

Extraforaminal Stenosis at L2–L3 Treated with Microendoscopic Surgery: Report of Two Cases

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Learning Point of the Article:

Care should be taken as extraforaminal stenosis can occur at levels other than L5 / S1.

Abstract

Introduction: The many cases of far-out syndrome that have been reported have involved extraforaminal stenosis at L5–S1. We report two cases of extremely rare extraforaminal stenosis at L2–L3.

Case Report 1: A 59-year-old man presented with a 1/2-year history of the right leg pain. Radiological examination revealed stenosis of the right L2 spinal nerve between the osteophyte of the vertebral body and the L3 right transverse process. The right L2 spinal nerve was decompressed with microendoscopic surgery. Postoperatively, the pain in the right lower extremity was relieved.

Case Report 2: An 80-year-old man presented with a 1/2-year history of the right leg pain. He had undergone posterior lumbar fusion (L4–L5 and L5–S1) approximately 30 years earlier. Radiological examination revealed stenosis of the right L2 spinal nerve between the osteophyte of the vertebral body and the L3 right transverse process. The right L2 spinal nerve was decompressed with microendoscopic surgery. Postoperatively, the patient had no symptoms and his course over the next 6 months was good.

Conclusions: In both cases, we performed microendoscopic decompression of the L2 spinal nerve with good post-operative results. In both our patients, extraforaminal stenosis was caused by osteophytes that formed as a result of degenerative spondylosis.

Keywords: Osteophyte, extraforaminal stenosis, upper-middle lumbar spine, microendoscopic decompression.

Introduction

Far-out syndrome is L5 spinal nerve radiculopathy caused by nerve compression at the L5–S1 level outside the foramen by vertebral osteophytes, ligament tissues, bulging disks, and other entities. Although many cases of far-out syndrome have been reported [1, 2], two patients, to the best of our knowledge, were the first to exhibit extraforaminal stenosis at a location other than L5–S1. These patients had extremely rare extraforaminal stenosis at L2–L3.

Case Report 1

A 59-year-old man presented with a 1/2-year history of the right

leg pain (visual analog scale [VAS] score: 62). He received medical treatment from a nearby hospital but was referred to our hospital due to lack of improvement. Physical examination confirmed paresthesia in the front of the right thigh (in L2 dermatome), but no weakness and no abnormal tendon reflexes were apparent. Both the straight leg raising test and the femoral nerve stretching test yielded negative results. A plain radiograph of the lumbar spine showed a vertebral osteophyte that had formed as a result of degenerative spondylosis on the right side of L2–L3 (Fig. 1a). Magnetic resonance imaging (MRI) showed no central spinal stenosis but did indicate stenosis of the right L2 spinal nerve far outside the L2–L3 foramen (Fig. 1c and d). Computed tomography (CT) after myelography and

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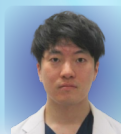
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Figure 1: Case 1: Plain radiographs of the lumbar spine. a Frontal view. b Lateral view. A vertebral osteophyte (white arrow) formed as a result of degenerative spondylosis on the right side of L2-L3. Magnetic resonance images of the lumbar spine. c Sagittal view. d Axial view. Stenosis of the right L2 spinal nerve (white arrow) is visible between the osteophyte of the vertebral body and the L3 right transverse process.

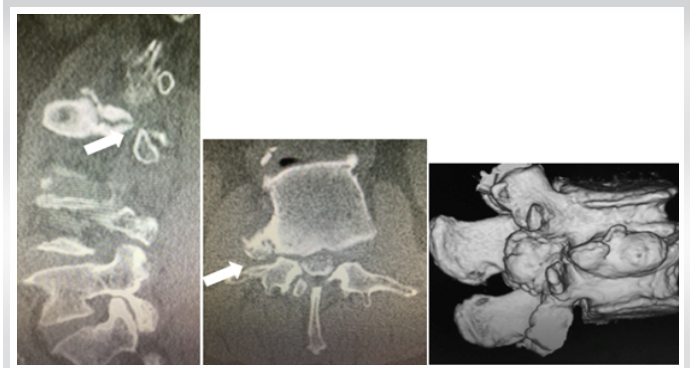


Figure 2: Case 1: Computed tomography after myelography and radiculography. a Sagittal view. b Axial view. Stenosis of the right L2 spinal nerve (white arrow) is visible between the osteophyte of the vertebral body and the L3 right transverse process.

