

## Case Report

# L2 Radicular Compression Caused by a Foraminal Extradural Gas Pseudocyst

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Gas pseudocysts are a rare cause of lumbar radiculopathy and most symptomatic gas pseudocysts are found within the confines of the spinal canal. A gas pseudocyst in the foramen causing lumbar radiculopathy is very rare. We present a case of a 67-year-old woman suffering from severe pain in the right leg. Computed tomography and magnetic resonance imaging revealed a gas pseudocyst compressing the L2 root at the right L2-3 foramen. The patient underwent cyst excision using the lateral transmuscular approach and her leg pain was improved after the operation.

**KEY WORDS :** Gas pseudocyst · Radiculopathy · Lumbar vertebra.

## INTRODUCTION

Intraspinous gas pseudocysts are a rare cause of radicular pain<sup>1-3,5,8,9,11)</sup>, and it has been suggested that they are associated with the intervertebral vacuum phenomenon<sup>11)</sup>. Until now, most symptomatic gas pseudocysts have been found within the confines of the spinal canal. However, a gas pseudocyst located in the foraminal and/or extraforaminal zone causing radicular compression is very rare<sup>2)</sup>. We present a case of a 67-year-old woman who suffered from severe pain in the right leg caused by an extradural gas pseudocyst in the intervertebral foramen. The patient underwent cyst excision using the lateral transmuscular approach<sup>6,7)</sup> and her leg pain was significantly improved after the operation.

## CASE REPORT

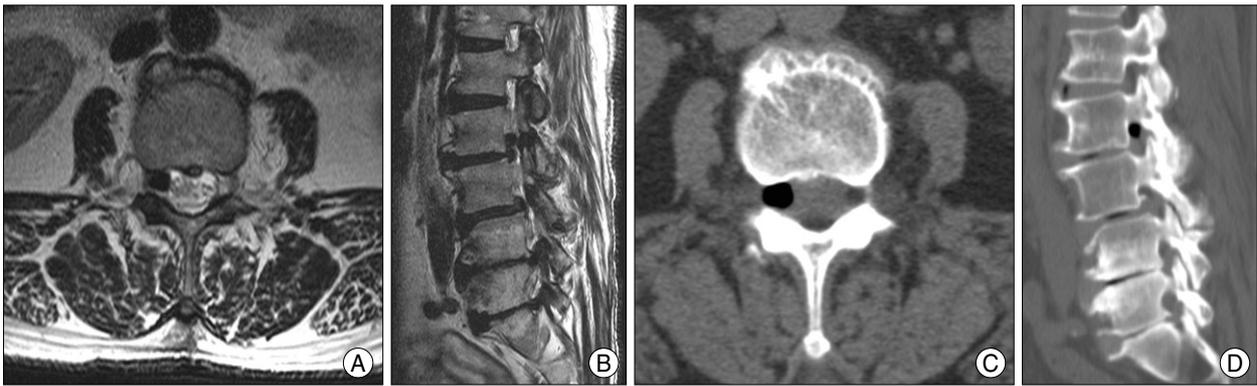
A 67-year-old female presented at our hospital suffering from pain in her right buttock and lateral thigh for 10 days. Upon admission, she had difficulty in standing and walking due to the severe pain. She was unable to sleep due to the

pain, which did not respond to narcotic analgesics. Her visual analogue scale (VAS) score for pain was 10 points. She had a history of taking medications for diabetes mellitus. There were no abnormal findings in the preoperative laboratory analysis and her neurological examination did not show any motor weaknesses. She showed a decreased bilateral knee jerk and ankle jerk. A plain radiographic examination revealed degenerative spondylolisthesis at the L3-4 level but there was no definite instability. Magnetic resonance imaging (MRI) demonstrated a low-signal intensity, well-demarcated round mass lesion compressing the L2 root at the right L2-3 foramen. This was revealed as gas on computed tomography (CT) scan. The CT scan also demonstrated an intervertebral vacuum phenomenon at the L2-3 level (Fig. 1). Therefore, the preoperative diagnosis was a gas pseudocyst compressing the L2 root in the foramen. Because the patient complained of intractable leg pain, we decided to perform an early surgical intervention.

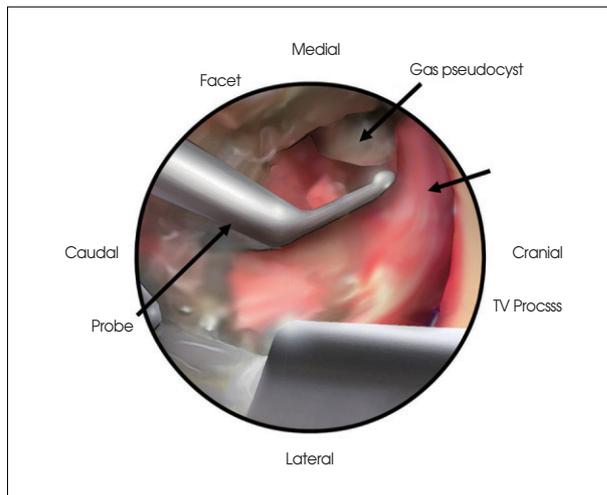
The gas pseudocyst was removed using the lateral transmuscular approach<sup>6)</sup>. During the surgery, a well-demarcated oval-shaped pseudocyst filled with gas, which was compressing the L2 root, was detected in the foraminal zone. There was no adhesion between the gas pseudocyst and the L2 root and herniated disc material around the pseudocyst was not found. The thin wall of the gas pseudocyst was excised and completely removed (Fig. 2).

