A Case of Acute Intervertebral Disc Herniation into Both the Upper and Lower Vertebral Body

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A previously healthy 15-year-old boy visited our hospital with a 1-month history of low back pain. He played football for his junior high school team but had not experienced any traumatic episode before the onset of the pain. Physical examination revealed no neurological deficit, and radiographs of the lumbar spine revealed no obvious abnormality (Fig. 1). After 2 weeks, the pain worsened, and a high fever of 39°C developed. He reported tenderness and knock pain at the spinous process and paravertebral muscle at the L2 level. A neurological evaluation revealed no abnormalities. Magnetic resonance (MR) images of the lumbar spine revealed a bone marrow edema in the L2 vertebral body but no abnormality in the L1 vertebral body or intervertebral disc (Fig. 2). Laboratory results revealed an increased C-reactive protein level (11.8 mg/dL) and white blood cell count (14,900 cells/mm³). He was admitted to our hospital. Although his blood cultures were negative, antibiotics were initiated with 1 g of cefazolin administered intravenously twice daily for 7 days followed by oral administration of 750 mg/day of cefazolin for 2 weeks in case the patient had pyogenic spondylitis. He was encouraged to rest and use a lumbosacral corset. His low back pain and high fever improved gradually, and he was discharged 10 days after admission still wearing the lumbosacral corset. His inflammatory response was negative three weeks after admission.

Follow-up MR images of the lumbar spine performed 1 month after the onset of the pain revealed the L1-L2 intervertebral disc protruding into both the L1 and L2 vertebral bodies, accompanied with bone marrow edema (Fig. 3). Follow-up radiographs of the lumbar spine performed 4 months after the onset of the pain demonstrated depression with sclerotic change in the lower endplates of the L1 vertebral body and upper endplate of the L2 vertebral body (Fig. 4). Moreover, MR images revealed the restoration of the signal change of vertebral bodies; however, the signal intensity of the intervertebral disc remained low (Fig. 4).

Schmorl’s nodes, first reported by Schmorl in 1928, are herniations of intervertebral disc material into the vertebral body. They are typically asymptomatic entities observed incidentally in imaging studies and may occur in 76% of the general population. However, reports of symptomatic acute Schmorl’s nodes in the literature are sparse. A weakened vertebral endplate due to vascular channels, ossification gaps in the first or second decades of life, and other acquired factors such as Scheuermann’s disease, trauma, infection, metabolic disorders, and neoplasms are the proposed pathogenesis of Schmorl’s nodes.

A special feature of the current case is that the herniation of intervertebral disc material into the L2 and L1 vertebral bodies occurred consecutively over an interval of a few weeks. To our knowledge, no report of a similar case exists in the English literature. The current case had no obvious traumatic episode, metabolic disorders, or neoplasms, but a high inflammatory response was observed. Therefore, some infectious disease is believed to have participated in the onset of the pain. Infection of the L2 vertebral endplate spreading to the L1 vertebral endplate through the intervertebral disc may be a pathomechanism of the current case of two-directional acute Schmorl’s nodes. Although the pathogenesis of Schmorl’s nodes remains unclear, an infectious disease may play an important role in certain cases, which is highlighted by the degeneration of intervertebral discs despite the young age.

Modic changes have an unclear pathogenesis, which is

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Figure 1. Radiographs of the lumbar spine showing no obvious abnormality.
A: Antero-posterior view.
B: Lateral view.

Figure 2. MR images of the lumbar spine showing low signal intensity in a T1-weighted image and high signal intensity in a T2-weighted image in the L2 vertebral body.
A: T1-weighted sagittal image.
B: T2-weighted sagittal image.

hypothesized to be mechanical, autoimmune, vascular, inflammatory, and/or infectious. Rannou et al. reported low-grade inflammation in patients with low back pain and Modic type I signal changes. Additionally, Albert et al. reported the effectiveness of antibiotic treatment for patients...
with low back pain and Modic type I signal changes. Accordingly, in the present case, signal changes in the vertebral endplate concomitant with a high inflammatory response and low back pain, which was relieved with antibiotic therapy would also be considered as Modic type I signal changes.

Conflicts of Interest: The authors declare that there are no relevant conflicts of interest.

Author Contributions: Mitsunori Yoshimoto wrote and prepared the manuscript, and all authors participated in the study design. All authors have read, reviewed, and approved the article.

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