De novo Ossification of the Posterior Longitudinal Ligament related to Pseudarthrosis after Anterior Cervical Decompression and Fusion with floating of the Ossification Foci

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ABSTRACT

Aim: The aim of this article is to report a case of ossification of the posterior longitudinal ligament (OPLL) in a patient who showed a de novo ossification focus compressing the spinal cord at the pseudarthrosis site several years after anterior decompression and fusion treatment for OPLL using the floating method.

Background: Segmental motion of the ossification foci has been reported to promote OPLL development. The OPLL can grow longitudinally and thicken after laminoplasty, which allows segmental motion of the OPLL.

Case report: A 66-year-old man, who has a history of OPLL anterior surgery with floating method 11 year prior, showed a gradual increase in gait disturbance. Imaging analyses revealed a de novo ossification focus at the C6 to 7 pseudarthrosis level compressing the spinal cord anteriorly.

Discussion: The present case showed that there is a possibility of de novo OPLL development after pseudarthrosis of anterior decompression and fusion surgery, even after complete floating of the ossification foci.

Conclusion: The OPLL can develop under certain conditions even after anterior decompression and fusion surgery using a floating method. Thus, rigorous observation is essential for pseudarthrosis even though the initial neurological recovery may be good.

Clinical significance: The present case showed a close relationship between OPLL genesis and segmental motion.

Keywords: Cervical spine, Ossification of the posterior longitudinal ligament, Pseudarthrosis.

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BACKGROUND

Ossification of the posterior longitudinal ligament is heterotopic and, in many cases, results in compression of the spinal cord that requires decompressive surgery to relieve myelopathic symptoms.1 The OPLL is one of the main causes of compressive myelopathy, such as cervical spondylotic myelopathy because of degenerative spinal changes as a result of aging.2

Surgical procedures for cervical OPLL include posterior decompression with laminectomy or laminoplasty, posterior decompression with instrumented fusion, and anterior decompression and fusion surgeries.3 Anterior procedures include both extirpation and floating of the ossification foci according to the surgeon’s decision. Massive ossification foci often show tight adhesion to the dura mater, resulting in difficulty in extirpation without a dural injury or dural defect. Therefore, a floating method is sometimes used as an anterior surgical procedure for cervical OPLL, even though parts of the ossification foci remain after the floating method.4 To our knowledge, there is no previous report showing OPLL development at the fusion level within the surgical site.

Here, we report a case of OPLL in a patient who showed a de novo ossification focus compressing the spinal cord at the pseudarthrosis site several years after anterior decompression and fusion treatment for OPLL using the floating method, supporting a close relationship between OPLL progression and segmental motion.

CASE REPORT

A 55-year-old man complained of bilateral hand clumsiness and gait disturbance, and was referred to our institution for surgery. On examination, the patient showed...
hyperreflexia of bilateral lower extremities. Anterior decompression and fusion surgery from C2 to C6 was performed (Fig. 1A). Ossification foci were completely floated from surrounding vertebral bodies, and autologous fibula was transplanted onto the excised vertebrae (Fig. 1B). His postoperative course was uneventful. The patient showed gradual neurological improvement. His Japanese Orthopedic Association score improved from 9 points preoperatively to 13 points postoperatively.

Eleven years after the surgery, the patient showed a gradual increase in gait disturbance. Follow-up magnetic resonance imaging revealed anterior cord compression at the C6 to 7 disk level. A plain radiograph showed pseudarthrosis at the caudal end of the fibula graft (C6–7). Computed tomographic myelogram (CTM) revealed a de novo ossification focus at the C6 to 7 pseudarthrosis level compressing the spinal cord anteriorly (Fig. 1C). Additional surgery is planned for the near future because the patient’s neurological status is gradually deteriorating.

**DISCUSSION**

The present patient showed a de novo ossification focus compressing the spinal cord at the pseudarthrosis site several years after anterior decompression and fusion treatment for OPLL using the floating method.

Although the etiology of OPLL is not fully understood, hereditary factors,\(^5\) glycometabolic abnormality,\(^6\) and local factors\(^7\) are known risk factors for its development. Local factors include segmental motion of the ossification foci, which has been reported to promote OPLL development.\(^8\) The OPLL can grow longitudinally and thicken after laminoplasty,\(^9,10\) which allows segmental motion of the OPLL. Addition of instrumented fusion to laminoplasty can suppress development of OPLL thickening in cervical OPLL.\(^11,12\) Similarly, in cervical OPLL, instrumented fusion can suppress the development of thoracic OPLL thickening. Moreover, reports have indicated remodeling of thoracic OPLL foci after instrumented fusion.\(^13,14\) These lines of evidence suggest that segmental motion is one of the most important factors for OPLL development.

However, there is no evidence that segmental motion can lead to de novo OPLL "genesis". There are several possible hypotheses for the de novo OPLL development along with pseudarthrosis after anterior surgery in the present case. First, long fusion surgery may have increased axial load and segmental motion because of its long lever arm, resulting in an apparent increase of mechanical stress at the pseudarthrosis site. Next, there is a possibility that the floating method omitted part of the ossification foci and that an unossified longitudinal ligament, which is a possible source of OPLL foci, resulted in OPLL genesis under conditions stimulating OPLL development. Either way, the present case showed that there is a possibility of de novo OPLL development even after pseudarthrosis of anterior decompression and fusion surgery, even after complete floating of the ossification foci.

**CONCLUSION**

The OPLL can develop under certain conditions even after anterior decompression and fusion surgery using a floating method. Thus, rigorous observation is essential for pseudarthrosis even though the initial neurological recovery may be good.
CLINICAL SIGNIFICANCE

The present case showed a close relationship between OPLL genesis and segmental motion.

REFERENCES