radiculography for the right spinal nerve showed flattening of the right L2 spinal nerve between the osteophyte of the vertebral body and the L3 right transverse process (Fig. 2). Selective right L2 spinal nerve block first reproduced the pain and then temporarily relieved it. Based on all the evidence, we diagnosed extraforaminal stenosis at the L2-L3 level. We performed microendoscopic decompression of the right L2 spinal nerve. The right L3 transverse process was removed, but stenosis of the right L2 spinal nerve remained. Therefore, the vertebral osteophyte was partially resected (Fig. 3). At present 1.5-year follow-up, the pain in the right lower extremity was relieved (Pre-operative VAS score: 62 Oswestry Disability Index [ODI]: 21% and post-operative VAS score: 0 ODI: 2%).

Case Report 2

An 80-year-old man presented with the right leg pain in L2 dermatome (VAS score: 78). He had undergone posterior lumbar fusion (L4-L5 and L5-S1) approximately 30 years

earlier. He was admitted to our hospital due to the right frontal thigh pain and numbness that had begun 6 month earlier. The treatment with medication did not improve his symptoms and he requested surgery. Physical examination confirmed paresthesia in the front of the right thigh, but Medical Research Council grade of lower limbs is all 5 and no abnormal tendon reflexes were apparent. Both the straight leg raising test and the femoral nerve stretching test yielded negative results. A plain radiograph of the lumbar spine showed osteophyte formation as a result of degenerative spondylosis in the upper lumbar spine and posterior bone union between L4-L5 and L5-S1. On the right side of L2-L3, osteophyte formation in the vertebral body was particularly marked (Fig. 4a). MRI showed no central spinal stenosis but did indicate stenosis of the right L2 spinal nerve far outside the L2-L3 foramen (Fig. 4c and d). CT after radiculography of the right L2 spinal nerve showed flattening of the right L2 spinal nerve between the osteophyte of the vertebral body and the L3 right transverse process (Fig. 5). Selective right L2 spinal nerve block first reproduced the pain and then temporarily relieved it. Based on all the evidence, we diagnosed extraforaminal stenosis at the L2-L3 level. We performed microendoscopic decompression of the right L2 spinal nerve. The right L3 transverse process was removed, but stenosis of the right L2 spinal nerve remained. Therefore, the osteophyte of the vertebral body was partially resected (Fig. 6). At present 1-year follow-up postoperatively, the pain in the right lower extremity

