Two Cases of Delayed Onset Myelopathy at the Cervicothoracic Junction Caused by Spontaneous Multiple Interlaminar Bony Fusion after Cervical Laminoplasty in Patients with Ossification of the Posterior Longitudinal Ligament

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Cervical laminoplasty is the standard method for cervical myelopathy[1,2)]; it has stable long-term results[3,4)]. Although spontaneous interlaminar fusion following laminoplasty frequently occurs, it is rarely clinically problematic[5)]. Here, we report two rare cases of cervical ossification of the posterior longitudinal ligament (OPLL) with a spontaneous multiple interlaminar fusion after laminoplasty and delayed onset myelopathy at C7/T1.

Case 1

An 80-year-old man underwent a double-door laminoplasty from C3 to C7 for cervical OPLL 12 years earlier (Fig. 1A). He had no problems for 10 years after the operation. At the initial visit, he used a cane while walking due to spastic gait, and his Japanese Orthopaedic Association (JOA) score of cervical myelopathy was 10 out of 17 points.

A lateral plain X-ray showed multiple interlaminar fusion between C2 and C6, and bony fusion of the anterior longitudinal ligament (ALL) at C6/C7. The cervicothoracic junction was difficult to visualize (Fig. 1B). T2-weighted magnetic resonance imaging (MRI) showed severe spinal cord compression due to increased OPLL from C7 to T1 (Fig. 1C). Computed tomography (CT) myelography showed incomplete bony fusion of the ALL or the OPLL at C7/T1, but a complete bony fusion of the OPLL and diffuse idiopathic skeletal hyperostosis (DISH) at T1/T2 and on the caudal side of T2, respectively (Fig. 1D).

Posterior fusion from C4 to T4, including laminectomy from C6 to T2 was conducted (Fig. 2A, B). CT images one year after the surgery confirmed complete bony fusion of the ALL and OPLL at C7/T1 (Fig. 2C). Four years after the surgery, the patient showed a stable gait with a cane, and a plain X-ray confirmed no implant failure (Fig. 2D).

Case 2

A 43-year-old man underwent a double-door laminoplasty from C3 to C7 for cervical OPLL 14 years earlier (Fig. 3A). Although OPLL compressed the spinal cord at T1/T2 (Fig. 3B), the patient exhibited no problems with daily life 13 years after the initial operation. The patient could not walk at the initial visit, and his JOA score was 7.

A lateral plain X-ray exhibited bony fusion at C3/C4 and between C5 and C7 (Fig. 3C). The cervicothoracic junction was difficult to visualize on a functional X-ray (not shown). T2-weighted MRI showed severe spinal cord compression due to the intervertebral disc and ligamentum flavum at C7/T1 (Fig. 3D). There was no change in the degree of spinal cord compression at T1/T2. A plain CT did not show bony

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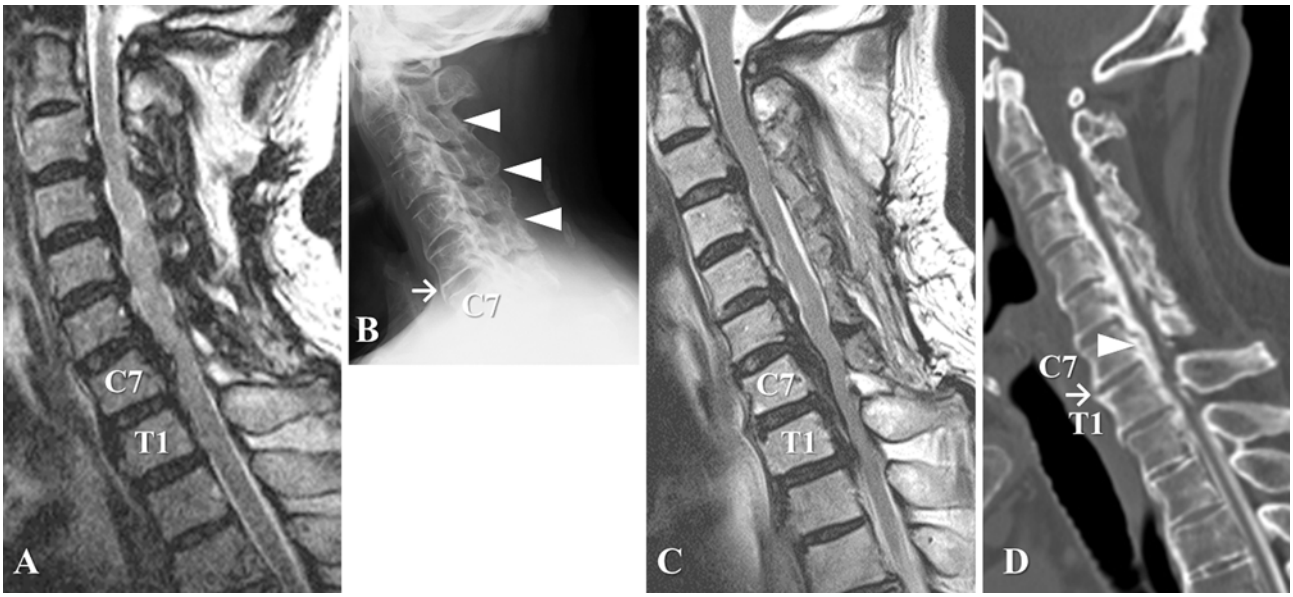

