CERVICAL ARACHNOIDITIS OCCURRING AFTER SPINAL ANESTHESIA

REPORT OF A CASE *

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A white soldier, 24 years of age, entered Lovell General Hospital on October 3, 1941. He had been well until June 23, 1941, when he twisted his right knee while playing baseball. He was hospitalized for this accident at an army hospital, where it was decided that, because of a demonstrable joint mouse, his knee should be explored surgically. This was done on August 1, 1941, under a spinal anesthetic consisting of a pontocaine-glucose mixture. It was found that he had also suffered a torn cruciate ligament.

The operation and the convalescence were uneventful until the fourth day, at which time he began to experience sharp, shooting pains which radiated from the neck down the right shoulder and the right arm to the finger tips. He also began to complain of pain emanating from behind the right scapula, up to the shoulder and down the right arm. This pain became rapidly and progressively worse up to and including the time of his entry into Lovell General Hospital. Two days after the onset of the pain, anesthesia began to develop in the right arm and along the ulnar side of the hand. Rapidly, over a period of two to three days, there developed a weakness of the muscles of the shoulder girdle, right arm and hand, and of the muscles of the chest. Atrophy was evident and, within six days of the onset of his disease, it was noted that he had a winged scapula.

The process lessened in rapidity, but continued relentlessly, so that at the time of his admission to this hospital, the patient stated that he was also having pain in the left arm corresponding in type to the pain suffered in the right arm. This pain again was sharp and shooting and he had begun to notice weakness of the left arm and anesthesia of the upper part of the left arm. He had noticed no voice change. Water, when swallowed, did not go up into his nose. He had no difficulty with his lower extremities. No sphincter disturbance developed. The only neurologic complaint was the unabating progression of sharp, shooting pains first down the right arm and then down the left, followed by weakness and atrophy of the right arm, beginning later in the left arm. There was a weight loss of over forty pounds.

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The patient’s family history and clinical history were irrelevant. He had had no focus of infection. He had had no pain or weakness of the shoulder girdle prior to the operation on August 1, 1941.

Neurologic examination at the time of admission revealed a curved linear scar over the medial aspect of the right knee. There was some limitation of motion of the knee with crepitus upon flexion. The other positive findings were largely confined to the shoulder girdle. There was marked atrophy of the deltoïd, supra- and infraspinatus, pectoralis and latissimus dorsi muscles. There was also atrophy of the teres major and minor, the biceps, the interossei and the lumbricales muscles on the right. There was a beginning atrophy of the deltoïd and pectoral muscles on the left as well as of the triceps and biceps muscles. This, however, was not nearly so marked as on the right. There was a winging of the scapula on the right as well as a slight degree of winging on the left. There was definite and clear-cut anesthesia of the right arm which extended over the lateral aspect of the right upper arm from the shoulder to the elbow. There was a strip of anesthesia which extended from the medial condyle of the humerus to the ulnar side of the wrist. On the left upper arm, there was a strip of anesthesia corresponding to the strip on the right arm. The left lower arm, however, was spared. The reflex changes were confined largely to the right side, the right triceps, biceps, radial and ulnar reflexes being absent. On the left side the triceps reflex was diminished.

The remainder of the nervous system was not affected. The cranial nerves, cerebrum, basal ganglia, cerebellum, et cetera showed no evidence of involvement. In the lower extremities there was no weakness or anesthesia. The reflexes on the right were increased, there being a Rossolimo’s reflex on the right as well as an unsustained ankle clonus. The abdominal reflexes were present and equal. There was a Horner’s syndrome on the right.

Roentgenograms of the cervical spine were entirely negative, as were those of the chest. Fluoroscopic examination of the chest showed that the diaphragm moved freely and normally on both sides. Examinations of the blood and urine were entirely negative. Spinal puncture showed a partial subarachnoid block as determined by the mercury manometer. Examination of the spinal fluid, however, showed no cells and no increase in the spinal fluid protein. The serologic tests of the spinal fluid and blood were negative for syphilis.

