Onset of Myelopathy Induced by Trauma in Patients with Ossification of the Posterior Longitudinal Ligament

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INTRODUCTION: Severe myelopathy can be induced by minor cervical trauma in patients with ossification of the posterior longitudinal ligament. Results of treatment by decompression surgery for this condition are far from satisfactory. To justify the usefulness of preventive surgery for patients with potential spinal stenosis due to ossified ligaments, it must be demonstrated that trauma is significantly involved in the onset of myelopathy in ossification of the posterior longitudinal ligament. In the present study, onset of myelopathy mainly due to determined trauma was examined in patients with ossification of the posterior longitudinal ligament in our clinic from 1967 to the present by prospective and retrospective studies.

METHODS: A total of 552 patients with ossification of the posterior longitudinal ligament in the cervical spine were selected as subjects, including 184 who had already developed myelopathy by the time of initial consultation, and 368 patients who had not developed myelopathy by the time of initial consultation and were followed-up. The former group of 184 patients was retrospectively examined by interview survey regarding the relationship between onset of myelopathy and trauma. The latter group of 368 patients was prospectively examined by observing radiographic findings and changes in clinical symptoms on regular physical examination twice a year. Ossification type at the time of initial consultation was continuous in 168 patients, segmental in 201, mixed type in 164, and other type in 19 patients. To patients who had not developed myelopathy by the time of initial consultation, we explained that cervical trauma should be avoided in daily life and observed the changes in clinical symptoms thereafter. For all patients, the relationships between ossification type and presence or absence of onset of myelopathy induced by trauma and between maximum stenosis of the spinal canal caused by ossified ligament and onset of myelopathy were examined. The follow-up period ranged from a minimum of 10 years to a maximum of 32 years, with an average of 19.6 years. Patient age at the time of final examination ranged from 58 years to 98 years, with an average of 79.6 years.
RESULTS: Of the 184 patients who had already developed myelopathy by the time of initial consultation, 24 (13%) patients had developed myelopathy with cervical trauma as a trigger. Fifty-two (28%) of these 184 patients had a history of cervical trauma, and among them 46% (24/52) developed myelopathy due to trauma. Of the 368 patients who had not developed distinct myelopathy by the time of initial consultation, 70 (19%) developed myelopathy during the follow-up period. The rates of undevelopment of accumulated myelopathy determined by the Kaplan-Meier method were 79% for 10-year follow-up and 70% for more than 20-year follow-up. Of the 70 patients who developed myelopathy, 6 (9%) developed myelopathy induced by trauma, all of whom had suffered traffic accidents. Of the 368 patients who had no myelopathy at the time of initial consultation, 2% (6/368) subsequently developed myelopathy induced by trauma. Of these 368 patients, 14 (5%) had cervical trauma. Among the 14, 43% (6/14) developed myelopathy induced by trauma. Ossification types in the 30 patients who developed myelopathy induced by trauma were as follows: mixed type, the largest in number, in 20 patients (67%); segmental type in 9 (30%); and continuous type in only 1 patient (3%). All of the 45 patients with maximum percentage stenosis of the spinal canal of 60% or higher developed myelopathy with or without trauma. Analysis of the 507 patients with maximum percentage stenosis of the spinal canal of less than 60% revealed no significant difference in diameter of the remaining spinal canal between the groups of patients with and without myelopathy.

CONCLUSIONS: The results of prospective investigation with guidance on living to avoid trauma revealed low frequency of development of myelopathy induced by trauma, and 70% of patients did not develop myelopathy during long-term follow-up. We concluded that preventive surgery should not be performed before the onset of myelopathy. Of patients who developed myelopathy induced by trauma, a significantly large number had mixed type ossification with large mobility at sites of non-continuous type ossification. This suggests that dynamic factors are important in the development of myelopathy in ossification of the posterior longitudinal ligament. In all patients with maximum percentage stenosis of the spinal canal more than 60%, myelopathy developed after cervical trauma. Therefore, if preventive surgery is performed for ossification of the posterior longitudinal ligament, it should be limited to special cases with maximum percentage stenosis of the spinal canal of 60% or higher, who lead a life with
high risk of trauma due to traffic accidents.