Morphological features and clinical significance of the Epidural membrane and Epiradicular sheath in Cervical Spondylotic Myelopathy

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Introduction/Aim: The morphology and clinical significance of the Epidural Membrane (EM) and Epiradicular Sheath (ERS) have been discussed in the context of the entire spine; however, there has been less research on these entities in the cervical spine versus the lumbar spine. This prospective study aimed to elucidate the morphological features and clinical significance of the EM and ERS in a Degenerative Cervical Spine Disorder.

Materials and Methods: This study included 151 patients with Cervical Spondylotic Myelopathy (CSM) who underwent expansive open-door Laminoplasty or Laminectomy using a microscope with a follow-up period of at least 2 years. The most damaged spinal segment (D-segment) was determined in each patient using the preoperative neurologic and image findings along with the remaining symptoms at follow-up. The morphological features of the EM and ERS were recorded in each patient during surgery. Specimens of EM and ERS were obtained for histological analysis from 17 patients selected at random.

Results: The average age at surgery was 63.2 years; there were 105 men and 46 women. The D-segments were located in the spine as follows: 21 cases at C3-4, 56 at C4-5, 67 at C5-6, and 7 at C6-7. The EM and ERS were adipo-fibro-vascular tissues, and their morphology ranged from delicate fibrous strands to substantial membranous structures over the dural tube. There was adhesion to both the ligamentum flavum and the dura to varying degrees. Some samples showed structures that caused **Neural Compression:** obstruction of dural tube expansion (21 cases, 13.9%), compression or impairment of the mobility of a nerve root (4 cases, 2.6%), or a combination (1 case, 0.7%). Except for one case, these structures were all located at the D-segment and/or its adjacent levels. Interestingly, the analysis of the EM and ERS showed that some harbored many small arteries, calcified debris, metaplastic bone fragments, or pseudo-angiomatous structures.

Conclusion: The EM and ERS are important structures that can undergo clinically relevant degenerative changes in response to aging and various mechanical stresses. Some of these changes can cause an inadequate neural decompression despite an adequate bony decompression, leading to unsatisfactory surgical outcomes in CSM.

Speaker Biography

Akira Miyauchi is an Orthopaedic Surgeon, specializing in Spine Disorders. He earned his MD and PhD at Hiroshima University in 1993 and 2012, respectively. He has over 3500 surgical cases of spine diseases using a microscope, about 200 – 250 cases every year. He has much interest in less invasive surgery and the anatomy in the epidural space and around the nerve root. He has performed neural decompression alone for almost all surgical cases; for example, decompression without spinal fusion even though patients have Degenerative Lumbar Spondylolisthesis or the so-called unstable spine.

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