

A Gas Filled Intradural Cyst with Intradural Disc Herniation: A Case Report

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Abstract- Intradural disc herniation is rare. In a colon cancer patient who suffered from low back pain for several years, MRI examination showed evidence of vacuum phenomenon and ring enhancement at the level of L3-4. Intradural herniation of an intervertebral disc was confirmed surgically. Pathological evidence of intradiscal gas is rarely reported in the literature, however, an association between intradural disc herniation and pneumocysts was demonstrated in this case. The implications of our sequential radiological and pathological findings for the pathogenesis of intradural pneumocysts are discussed.

Key Words: Intradural disc, Vacuum phenomenon, Pathology

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INTRODUCTION

Lumbar intradural disc herniation comprises about 0.3% of lumbar disc protrusions⁽¹⁾. It is uncommon but has been well described in a limited number of case reports⁽²⁾. A gas lucency within the intervertebral disc space was observed in up to 20% of conventional spinal radiographs of patients with degenerative disc diseases⁽³⁾. Intradural gas is reported much less frequently than gas in the disc. The vacuum disc phenomenon and its cause have been covered in the literatures, but few attempts have been made to investigate the pathogenesis of intradural gas. An association with intradural herniation was suggested in three reported cases⁽⁴⁾. We

report a case of intradural gas collection in the spine with intradural disc herniation. The implications of our sequential radiological and pathological findings for pathogenesis are discussed.

CASE REPORT

A 71-year-old female patient suffered from ascending colon cancer in 1995, and was treated with right hemicolectomy as well as chemotherapy. Low back pain which radiated down to the posterior aspect of her right thigh was noted five years later. The pain developed insidiously in the absence of trauma, and was exacerbated by walking. Bone scan showed abnormal tracer

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uptake in the lumbar spine, and she received local radiation therapy under the impression of bone metastasis. The pain was, however, relieved for only one month and recurred afterwards. After one year of outpatient conservative therapy, difficulty in urination and right thigh numbness were noted besides the pain. Urodynamic study revealed atonic bladder. Lumbar spine MRI showed multiple herniated intervertebral discs at the level of L1/2, 2/3, 3/4, and 4/5 (Fig. 1A). She refused surgery and the severity of her symptoms fluctuated for the next two years. Finally, she was transferred to our neurosurgery clinic because of acute-onset gait disturbance associated with the progressive low back pain. The straight leg raising test was positive on the right side.

Myelogram (Fig. 2) of the lumbar spine showed that the passage of contrast medium was completely blocked at the level of L3/L4, with the presence of cupping sign and conus expansion. Intervertebral gas was recognized at L3/L4 (a condition known as the “vacuum phenomenon”), suggesting intradural disc herniation. In addition, lesions with the density of air and sharp margins were found in the center of the L3/4 disc and the spinal canal by postmyelogram computer topography (CT) (Fig. 3). Lumbar spine MRI (Fig. 4) showed increased signal intensity in the T1 weighted image (T1WI), implying fatty change of irradiated vertebral bone marrow. The vacuum phenomenon looks like a void in the intervertebral space and extends into a pseudocyst (Fig. 4A). A lesion with ring enhancement at the herniated L3/4 disc was shown after the injection of gadolinium (Fig. 4B & 4C). An axial view of MRI also revealed an accumulation of gas in contact with the ruptured disc and surrounded by soft tissue (Fig. 4C). Surgical treatment was indicated under the diagnosis of herniated intradural disc.