After surgery, the patient's pain was significantly improved.

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**Fig. 1.** Magnetic resonance images (MRI) (A and B) and computed tomography (CT) scan (C and D) showing a gas pseudocyst that is compressing the root at the right L2-3 foramen. T2-weighted sagittal MRI (B) and sagittal reconstruction image of CT scan (D) show that the gas pseudocyst is connected to L2-3 intervertebral disc, which contained intradiscal gas. Therefore, the gas pseudocyst in the foramen was assumed to originate from the gas in the L2-3 intervertebral disc.



**Fig. 2.** Illustration showing a surgical microscopic view of the operating field. A well-demarcated oval-shaped pseudocyst filled with gas, which is compressing the L2 root, is detected in the foraminal zone. TV process : transverse process.

Four days after the operation, the VAS score was improved to 1 point and the patient was discharged.

## DISCUSSION

The presence of intraspinal gas is an uncommon phenomenon. Teplick et al.<sup>10</sup> observed only seven cases of intraspinal gas in a series of 2500 CT scans. The pathologic mechanism of intraspinal extradural gas pseudocyst is still unclear. Gas localized outside the intervertebral disc has been suggested to originate from the intervertebral disc and migrated through a tear in the annulus fibrosus due to the motion of the spine<sup>2,9,11</sup>. A weak point in the posterior longitudinal ligament caused by developmental impairment was also suggested to have a role in the formation of pseudocysts<sup>9</sup>. The gas in the disc, the so called 'vacuum phenomenon', was reported to consist of 90-95% nitrogen<sup>4</sup>.

Yoshida et al.<sup>11</sup> demonstrated by using gas chromatography that the major composition of gas aspirated from a gas pseudocyst was also nitrogen. They also demonstrated the flow of contrast media into the pseudocyst using CT after discography, which suggested the existence of communication between the intradiscal gas and the intraspinal gas pseudocyst<sup>11</sup>. Recurrence of the pseudocyst in the same location after surgery also suggested persistent migration of the gas from the intervertebral disc to the intraspinal canal<sup>1,3,11</sup>. In the present case, we could not find any direct communication between the gas pseudocyst and the L2-3 intervertebral disc during the operation and the gas cyst was not accompanied by foraminal disc herniation. However, T2 weighted sagittal MRI showed that the gas pseudocyst was connected to the L2-3 intervertebral disc, which contained intradiscal gas. Therefore, a gas pseudocyst in the foramen was assumed to originate from the gas in the L2-3 intervertebral disc.

A gas pseudocyst in the foraminal and/or extraforaminal zone is very rare. Cheng et al.<sup>2</sup> reported a case of a large, far lateral extruded disc fragment that contained air. In the case, the nerve root was impaled by an unusual combination of a small extruded disc fragments, as well as an air-filled sac that was surrounded by the walled-off fragment's capsule, which freely communicated with the gaseous degenerated disc space. They suggested the possibility of disc herniation, which should be seriously considered in cases of nerve root compression where epidural gas is present, especially those associated with gaseous degenerated discs. In the present case, the gas pseudocyst was located in the foraminal zone. The patient's intractable leg pain seemed to be caused by the progressive enlargement of a gas pseudocyst in the narrow foramen, which directly compressed the dorsal root ganglion. It was speculated that the motion of the lumbar spine induced a pressure gradient, so that the intra-

discal gas moved into the gas pseudocyst by the valve-pump mechanism<sup>11)</sup>.

Surgical excision is the optimal treatment for symptomatic gas pseudocyst. Recurrence of a gas pseudocyst was reported after percutaneous needle aspiration or surgery with needle aspiration<sup>1,3,11)</sup>. In this regard, the patient in the present study underwent surgical excision of the gas pseudocyst using the lateral transmuscular approach. Decompression using the lateral transmuscular approach is an effective surgical option for pathologies in the foraminal and/or extraforaminal zone. It enables direct decompression with minimal damage to the surrounding anatomical structures<sup>6,7)</sup>. In the present study, the patient showed a marked reduction of leg pain after surgical excision of the gas pseudocyst. However, further long-term follow-up evaluation is necessary because of the possibility of a delayed recurrence of the gas pseudocyst.

## CONCLUSION

The authors report a rare case of foraminal extradural gas pseudocyst causing L2 radicular compression. The patient was successfully treated by surgical excision using the lateral transmuscular approach.

### • Acknowledgements

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