CASE REPORTS

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Spinal Hematoma following Spinal Anesthesia in a Patient with Spina Bifida Occulta

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SPINAL hematomas leading to paraplegia are a rare but devastating complication of regional anesthesia. The following case report describes a patient diagnosed with spina bifida occulta who developed a subarachnoid hematoma and paraplegia after spinal anesthesia. She was subsequently found to have a tethered spinal cord (cord ending at L4), which may have played a role in this complication.

Case Report

A 77-yr-old woman was scheduled to undergo a left total knee replacement. She had a significant cardiac history, including a remote myocardial infarction, frequent past episodes of congestive heart failure, NYHA Class III angina (marked limitation of physical activity), and episodes of nonsustained ventricular tachycardia documented by Holter monitor. She also was diagnosed as having chronic bronchitis. She received a general anesthetic 1 yr previously for the same procedure on the other knee, and her postoperative course was complicated by congestive heart failure, unstable angina, pneumonia, and a prolonged period of delirium. Because of her numerous medical problems, spinal anesthesia was selected. She was diagnosed as a child as having spina bifida occulta. She had no symptoms from this, and the only manifestation was a skin dimple at the level of L5-S1. She had never experienced bowel or bladder dysfunction, and a preoperative neurologic examination revealed no motor or sensory abnormalities in the lower extremities.

The patient was taken to the operating room and placed in the left lateral decubitus position. A 22-gauge Quincke (sharp bevel) spinal needle was introduced into the subarachnoid space at the L3-L4 interspace on the second attempt, and the cerebral spinal fluid (CSF) flowed freely. The CSF was initially bloody but quickly cleared. No paresthesias were elicited, and the procedure was otherwise uncomplicated. Eleven milligrams of bupivicaine, 0.75%, in dextrose was injected. The patient was then turned supine, and the surgery was performed uneventfully. Postoperatively, neurologic recovery in her lower extremities was documented by the recovery room nurses.

The patient was given prophylactic subcutaneous heparin, 5000 IU, three times daily postoperatively. The platelet count, partial thromboplastin time, and prothrombin time were measured preoperatively and daily postoperatively and remained within the laboratory's normal limits. She was confused and uncooperative after the surgery, and this limited attempts to ambulate her. She sat in a chair on the third postoperative day. Her confusion also limited the extent of a daily neurologic examination, but she was documented to have normal muscle power in her legs until the fourth postoperative day, when she was found to have bilateral leg weakness and a sensory deficit starting at the T10 dermatome. A computed tomography scan was done, revealing lumbar spinal cord compression and a complex bony abnormality of the lumbar spine. The patient underwent an emergency laminectomy 5 h after the neurologic deficits were first observed. A large hematoma was found in the subarachnoid space extending from T12 to L5. It was compressing spinal nerve roots and the spinal cord, which was tethered and ended at the L4 vertebral body. Once the hematoma was removed, the neurosurgeon found an actively bleeding vein on the surface of the cord at the level of the dural puncture. The surgeon could not determine whether this was the original site of the hemorrhage or the result of the procedure to remove the hematoma. After surgery, the patient did not regain any significant neurologic function in her lower limbs.

Discussion

There is little literature on the topic of regional anesthesia and spina bifida. The more serious defects are termed *spina bifida cystica* (aperta) and involve complex bony abnormalities with cystic protrusion of neural elements (meningocele and meningomyelocele). Up to 20% of people have an incomplete formation of a single lamina in the lumbosacral spine without any other abnormalities.[1] This anomaly is usually termed *spina bifida occulta,* and it is a radiologic diagnosis and an incidental finding. Because there are no underlying abnormalities, an increased risk with spinal anesthesia would not be expected, and large numbers of these patients are receiving spinal anesthesia safely every year.

There are an intermediate group of conditions wherein the bony defect is associated with one or more anomalies of the spine, including intraspinal lipomas, dermal sinus

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tracts, dermoid cysts, fibrous bands, and diastematomyelia (splitting of the cord). These patients may have no neurologic symptoms or may have minor motor and sensory deficits of the lower limbs and bowel or bladder symptoms that can progress with age.[1] A tethered cord (a cord ending below the L2-L3 interspace) is found in 35-87% of these patients[2,3] and is thought to be responsible for the progressive neurologic symptoms.[2] Up to 50% of patients with a tethered cord have cutaneous manifestations overlying the anomaly including tufts of hair, hyperpigmented areas, cutaneous lipomas, skin dimples, hemangiomas, or hypertrophic or atrophic skin.[3] Because neurologic signs are absent or minor, there is no cystic protrusion of the meninges or neural elements, and the defects are covered by skin, some authors use the term *spina bifida occulta* to describe these anomalies.[2,3] Page has advocated that these lesions be termed *occult spinal dysraphism* to differentiate them from the more benign lesion of spina bifida occulta as described in the previous paragraph.[1] The anomaly presented in this report consisted of occult spinal dysraphism with cutaneous manifestations and a tethered cord in a woman who was neurologically asymptomatic. Most patients with a tethered cord present with neurologic symptoms in childhood, but some may not develop symptoms until late adulthood.[4]

It is impossible to be certain in this patient whether the spinal abnormality played a role in the development of the hematoma and paralysis, although there are a number of potential mechanisms whereby the tethered cord could have contributed to the complication. A subarachnoid hematoma resulting from a dural puncture below the level of the spinal cord results from trauma to radicular arteries and veins, which travel with each nerve root in the subarachnoid space.[5] With a tethered cord, there is the added possibility of lacerating vessels on the surface of the cord. A bleeding vein on the surface of the cord at the level of the spinal needle insertion was found at laminectomy in this patient. In addition, because she had a low lying spinal cord, what might have been a cauda equina syndrome resulted in complete paralysis. The delay in onset of neurologic symptoms in this patient is not unprecedented because previous reports of spinal hematomas describe symptoms of cord compression beginning 36 h[6] and 4 days[7] after lumbar puncture.

Although magnetic resonance imaging (MRI) is now the technique of choice, lumbar puncture to facilitate myelography was previously used to diagnose the abnormality in symptomatic occult spinal dysraphism. Despite the fact that many subjects were subsequently found to have tethered cords, no complications were reported in two series.[3,8]

Spina bifida occulta is not well represented in most anesthesia textbooks. The only major anesthesia text that mentions this disorder in any detail uses the term to describe lesions including those of occult spinal dysraphism and suggests that regional anesthesia would not be complicated in these patients.[9] Numerous authors writing in the neurosurgery and neuropathology literature use the term *spina bifida occulta* to include lesions with internal anomalies including a tethered cord.[2,3] Despite Page's call to clarify the terminology,[1] spina bifida occulta and occult spinal dysraphism continue to be used interchangeably. It is therefore up to the anesthesiologist to understand the extent of the anomaly in these patients before considering neuraxial anesthesia. If a patient is labeled as having spina bifida occulta because of an incidental radiographic finding and if the anomaly only involves the failure of fusion of a single lamina, then spinal anesthesia should present no increased risk. It is a common occurrence and is seldom associated with any internal anomalies.[2] However, patients with neurologic abnormalities, cutaneous manifestations, or a bony anomaly involving more than a single lamina may have a tethered cord, and spinal anesthesia may risk trauma to the cord unless tethering is first excluded by MRI.

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