Via a posterior approach, the dura was opened after laminectomy. Cauda equina were displaced by a well-encapsulated cyst abutting the herniated L3/L4 disc (Fig. 5). The cyst and the degenerative disc were dissected and removed altogether. Pathological examination showed a pneumocyst walled by a layer of synovial-like cells against a background of inflammatory granulation

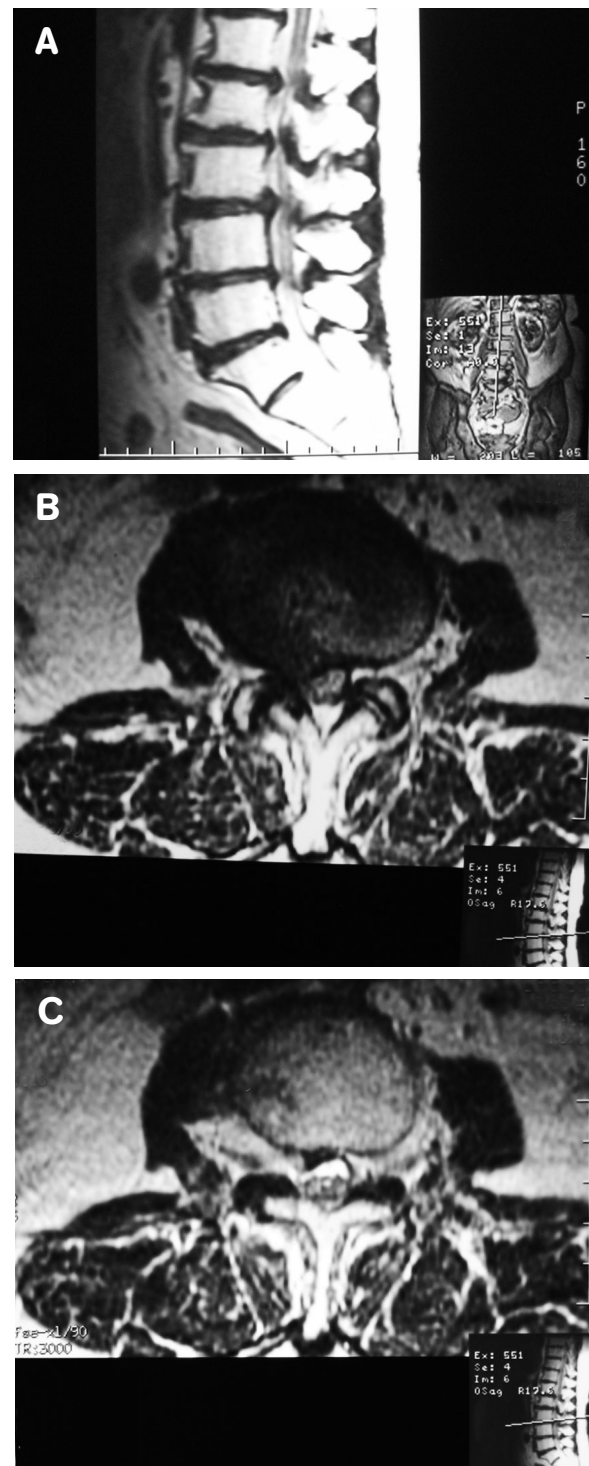


Figure 1. (A) Sagittal view of lumbar spine MRI (T2WI) showed multiple herniated intervertebral discs at the levels of L1/2, 2/3, 3/4, 4/5. (B) and (C) Axial view of lumbar spine MRI (T1WI and T2WI) showed intradural herniated disc without cystic component at L3/4.



Figure 2. Vacuum phenomenon and cupping sign at the level of L3/4 on lumbar myelogram.



Figure 3. Postmyelogram CT showed vacuum phenomena and blockade of contrast by a gas-containing lesion at the level of L3/4.

