A novel experimental animal model of delayed palsy after posterior decompression surgery of the cervical spine.

Background. Posterior shift of the cervical cord was thought to be one of the probable factors causing so called C5 palsy (C5P).

Research question. Can the structural and functional alterations of cervical roots following posterior decompression be clarified using an animal model?

Design. Basic *in vivo* research

Methods. Twenty-eight SD rats were divided into Group L (C3-7 laminectomy, N=18) and Group S (sham operation, N=10). The CT myelogram (CTM) was performed before and 3, 10, and 14 days after surgery (Pre, PO3, PO10, PO14, respectively) (Group L, N=5). The 3D-reconstructed images of CTM were created and posterior shift of the cervical cord and the elongation of each anterior rootlet were quantified. Motor evoked potential (MEP) of the deltoid (C5, 6 innervated) and triceps brachii (C7-T1 innervated), mechanical allodynia and grip strength of the forepaw were measured at Pre and PO3, PO7, PO10, and PO14 (Group L: N=8, Group S: N=5). Ultrastructure of the anterior rootlets of C5-8 specimens were examined by TEM.

Results. All anterior rootlets were elongated as the cord gradually shifted posteriorly. The elongation rate of the C6 anterior rootlets was the highest (142% at PO14). The MEP latency of the deltoid was significantly delayed throughout all postoperative time points. However, significant delay in the latency of the triceps brachii was observed only

on PO10. Degenerative change of unmyelinated axons was sporadically observed in the anterior rootlets. **Conclusions**. Tethering of the anterior rootlets due to posterior cord shift was suggested to be a probable mechanism causing C5P.

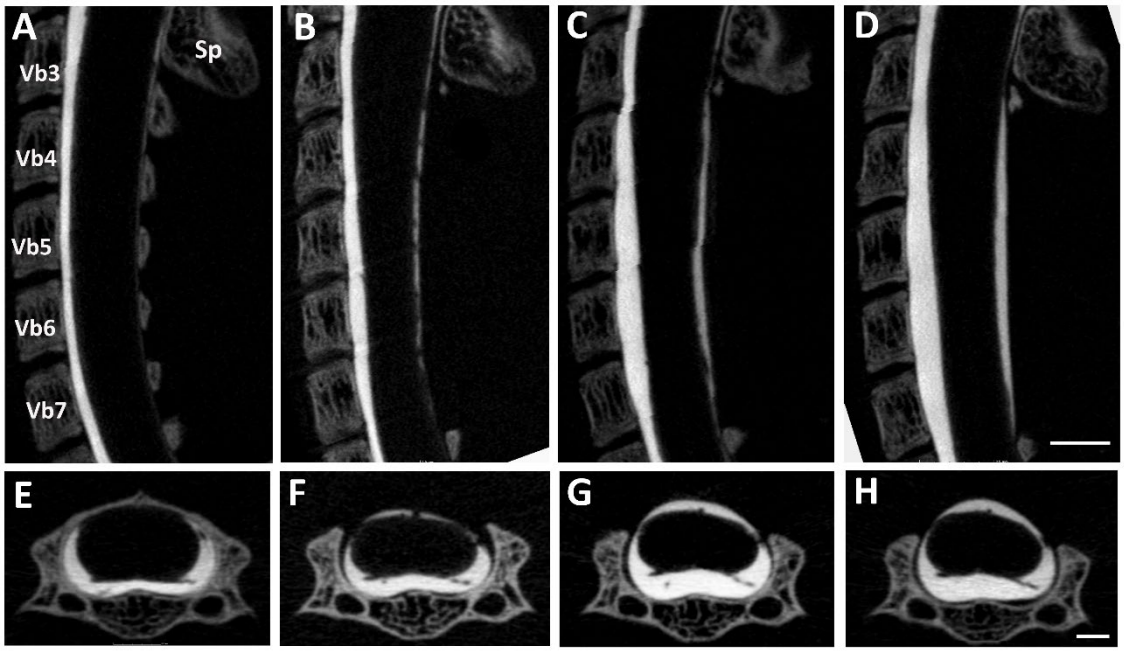

Fig. 1 Sagittal (A-D) and axial (E-G) MPR images of CTM (identical rat). (A, E) Pre and (B, F) PO3, (C, G) PO10, and (D, H) PO14. The scale bars indicate 2 mm (sagittal) and 1 mm (axial). Sp, spinous process of the C2 vertebra; Vb, vertebral body of the cervical spine.