

Lateral ventriculo-peritoneal shunt treating delayed cerebrospinal fluid leak after cervical laminoplasty

Case report

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Abstract

Rationale: Delayed cerebrospinal fluid (CSF) leak is a rare and terrible complication after cervical surgery, potentially causing morbidity or even threatening life.

Patient concerns: A 55-year-old Chinese male, with a history of hypertension for 8 years, complained of numbness and weakness of both upper limbs for 10 years. Strength of right upper limb triceps and wrist extensor muscle was slight weakness. Bilateral Hoffman sign was positive. Cervical magnetic resonance imaging (MRI) indicated multilevel cervical spondylotic myelopathy. We performed cervical laminoplasty for that patient on August 23, 2018. Nevertheless, he abruptly complained of dizziness and vision, but the wound condition was good. Cervical MRI showed delayed cerebrospinal fluid leak on October 15, 2018.

Diagnoses: He was diagnosed with delayed CSF leak after cervical laminoplasty.

Interventions: We performed lateral ventriculo-peritoneal shunt (LVPS) for that patient on October 17, 2018.

Outcomes: At 3-month follow-up, the treatment has a good outcome and there is no recurrence of clinical symptoms.

Lessons: Delayed CSF leak after cervical laminoplasty is rare. Once diagnosed, surgery is needed as soon as possible. LVPS has been proven an effective treatment for this server disease.

Abbreviations: CSF = cerebrospinal fluid, CSM = cervical spondylotic myelopathy, LVPS = lateral ventriculo-peritoneal shunt, MRI = magnetic resonance imaging.

Keywords: cerebrospinal fluid leak, cervical laminoplasty, delayed, lateral ventriculo-peritoneal shunt

1. Introduction

Cervical degenerative diseases, caused by cervical spondylotic myelopathy or ossification of posterior longitudinal ligament, are common in elder population. It may seriously affect quality of life and even lead to disability.^[1,2] Cervical laminoplasty has been widely used to treat multilevel cervical degenerative diseases, which is able to provide adequately decompress spinal cord. However, it also could cause severe complications like cerebrospinal fluid (CSF) leak, which may cause wound infection, purulent meningitis, or even high risk of death. Previous studies

reported that rate of immediate CSF leak after cervical operation ranged from 0.4% and 21.1%,^[3,4] however, the incidence of delayed CSF leak has been not reported due to limited data. We present a case on lateral ventriculo-peritoneal shunt treating delayed CSF leak after laminoplasty

2. Consent

The current study was approved by ethics committee of our hospital. Informed written consent was obtained from the patient for publication of this case report and accompanying images.

3. Case report

A 55-year-old adult man with a history of hypertension complained of numbness and weakness of both upper limbs for 10 years. Physical examination showed that strength of right upper limb triceps and wrist extensor muscle was slight weakness. Bilateral Hoffman was positive. Cervical magnetic resonance imaging (MRI) indicated spinal cord compression at C3–4, C4–5, and C5–6 levels, as shown in Fig. 1. Considering multilevel spinal cord compression, we performed cervical laminoplasty on August 23, 2018. Due to less than 10 mL of drainage per day, the drainage tube was pulled out at the 3rd day after the operation, and the patient was out of hospital in 1 week after the operation without any complaint of special discomfort. However, on October 08, 2018, the patient suddenly suffered headache, dizziness, and misgivings, but the wound condition

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WG and BR contributed equally to this article.

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Figure 1. Spinal cord compression of C3–4, C4–5, and C5–6.

was good. We checked cervical MRI for him and showed a large area of high signal behind the cervical vertebra implying cerebrospinal fluid leakage (Fig. 2). Body temperature ranged from 37° to 38°. No bacterial infection was founded in cerebrospinal fluid findings. That patient was diagnosed with delayed CSF leaks after cervical laminoplasty. We performed lateral ventriculo-peritoneal shunt for that patient on October 17, 2018. The patient lay on the left side of operation table. We made a 5 cm length arc incision with the front 1.5 cm of the coronal suture as the center. The whole scalp layer was cut to both sides and the dura was cut. The ventricular end of the shunt with the needle core was then punctured along the bilateral external auditory canal to the frontal angle of the right ventricle. The pressure pump was connected and placed subcutaneously behind the occipital part. When the connection and fixation were firmly fixed, subcutaneously through the right ear, the anterior margin of the sternocleidomastoid muscle, the right side of the sternoclavicular joint, and the right side of the sternal hilt to the right upper abdomen, the shunt tube was diverted to the upper abdomen. The shunt tube drainage was smooth. The bleeding was stopped completely in the head and abdomen, and the incision was closed by suture. That patient was confined to bed rest with the head elevated 30° for at least 1 night and was given antiemetics and anti-infective therapy. Headache disappeared and cerebral ventricle shrinkage was immediately



