

require thorough inspection after its use. To avoid the problems associated with the absorption of dextran 70, we recommend careful monitoring of the infusion pressure that should not exceed 150 mmHg and limiting the procedure time to less than 45 min and the infusion volume to less than 500 ml.

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## Subdural Hematoma following Spinal Anesthesia

MYRTICE E. MACON, M.D.,\* LAVONDA ARMSTRONG, M.D.,† ELI M. BROWN, M.D.‡

Subdural hematoma is a very rare yet life-threatening complication of spinal anesthesia. The purpose of this report is to describe a case of subdural hematoma following spinal anesthesia and to emphasize the importance of early diagnosis and appropriate treatment of this very serious condition.

#### CASE REPORT

A 68-yr-old male presented as an outpatient for elective inguinal hernia repair. His past medical history included a history of hypertension and hyperlipidemia but was otherwise unremarkable. The patient had previous surgery for herniorrhaphy 3 times and arthrotomy 2 times performed under general anesthesia with severe postoperative nausea and vomiting on each occasion.

The patient underwent left inguinal herniorrhaphy under spinal anesthesia. Following uncomplicated lumbar puncture at the L3-4 interspace using a 25-G spinal needle, 12 mg of 0.75% marcaine was administered. After 20 min, there was no evidence of anesthesia, so the lumbar puncture was repeated at the L2-3 interspace using the same volume of 0.75% marcaine. Satisfactory anesthesia to a level of T-5 ensued.

The intraoperative course was uncomplicated except for a decrease in systolic blood pressure from 149 to 110 mmHg that was treated by

the iv administration of ephedrine 10 mg. The patient's systolic blood pressure remained greater than 110 mmHg throughout the remainder of the operative period.

The patient had no immediate postoperative complications other than difficulty in urination that resolved spontaneously. He was discharged the following day.

On the seventh postoperative day, the patient complained of persistent left retro-orbital and left hemicranial headaches not related to position and generalized weakness and loss of appetite. The patient denied history of trauma. The headaches persisted for approximately 2 weeks, improved for 1 week, but then returned. The patient was seen by the anesthesiologist who recommended consultation with a neurologist because of the nature of the headache.

A thorough physical/neurological examination revealed no focal neurologic signs other than a slight left lateral gaze nystagmus. Computer axial tomography (CAT) scan with and without contrast revealed a left subdural hematoma with marked mass effect and midline shift and marked subfalcine herniation. The patient subsequently underwent trephination with drainage under general anesthesia without complication.

A follow-up CAT scan on postoperative day 3 showed resolution of the subdural hematoma and decreased mass effect and correction of midline shift. The patient's postoperative course was uneventful and he was discharged on the fourth postoperative day. There was no residual neurologic deficit.

#### DISCUSSION

The most frequent complication following spinal anesthesia is headache. In the majority of patients, this symptom subsides within a few days following conservative treatment including bed rest, analgesics, and fluids. Some patients require an epidural blood patch to control more severe or persistent headaches. When a headache persists despite the treatment, however, it is incumbent upon anesthesiologists to consider an intracranial complication such as subdural hematoma.

The mechanism involved is believed to be formation of a dural fistula caused by dural puncture with a spinal

\* Attending Staff, Department of Anesthesiology, Sinai Hospital of Detroit, Detroit, Michigan.

† Resident, Department of Anesthesiology, Sinai Hospital of Detroit, Detroit, Michigan.

‡ Chairman and Professor, Department of Anesthesiology, Wayne State University School of Medicine, Detroit, Michigan; and Chairman, Department of Anesthesiology, Sinai Hospital of Detroit, Detroit, Michigan.

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Address reprint requests to Dr. Brown: Department of Anesthesiology, Sinai Hospital of Detroit, 6767 West Outer Drive, Detroit, Michigan 48235-2899.

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needle. The dural fistula allows continued leakage of cerebral spinal fluid (CSF) with caudal displacement of the brain and tearing of intracranial subdural veins with formation of a subdural hematoma.<sup>1</sup> Dural fistulae following spinal anesthesia have been shown to persist for as long as 18 weeks,<sup>2</sup> and the volume of CSF lost may be over 200 ml per day which could exceed normal production.<sup>3</sup> Under these circumstances, the rupture of subdural veins is certainly conceivable. Ordinarily, one would not expect a dural puncture using a 25-G needle to produce a tear sufficiently large to cause such a serious problem. It is possible, however, that multiple dural punctures could result in sufficient CSF leakage to tear fragile veins in the cranium.

The symptoms of subdural hematoma are somewhat different from the usual postspinal headache in that the headache is more severe and persistent, even in the recumbent position. Associated symptoms of subdural hematoma include vomiting, blurring of vision, drowsiness, and disorientation. It must be emphasized, however, that many or all of these symptoms may not be apparent. The patient that we report demonstrated none of the above associated symptoms. Also, there were no localizing neurologic signs or papilledema. It is possible that the subdural hematoma occurred coincidentally and was entirely unrelated to the lumbar puncture. Trivial head injury may lead to a subdural hematoma in elderly patients and spontaneous hematoma may occur in patient treated with anticoagulants.<sup>4</sup> This patient, though somewhat elderly, gave

no history of even minor trauma and was not taking anticoagulants. Whether the subdural hematoma was coincidental or not, the fact that the patient had a spinal anesthetic must not cloud the possibility that the symptoms are a result of subdural hematoma.

The failure to make an early diagnosis of subdural hematoma may result in additional complications. Four of 14 cases reviewed by Newrick and Read resulted in death, and one other patient suffered persistent visual loss.<sup>5</sup> Consequently, when a patient complains of severe, persistent headache following spinal anesthesia unrelieved by conservative measures or epidural blood patch, one should consider the possibility of subdural hematoma. Current diagnostic procedures such as computed axial tomography should be employed so that appropriate treatment can be initiated before death or irreversible neurologic damage occurs.

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## Epidural Opioids for the Management of Pain in a Patient with the Guillain-Barré Syndrome

MICHAEL CONNELLY, M.D.,\* JONATHAN SHAGRIN, M.D.,† CAROL WARFIELD, M.D.‡

The Guillain-Barré Syndrome (GBS) is an acute post-infectious polyneuropathy characterized by demyelination of the peripheral nervous system and rapidly progressive

paralysis. The primary neurological deficit is motor loss, often accompanied by paresthesias. Pain, often severe, is a common manifestation of the disease that poses a difficult therapeutic challenge. We report a case of GBS in which severe pain was a prominent symptom that was effectively treated with epidural opioids.

#### CASE REPORT

A 34-yr-old female presented to the emergency room with complaints of pain in her lower back, later accompanied by weakness and paresthesias in her lower extremities. She was admitted to the hospital and analysis of CSF was consistent with a diagnosis of GBS with an elevated protein of 51 mg/dl. During the first 24 h in the hospital she was transferred to the intensive care unit where her trachea was later intubated when her vital capacity decreased. She then rapidly developed flaccid quadriplegia, diplopia, and facial muscle weakness. An EMG

\* Resident in Anesthesia, Beth Israel Hospital, Boston.

† Co-Director, Respiratory/Surgical Intensive Care Unit, Beth Israel Hospital; Instructor in Anesthesia, Harvard Medical School.

‡ Director, Pain Management Centre, Beth Israel Hospital and Assistant Professor in Anesthesia, Harvard Medical School.

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Address reprint requests to Dr. Connelly: Department of Anesthesia, Beth Israel Hospital, 330 Brookline Avenue, Boston, Massachusetts 02216.

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