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A Novel Method of Predicting Postoperative Neurological Recovery Of Cervical Spondylotic Myelopathy Based On The Ultrasonographic Echo Complex

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Introduction: The spinal cord central echo complex (SCCEC) is a special ultrasonography-based intramedullary structure, but its clinical significance in cervical spondylotic myelopathy (CSM) is undefined. This study aimed to explore the potential of the SCCEC in predicting postoperative neurological recovery in CSM.

Methods: Thirty-two DCM patients who underwent intraoperative ultrasonography-guided French-door laminoplasty were prospectively enrolled. The modified Japanese Orthopaedic Association (mJOA) score was evaluated preoperatively and 24 months postoperatively. SCCEC width (SCCEC-W), and anteroposterior diameter (APD) and transverse diameter (TD) of the spinal cord were measured on transverse ultrasonographic images, while the tissue widths from anterior and posterior borders of the spinal cord to the SCCEC were measured on sagittal ultrasonographic images. The APD of the spinal cord and occupying rate of the spinal canal were measured on preoperative magnetic resonance imaging (MRI).

Results: All patients achieved improvements in mJOA scores, with an average recovery rate (RR) of $68.69 \pm 20.22\%$. Spearman correlation analysis revealed that SCCEC-W, and ratios between the SCCEC-W and APD/TD based on ultrasonography, correlated moderately with mJOA score RR, with coefficients of -0.527, -0.605 and -0.514, respectively. The ratio between SCCEC-W and ultrasonographic TD correlated moderately with preoperative APD of the spinal cord. The MRI measurements and ultrasonography-based tissue widths showed no significant correlation with mJOA score RR.

Conclusions: The SCCEC may have predictive potential as an intraoperative indicator of neurological recovery in treating CSM. SCCEC-W may be related to spinal cord compression in CSM. This would help the surgeons to select appropriate surgical methods to treat cervical spondylotic myelopathy.

Fig. 1

The Grading system of the spinal cord central echo complex

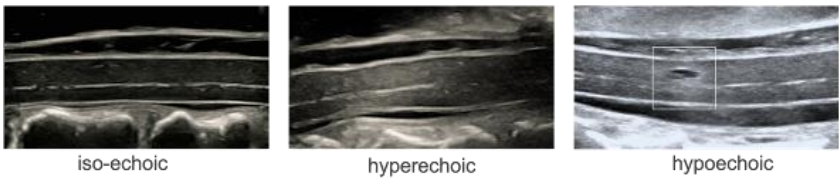


Fig. 2

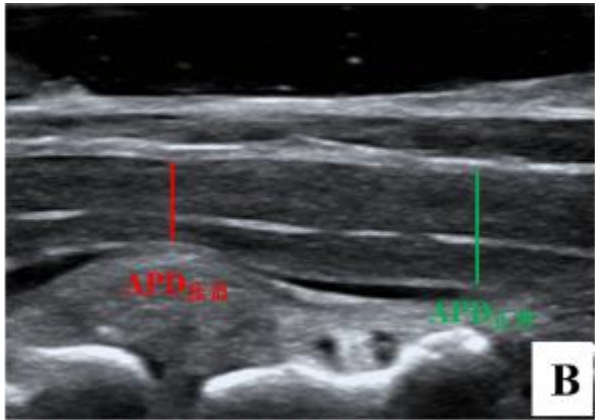


Fig. 3

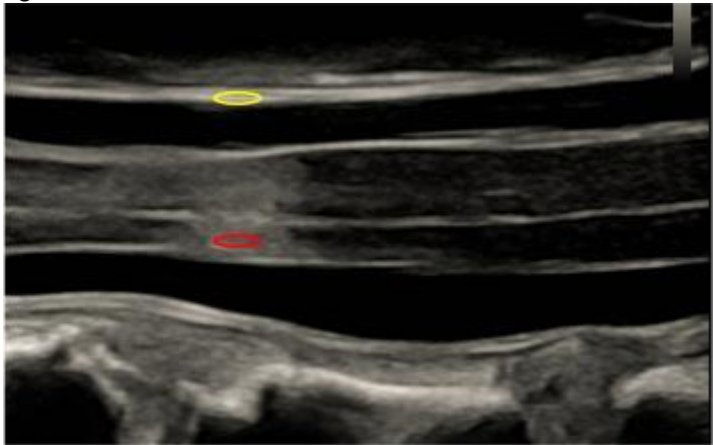


Fig. 4**The mJOA Score between different groups**

	Pre-operative	12ms-Postoperative	Recovery rate
Decompression Grade			
Grade 1 (n=23)	11.5 ± 1.3	15.2 ± 1.0*	68.1 ± 16.5%
Grade 2 (n=19)	11.7 ± 1.9	15.4 ± 1.1*	69.9 ± 19.3%
Spinal cord expansion			
adequate (n=24)	11.5 ± 1.7	15.6 ± 0.9*	75.9 ± 13.8%**
inadequate (n=18)	11.8 ± 2.1	14.9 ± 2.4*	59.6 ± 19.2%
Spinal cord echo			
iso-echoic (n=8)	11.4 ± 1.6	15.5 ± 1.1*	76.1 ± 17.0%
hyperechoic (n=34)	11.6 ± 2.1	15.3 ± 2.3*	67.1 ± 19.0%

* Compared with preop, $P < 0.05$; ** Compared with inadequate spinal cord expansion, $P < 0.05$;