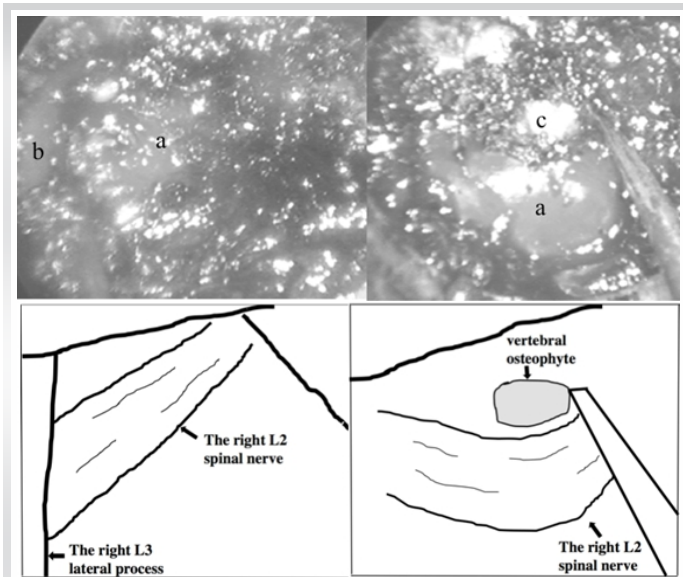


Figure 3: Case 1: Intra-operative photograph and schematic illustrations. A The right L3 transverse process (b) compressed the right L2 spinal nerve (a) from the dorsal side. B After excision of the right L3 transverse process, the right L2 spinal nerve (a) remained compressed by a vertebral osteophyte. C Schematic diagram of A. D Schematic diagram of B.



Figure 4: Case 2: plain radiographs of the lumbar spine. a Frontal view. b Lateral view. A vertebral osteophyte (black arrow) formed as a result of degenerative spondylosis on the right side of L2-L3. Magnetic resonance images. c Sagittal view. d Axial view. Stenosis of the right L2 spinal nerve (white arrow) is visible between the osteophyte of the vertebral body and the L3 right transverse process.



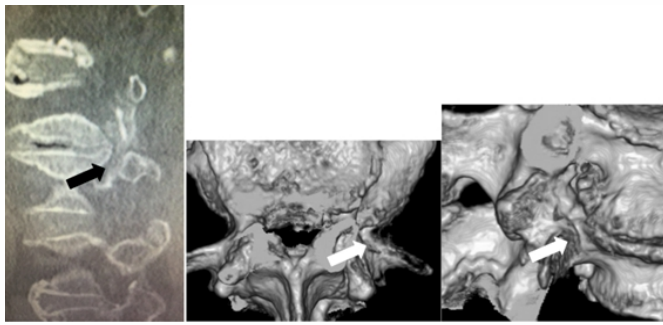


Figure 5: Case 2: Computed tomography after radiculography. a Sagittal view. b and c Three-dimensional views. Extraforaminal stenosis is visible between the osteophyte of the vertebral body and the L3 right transverse process.

was relieved (Pre-operative VAS score: 78 ODI: 38% and postoperative VAS score: 8 ODI: 4%).

Discussion

In 1984, Wiltse et al. described far-out syndrome, in which, the L5 spinal nerve was squeezed between the L5 transverse process outside the foramen and the sacral ala as a result of degenerative scoliosis and spondylytic spondylolisthesis [1]. Nathan et al. reported that in far-out syndrome, L5 spinal nerve entrapment occurs in the lumbosacral tunnel, surrounded by the lumbosacral ligament, L5 transverse process, sacral ala, L5 vertebral body, and

L5–S1 intervertebral disc [3]. At present, far-out syndrome is considered to be entrapment of the L5 spinal nerve outside of the foramen by an osteophyte of the vertebral body, ligamentous tissue, and bulging intervertebral discs.

Far-out syndrome is a pathological process caused by the presence of the sacrum, but the sacrum cannot account for this disorder in the upper-middle lumbar spine. Nakamitsu et al. reported that the intertransverse process ligament is thinner than the lumbosacral ligament [4]. Furthermore, the upper-middle lumbar spine often demonstrates less disc degeneration than does the L4–L5 and L5–S1 region [5], and diseases caused by osteophytes, such as intervertebral foramen stenosis, also occur more often in the lower lumbar spine [6]. Extraforaminal stenosis is thus unlikely to occur in the upper-middle lumbar spine. To the best of our knowledge, extraforaminal stenosis at other than L5–S1 has not been previously reported. In both our patients, extraforaminal stenosis was caused by osteophytes that formed as a result of degenerative spondylosis. Our second patient had previously undergone L4–L5 and L5–S1 fusion surgery, and a high degree of degeneration probably occurred as a result of the adjacent segmental disease.

