

The Essence of Clinical Practice Guidelines for Ossification of Spinal Ligaments, 2019: 1. Epidemiology of OPLL

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Epidemiology of Cervical OPLL

Summary

Many reports indicate that the incidence of cervical OPLL differs according to race, with a higher incidence among Japanese and East Asian people than in Western people. Cervical OPLL is more common among men, whereas thoracic OPLL is common among women. Cervical OPLL often develops in middle age (approximately 50 years of age). The presence of cervical OPLL indicates a high rate of concurrent ossification in other spinal ligaments. Patients that present with serious ossification such as that extending in the entire spine are often women.

Commentary

1. Incidence in Japanese and differences according to race

In a study using plain X-rays in Japanese, the incidence of cervical OPLL was approximately 3% (1.9-4.3%)¹⁻⁴. In a study using CT, the incidence of cervical OPLL was 6.3%⁵. In East Asian studies of the incidence of cervical OPLL, i.e., 2.8-3.0% in Taiwanese^{6,7}, 0.95-3.6% in Korean^{7,8}, and 1.1-1.7% in Chinese, were approximately equal to that in Japanese⁹⁻¹¹. On the other hand, in an American study using CT, the prevalence of OPLL according to race was 1.3% among Caucasians, 4.8% among Asians, 1.9% among His-

panics, 2.1% among Africans, and 3.2% among Native Americans¹², indicating a difference between races, with OPLL found to be more common among Asian people.

2. Differences in incidence according to gender

In a Japanese report, the incidence of cervical OPLL was 3.2% (4.3% in men and 2.4% in women)^{13,14}. In an evaluation using CT, the incidence was 6.3% (8.3% in men and 3.4% in women)⁵. On the other hand, the male/female ratio of thoracic OPLL was the contrary to that of cervical OPLL. The incidence of thoracic OPLL was 0.25% in men and 0.74% in women¹⁵. Furthermore, in another study using CT, the incidence of thoracic OPLL was 1.0% in men and 3.1% in women¹⁶.

Therefore, the incidence of cervical OPLL in Japan was approximately twofold higher in men than in women, whereas the incidence of thoracic OPLL was 1.5-3-fold times higher in women.

3. Common age of OPLL onset

The onset of cervical OPLL was reported to be more common from 50 years onward¹. In a study using CT, the onset of cervical OPLL was noted in individuals in their 30s and 40s as well; however, the incidence increased from 50 years onward¹⁷. Furthermore, with regard to thoracic OPLL, a study using CT revealed that the onset increased from 40 years onward, peaking in individuals in their 60s¹⁶. Based on the above results, cervical OPLL also develops in individuals in their 30s and 40s, and the incidence increases after 50 years of age.

4. Cervical OPLL and ossified lesions of the entire spine

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In a report on the prevalence of ossification of spinal ligaments in Japanese individuals examined using CT, cervical OPLL was present in 6.3%, thoracic OPLL in 1.6%, thoracic OLF in 12%, lumbar spine OPLL in 0.7%, lumbar spine OLF in 0.3%, diffuse idiopathic skeletal hyperostosis in 12%, cervical ossification of the anterior longitudinal ligament in 8%, thoracolumbar ossification of the anterior longitudinal ligament in 37%, and ossification of the nuchal ligament in 23% of patients⁹. Furthermore, the range of ossified lesions in the entire spine tended to be greater in women than in men. Particularly, ossification of the thoracolumbar spine tended to be more serious in women¹⁸.

Natural Course of OPLL (Symptoms, Imaging, Type of Onset, Involvement of Trauma, and Risk of Spinal Damage)

Summary

- Natural course (progression of ossification and myelopathy): The form of ossification correlates with the appearance of symptom. No significant correlation was observed between ossification progression and symptoms.
- Onset risk: Onset of myelopathy relates to small anteroposterior diameter of the spinal canal.
- Involvement of trauma: OPLL is a risk factor of cervical cord injury without bony injury.

Commentary

1. Progression of ossification

a. Evaluation using plain X-ray

Followed up for at least 10 years, the progression of ossification in cervical OPLL was observed in 49% of patients. Furthermore, the progression was observed in 57% of aged <50 years¹⁹. The rate of progression tended to be higher for the mixed type and the segmental type²⁰.

b. Evaluation using CT

A report of the three-dimensional progression of OPLL showed a mean annual increase of 4.1%. The risk factors for OPLL progression are young age, high body weight, and high BMI²¹. Another study revealed that involvement of multilevel and mixed type significantly correlated with progression of ossification, while trabeculation of OPLL and connection of the OPLL with the vertebral body showed a significant correlation with the absence of ossification progression²².

2. Myelopathy

Most of the cases with aggravation of myelopathy in the natural course were segmental type or mixed type, having a triangular shape of spinal cord on axial MRI, and an intramedullary high intensity region with T2-weighted imaging²³.

Furthermore, in conservative treatment patients, 66.5% remained without myelopathy, 14.7% newly developed myelopathy, and 4.6% exhibited exacerbation of myelopathy²⁴. In contrast, the symptoms improved in 60.5% of subjects in the natural course group, and no clear relationship was observed between the progression of ossification and symptoms²⁵.

3. Risk of onset

Mixed type of ossification was highly observed in myelopathy group. The rate of spinal canal stenosis and the range of motion at the site involving myelopathy was significantly greater in the group with myelopathy²⁶. Another study indicates that the minimum residual anteroposterior diameter of spinal canal of <6 mm was a risk factor to the onset of myelopathy, while the dynamic factors greatly contribute to the onset of myelopathy in patients with ≥ 6 mm²⁷.

4. Involvement of trauma

The presence of OPLL was a risk factor for cervical cord injury and especially in patients without bony injury^{28,29}. Another study noted that myelopathy was caused by trauma in 13% of OPLL patients³⁰. Among OPLL patients with a spinal canal occupancy rate of $\geq 60\%$, myelopathy was caused by trauma at high rates. Univariate analysis revealed a significant difference in elderly age, anteroposterior spinal canal diameter, and rate of spinal canal stenosis³¹.

Conflicts of Interest: The author declares that there are no relevant conflicts of interest.

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1. Epidemiology of OPLL, written by Tomohiko Hasegawa, MD, PhD, Hamamatsu University, School of Medicine, Japan. <https://doi.org/10.22603/ssrr.2021-0096>
2. Pathology of OPLL, written by Takashi Kaito, MD, PhD, Osaka University Graduate School of Medicine, Japan. <https://doi.org/10.22603/ssrr.2021-0074>
3. Diagnosis of OPLL, written by Hirotaka Chikuda, MD, PhD, Gumma University, School of Medicine, Japan. <https://doi.org/10.22603/ssrr.2021-0118>
4. Treatment of Cervical OPLL, written by Toshitaka Yoshii, MD, PhD, Tokyo Medical and Dental University Hospital, Japan. <https://doi.org/10.22603/ssrr.2021-0100>
5. Treatment of Thoracic OPLL, written by Shiro Imagama, MD, PhD, Nagoya University Graduate School of Medicine, Japan. <https://doi.org/10.22603/ssrr.2021-0095>
6. Diagnosis of OLF, written by Masao Koda, MD, PhD, University of Tsukuba, Japan. <https://doi.org/10.22603/ssrr.2021-0116>
7. Treatment of Thoracic OLF, written by Kanji Mori, MD, PhD, Shiga University of Medical Science, Japan.

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