

LEFT SIXTH NERVE PALSY AND SUBDURAL HYGROMA FOLLOWING INTRATHECAL MORPHINE PUMP PLACEMENT: A CASE REPORT

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Background: An intrathecal (IT) pump is an effective drug delivery system that assists patients with chronic pain management. However, due to the invasive nature of the procedure, a complication that could arise is cerebrospinal overdrainage or leak, which could lead to adverse effects.

Case Report: The patient underwent an IT morphine pump implant for treatment of his chronic, intractable low back pain. Following the procedure, he developed persistent headaches and diplopia and was found to have left lateral rectus palsy. Imaging studies showed the development of bilateral subdural hygromas. His condition was resolved with surgical intervention and time.

Conclusions: After an extensive literature search and review, to our knowledge, this is the first reported case of sixth nerve palsy and subdural hygromas following the implant of a drug delivery system.

Key words: Abducens palsy, IT pump, subdural hygromas, intrathecal drug delivery system, lateral rectus palsy

BACKGROUND

An intrathecal (IT) pump is an effective drug delivery system that assists patients with chronic pain management. These pumps may contain, but are not limited to, opiates like morphine or hydromorphone, baclofen for spasticity, or local anesthetics. However, due to the invasive nature of the procedure, a complication that could arise is cerebrospinal fluid (CSF) overdrainage or leak, which could lead to adverse effects (1).

One of these side effects includes a palsy of the sixth cranial nerve, also known as abducens or lateral rectus palsy. This side effect is a rare, but serious complication that can manifest as severe headaches and vision problems, including diplopia (2). Although sixth nerve palsy has been reported previously with IT pumps, it has never been associated with subdural hygromas, a collection of CSF located under the brain's dural membrane. Subdural hygromas, if not identified or treated, may

lead to fatal brain herniation (3). This report describes a unique clinical case of sixth nerve palsy and subdural hygromas following an IT morphine pump implant. Following an extensive literature search and review, it can be determined that this is the first reported case of subdural hygromas and sixth nerve palsy following an IT drug delivery system (IDDS).

CASE REPORT

Our patient is a 59-year-old man who reported chronic, intractable low back pain that radiated into his bilateral lower extremities. He was nonresponsive to conservative treatment, including physical therapy and oral analgesics. He had a lumbar epidural steroid injection with no improvement of his radicular pain and bilateral lumbar medial branch blocks followed by lumbar radiofrequency ablations with transient relief of his chronic pain. The patient also had a magnetic

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resonance imaging of the lumbar spine, which was consistent with diffuse lumbar degenerative disease, for which no surgical intervention was felt to be indicated. As his pain continued to interfere with functional activities, including sleep and work, a decision was made to pursue a morphine IT pump to manage his chronic low back pain. He underwent an IT morphine pump trial, in which 0.25 mg morphine was IT injected utilizing the barbotage procedure. Following the procedure, the patient had about 60% pain relief for > 24 hours and a decision was made to pursue a permanent implant about 3 months later.

During the IT pump implant procedure, a 14G Tuohy needle was slowly advanced under fluoroscopic guidance until it entered the IT space at the L3/L4 level. Clear spinal fluid was noted. At this point in time, an IT catheter was placed through the center of the spinal needle and advanced in the IT space until the tip reached approximately the T9-T10 vertebral segment.

Additional local anesthetic in the form of a 50:50 mixture of 0.25% bupivacaine with 1% lidocaine was utilized to anesthetize the skin and subcutaneous tissues around the spinal needle. The spinal needle and IT pump catheter stylet was then removed leaving the catheter in place. An anchoring system was then placed over the catheter and secured to the subcutaneous fascia with 2-0 silk sutures. Once proper placement of the IT catheter was verified, good CSF flow was verified and the catheter was clamped.

After a pump pocket was created, it was irrigated with preservative-free normal saline. The catheter was then trimmed and an extension catheter was then connected to the catheter, which was then attached to the pump. Once a connection between the pump and catheter system was verified, the pump was placed into the pocket and secured with three 2-0 silk sutures. The 40 mL morphine pump with a concentration of 1.0 mg/mL was set to deliver at 0.25 mg/d. The patient tolerated the procedure well and there were no complications.