Figure 1. After prior surgery (A) and before treatment (B, C, and D) of Case 1.
A. The patient underwent double-door laminoplasty from C3 to C7 for cervical OPLL 12 years earlier.
B. Lateral plain X-rays showed multiple interlaminar fusion between C2 and C6 (arrowheads), and bony fusion of the ALL at C6/C7 (arrow).
C. T2-weighted MRI showed severe spinal cord compression due to increased OPLL from C7 to T1.
D. CT myelography showed incomplete bony fusion of the ALL (arrow) or the OPLL (arrowhead) at C7/T1, but a complete bony fusion of the OPLL was visible at T1/T2, and DISH was present on the caudal side of T2.

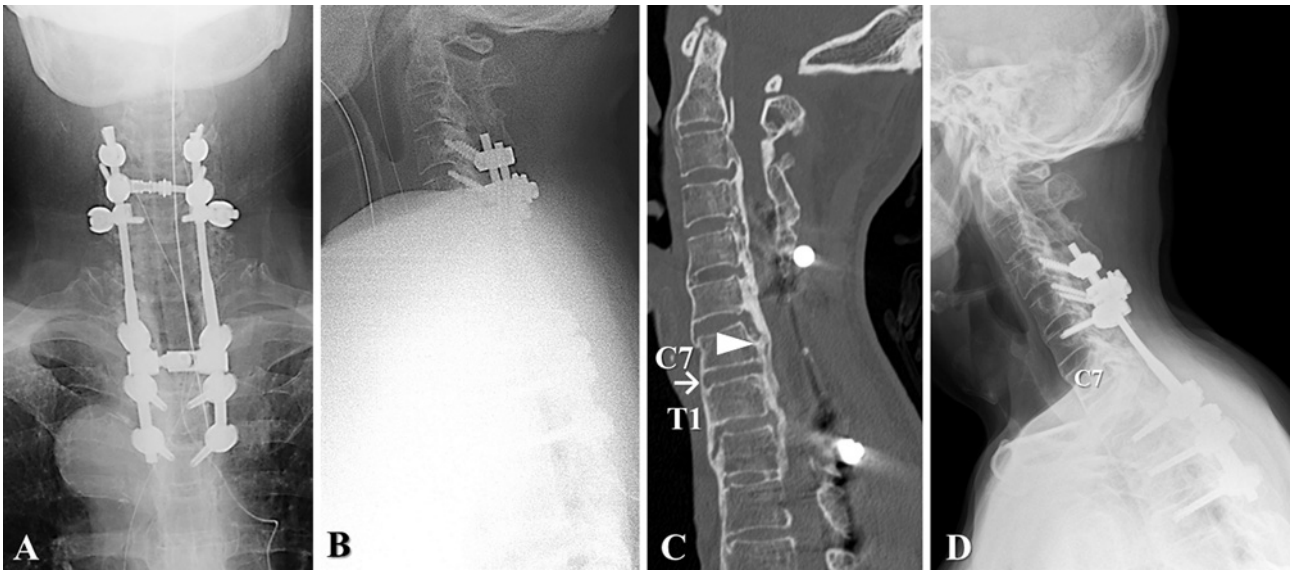

Figure 2. After treatment of Case 1.
A and B. Posterior fusion from C4 to T4, including laminectomy from C6 to T2, was conducted.
C. CT images one year after the surgery confirmed complete bony fusion of the ALL (arrow) and OPLL (arrowhead) at C7/T1.
D. A plain X-ray confirmed no implant failure four years after the treatment.

fusion at C7/T1 and T1/T2, but there was bony fusion by DISH on the caudal side of T2 (Fig. 3E).

Posterior fusion from C5 to T5, including laminectomy from C7 to T2, was conducted (Fig. 4A, B). MRI taken one week after surgery showed that the spinal cord was well decompressed (Fig. 4C). One year after surgery, the patient could walk using a Lofstrand crutch, and CT images confirmed that bony fusion of the ALL at C7/T1 was completed (Fig. 4D).

Although myelopathy at C7/T1 is one of the differential diseases of gait disturbance, it is a rare condition[6]. In clinical situations, a C7/T1 lesion can be initially neglected because the cervicothoracic junction is difficult to visualize on a plain X-ray[6]. Cervical OPLL and thoracic DISH are fre-

