INTRODUCTION: There are some reports about the relationships between the clinical manifestations and the spine morphology or spinal cord morphology in patients with myelopathy. But no reports have been published on the use of spinal cord volume. Our final goals were to use the spinal cord volume to assess the severity of cervical myelopathy and to determine the critical points of the surgical indications. Therefore, we considered that after measuring the cervical spinal cord volume in the healthy people, we should obtain an index corrected for the inter-individual variations.

METHODS: The cervical spinal cord volume of 90 healthy people (47 males, 43 females) was measured on MRI, and the relationships between this volume and each of the gender, height, body weight, and age were evaluated. In addition, the cervical spinal cord volume ratio was evaluated. The T1-weighted sagittal sectional images (1.4 mm continuous slices) were obtained using a 1.5T MRI system (GE) with 3D SPGR sequence. The sagittal sectional area of the spinal cord was measured by using a cursor to trace the outline of the spinal cord on each slice, and the spinal cord volume was calculated by integrating the sagittal sectional area. The measurement software used was GE surface rendering software. The measurements were taken from the foramen magnum to the inferior border of the second cervical (C2) vertebral body (volume 1), where spinal cord compression is rarely observed, and from the foramen magnum to the inferior border of the C7 vertebral body (volume 2). In addition, the ratio of volume 2 to volume 1 (cervical spinal cord volume ratio) was calculated, and the correlations between this ratio and each of the gender, height, body weight, and age were assessed.

RESULTS: The mean volume 1 was 3.191±0.529 cm³ in the males and 2.844±0.404 cm³ in the females, and the difference was significant. The mean volume 2 was 9.622±1.309 cm³ in the males and 8.543±1.048 cm³ in the females, and the difference was significant. However, there was no significant inter-sex difference in the cervical spinal cord volume ratio, which was 3.039±0.260 in the males and 3.020±0.252 in the females. Our study showed that in the healthy people, the cervical spinal cord volume depended on the gender, age, height, and body weight, and that the cervical spinal cord volume was larger in the males than in the females, decreased with age, and increased.
with height and body weight. However, the cervical spinal cord volume ratio was not affected by the gender, age, height, or body weight.

CONCLUSIONS: We consider that the cervical spinal cord volume ratio enables evaluation of spinal cord atrophy in the patients with cervical spinal cord lesions, without being affected by the inter-individual variations. The cervical spinal cord volume ratio can be an important index for predicting the prognosis, and accordingly it will be an important issue in our future studies.

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