Extraforaminal stenosis can be determined on an MRI sagittal or transverse view. However, the extraforaminal location may not be visible in routine sagittal view, and the transverse process and osteophyte often do not appear in the same slice of an axial view. If plain radiographs demonstrate a high degree of osteophyte formation in the lumbar spine, sagittal MRI of the extraforaminal level should be obtained and, if necessary, axial imaging of the entrapment should be performed. Yamada et al. reported that three-dimensional MRI can visualize intervertebral foramen and extraforaminal lesions with high accuracy, which may be useful for depicting far-out syndrome [7].

In our patients, the symptoms were relieved by resection of the transverse process and partial resection of the vertebral osteophyte. Matsumoto et al. reported that L5–S1 extraforaminal stenosis occurred in a front-to-back direction and that partial resection of the sacral ala, the counterpart of the osteophyte, was effective [8]. For this pathological process in L2–L3, resection (or partial resection) of the transverse process may be sufficient. In our patients, pressure on the spinal nerve remained after transverse process resection, and so partial resection of the vertebral osteophyte was also performed.

Conclusion

Two of our patients had extremely rare cases of L2 spinal nerve radiculopathy caused by extraforaminal stenosis at L2–L3. In both cases, we performed microendoscopic decompression of the L2 spinal nerve and the post-operative course was good.

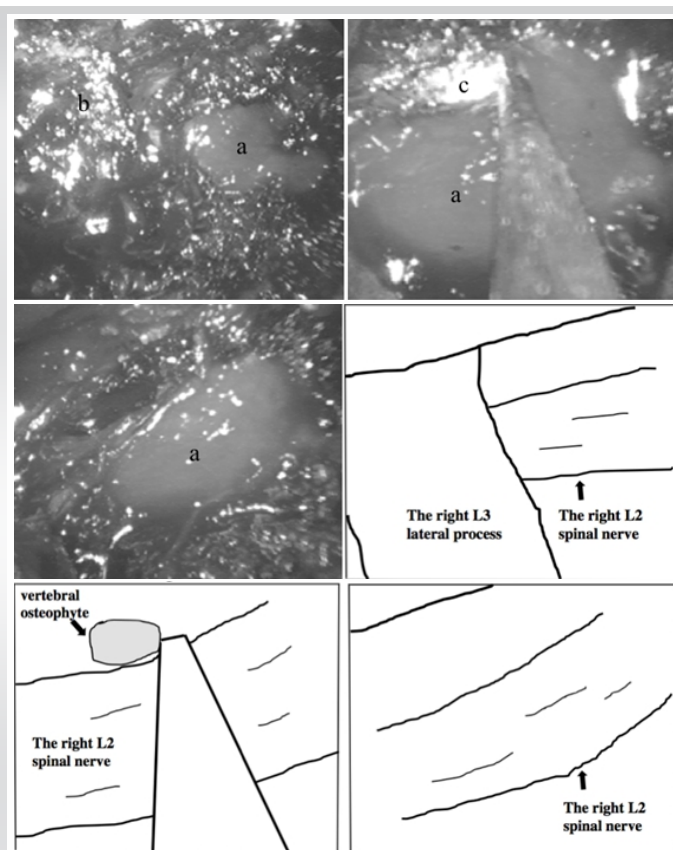


Figure 6: Case 2: Intra-operative photos. A The right L3 transverse process (b) compressed the right L2 spinal nerve (a) from the dorsal side. B After excision of the right L3 transverse process, the right L2 spinal nerve (a) remained compressed (arrowhead) by a vertebral osteophyte. C The right L2 spinal nerve (a) was decompressed after excision of the vertebral osteophyte. D Schematic diagram of A. E Schematic diagram of B. F Schematic diagram of C.

Clinical Message

If plain radiographs demonstrate a high degree of osteophyte formation in the lumbar spine, extraforaminal stenosis should also be kept in mind.

Declaration of patient consent : The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient's parents have given their consent for patient images and other clinical information to be reported in the journal. The patient's parents understand that his names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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Consent: The authors confirm that informed consent was obtained from the patient for publication of this case report

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