Endoscopic Observation of the Syrinx in Chiari Malformation

—Case Report—

Shiro NAGASAWA, Tomio OHTA, Toshinobu ONOMURA* and Yoshiki MIYAJI*

Departments of Neurosurgery and *Orthopedics, Osaka Medical College, Takatsuki, Osaka

Abstract

The cervical syrinx cavity in a 27-year-old male with Chiari 1 malformation was inspected with a flexible small-caliber endoscope during syringosubarachnoid shunting. A cleft was observed in the midline on the ventral wall of the cavity, from which blood vessels emerged and ran along the wall. Several strands accompanying the blood vessels passed from one wall to another. The endoscope was also used to evaluate whether any obstacles to the passage of a shunt tube were present in the subarachnoid space. Endoscopic observation of the syrinx cavity is helpful in performing the shunt operation.

Key words: Chiari malformation, endoscopy, syringomyelia, syringosubarachnoid shunt

Introduction

A variety of endoscopic techniques have been developed, mainly for the diagnosis and treatment of hydrocephalus, since endoscopic visualization of the lateral ventricle was first carried out in the early 1920s. The recent development of the small-caliber flexible fiber catheter and illumination system now allows neurological endoscopy to visualize fine and deeply located targets in the cistern (cisternoscopy), the spinal cord (myeloscopy or spinaloscopy), and intracerebral tumors (tumoroscopy).

Here we report the inspection of the syrinx cavity in a patient with Chiari 1 malformation using an endoscope during the syringosubarachnoid shunt operation, describe the endoscopic findings for the syrinx, and discuss the applicability to performance of the shunt operation.

Case Report

A 27-year-old male presented with a 10-year history of slowly progressive gait disturbance and numbness on the left side of the face. Since tingling and numbness of the right thigh had also developed, he was admitted to our hospital on February 21, 1992. Neurological examination on admission revealed left lateral gaze nystagmus, downward nystagmus, hypesthesia on the left side of the face, and mild dysfunction of the left IXth and Xth cranial nerves. Motor weakness of the left lower extremity, decreased pain sensation from C5 to S1 on the right side of the body and from C2 to C4 on the left, and diminished deep sensation of the left upper and lower extremities were also present. The deep tendon reflex was exaggerated on the left side with bilateral Babinski reflexes and absent biceps reflexes.

Plain x-ray films revealed an increased sagittal diameter of the spinal canal between C3 and C7 and scoliosis in the thoracolumbar region. Magnetic resonance (MR) images demonstrated herniation of the cerebellar tonsils and a large intraspinal cavity from C2 to Th10, with the maximum diameter located at around C3–C7 (Fig. 1 left).

A suboccipital craniectomy, C1 laminectomy, and removal of the C4–C5 arch were performed on March 9. Dural opening between C4 and C5 revealed swelling of the spinal cord. Midline myelotomy about 3 mm in length yielded clear cerebrospinal fluid. A 19-gauge nylon catheter was manually advanced 5 mm into the cavity, and an endoscope in-
introduced about 15 mm rostrally and caudally under television monitoring. The endoscopic system consisted of a flexible fiber catheter 0.75 mm in diameter containing 3000 optic fibers, a high-intensity xenon light source, and a video processor system (AS-001; Fukuda-densi Co., Ltd., Tokyo). The view angle is 55 degrees, and the depth of field ranges from 1 to 15 mm. The endoscope gave a good view of the cavity up to 30 mm from the myelotomy site, which was judged adequate for the placement of a shunt tube. The wall of the cavity was discolored yellowish-brown. A cleft was observed in the midline of the ventral wall, from which blood vessels emerged and ran along the wall to the right and left (Fig. 2 left). Several strands accompanying the blood vessels passed from one wall to another in the caudal part of the cavity (Fig. 2 right). The endoscope was removed from the syrinx and reinserted into the subarachnoid space to confirm the absence of trabeculae or other pathological signs. A silicone tube 1.5 mm in diameter and 50 mm in length was then inserted rostrally into the syrinx and caudally into the subarachnoid space, fixed to the pia mater, and the surgical wound closed in layers.

The postoperative course was uneventful. MR images on March 30 showed that the syrinx had collapsed (Fig. 1 right). Although the motor weakness of the left lower extremity showed little change, most symptoms due to posterior fossa compression and sensory disturbance of the body and extremities had improved to various degrees. Dysesthesia in the right thigh which developed postoperatively has decreased gradually since.

**Discussion**

Various etiologies have been proposed for spinal cord cavitation, but there are three categories of the disease: "true" syringomyelia, hydromyelia, and acquired syringomyelia due to known causes such as trauma, infection, and tumor. Hydromyelia primarily manifests as central canal dilatation of the spinal cord, and syringomyelia as intramedullary cavitation extrinsic to the canal. However, these two conditions are closely related and so difficult to differentiate based on clinical manifestations or neuroimages that they are sometimes combined into the single entity syringohydromyelia.

Detailed microscopic descriptions of the wall of the syrinx have been reported. The macroscopic appearance includes thick strands or blood vessels in the cavity, and often communication between the "true" syringomyelic cavity and the central canal. These findings were obtained either at autopsy or by direct visual observation during operations, and so are subject to postmortem deformations and discolorations, and the limited angle of vision allowed by the myelotomy.

The endoscope used in this study has a small diameter (0.75 mm), is flexible, and provides a wide angle of view (55 degrees), so good visualization was obtained even in the deep part of the cavity. A cleft was observed in the midline of the ventral wall, with vessels emerging and running along the wall to the right and left. These vessels probably originated from the anterior median fissure and branches of the anterior spinal artery, suggesting that the major part of the cavity was the enlarged central canal, i.e. a
hydromyelic cavity. Several strands accompanied the blood vessels and passed from one wall to another in the caudal part of the cavity. The presence or absence of any obstacles in the subarachnoid space could also be ascertained using the endoscope. Based on these findings, the shunt tube was inserted rostrally into the cavity and caudally into the subarachnoid space. We suggest that the use of an endoscope can ensure safer operation and possibly longer shunt patency.

References


Address reprint requests to: S. Nagasawa, M.D., Department of Neurosurgery, Osaka Medical College, 2-7 Daigaku-cho, Takatsuki, Osaka 569, Japan.