Figure 2. Large area of high signal behind the cervical vertebra implying cerebrospinal fluid leakage on October 08, 2018.

apparent after surgery. In a week after surgery, cervical MRI showed significant reduction of cerebrospinal fluid behind the cervical spine, as shown in Fig. 3. Patient was out of hospital



Figure 3. Significant reduction of cerebrospinal fluid behind the cervical spine.



Figure 4. There was no cerebrospinal fluid behind the cervical spine at 3-month follow-up after ventriculo-peritoneal shunt.

1 week after the operation without any complaint of special discomfort. At 3-month follow-up, the symptoms did not recur and the MRI showed no change compared with postoperative one (Fig. 4).

4. Discussion

The incidence of CSF leaks ranged from 0.1% to 0.9% in different spinal procedures which was reported by previous articles. The incidence of CSF leaks in anterior cervical surgery was higher than that in posterior cervical surgery.^[5] Hannallah et al^[5] reported that patients with a diagnosis of ossification of the posterior longitudinal ligament, patients having a revision anterior procedure, men, and patients undergoing an anterior cervical corpectomy and arthrodesis were risk factors for CSF leaks. If handled improperly, it may lead to a number of severe consequences, such as CSF fistulas, meningitis, hematoma, and neurological deficits or even death. However, occurrence of delayed CSF leak is more rare than postoperative CSF leak after cervical surgery, especially for the posterior cervical procedures. We even did not find a case report on delayed CSF leak after cervical laminoplasty in PubMed database. Treatment of delayed CSF leak has typically been challenging due to the underappreciated association with hypertension and limited data catered specifically to this type of leak.

Floccari et al^[6] reported that 4 of 322 adolescent idiopathic scoliosis patients suffered delayed CSF leak following posterior spinal fusion surgery and found that delayed CSF leak resulted from pedicle screw malposition. Guyer and Turner^[7] reported that a 61-year-old woman suffered delayed CSF leak after a traumatic motor vehicle accident 12 years earlier and tried to explain the reason that small dural defects may heal spontaneously, but persistent fracture lines or areas of weakness along the

skull base can persist years beyond the injury, particularly because such fractures are rarely corrected surgically.

In our case presents a 55-year male receiving cervical laminoplasty due to multilevel spinal cord compression. Dizziness and headache suddenly appeared 6 weeks after the operation. Cervical MRI showed delayed CSF leak, which was a rare disease in clinic and tough to cure. There are a large number of surgical repair of CSF leaks including endoscopic endonasal approach, middle cranial fossa, transmastoid.^[8,9] Considering source of CSF leak was difficult to find. We performed lateral ventriculo-peritoneal shunt for him. At 3-months follow-up, the symptoms did not recur and the MRI showed no high signal in section of posterior cervical, which proved lateral ventriculo-peritoneal shunt was an effective treatment for delayed CSF leak. We deduce a possible reason for delayed CSF leak after cervical laminoplasty that spinal cord drifts backward due to decompression after laminoplasty, and then repeated collision and friction with the posterior bony structure results in thinning of the dural membrane, gradually appearing small cracks, and finally leading to large amount of cerebrospinal fluid exposure. In spite of the satisfactory results, our treatment has some limitations. First, it needs a long-term follow-up to assess the efficacy; second, we need more cases to evaluate this procedure.

In conclusion, delayed CSF leak after posterior cervical surgery is rare in clinic. Few report has reported lateral ventriculo-peritoneal shunt treating delayed CSF leak after laminoplasty. That surgical procedure is an effective treatment. We provide a method for surgeons when facing the rare case like this and we need further study to observe efficacy in long-term follow-up.

Author contributions

Methodology: Bao Ren, Ye Han.

Resources: jilong an, Xiaodong Wang.

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