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Subdural hygroma as a rare complication after revision spine surgery

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SUMMARY

Spinal fusion surgery is the most commonly performed orthopaedic surgical procedure. However, subdural hygroma occurrence is a very rare complication after revision spinal fusion surgery. Here, we report a case of revision lumbar fusion surgery at the L3–4 level. The patient developed acute conus medullaris syndrome at 10 days postoperatively. MRI showed a subdural, extra-arachnoid area fluid collection following the T12–L2, cephalad to the area of revision spinal fusion. When patients have a decreased motor grade, difficulty in voiding urine and neurological abnormalities after lumbar spine surgery, conus medullaris syndrome with a possible occurrence of subdural hygroma should be considered. In this situation, immediate imaging investigations and emergency surgery might be necessary to reduce the pressure on the spinal cord.

BACKGROUND

Spinal subdural hygroma (SSH) refers to excess fluid retention in the subdural space along the spine. SSH must be differentially diagnosed from a subdural haematoma, empyema and lipoma. This differentiation can be made using MRI, mainly owing to differences in the parts involved in these complications. Cystic lesions are located in the epiarachnoid or subdural spaces. The physiology behind cerebrospinal fluid (CSF) accumulation within the subdural space is hypothesised to result from tears in the arachnoid membrane. Although SSH is possible, it is a rare complication of cranial and spinal surgeries. Some cases of SSH have been reported following spinal decompression surgery. In the most cases, a pinhole leak in the arachnoid membrane caused SSH.[1 2]

This case report describes a postoperative complication, especially the case of a patient with conus medullaris syndrome with SSH developed proximal to the area of spinal fusion. Contrary to previously reported cases, SSH occurred very late in our case, at 10 days postoperatively.

CASE PRESENTATION

This retrospective review was conducted with the approval of the corresponding institutional review board of our hospital. A woman in her 70s with chronic kidney disease, diabetes mellitus and hypertension underwent laminectomy and discectomy at L4–5–S1 and posterior lumbar interbody fusion at L4–5–S1 2 years previously. At 1 year and 6 months after the first surgery, she visited the outpatient clinic for aggravated back pain and radiculopathy. Radiography and MRI findings revealed an L3 spinal compression fracture, severe central canal stenosis and right foraminal stenosis at L3–4, and bilateral pedicle screw loosening at L4 (figure 1A). Therefore, we performed revisional surgery. L3–4 posterior decompression and posterolateral fusion, as well as posterior instrumentation, were performed at L2–3–4.

Postoperatively, the patient underwent prolonged periods of bed rest, and her general weakness was severe. On postoperative day 8, the patient started walking. At 10 days after the revision surgery, the patient chad decreased right lower extremity motor and sensory scores. Urinary retention and sacral hypoesthesia were observed.

INVESTIGATIONS

MRI performed immediately after the patient-reported symptoms revealed a newly developed subdural fluid collection extending between T12–L1–L2, located on the right side of the canal, compressing the spinal cord (figure 1B).

TREATMENT

The patient's right lower extremity motor function deteriorated further as time passed. Therefore, we decided to perform emergency surgical exploration with posterior decompression by T12–L1–L2 laminectomy and epi-arachnoid fluid evacuation. After making a 5 mm incision in the dural sac, a yellowish fluid was drained. After fully draining this yellowish fluid, the dural sac was successfully repaired. After surgery, although the right motor grade slowly recovered, urinary retention persisted.

OUTCOME AND FOLLOW-UP

MRI performed at 2 weeks after the final surgery revealed complete removal of subdural fluid accumulation at the L1–2 level and resolved moderate spinal cord compression (figure 1C). At 4 weeks postoperatively, the patient's motor grade was restored to grade 4. The patient's sensory grade almost recovered to a normal level.

DISCUSSION

Subdural hygroma is a very rare but well-known complication of revision spinal surgery, spinal anaesthesia or Chiari malformation surgery,[1 2] such as foramen magnum decompression.[3–5] Development of neurological symptoms after spinal fusion surgery due to CSF collection is rare and difficult to diagnose.[3 6] A subdural hygroma is a CSF collection