The condition of this patient was diagnosed as a lower motor neuron lesion of the cervical spinal cord, involving both the anterior and posterior roots. It was felt that the lesion probably extended from as high as the second cervical down to the seventh cervical vertebra. The differential diagnosis of this lesion was difficult. The history seemed to rule out a spinal cord tumor or syringomyelia. It was felt, however, that the lesion was either a chronic adhesive arachnoiditis or an epidural abscess requiring surgical treatment. On October 17, 1941, the oper-
ation was performed under intratracheal ether anesthesia. The operative report is summarized as follows:

The laminae of the third and fourth cervical vertebrae were removed, since the lesion had been localized clinically to this region. The dura was normal externally and was opened after the ligamentum flavum had been trimmed away. This brought to immediate view a mass of fine adhesions between the arachnoid and the cord, and covering the anterior and posterior nerve roots. These were extensive and severe. Complete inspection of the cord in this area was carried out, the dentate ligament being caught and clipped and used to rotate the cord so that the anterior surface of the cord could be carefully explored. No tumor or cystic lakes were found. The adhesions were then carefully broken down and the nerve roots freed. A catheter was passed caudal with ease, but when an attempt was made to pass it cephalad, an obstruction was encountered. Accordingly, the lamina of the second cervical vertebra was removed and the dura opened under this region. Here we found a dense, fibrous band of arachnoid adhesions between the arachnoid and the cords and the nerve root. The fibrous band was broken down with difficulty. The cord in this region was then inspected thoroughly, both anteriorly and posteriorly. There was no other pathologic finding. Hemostasis was obtained, and the catheter passed freely in both directions. The dura was closed with interrupted sutures, and the usual closure of the muscle and skin was carried out. The patient's condition at the termination of this operation was good.

The patient's postoperative convalescence was uneventful. The sutures were removed on the eighth day, at which time he already had relief from his pain and improvement in the functions of his muscles had begun. His initial progress was fast in that, within two weeks, he was beginning to have a fairly complete range of motion of his left arm and shoulder girdle, and a considerable improvement in the power and range of motion of the almost completely paralyzed right arm and hand. His anesthesia receded slowly, and at the present writing, March 1, 1942, it is completely gone. His left arm is entirely free from pain and weakness. His right arm, forearm and hand are as strong as they were prior to his initial arthroty. The right shoulder girdle and the right upper arm are still weak, but there is marked improvement compared with the condition as it was prior to laminectomy. He no longer has a winged scapula on the right. He has regained his weight and is entirely free from pain. The disability of the left arm, forearm and hand has been entirely relieved, and the disability of the right shoulder, arm, forearm and hand has been relieved approximately 85 to 90 per cent.

In any discussion as to the etiology of the condition in this man's case we must be sure that the spinal anesthelic was not merely coincidental to the onset of his disease. The usual etiologic factors which may be responsible for chronic adhesive arachnoiditis were entirely lacking in this case, there being no syphilitic infection, no trauma, or no
foci of infection. Since the spinal anesthetic was administered just four days prior to the rapid onset and progression of the arachnoiditis, we have no recourse but to question the anesthetic agent used on August 1, 1941.

Information relating to the preanesthetic medication and the spinal anesthetic administered to this patient was obtained from the hospital at which the operation on the knee was performed. Three grains of phenobarbital was given the night prior to surgery and again the following morning. Morphine sulphate, grain ¼, and scopolamine, grain ¼ₚ₉, were administered on the morning of the operation.

To produce spinal anesthesia, 17 mg. of pontocaine mixed with 1 cc. of 10 per cent glucose and diluted to a volume of 4 cc. with spinal fluid was injected into the spinal canal through the third lumbar interspace. The condition of the patient during the operation was satisfactory.

The question arises as to whether or not the spinal anesthesia was a causative factor in the formation of the cervical arachnoiditis. In view of the fact that the patient showed no evidence of a septic reaction following the spinal anesthetic, one would suppose that bacterial contamination did not occur. We were unable to find any report in the literature reviewed that pontocaine and 10 per cent glucose used as an anesthetic mixture had ever produced such an effect.

We examined the *Cumulative Index* from the years 1925 to 1940 on the subject of anesthesia—including spinal anesthesia, anesthetic complications, drugs used for spinal anesthesia—and arachnoiditis. We were unable to find a reference to the subject of cervical arachnoiditis following spinal anesthesia. There were a number of references to neurologic sequelae of spinal anesthesia such as paralysis of the abducens nerves, septic meningitis, aseptic meningitis, radiculitis, myelitis and other sequelae.

We are unable to prove whether or not the spinal anesthesia was concerned with the development of cervical arachnoiditis in the case of this patient; however, inasmuch as this particular sequence of events did occur, we feel that the case history should be reported for the sake of record.

**Summary**

We have presented the case report of a patient who developed cervical arachnoiditis four days following an operation on the leg, for which he had been given a pontocaine-glucose spinal anesthetic. Pain, anesthesia, muscle weakness and atrophy were present in varying degrees in both shoulders, arms and hands.

Cervical laminectomy performed approximately two months later revealed the pathologic process and restored to a large extent the functions of the structures involved.

The question of the spinal anesthetic as an etiologic factor in the development of the cervical arachnoiditis is discussed.