

Technical Note

Full-endoscopic interlaminar removal of chronic lumbar epidural hematoma after spinal manipulation

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[†]The first two authors contributed equally to this work**Abstract****Background:** Spinal manipulation is widely used for low back pain treatments. Complications associated with spinal manipulation are seen. Lumbar epidural hematoma (EDH) is one of the complications reported in the literature. If lumbar chronic EDH symptoms are present, which are similar to those of a herniated nucleus pulposus, surgery may be considered if medical treatment fails. Percutaneous endoscopic discectomy utilizing an interlaminar approach can be successfully applied to those with herniated nucleus pulposus. We use the same technique to remove the lumbar chronic EDH, which is the first documented report in the related literature.**Methods:** We present a case with chronic lumbar EDH associated with spinal manipulation. Neurologic deficits were noted on physical examination. We arranged for a full-endoscopic interlaminar approach to remove the hematoma for the patient with the rigid endoscopy (Vertebri system; Richard Wolf, Knittlingen, Germany).**Results:** After surgery, the patient's radiculopathy immediately began to disappear. Magnetic resonance imaging (MRI) follow-up 10 days after the surgery revealed no residual hematoma. No complications were noted during the outpatient department follow up.**Conclusions:** Lumbar EDH is a possible complication of spinal manipulation. Patient experiencing rapidly progressive neurologic deficit require early surgical evacuation, while conservative treatment may only be applied to those with mild symptoms. A percutaneous full-endoscopic interlaminar approach may be a viable alternative for the treatment of those with chronic EDH with progressive neurologic deficits.**Key Words:** Chronic epidural hematoma, endoscopic, interlaminar, lumbar, spinal manipulation**Access this article online****Website:**www.surgicalneurologyint.com**DOI:**

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Quick Response Code:**INTRODUCTION**

Lower back pain treatments can vary greatly. Among

them, spinal manipulation is widely used. Complications associated with spinal manipulation are frequently seen in the cervical region, as well as some in the lumbar

region. Solheim *et al.*^[20] reported a case of lumbar epidural hematoma (EDH) that occurred receiving chiropractic manipulation, which highlighted to us the possibility of such complications. The etiology of spinal epidural hematoma (SEH) can be separated into three types: Idiopathic, secondary, and spontaneous.^[19] Spinal manipulation is one of the secondary forms of SEH. In acute lumbar EDHs with severe neurologic deficit such as cauda equine syndrome, early surgical intervention is often required. If lumbar chronic EDH symptoms are present, which are similar to those of a herniated nucleus pulposus, surgery may be considered if medical treatment fails. Percutaneous endoscopic discectomy utilizing an interlaminar approach can be successfully applied to those with herniated nucleus pulposus.^[18] We now present a case with chronic lumbar EDH associated with spinal manipulation treated with a full-endoscopic interlaminar approach to remove the hematoma, which is the first documented report in the related literature.

MATERIALS AND METHODS

The patient was a 63-year-old male with no obvious illness. He had back pain that lasted for 1 year before his first outpatient department (OPD) visit and was not associated with any traumatic episode. No coagulation disorders or anticoagulation medication had been used. Before his first OPD visit, he had already tried medical treatment for 3 months, but mild to moderate back pain still gave him discomfort and was found to be bothersome. Lumbar plain film was arranged and showed no spondylolisthesis or fracture was observed. Magnetic resonance imaging (MRI) revealed only mild bulging disc over the L4-5 L5-S1 and no spinal stenosis was discovered [Figure 1]. On his second OPD visit 2 months later, he complained of left leg pain and soreness, which was noted after receiving spinal lumbar manipulation twice a month before. On physical examination, no obvious muscle weakness was observed. Left L5 root sensory disturbance was found. No drop foot was noted and he was still able to walk. Bilateral patellar tendon reflex and bilateral ankle jerk reflexes were all normal. Bladder and bowel functions were also normal. There was no local tenderness on his lumbar region. Furthermore, there were no signs of tension of the femoral or sciatic nerves. Laboratory examination revealed that coagulation parameters were within normal ranges. An MRI was arranged again and demonstrated an extradural mass in the left post-erolateral spinal canal at the L5-S1 level [Figure 2]. The mass lesion extended upwards to compress the left L5 exiting nerve root. It was an inhomogeneous hyperintensity mass on T1-weighted images, and a high to intermittent intensity mass on T2-weighted images [Figure 3a, b]. The extradural mass was adjacent to the left L5-S1 facet joint and compressed the dural sac. We arranged for a full-endoscopic