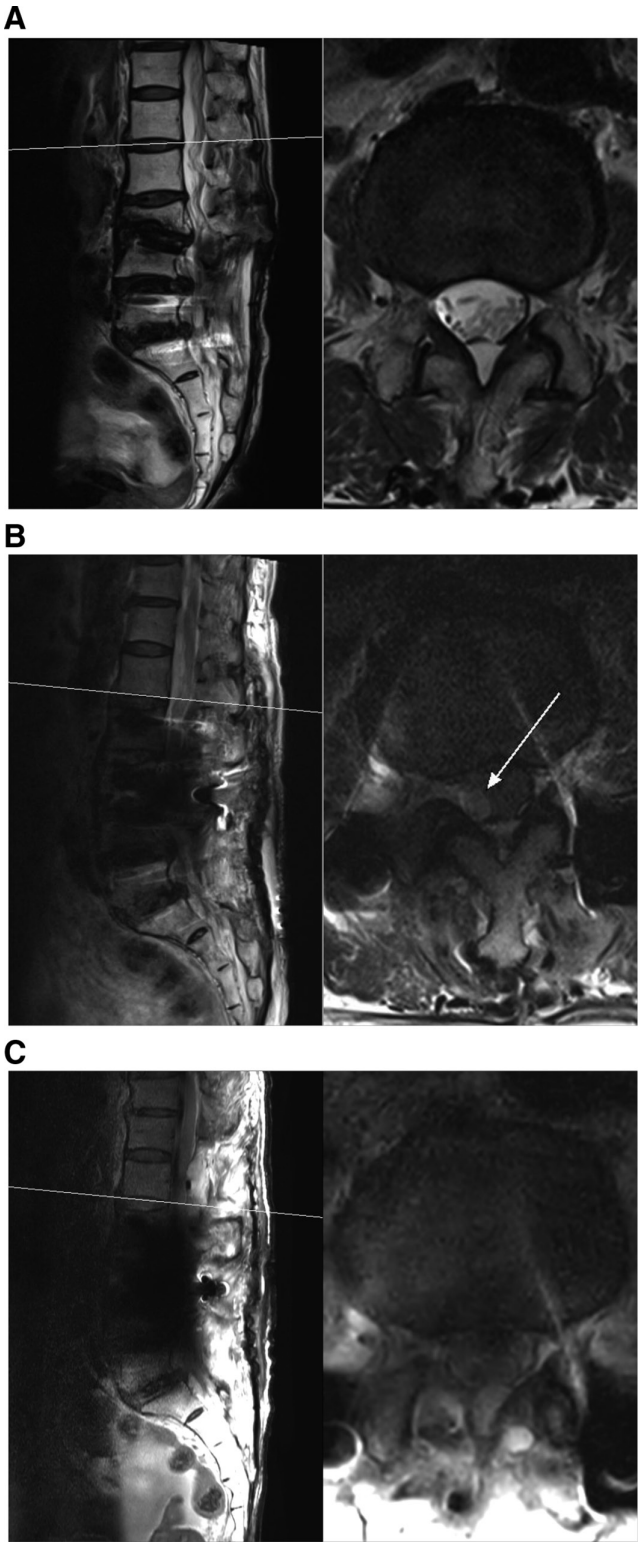

Figure 1 (A) Sagittal and axial T2-weighted MRI obtained preoperatively, 6 months after a previous laminectomy and discectomy at L4–5 and posterior lumbar interbody fusion at L4–5–S1. There were no signs of fluid collection. (B) Sagittal and axial T2 MRI obtained 10 days after the development of conus medullaris syndrome. The image reveals newly developed subdural complicated fluid collection (arrow) through the T12–L1–L2 level, which seems to cause moderate conus medullaris compromise. (C) Sagittal and axial T2 MRI obtained after hygroma evacuation. The previous fluid collection is resolved.

between the dura mater and the arachnoid membrane. In the most previous cases, incidental durotomy could occur during decompressive surgery, resulting in CSF leakage.[7 8] Without evidence of durotomy, CSF collection can be accompanied by a pinhole injury to the arachnoid membrane, and a one-way slit valve may develop, causing CSF collection in the subdural space.[9]

In this case, SSH occurred following revision fusion surgery. In most previous cases, SSH occurred 2–5 days postoperatively. This can be related to the starting point of ambulation. However, in this case, SSH occurred at 10 days postoperatively, which was different from other reported cases. The exact cause of this delay is unknown.[4 5] However, ambulation was delayed owing to the patient's poor post-operative condition and remarkable medical history. The symptoms developed at 2 days after ambulation, and the onset of SSH might have been related to the initiation of ambulation and movement of fluids in the epiarachnoid space. There were no events, such as dura tears, during the operation. Nevertheless, as this was a revision fusion surgery, the risk of dura injury was higher. Generally, the fluid collection was caused by a pinhole injury to the arachnoid membrane resulting in a spread of fluid in the subdural and epiarachnoid space, which might have been caused by the movement of the collected fluid in the subdural space after ambulation.[7 8]

In cases where the motor grade decreased a few days after surgery, the cause of the haematoma was considered first, and MRI scanning was urgently performed after a physical examination. It should be noted that SSH could also cause spinal cord or root compression after spinal fusion surgery. Therefore, it is necessary to note that rapid MRI and treatment could affect a patient's long-term outcomes.[10–12] In previous studies, the cause of SSH was only a hypothesis, and no clear cause was ever revealed. To prevent SSH after revision spinal fusion surgery, more researches on the causative factors are needed.

SSH should be considered one of the causes of motor weakness after revision lumbar fusion surgery. Early diagnosis and decompression surgery may help achieve recovery.

Learning points

- Subdural hygroma is a rare complication after revision spinal fusion surgery.
- When delayed motor weakness is evoked after revision spinal fusion surgery, a subdural hygroma may be the cause.
- To make a differential diagnosis of subdural hygroma from other problems, detailed history taking, physical examination and performing MRI are essential.
- When subdural hygroma is diagnosed, it is important to treat it with surgery quickly to achieve recovery.

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Case reports provide a valuable learning resource for the scientific community and can indicate areas of interest for future research. They should not be used in isolation to guide treatment choices or public health policy.

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