During a follow-up appointment several days later, the patient reported no headache or visual issues. Approximately, one week later, he had his first complaint of diplopia, headache, and photophobia and was seen in the emergency room (ER), where he had a computerized tomography (CT) scan, which was interpreted as normal. The patient was then referred to ophthalmology. He was determined to have no ocular deficits, however, was found to have left lateral rectus palsy, in which his

left eye was unable to deviate to the side. The patient was again seen in the ER, for persistent headaches and diplopia. A spinal tap was performed and the patient was found to have low-opening pressure and a normal spinal fluid evaluation. He was then seen by neurology and a blood patch was performed 8 weeks post-op, due to concerns of CSF leak from the catheter. However, the blood patch resulted in no improvement in headache or visual symptoms. He had a repeat CT scan showing the development of bilateral subdural hygromas (Fig. 1). At this point in time, neurosurgery was consulted and the patient underwent exploratory surgery, indicating the CSF leak was located around the catheter, which was passing through the dura into the IT space. Low-dural turgor was also identified. During the procedure, the dura was sutured around the catheter, preventing further CSF leaks, and the operative site was closed. Two weeks later, he was found to have a large postoperative seroma with poor healing and continued diplopia and headache. The patient elected to have the pump and catheter removed with a dural closure. At 6 months post-op, he reported the ultimate resolution of his headache and left lateral rectus palsy, with no extraocular movement deficits.

Pathophysiology

The abducens nerve innervates the ipsilateral lateral rectus muscle, which is responsible for the abduction of the eyes. Trauma or damage to the abducens nerve is noted in the etiology of lateral rectus palsy (4). However, reasons extending beyond damage might be implicated in the impairment of the nerve. These causes include infections, such as Lyme disease, bacterial or viral infections, ischemic stroke, Wernicke's encephalopathy, and demyelinating lesions caused by metabolic diseases like multiple sclerosis. Other causes can include increased or decreased intracranial pressure, tumor, or head trauma (5). However, in the case described in this paper, damage to the sixth cranial nerve may result from damage or stretching of the nerve due to a downward displacement of the brain stem caused by decreased intracranial pressure (ICP) (6). As the sixth nerve is tethered as it exits the pons and inside Dorello's canal, a decrease in ICP may have caused this downward displacement (7). Following the damage, the ability of the abducens nerve to transmit signals to abduct the eye ipsilaterally is impaired. In our case, damage to the left abducens nerve impaired our patient's ability to deviate his left eye.

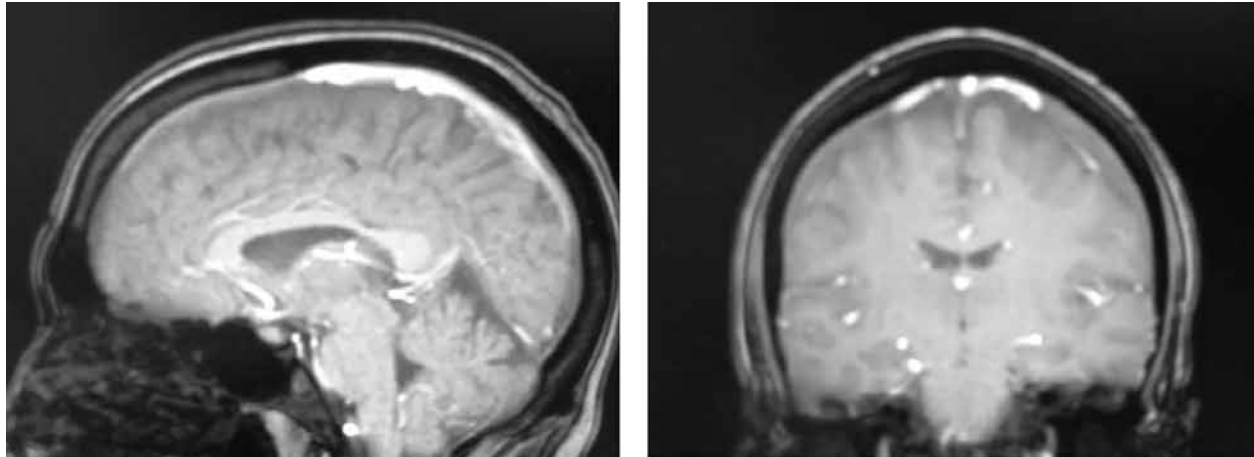


Fig. 1. Computerized tomography (CT) of the head that shows the development of bilateral subdural hygromas.

CONCLUSIONS

Although uncommon, of all cranial nerve palsies after CSF diversion or dural puncture, palsy of the sixth nerve is the most common, encompassing 83% of all cases (8). The authors feel confident this is the first reported case of sixth nerve palsy and subdural hygroma following an IDDS. It is important to recognize that despite its rarity, headache and diplopia following this procedure must be actively pursued, as cranial nerve palsy could be implicated in its cause and should be ruled out im-

mediately. Although an epidural blood patch was unsuccessful in this case, this option for treatment should be considered (1). Imaging studies will help identify whether further surgical intervention is needed. Finally, sixth cranial palsy can be reversed if specific measures are taken early on. While the spontaneous resolution of symptoms may occur, surgical intervention is often required. However, it is important to note that treatment is on a case-by-case basis and it may take several months for the symptoms to resolve.

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