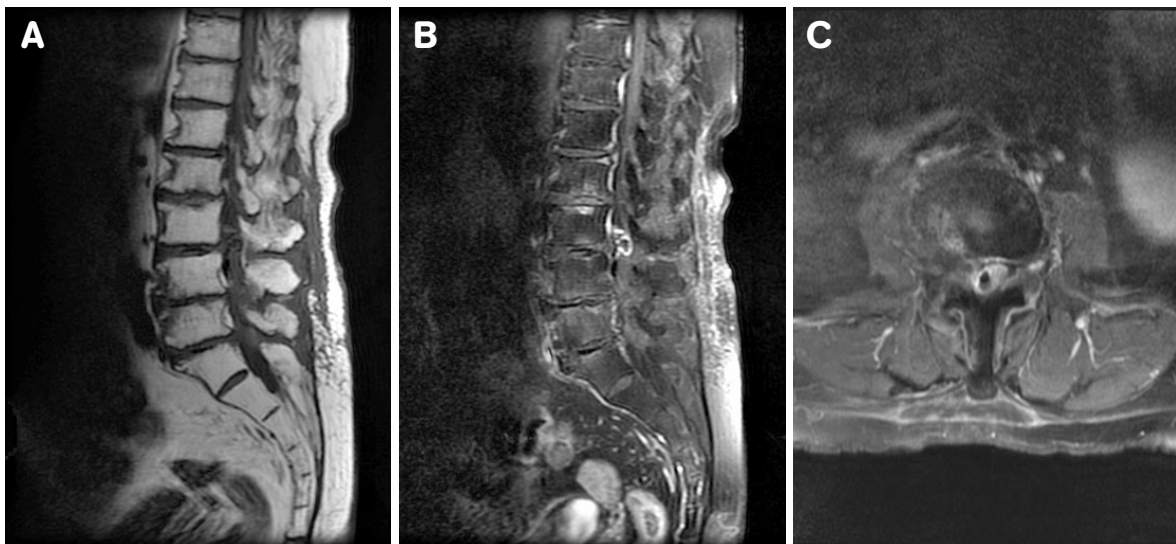


Figure 4. (A) Sagittal view of lumbar spine MRI (T1WI) showed fatty change of bone marrow, probably a post-irradiation effect, and intervertebral gas at L3-S1. (B) and (C) Sagittal and axial views of lumbar spine MRI after injection of gadolinium, showing L3,4 intradural herniated disc with cystic component and ring enhancement.

tissue. There was degenerative cartilage, which is possibly associated with the herniated disc (Fig. 6A). Hemorrhage was also noted with degenerative fibrocartilage in the disc (Fig. 6B).



Figure 5. Cauda equina was deviated by a cystic lesion after the dura was opened.

DISCUSSION

Gas in the intervertebral disc is recognized radiologically by identification of the vacuum phenomenon. It is a common finding and can be caused by disc degeneration, gas-producing infection, tumors, and spinal canal procedures⁽⁵⁾. On the other hand, gas collection in the spinal canal is not as common. According to a review published in 1994 among the 29 cases presented in the literature⁽⁴⁾, only three showed intradural gas⁽⁶⁻⁸⁾. All of the three cases were associated with intradural disc herniation, which is also a rare condition, suggesting an association between gas collection and disc herniation⁽⁵⁾. On the other hand, there are cases of intraspinal gas in the absence of disc herniation^(9,10). Other possible causes for intraspinal gas include osteomyelitis, Sheuermann's disease, spondylosis deformans, vertebral collapse, and degenerative disc disease⁽¹¹⁾.

Tamburreli et al. reported a case of epidural gas-containing lesion connected to a disc by image studies. The disc was not herniated but contained gas⁽¹²⁾. A case reported by Kawaguchi et al. also showed an intradural pseudocyst with herniation of a vacuum disc, which was not intradural. It was assumed to be a gas-filled cyst connected to a herniated disc rather than an intradural herniated gas-containing disc⁽¹³⁾. The pathological association between the cyst and disc was noted postoperatively.

