

## Acute lumbosacral hemorrhagic ganglion cyst after transforaminal epidural steroid injection



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### ABSTRACT

Epidural steroid injection is one of the most commonly used non-surgical treatments for degenerative lumbar vertebral disease. Its use has increased as degenerative lumbar vertebral disease has increased in frequency. Concomitant complications are being reported more often. In this report, we report a rare case of iatrogenic hemorrhagic cyst following epidural steroid injection. The patient underwent operative treatment with complete resolution of his symptoms

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### Introduction

Epidural steroid injection is one of the most commonly used non-surgical treatments for degenerative lumbar vertebral disease in the presence of radiating pain in the lower extremities, and its success rate has been established.<sup>1</sup> However, complications, such as subdural or subarachnoid hemorrhage, epidural abscess, discitis, paralysis, vasovagal reaction, aggravation of pain, facial flushing, and headache, are increasingly reported along with the increasing frequency of the treatment.<sup>2</sup> Spinal facet cysts are usually secondary to spondylotic changes that can occur as part of the degenerative process. Rarely, a facet cyst can become hemorrhagic; the mechanisms by which it does so are unclear, although contributing factors such as trauma, use of anticoagulants, and the presence of vascular anomalies have been identified.<sup>3</sup> MRI is

considered a good modality for diagnosis. Furthermore, because hemorrhagic cysts seldom respond to conservative treatment, the authors advocate proceeding with surgical excision.<sup>4</sup> Herein, we report a rare case of a patient with degenerative lumbar vertebral disease involving an asymptomatic intraspinal juxtafacet cyst located between L5 and S1. The patient suffered from pain and aggravation of neurologic symptoms caused by the hemorrhagic cyst following an epidural steroid injection, was treated surgically, and has a good prognosis. We report this case along with a literature review.

### Case report

A 79-year-old female patient transferred to our hospital for severe pain, paresthesia, and weakness in the right lower extremity after an epidural steroid injection. According to her medical history, the patient was taking medication for hypertension and underwent percutaneous vertebroplasty after being diagnosed with a compression fracture in L3 due to a fall. Other than that, there was no specific history of trauma. An asymptomatic cystic change located in the right facet joint between L5 and S1, 5.0 × 5.0 × 5.0 mm in size, was accidentally discovered 3 months ago on MRI, and a mild degree of spinal stenosis was present in