Figure 1: Sagittal MRI revealed mild bulging disc over L5-S1 level without stenosis

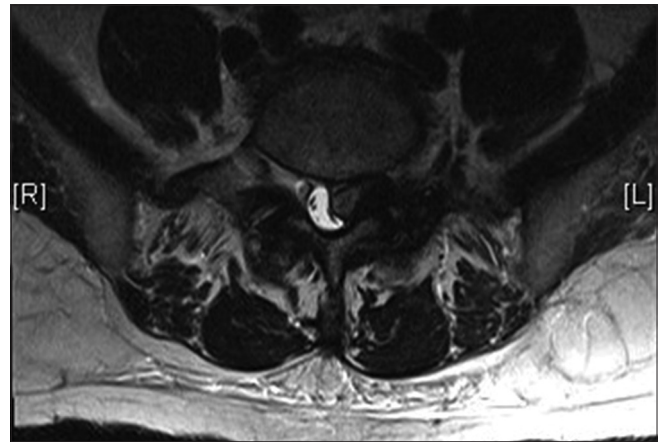


Figure 2: Axial MRI revealed an extradural mass in the left posterolateral spinal canal at the L5-S1 level



Figure 3: Sagittal MRI showed (a) inhomogeneous hyperintensity mass on T1-weighted images, and (b) a high to intermittent intensity mass on T2-weighted images

interlaminar approach to remove the hematoma for the patient. After receiving general anesthesia, the patient was placed in a prone position with fluoroscopic guidance. A vertical small (8 mm) skin incision was made midway between the left medial margin of the L5-S1 facet joint

and the L5 spinous process in the L5-S1 interlaminar window.^[6,18] [Figure 4]. A dilator (6.9 mm diameter) was inserted under fluoroscopic assist at the lateral edge of the left L5-S1 interlaminar window, and the medial margin of the L5-S1 facet joint and the inferior margin of the L5 lamina were touched with the dilator. A working channel with a beveled opening (8.0 mm outer diameter) was inserted over the dilator and a rigid endoscope (Vertebris system; Richard Wolf, Knittlingen, Germany) was introduced after the removal of the obturator [Figure 5a]. After flavum ligament was cut with endopunch, no flavum ligament origin hematoma was revealed. We identified an encapsulated hematoma over the left L5 exiting nerve root axilla region with an upward compression of Left L5 root [Figure 5b]. The encapsulated hematoma was then punctured by endoscopic bipolar coagulation, which revealed old coagulated dark-brown blood [Figure 5c], but no malignant cells were found during the histological examination. Histologic examination of the surgical specimen showed a hematoma with fibrin deposition. Typical synovial membranes were absent.

RESULTS

After surgery, the patient's left leg pain immediately improved. MRI follow-up 10 days after the surgery revealed no residual hematoma [Figure 6].

DISCUSSIONS

Lumbar EDH with neurologic deficit usually requires surgical intervention to decompress the nerve root and spinal canal. Conservative treatment may be considered in cases of mild neurologic deficit patients,^[13] and close follow-up is, of course, required.^[9] Although there is a case report of spontaneous regression of traumatic lumbar EDH,^[2] but most in the related literature involve performing a laminectomy or hemilaminectomy to remove the hematoma.^[1,5,14] Laminectomy can cause damage to the spinal ligaments with a risk of spinal instability,^[17] and therefore hemilaminectomy is chosen when hematomas are located in the lateral or dorsolateral spinal canal region.

