Neurosurgical forum
Letters to the editor

Filum terminale

To The Editor: We read with interest the article by Gaddam et al.1 (Gaddam SSK, Santhi V, Babu S, et al: Gross and microscopic study of the filum terminale: does the filum contain functional neural elements? Laboratory investigation. J Neurosurg Pediatr 9:86–92, January 2012). The authors are to be congratulated on their study, which demonstrates for the first time the presence of neural connections between the filum terminale and cauda equina roots, thereby supporting the importance of intraoperative neural stimulation studies before sectioning of the filum terminale. The authors described 2 types of connections between the filum terminale and the nerve roots: Type I, nerves traversing within the filum terminale; and Type II, nerves traversing the surface of the filum terminale.

Neurosurgeons routinely use intraoperative neurological monitoring such as motor-evoked potentials and free-running electromyograms (EMGs). Adult cases of thickened filum terminale are sometimes encountered in association with tethered spinal cord. In such cases, after the dura is opened during surgery, the filum terminale is isolated and sterile bipolar stimulation applied in the 0.2–0.5 mA range. If the patient responds to EMG stimulation in the leg or perianal external sphincter, or even if the patient shows no external response, but a recording electrode located distally on the filum terminale shows conduction from proximal stimulation of the filum terminale, then section of the filum terminale is not performed. We have seen good outcomes using this technique. Patients are counseled before surgery that intraoperative neurological monitoring results may preclude sectioning of the filum terminale. They are also counseled that even when satisfactory neural monitoring demonstrates the absence of conduction, a risk of neurological deficit remains.

Again, the authors are to be congratulated on showing clear anatomical and histological photomicrographs that support the importance of utilizing intraoperative monitoring techniques in adult patients with thickened filum terminale and/or tethered spinal cord before sectioning the filum terminale.

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Disclosure
The authors report no conflict of interest.

Reference

Response: We thank Gilbert and colleagues for their comments on our paper. The surgical implication of our findings is that sectioning of the filum should be undertaken only after intraoperative stimulation studies have revealed a lack of any functioning neural elements within it. In a previous study of intraoperative monitoring of the sacral roots in patients undergoing surgery for tethered cord or tumors, we found responses on stimulation of the filum in 3 (11.5%) of 26 patients.1 In these 3 patients, we did not proceed with the planned section of the filum. We are pleased to note that Gilbert et al. have also encountered “functional” filum terminale in some of their patients as their experience lends credence to the anatomical findings reported by us. It would have been informative if they could have indicated the proportion of their patients in whom they found a “functional” filum. An important point that they have noted is the need to counsel patients preoperatively regarding the possibility of not going through with a planned section of the filum in the event of finding responses on stimulation.

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Cerebrospinal fluid drainage

To The Editor: I wish to thank Drs. Ramakrishna and colleagues1 for their informative case report (Ramakrishna R, Mai JC, Filardi T, et al: Brainstem hypertrophy, acquired Chiari malformation, syringomyelia, and hydrocephalus: diagnostic dilemma. Case report. J Neurosurg Pediatr 8:184–188, August 2011) describing the concurrence of brainstem hypertrophy, acquired Chiari malformation, syringomyelia, and hydrocephalus. In this patient, a lumbo-peritoneal (LP) shunt with adjustable valve was placed to treat a pseudomeningocele complicating posterior fossa decompression for cerebellar hemorrhage. Subsequently, over a 6-year period, the patient developed a symptomatic syringomyelia associated with brainstem hypertrophy. No ventricular enlargement was found. Posterior fossa exploration was performed with lysis of adhesions and duraplasty. This procedure resulted in resolution of the syrinx with temporary clinical improvement followed in 4 weeks by confusion, ataxia, and somnolence; syringobulbia and persistent brainstem swelling.

were discovered. The LP shunt was tied off, and the patient improved clinically once again. Three weeks later the patient’s condition deteriorated again, with somnolence, confusion, and episodic unresponsiveness. Brainstem swelling persisted without ventricular enlargement. A lumbar puncture revealed increased subarachnoid fluid pressure, and as a result, a ventriculoperitoneal shunt was inserted. Thereafter, the brainstem swelling resolved and the patient’s condition improved.

It is possible that this report describes a consequence of chronic intermediate and longer-term subarachnoid space drainage. While the index issue was the cerebellar hemorrhage and the postoperative pseudomeningocele, the effective LP shunt’s drainage of the spinal and cranial subarachnoid space resulted in both chronic hindbrain and transtentorial herniation. Along with posterior fossa arachnoiditis, the stage was set for the development of the syringomyelia. Concurrently, chronic rostral-caudal transtentorial herniation led to partial galenic and petrosal venous obstruction with midbrain, pontine, and probably rostral cerebellar edema. The posterior fossa exploration, in the face of the functioning LP shunt, may have aggravated CSF loss through the healing duralotomy and precipitated aseptic meningitis with resultant normal volume communicating hydrocephalus. It was not until the lumbar drain was removed, the posterior fossa wound healed, and the hydrocephalus was addressed, that the subarachnoid space could be reconstituted, the deep venous obstruction could be corrected, and brainstem edema could resolve.

Chronic CSF loss from the subarachnoid space is seen in nature and following neurosurgical procedures. The results of nature’s experiments are best seen in the Chiari Type II spectrum of deformations1,4,10,11 and in spontaneous intracranial hypotension syndromes.5,13,15 The iatrogenic causes of subarachnoid fluid volume loss are seen after shunting of CSF from the subarachnoid space in either the lumbar region3 or cranial compartments (from arachnoid cyst7,12 or ventricle(s)12) and following CSF fistulas complicating craniotomy.5 Whether spontaneous or iatrogenic, CSF loss can result in chronic rostral to caudal transtentorial herniation with secondary venous obstruction of the galenic and petrosal systems. Alterations in consciousness can be seen associated with rostral brainstem edema. With cessation of the CSF loss, venous distortion is relieved, edema resolves, and the patient’s altered consciousness normalizes. The many imaging features, both acute and chronic, may reflect venous obstruction and secondary redistribution of venous drainage.13 This case is unique and adds to our knowledge of the effects of chronic subarachnoid space drainage resulting in rostral to caudal transtentorial herniation with incomplete deep venous system obstruction.

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The author reports no conflict of interest.

References

RESPONSE: No response was received from the authors of the original article.

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Cribriform neuroepithelial tumor or atypical teratoid/rhabdoid tumor?

To The Editor: We read with great interest the arti-