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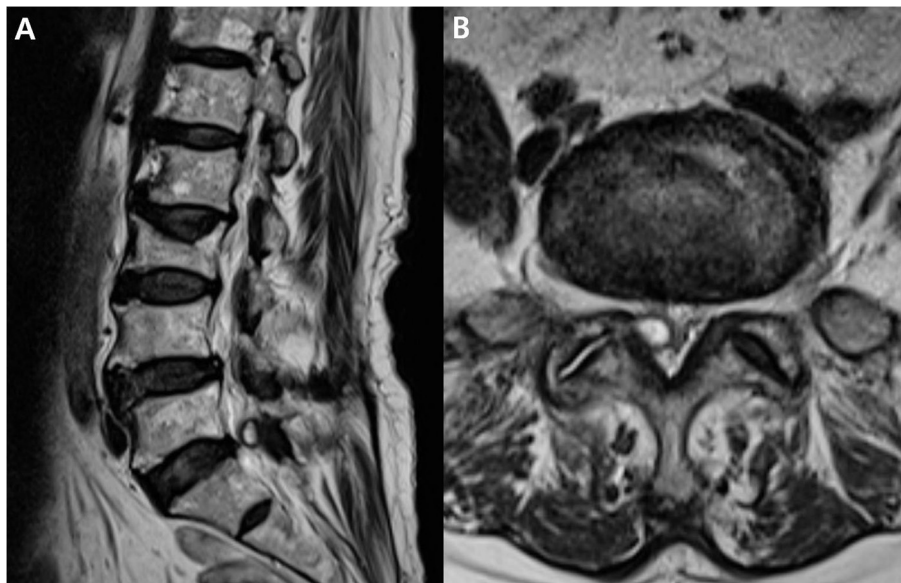
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multiple segments of the lumbar vertebrae; the cyst did not seem to accompany a notable degree of pain, and conservative treatment was done (Fig. 1). One month prior to transferring to our hospital, 3 trials of transforaminal steroid injection between the right L5 and S1 vertebrae were performed within a one-month period, and the patient was transferred to our hospital one day after the last injection, at which point she was suffering from severe pain, paresthesia, and weakness in the right lower extremity. On a physical examination done at the time of hospitalization, the patient complained of severe pain in the lumbar area and radiating pain in the right lower extremity. She was positive in the straight leg raise test at 30°, and positive for claudication after 5 m of ambulation. Neurologic examination concluded with a decrease in sensory function by 30% compared to the unaffected side along the dermatome corresponding to L5 and S1 in the lower leg and foot. Dorsiflexion of the ankle and extension of the toe were graded American Spinal Injury Association (ASIA) motor power grade V, and plantarflexion of the ankle was ASIA grade III. The deep tendon reflex in the knee joint and foot joint was bilaterally symmetric, and abnormal findings, such as coagulopathy, were not uncovered on hematologic examination. Plain radiographs of the lumbar vertebrae presented vertebroplasty at L3 and sclerotic changes in bony spurs and the vertebral body, but narrowing of the intervertebral space and other intervertebral disc lesions were not conspicuous, and flexion and extension views did not show intervertebral instability. On a CT scan, formation of a bony spur at the facet joint between L5 and S1, narrowing of the facet joint, and low signal intensity in T1-weighted images were observed. Also, an ovoid cyst 12.6 × 9.5 × 13.1 mm in size with inhomogeneous and high signal intensity in T2-weighted images at the posterolateral epidural area were observed on MRI (Fig. 2). By comparing the results with those of an MRI scan taken 3 months prior, it was concluded that the cyst existed back then and its size had increased. In order to accurately comprehend the pattern of the cystic changes, intraspinal myelography was performed, and CT scans of the lumbar vertebrae 6 h and 12 h later were taken to confirm non-leakage of radio-contrast dye into the cyst. We were able to conclude that the cyst was derived from the epidural facet joint (Fig. 3). Surgical removal was planned, as the patient's degree of pain and neurologic symptoms

seemed to progress. Removal of the cyst following right L5 partial laminectomy was originally planned, but we encountered difficulties in security of sight and excision, and excision of the cyst following posterior decompression through total laminectomy was performed. Pre-operative radiography showed degenerative changes in the lumbar vertebral area accompanying spinal stenosis, so posterolateral fusion between L5 and S1 was performed as well. Under surgical evaluation, the cyst in the right epidural area in L5 was discovered to be compressing the thecal sac and L5 nerve root, and it presented with severe adhesion to the surrounding dura. It was carefully isolated and totally excised. Pathologic evaluation of the excised cyst revealed a hemorrhage on the inside and the presence of hemosiderin-laden macrophages, and angiogenesis was observed in multiple parts of the cystic wall. However, formation of air bubbles and steroid accumulation were not observed on the inside of the cyst, and arrangement of the synovium or synovial cell lining was not seen. The condition was finally diagnosed as an iatrogenic hemorrhagic ganglion cyst due to injection with a needle (Fig. 4). The radiating pain in the right lower extremity ameliorated after surgery over the course of several days, the paresthesia and weakness also improved, and the patient was able to ambulate. Upon follow-up 1 year after the operation, the patient used a walking stick to ambulate due to degenerative lumbar vertebral disease, but the initial clinical findings, such as radiating pain, paresthesia, and weakness, were not seen and there was no evidence of relapse.

## Discussion

Juxtafacet cysts are known to be rare, but, when one does occur, it is usually located in the lumbar vertebrae, and it may manifest with such clinical presentations as radiculopathy, myelopathy, spinal stenosis, and cauda equine syndrome.<sup>5</sup> Recently, the use of CT and MRI have become more frequent, and asymptomatic intraspinal cysts are diagnosed incidentally at a rate of 7.0–22.4%.<sup>6</sup> Likewise, an incidentally discovered juxtafacet cyst may be associated with no symptoms at all or may undergo spontaneous regression; on the other hand, through hemorrhagic or non-hemorrhagic mechanisms, its size may increase, and 0.5% of



**Fig. 1.** Magnetic resonance images of the lumbar spine at pre-operative 3 months, demonstrating the location of the cyst and the compromised portion of the spinal canal on T2-weighted images (A and B). The cyst was associated with the facet joint and posterolateral to the thecal sac, and it was about 5.0 × 5.0 × 5.0 mm in size.