The clinical presentation of lumbar EDH is variable. In our case, a patient who suffered from left leg pain gradually after spinal manipulation made us aware of the possibility of traumatic or secondary lumbar EDH. Also, the leg pain becoming gradually intolerable hinted to us the chronic level of this situation. An MRI is the preferred diagnostic tool for lumbar EDH, which can reveal the location and extension of the hematoma and the degree of lumbar nerve root compression. Although in the lumbar region, encapsulated spaces lacking a capillary network may have a different time course in MRI signal presentation as compared with that in parenchymatous

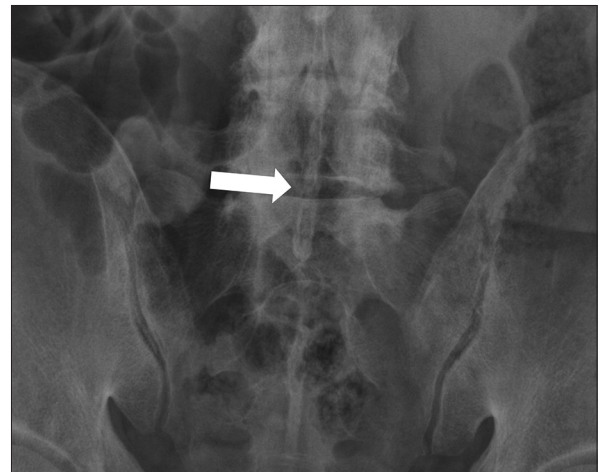


Figure 4: Plan film revealed interlaminar space over L5-S1 which is the entry point of percutaneous endoscopy

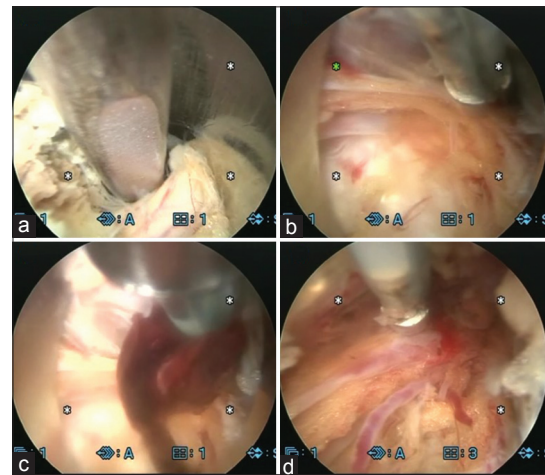


Figure 5: Full endoscopic views: (a) A working channel was inserted after flavum ligament opened. (b) An encapsulated hematoma was found. (c) The hematoma was punctured. (d) Ellman bipolar flexible radiofrequency probe tip is activated over the bleeding points around the hematoma once hematoma is removed

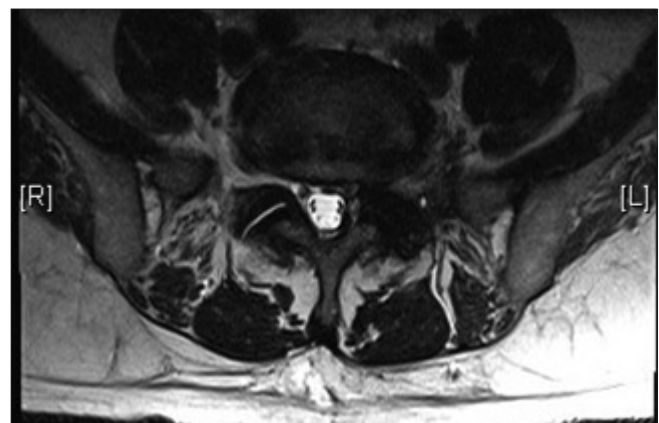


Figure 6: Postoperation follow-up axial T2-weighted MRI revealed no residual hematoma

organs such as the brain. The MRI presentation of the hematoma related to the hematoma stage could roughly be predicted.^[7] It is usually isointense on T1-weighted and hyperintense on T2-weighted MRI in the acute stage within 24 h following symptom beginning, and hyperintense on both T1- and T2-weighted MRI on subacute or chronic stages,^[3,4,11] which is compatible with our patient's MRI finding, implying that spinal manipulation related to the lumbar EDH was the main reason for this clinical complaint.