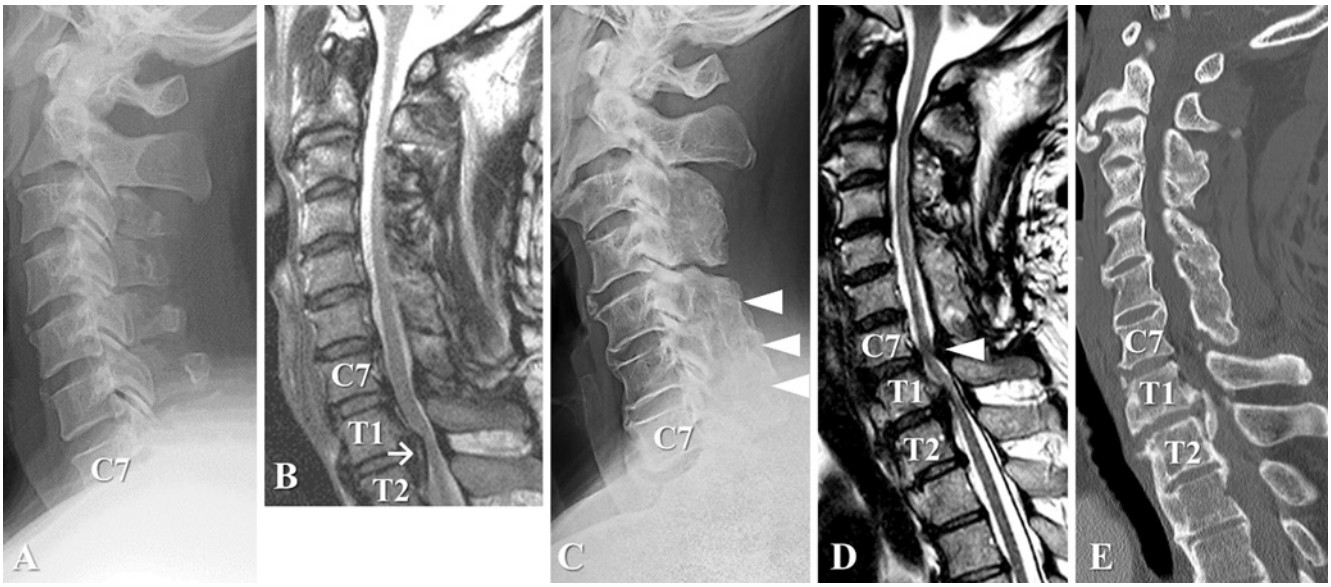

Figure 3. After prior surgery (A and B) and before treatment (C, D and E) of Case 2.
A. The patient underwent double-door laminoplasty from C3 to C7 for cervical OPLL 14 years earlier.
B. Although the spinal cord was compressed by OPLL (arrow) at T1/T2, the patient exhibited no problems in daily life 13 years after the prior surgery.
C. Lateral plain X-ray exhibited bony fusion at C3/C4 and between C5 and C7 (arrowheads).
D. T2-weighted MRI showed severe spinal cord compression due to the intervertebral disc and ligamentum flavum at C7/T1 (arrowhead). There was no change in the degree of spinal cord compression at T1/T2.
E. Plain CT did not show bony fusion at C7/T1 and T1/T2, but bony fusion by DISH was visible on the caudal side of T2.

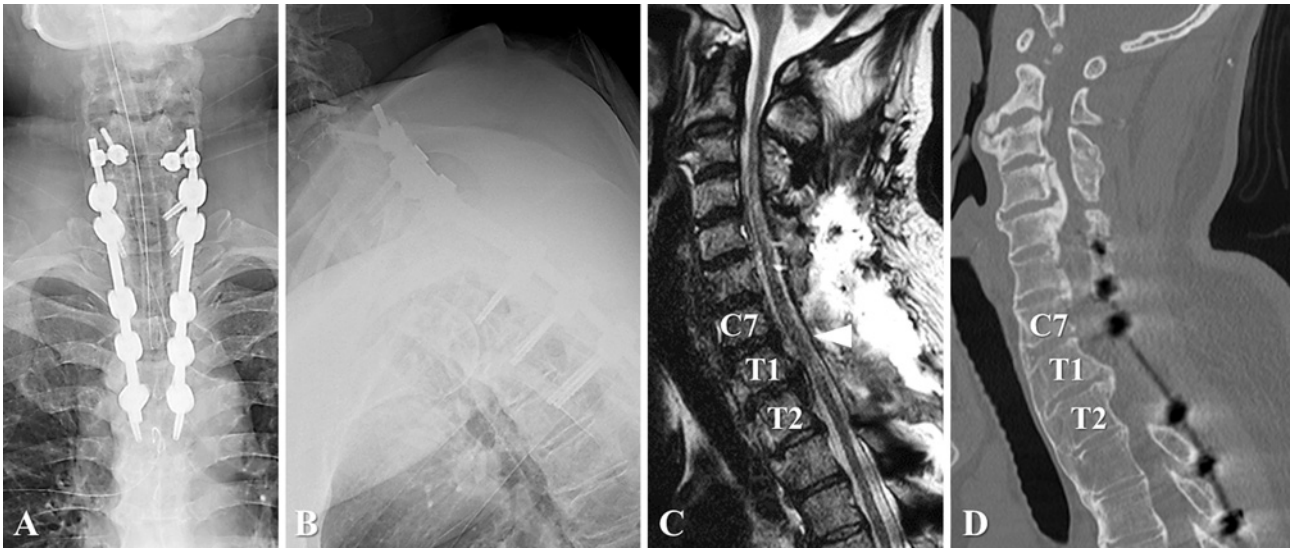

Figure 4. After treatment of Case 2.
A and B. Posterior fusion from C5 to T5, including laminectomy from C7 to T2, was conducted.
C. MRI taken one week after surgery showed that the spinal cord was well decompressed (arrowhead).
D. CT images confirmed complete bony fusion of the ALL at C7/T1 one year after treatment.

quently combined[7], and OPLL lesions may increase the following laminoplasty in cervical OPLL[8]. Moreover, long-level cervical instrumentation tended to result in the progress of C7/T1 degeneration[9], and thoracic DISH tended to result in the progressive degeneration between adjacent vertebrae[10].

In our cases, thoracic DISH was present. Although instrumentation was not conducted, the condition might be similar to that of instrumentation due to spontaneous multiple interlaminar fusion following laminoplasty. Therefore, excessive mechanical stress might have been applied at C7/T1, resulting in minor and chronic instability though it is difficult to visualize on X-ray.

Long-term observation is essential after laminoplasty in

patients with cervical OPLL. Coexisting thoracic DISH could induce delayed onset myelopathy at the cervicothoracic junction when multiple interlaminar fusions occur after laminoplasty.

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