**Fig. 2.** Magnetic resonance images of the lumbar spine after epidural steroid injection, indicating that the size of the juxtafacet cyst had increased (to about  $12.6 \times 9.5 \times 13.1$  mm). The scans reveal hypointensity on a T1 axial image (A), hyperintensity on a T2 axial image (B), hyperintensity on a fat-suppressed T2 image (C), and a non-enhanced cyst with peripheral rim enhancement on a contrast-enhanced image (D).

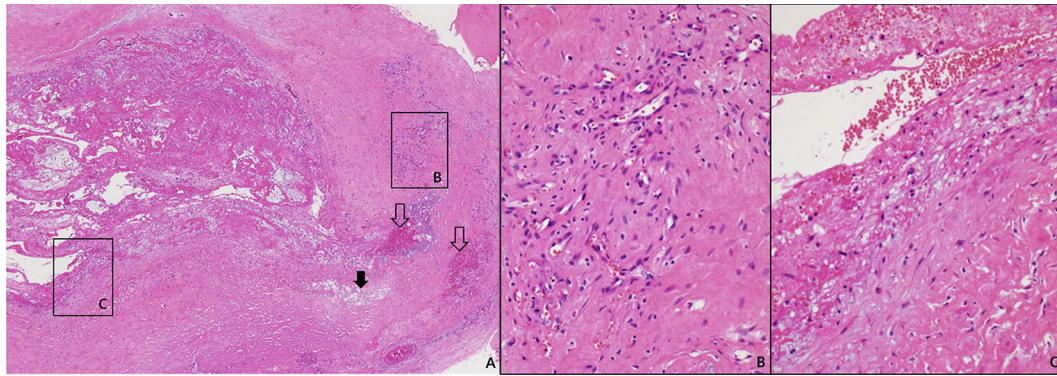


**Fig. 3.** CT-myelogram of the lumbar spine showing a right intra-canal, extra-medullary, space-occupying lesion located in the posterolateral area of the thecal sac (white arrows). There was no connection between the cyst and the dural sac.

patients with asymptomatic juxtafacet cysts may end up suffering from neurologic symptoms.<sup>7</sup> The present report details a rare case of a patient with degenerative lumbar vertebral disease and an asymptomatic intraspinal juxtafacet cyst who suffered from pain and aggravation of neurologic symptoms caused by the hemorrhagic cyst following epidural steroid injection and was treated surgically with a good prognosis.

A juxtafacet cyst usually occurs at the level of the lumbar vertebrae, and the condition is known to be caused by degenerative changes of the facet joint. Differential diagnoses of juxtafacet cyst include ependymal cyst, arachnoid cyst, cystic neurofibroma, perineural cyst, sequestered nucleus pulposus, synovial cyst, ganglion

cyst, and so forth.<sup>8</sup> Recent advancements in diagnostic imaging technology such as CT and MRI have resulted in a higher rate of diagnosis, and the diagnostic rate associated with MRI (77%) is higher than that of CT (56%). Also, myelographic positivity for the presence of a fistula connecting intrathecal matter to the cyst may lend indirect support to the diagnosis, but the associated diagnostic rate is only 42%, and a final diagnostic decision is based upon pathologic evaluation.<sup>5</sup> Signal intensity in MRI of a hemorrhagic juxtafacet cyst may vary with time lapse, and such cysts mostly present with hypointensity to isointensity in T1-weighted images, or peripheral hypointensity due to chronic hemorrhaging or capsular calcification. The center of the cyst may present with high



**Fig. 4.** A hemorrhagic ganglion cyst. (A) The cyst wall is composed of fibrous tissue with myxoid degeneration (solid arrow, which is not clearly visible here). The cyst shows hemorrhaging in the cavity and the wall (empty arrow). (B and C) The cyst does not show synovial cell lining (B) and shows angiogenesis (C) in the wall.