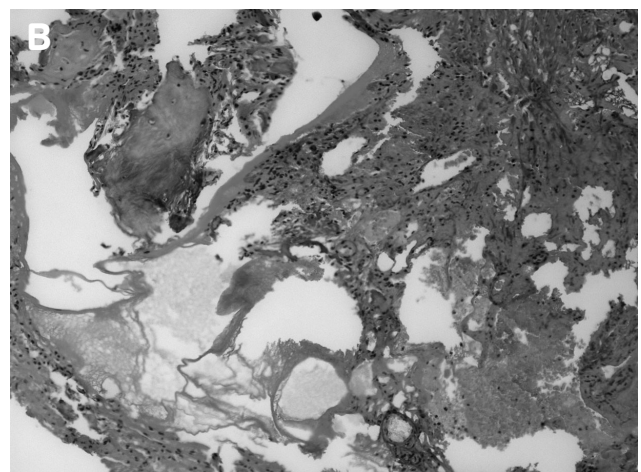
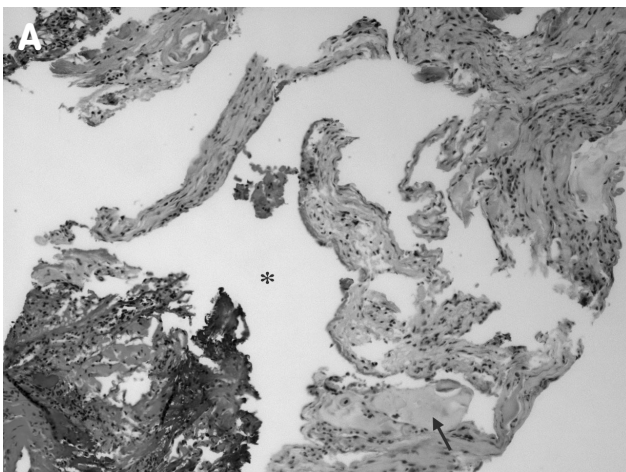


Figure 6. (A) Pathological examination showed degenerative cartilage (arrow) as well as granulation tissue and an area of pneumocyst (asterisk). (B) Cartilage and hemorrhage were noted in the herniated disc.

Thus in neither case was the evidence for the collection of gas obtained perioperatively. In a case reported by Yoshida et al., contrast medium was spread to a pseudocyst after discography⁽¹⁴⁾. Successive MRIs and pathology findings provided information on the pathogenesis of the pseudocystic lesion in our case. Intervertebral disc herniation at L3/L4 but not a gas-containing cyst was observed by the first lumbar MRI (Fig. 1B-C). After thirty months, however, a gas-filled cyst was shown on MRI between the herniated disc and thecal sac (Fig. 4). Gas spread from the herniated disc to the cyst. Pathologically, a pneumocyst encapsulated by granulation and fibrocartilagenous tissues was noted, implying its contiguity with the herniated disc (Figs. 5-6). It is likely that the gas was pumped from the intervertebral space through a weak point or rupture in the annulus fibrosus.

Additional information on the pathogenesis of the intradural gas collection can be drawn from the symptoms of this case. Acute-onset low back pain with radiation to the right thigh and atonic bladder was coincident with the appearance of the herniated disc. The severity of symptoms fluctuated for two years, but it was kept under control by non-steroid anti-inflammatory drugs. Nevertheless, the aggravated pain causing gait disturbance was noted just 1 week before her admission for surgery. A comparison of the MRI findings at two different time points showed no progression of L3/4 disc protrusion (Figs. 1-4). The pseudocyst was gradually formed with encapsulation by fibrous connective tissue. The acute exacerbation of the progressive pain was therefore ascribed to increased accumulation of gas, which was abruptly pushed into the cyst.

Compared with extradural lumbar disc herniation, intradural lumbar disc herniation has a much lower incidence. It tends to happen in the elders and is often associated with cauda equina syndrome⁽¹⁴⁾. If no protruding disc is found during extradural lumbar discectomy, the wound should be extended to check the foramen, cord, and tension on the nerve root carefully because of the possibility of intradural disc herniation. An accurate pre-operative diagnosis of intra- or extradural disc herniation would help the surgeon to decide whether the dura

should be opened, and thus not only shorten the operation time but also avoid the possibility of a second surgical approach⁽⁴⁾. Gadolinium enhanced MRI may show the surrounding vascular arachnoid membrane and ring enhancement at the borders of a herniated lesion⁽¹⁵⁾. In our case, both the herniated disc and pseudocyst were resected. After surgery, this patient's symptoms were relieved, allowing her to walk with a cane. The residual volume of urine was also decreased. After one year, however, her low back pain gradually recurred. Another surgery was suggested for the possibility of aggravated spinal stenosis due to herniation of other discs, but the patient refused further surgical interventions.

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