Surgical intervention to decompress the nerve root and spinal canal is considered if neurologic deficit progression is observed and it becomes unbearable. The traditional open procedure for lumbar decompression uses a midline approach. Bilateral subperiosteal dissection of the paraspinal muscles is performed followed by removal of the spinous process and lamina to expose the lumbar canal. Hemilaminectomy to keep the spinous process intact and supraspinous ligament continuity is generally chosen when possible. Recent advances in minimal access techniques by using muscle-splitting nonexpandable or expandable tubular retractors have benefits, which include decreased pain, decreased blood loss, lower rates of infection, and preservation of the normal biomechanics of the spine.^[8,10,15,16] Hemilaminectomy can be done in a minimally invasive way. The location and extension of the hematoma may limit our choice of surgery. In our case, with the lumbar EDH over left L5 exiting nerve root axilla region, it was relatively easy to perform the hemilaminectomy to remove the mass lesion. The percutaneous full-endoscopic approach from the left L5-S1 interlaminar window provides a minimally invasive way to remove the hematoma in addition to offering better cosmetic results in terms of appearance. In addition, endoscopic equipment has a good lens view that is close to the pathology to help to make the intraoperative differential diagnosis of EDH more accurate. In the related literature, facet cyst hematoma or synovial cyst hemorrhage with rupture or ligamentum flavum hematoma can all cause neurologic deficit with lumbar EDH presentation.^[5,12,14,21] Percutaneous full-endoscopic interlaminar approach (PEID) with endoscopic instruments assistance can fenestrate the encapsulated hematoma and remove it by utilizing continuous saline irrigation to wash out the hematoma. The full-endoscopic approach to the spinal canal can be divided in two routes, interlaminar and transforaminal.^[18] The reason to choose the interlaminar approach is that it is easy to convert to open surgery if the procedure fails. Furthermore, the safety concern of the percutaneous full-endoscopic technique is that the hemostasis is usually controlled by 4.0 MHz bipolar flexible radiofrequency probe (Ellman Trigger-Flex Probe™, Ellman International, Hewitt, New York, USA). The probe tip is activated over the bleeding points around the hematoma once the hematoma is washed out

as shown in Figure 5D. According to the retrospective investigation of the Spinal Endoscopic Surgery/Endoscopic Technical Accreditation System Committee of The Japanese Orthopedic Association (JOA), EDH is a recognized complication of endoscopic spinal surgery with incidence of approximately 1.5% in the lumbar discectomy group, but since endoscopic spinal surgery is using a micro endoscopic discectomy (MED) system by Medtronic, which is different from the percutaneous full-endoscopic system by Wolf, the incidence rate of postprocedure lumbar EDH may be even lower due to its utilization, involving only minimal access to the target lesion. Therefore, the percutaneous endoscopic interlaminar approach to remove hematoma and achieve adequate hemostasis can be performed safely and provides an alternative surgical choice when dealing with chronic lumbar EDH.

CONCLUSION

Lumbar EDH is a possible complication of spinal manipulation. Patient experiencing rapidly progressive neurologic deficit require early surgical evacuation, while conservative treatment may only be applied to those with mild symptoms. Although lumbar laminectomy to decompress the spinal canal or root is the mainstream management in those with neurologic deficits caused by EDH, a percutaneous full-endoscopic interlaminar approach may be a viable alternative for the treatment of those with chronic EDH with progressive neurologic deficits.

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