signal intensity in T2-weighted images, but the signal intensity may vary given such factors as the amount of remaining intra-cystic protein, components of the blood, and chronicity of hemorrhaging, and the cyst may appear with peripheral capsular enhancement in a contrast-enhanced image.<sup>9</sup> An MRI taken 3 months prior to the patient's visit showed low signal intensity in T1-weighted imaging and high signal intensity in T2-weighted imaging, and an MRI taken after the steroid injections presented with low signal intensity in T1-weighted imaging and heterogeneous and high signal intensity in T2-weighted imaging; there was no enhancement in contrast-enhanced imaging or peripheral capsular enhancement. Such findings hold positive for the presence of a hemorrhagic intraspinal cyst.

The cause of a hemorrhagic juxtafacet cyst is obscure, but it may be related to the use of anticoagulant agents, vascular malformations, hypermobility of the juxtafacet joint, trauma, and/or degenerative changes. The incidence of the condition is reported to be less than 10%.<sup>3</sup> However, aggravation of radiating pain or neurologic symptoms in patients with asymptomatic intraspinal cysts may imply compression of the nerve root by intra-cystic hemorrhaging or cauda equine syndrome, and surgical decompression is the treatment of choice.<sup>3</sup> Formation of a posttraumatic hemorrhagic cyst, as in the present case, is very rare, and this patient is considered to have suffered from symptoms stemming from needle insertion which may have caused hemorrhaging inside the cyst, leading to an increase in its size. It is obviously difficult to prove a direct relationship between intervertebral steroid injection and the incidence of hemorrhagic cyst. A pre-existing cyst caused lumbosacral vertebral instability after a fall 3 months prior to the patient's visit, and an increase in cystic size due to hypermobility of the juxtafacet joint should also be considered as a possible cause; alternatively, granulation tissue derived from degenerative changes of the juxtafacet joint could also have caused an increase in cystic size. However, several facts, i.e., that the patient's symptoms appeared immediately after steroid injection; hemosiderin-laden macrophages, which are suggestive of a hemorrhagic cyst, were present; angiogenesis occurred; and amelioration of symptoms followed surgery, may indicate an acute lesion as the cause, and we believe the condition to have resulted from the trauma of the needle sting. Thus, predisposing factors such as trauma must be also considered one of the causes of hemorrhagic juxtafacet cyst.

The treatment with the best clinical results for cases of symptomatic juxtafacet cyst is reported to be surgical decompression, which consists of cystectomy after laminectomy, and vertebral fusion may be required based on such factors as the size of the cyst, the stability of the vertebral body and juxtafacet joint, and involvement of a vertebral lesion.<sup>5</sup> Lyons et al<sup>10</sup> reported a good

prognosis in 91% of cases in which laminectomy alone was performed, and Fischgrund et al<sup>11</sup> reported that juxtafacet cysts accompanying degenerative lumbar vertebral diseases had good prognoses when treated with vertebral fusion, with a 76–85% success rate. In the present case, cystectomy after partial laminectomy on the right side was originally planned, but a lack of security of sight, the large size of the cyst, and a severe degree of adhesion changed our plan to cystectomy after total laminectomy and partial facetectomy and posterolateral fusion between L5 and S1 considering probable instability owing to a wide range of decompression and degenerative changes in the lumbar vertebrae. The patient presented with a good prognosis during the follow-up. Therefore, posterior decompression and posterolateral fusion may be a treatment of choice for juxtafacet cyst involved with degenerative changes.

Epidural steroid injection is one of the most commonly used non-surgical treatments for degenerative lumbar vertebral disease. In many cases, however, it is empirically performed without accurate localization of the lesion owing to cost, duration of the testing, and convenience. Even though epidural steroid injection has produced good results in patients with degenerative lumbar vertebral diseases, inadequate evaluation prior to treatment may increase the incidence of complications, as in this case. The authors confirmed that an asymptomatic juxtafacet cyst could progress to a hemorrhagic cyst as a result of injection and that supplemental neurologic symptoms could occur. In conclusion, physicians should be more cautious when performing nerve block in patients with intraspinal cysts, and meticulous evaluation of lesions through CT or MRI scans must be done prior to treatment.

#### Conflict of interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

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