerebral artery aneurysm. The patient was transferred to our hospital for an emergent operation.

Twenty-one days after the neck clipping of the aneurysm, she exhibited progressive disturbance of short-term memory. CT disclosed hydrocephalus, and a LP shunt procedure was performed. The LP shunt system used was of the one-piece type, with a low-pressure slit valve at the distal end (SILASCON®, Kaneka, Osaka). The total length of the catheter was 65 cm. About 10 cm was inserted rostrally into the subarachnoid space, and 20 cm into the peritoneal

Received July 18, 2000; Accepted November 27, 2000

Author's present address: T. Satow, M.D., Department of Neurosurgery, Kyoto University School of Medicine, Kyoto, Japan.

cavity. The anchoring device, an accessory plastic clip around the catheter, was applied to fix the catheter to the fascia at the iliac crest.

After 3 days, her symptoms and CT findings had not improved. Radiography revealed intrathecal migration of the shunt catheter, and the tip of the peritoneal end of the tube had apparently become displaced out of the peritoneal cavity (Fig. 1). Revision of the LP shunt was therefore performed. During the operation, the tip of the peritoneal end of the tube was not found under the scar at the right flank, but had moved further toward the spinal canal since the radiography taken one day earlier. The distal end was located at the lumbar region at the levels of L4-5. CSF was dripping from the tip, and we confirmed that the spinal catheter had been correctly inserted into the subarachnoid space. The tube fixation with the anchoring device was loose. The catheter was pulled back an appropriate distance and the peritoneal end of the tube was replaced in the peritoneal cavity, as in the initial LP shunt procedure. A new anchoring device was applied and fixed tightly to the fascia.

The patient's memory function thereafter improved and she was discharged with no further symptoms.

Discussion

Migration of the LP shunt catheter into the peritoneal space occurs occasionally, but migration of the LP shunt into the spinal canal has only been reported three times. In one case, the LP shunt catheter placed for the treatment of pseudotumor cerebri had migrated into the posterior fossa¹⁾; the second case involved intrathecal migration but details were not described¹²⁾; and in the third case the tip of a LP shunt catheter was dislocated into the cerebral parenchyma.²⁾ This complication might be avoided by directing the spinal catheter caudally,¹²⁾ but this is uncertain because the CSF flow would become craniocaudal. In a recently reported case,²⁾ proximal migration of the LP shunt was explained by intraspinal CSF bulk flow, which exerts force on the shunt tube in the rostral direction. However, regardless of the CSF bulk flow, CSF flow occurs in both the rostral and caudal directions. Accordingly, the spinal migration of the LP shunt cannot be explained simply by the flow of the CSF.

Proximal migration of VP shunts has also been reported.^{14,17,18)} Intraventricular migration of a VP shunt system occurred in a hydrocephalic infant, possibly because vigorous flexion-extension movements of the infant's head acts as a windlass, promoting upward migration of the peritoneal tube.¹⁷⁾

Fig. 1 Roentgenogram of the abdomen showing that the lumbar side of the catheter (arrowheads) has migrated upwards into the spinal canal. Arrows show the distal end of the tube, which was displaced out of the peritoneal cavity and was running subcutaneously.

In the present case, flexion-extension, rotational movements and lateral bending of the lumbar vertebrae provide an analogous mechanism. Furthermore, proximal migration of VP shunts has occurred in shunt systems consisting of straight tube, without any interposition such as flushing devices, in all reported cases.¹⁸⁾ Accordingly, the use of anchoring devices to fix the shunt system firmly to the periosteum is recommended. The LP shunt system used in the present case was the one-piece type with no flushing device, as in previous cases of intrathecal migration of LP shunts.^{1,12)} This type of system appears to migrate more easily. During the operation, we confirmed that the anchoring device fixing the catheter to the fascia at the iliac crest was loosened. Upward migration of the LP shunt in this case could therefore have been avoided by fixing the shunt catheter more firmly to the fascia using the anchoring device. Whenever LP shunting is performed, the possibility of migration should be kept in mind, and an anchoring device used to attach the catheter tightly to the fascia.

In conclusion, malfunction of a LP shunt can indicate spinal migration of the shunt catheter. This

complication can be avoided by anchoring the catheter tightly to the fascia.

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Address reprint requests to: T. Satow, M.D., Department of Neurosurgery, Kyoto University School of Medicine, 54 Kawahara-cho, Shogoin, Sakyo-ku, Kyoto 606-8507, Japan.