

Exploring the brain and spinal cord by a fine flexible fiberscope

Koki Shimoji^{1-3*}

¹Professor Emeritus, Niigata University Graduate School of Medicine, Japan

²Director, Standard Medical Information Center NPO, Japan

³Director, Pain Control Institute, Inc., Japan

Since we demonstrated the feasibility of inserting a fine flexible fiberscope through the lumbar spinal tap method to the human cisterna magna and cerebral ventricles in 1988 [1], 1991 [2] and 2009 [3,4], there have been no further developments in this new method, seemingly due to the difficulty in manipulating techniques and manufacturing so fine flexible fiberscopes, except the similar work by Layer *et al.* [5]. They, however, used the guide wire for insertion of the fiberscopes, which could cause the damage to the spinal cord or brain. The fibers should be floating and flexible throughout in the subarachnoid space.

Our study demonstrated that the brainstem structures can be safely and easily visualized with this method. The safety of this technique could be assured by the following 5 precautions.

First, the fiberscopes were introduced through a subarachnoid puncture at the lumbosacral level (L5/S or L4/L5 level), which eliminates the possibility of injuring the spinal cord. Second, the fiberscopes are fine and flexible enough to float easily in the cerebrospinal fluid (CSF). Even when the fiberscope hit the roots or vessels in the CSF, it slips out of those structures without causing any discomfort in all 25 patients except 6 abandoned cases with chronic arachnoiditis [2]. Third, all the procedures were carried out in patients during wakefulness and instructed beforehand to inform any discomfort or dysesthesia during the procedures. Fourth, the operator communicated with the patients frequently throughout the procedures, and monitored the patient's general condition. Fifth, constant visualization through the fiberscope image and x-ray image showed the position of the fiberscope tip during the procedures.

The safety of the present techniques was further supported by the absence of any major complications afterwards except headache occurred in the first 4 cases. The study showed that these headaches were caused by the dural puncture and prevented by the epidural saline injection and bed rest after the test [6].

Transaqueductal navigation of the 4th ventricles were also safely and successfully carried out by Longatti *et al.* [7] with 'small flexible endoscopes', which was however carried out through a frontal burr hole.

In addition to safety, this technique is simple to carry out and needs no surgical procedures. The method is so simple and safe that it could be carried out at the bedside once the operator becomes familiar with the techniques.

At the same time, advancement in technology to manufacture such fine, flexible and operable fiberscopes is longed for exploring visually the brain diseases and treating these.

References

1. Shimoji K, Fukuda S, Fujioka H, Matsuki M, Fujiwara N, et al. (1988) Development of fine fiberscopes for subarachnoid and epidural spaces (in Japanese). *J Soc Clin Anesth* 8: 215-220.
2. Shimoji K, Fujioka H, Onodera M, Hokari T, Fukuda S, et al. (1991) Observation of spinal canals and cisternae with the newly developed small-diameter, flexible fiberscopes. *Anesthesiology* 75: 341-344. [[Crossref](#)]
3. Shimoji K, Ogura M, Gamou S, Yunokawa S, Sakamoto H, et al. (2009) A new approach for observing cerebral cisterns and ventricles via a percutaneous lumbosacral route by using fine, flexible fiberscopes. *J Neurosurg* 110: 376-81. [[Crossref](#)]
4. Purdy P (2009) Lumbosacral fiberscope. *J Neurosurg* 110: 374. [[CrossRef](#)]
5. Layer L, Riascos R, Firouzbakht F, Amole A, Von Ritschl R, et al. (2011) Subarachnoid and basal cistern navigation through the sacral hiatus with guide wire assistance. *Neurol Res* 33:633-7. [[Crossref](#)]
6. Bridenbaugh PO, Kennedy, Jr WF (1980) Spinal, subarachnoid neural blockade. In: Michael JC, Phillip OB (Eds.), *Neural Blockade in Clinical Anesthesia and Management of Pain*. Philadelphia: J B Lippincott 146-75.
7. Longatti P, Fiorindi A, Feletti A, D'Avella D, Martinuzzi A (2008) Endoscopic anatomy of the fourth ventricle. *J Neurosurg* 109:530-5. [[Crossref](#)]

Copyright: ©2017 Shimoji K. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Correspondence to: Koki Shimoji, MD, PhD, FRCA, Professor Emeritus, Niigata University Graduate School of Medicine, Japan, E-mail: koki-shimoji@nifty.com

Received: April 10, 2017; **Accepted:** April 22, 2017; **Published:** April 25, 2017