Epidural Blood Patch for the Treatment of Post-laminectomy Cerebrospinal Fluid Fistula – A Case Report

Takao Motosuneya*, Ikuo Motosuneya and Hitoshi Masumo

Abstract

We report a case of an 86 year old female that presented with a refractory cerebrospinal fluid fistula after L2-L5 posterior decompression. An epidural blood patch was performed on post-operative day 21, and the leakage of cerebrospinal fluid ceased soon after the procedure, thus avoiding the need for open closure. One year after surgery, the patient showed improvement in intermittent claudication, and the post-operative wound was completely closed. The epidural blood patch is a good of treatment for cerebrospinal fluid fistula after spinal surgery.

Keywords: Epidural blood patch; Cerebrospinal fluid fistula; Durocutaneous fistula

Introduction

Cerebrospinal fluid (CSF) fistula after spinal surgery is associated with a high incidence of headache and a risk of meningitis. Thus, early active intervention such as surgical dural repair [1] or closed subarachnoid drainage [2,3] is usually recommended. Here, we performed an epidural blood patch for CSF fistula after spinal surgery, and the leakage of cerebrospinal fluid ceased soon after the procedure, avoiding the need for open closure.

Case Report

An 86 year old female experienced radiating pain of the left thigh in December 2010. The radiating pain worsened and intermittent claudication began in January 2011. The patient presented at our clinic, received oral medication, and nerve root block. However, the symptoms did not improve, and she was admitted on February 2011 for operative treatment. The patient showed hypertension, but reported no other particular medical or family histories.

At the time of admission, the patient was unable to walk over 20 meters due to severe radiating pain in the left lower extremity. She reported numbness in the lower extremities. The left femoral nerve stretch test was positive, although hypoesthesia and muscle weakness were not observed. The deep tendon reflexes in the upper and lower extremities were normal. Difficulty in urination and constipation were not reported.

Serial plain radiographs showed hyperostotic changes in the lumbar spine and lordosis was diminished. Scoliotic change and spondylolisthesis was not confirmed (Figure 1). Magnetic resonance imaging (MRI) showed compression of the dural sac between the L1/2 and L4/5 levels, and severe compression was confirmed at the L2/3 level (Figure 2).

We performed posterior decompression surgery without fusion. Initially, the patient was placed in the prone position, and a midline longitudinal incision was performed. The decompression procedure was performed bilaterally between the L1/2 and L4/5 levels with preservation of the spinous processes and the supraspinous ligament. Spinal instrumentation was not used. Although

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Received: October 15, 2012 Accepted: November 21, 2012 Published: November 24, 2012
the ligamentum flavum of L2/3 had slight adhesion with the dura, the decompression procedure was completed and the dural sac was well expanded. A breach of dural integrity or leakage of cerebrospinal fluid was not confirmed in the operating field. A closed suction drain was set before closure of the wound. Two days after surgery, the drain was removed and the patient was able to ambulate using a walker. Although a slight numbness remained, the severe radiating pain in the left lower extremity was subsided. Postoperatively, 3 cm cranial of the wound dehisced and began draining clear and colorless fluid, which confirmed a CSF fistula. Meningitis was not suspected because the blood examination revealed no evidence of inflammation, and nuchal rigidity and fever were not confirmed. Beta-2-transferrin was not examined because CSF leakage was confirmed by clinical findings [4]. Because the patient presented without motor or sensory signs, we treated by close observation [5]. We sutured dehisced skin again, and observed with bed rest.

However, due to the continuing CSF leakage, the patient was offered an epidural blood patch. The procedure was explained to the patient and her family, and possible hazards and poor performance were mentioned, both of which could necessitate further surgical intervention.

On day 21, the procedure was performed. The patient was placed in the right lateral position, and the Tuohy epidural needle (Terumo, Japan) was inserted via the T12/L1 interspinous space. After the epidural space was confirmed with loss of resistance, 15 ml of blood drawn from an antecubital vein was injected into the epidural space. The space was observed to be not resistant to injection, and no discomfort was experienced by the patient. She was maintained in supine position for 30 minutes, and fluid draining was improved completely. At 24 hours after the procedure, the patient was able to ambulate. On day 7 after the procedure, MRI on a T1 and T2-weighted image showed high signal intensity at the dorsal space of the dural sac at the T12/L1 and L2/3 levels, indicating hematoma (Figure 3). At 14 months after surgery, although a slight numbness remained, radiating pain of the left and intermittent claudication was subsided, and the post-operative wound was completely closed. MRI showed that the decompression of the dural sac was maintained (Figure 4).

Discussion

In the past, a CSF fistula after lumbar spinal surgery was managed by surgical dural repair [1] More recently, dural substitute or sealant were reported as a useful method of dural repair [6,7]. Otherwise, closed subarachnoid drainage has been recommended as an alternative to surgical intervention [2,3]. However, despite meticulous medical and nursing management, there still is an incidence of infection, including meningitis, of about 10% [3].

The epidural blood patch was reported initially by Gormley in 1960 as a treatment for headache resulting from dural puncture associated with spinal anesthesia [8]. This procedure is used widely by anesthesiologists and is recommended when conservative measures (hydration, bedrest, analgesics) fail to manage the pain [9,10]. Based on animal and laboratory studies, blood injected into the epidural space forms a clot that plugs a needle hole breach in the dura in approximately 30 minutes, and leakage of CSF was improved [10,11]. Recently, this procedure has been reported for the treatment of spontaneous low CSF pressure headache [12] and has also been reported as the treatment of a CSF fistula after spinal surgery in a few studies [13-15]. Only 3 studies report this treatment for a CSF fistula after spinal surgery, with 2 lumbar cases and 1 thoracic level case [13-15]. How long the patient should be maintained in bed after the patching are matters for conjecture. In the literature, the patients of a CSF fistula after spinal surgery were placed in bed for 24 to 48 hours [13-15]. The merit of the epidural blood patch is that general anesthesia is not necessary, and this procedure is less invasive because of no need for surgical re-exploration. Also, we can determine whether the CSF leakage has disappeared or not. Furthermore, the risk of infection is quite rare, and reports of such complications are difficult to find in the literature [13].

On the other hand, complications of the epidural blood patch are as follows. Rupp and Wilson summarize the complications as backache, back stiffness, radicular nerve discomfort, and subdural hematoma [12]. Furthermore, this procedure is technically demanding because the epidural needle must be inserted to the epidural space without puncture of the dural sac. Although there is a possibility of dural sac compression by the hematoma injected via the epidural needle, no reports of paraplesia were found in the literature. However, we must prepare for surgical intervention, such as decompression, in the case that paraplesia occurs soon after the epidural blood patch or for dural repair in the case that CSF leakage is not improved. Because only a few

Figure 3: MRI at 7 days after the epidural blood patch shows high signal intensity at the dorsal space of the dural sac at the T12/L1 and L2/3 levels, indicating hematoma (arrow). A, T1-weighted image. B, T2-weighted image.

Figure 4: MRI at 14 months after surgery shows that decompression of the dural sac was maintained.
The case reports exist in the literature, [13-15] the success rate or rational indication criteria of this procedure is unclear [5]. We consider the epidural patch should be indicated for the cases that CSF leakage is not improved by conservative therapy or the site of the dural breach was not identified at the time of surgical re-exploration [14].

**Conclusion**

Our results indicate that the epidural blood patch is a good choice of treatment for cerebrospinal fluid fistula after spinal surgery.

**References**


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