Physical characteristics of patients with developmental cervical spinal canal stenosis

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Abstract There has been only one report on the physical characteristics of patients with developmental cervical spinal canal stenosis. The objective of this consecutive clinical study was to identify the physical characteristics of patients with developmental cervical spinal canal stenosis. The subjects were 243 patients with cervical spine disease who received treatment in our department between April 2001 and March 2002. These patients were divided into two groups (the groups of patients with and without spinal canal stenosis) on the basis of their lateral cervical spine radiographs. The six items examined were height, weight, sitting height, inter inner canthal distance, upper arm length, and head circumference in each patient, and then their values were compared between the two groups. The mean inter inner canthal distance was 2.7 cm in the group of patients with spinal canal stenosis and 3.5 cm in the group of patients without spinal canal stenosis; a significant difference ($P < 0.01$) was observed. Regarding height, weight, sitting height, upper arm length, and head circumference, no significant difference was found while comparing the two groups. In conclusion, developmental cervical spinal canal stenosis seems to be highly likely in patients with smaller inter inner canthal distance.

Keywords Cervical spine · Spinal canal stenosis · Physical characteristics

Introduction

Developmental spinal canal stenosis is evident at the end of bone growth and with further regressive changes shows neurological symptoms most often in the cervical region of the spine after the patient reaches 60 years of age. Patients with developmental cervical spinal canal stenosis and an anteroposterior diameter of the spinal canal of 12 mm or less are highly likely to develop cervical myelopathy [1, 3]

While Nightingale [2] cited shorter upper arms and longer trunks as physical characteristics of patients with developmental cervical spinal canal stenosis, we have found from clinical experience that developmental cervical spinal canal stenosis frequently occurs in cross-eyed persons. The purpose of this study was to identify the physical characteristics of patients with developmental cervical spinal canal stenosis.

Subjects and methods

The subjects were 243 patients with cervical spine disease who received treatment in our department between April 2001 and March 2002. These patients were divided into two groups on the basis of their lateral cervical spine radiographs. One group consisted of 48 patients in whom at least one mid-sagittal diameter of the fourth, fifth, or sixth cervical vertebrae was 12 mm or less (the group of patients with spinal canal stenosis). The other group consisted of 195 patients in whom those mid-sagittal diameters were 13 mm or more (the group of patients without spinal canal stenosis). In the group of patients with spinal canal stenosis, the mean ($\pm$ SD) age was 62.8 ± 13.2 years and there were 27 men and 21 women. In the group of patients without spinal canal stenosis, the mean ($\pm$ SD) age was

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Fig. 1 Inter inner canthal distance

59.5 ± 18.4 years and there were 113 men and 82 women. Thus, no significant differences in age and sex were seen between the two groups.

The six items examined were height, weight, sitting height, inter inner canthal distance (Fig. 1), upper arm length, and head circumference. The inter inner canthal distance was measured using an ophthalmic scale. Upper arm length was measured as distance between the right acromion and the lateral epicondyle of the right humerus. Head circumference was measured at the level of the eyebrows. These six parameters were measured by three independent medical persons and mean values were calculated. These values were compared between the groups of patients and analyzed by the Student's *t* test, with $P < 0.05$ considered to be significant. The values were also compared between the two groups by sex.

Results

The overall results were shown in Table 1. The mean height was 160.8 cm in the group of patients with spinal canal stenosis and 162.2 cm in the group of patients without spinal canal stenosis; no significant difference was observed. The mean weight was 55.9 kg in the group of patients with spinal canal stenosis and 56.3 kg in the group of patients without spinal canal stenosis; no significant difference was observed. The mean sitting height was 87.8 cm in the group of patients with spinal canal stenosis and 87.9 cm in the group of patients without spinal canal stenosis; no significant difference was observed.

The mean inter inner canthal distance was 2.7 cm in the group of patients with spinal canal stenosis and 3.5 cm in the group of patients without spinal canal stenosis; a significant difference ($P < 0.01$) was observed. There was also a significant difference ($P < 0.01$) between the two groups by sex when compared.

The mean upper arm length was 27.6 cm in the group of patients with spinal canal stenosis and 28.2 cm in the group of patients without spinal canal stenosis; no significant difference was observed. The mean head circumference was 54.4 cm in the group of patients with spinal canal stenosis and 55.8 cm in the group of patients without spinal canal stenosis; no significant difference was observed. Regarding height, weight, sitting height, upper arm length and head circumference, no significant difference was found while comparing the two groups by sex.

Discussion

There have been no reports on the physical characteristics of patients with developmental cervical spinal canal stenosis other than the report by Nightingale [2], and thus such characteristics are almost unknown. Our results suggest that the physical characteristics of patients with developmental cervical spinal canal stenosis are not shorter

Table 1 Overall results (Mean $\pm$ SD)

	Patients with spinal canal stenosis			Patients without spinal canal stenosis		
	Subjects	Male	Female	Subjects	Male	Female
Height (cm)	160.8 $\pm$ 7.2	164.8 $\pm$ 8.3	155.7 $\pm$ 7.6	162.2 $\pm$ 8.5	166.8 $\pm$ 9.1	157.2 $\pm$ 7.9
Weight (kg)	55.9 $\pm$ 13.2	60.1 $\pm$ 10.4	49.6 $\pm$ 8.8	56.3 $\pm$ 12.5	61.2 $\pm$ 9.8	50.1 $\pm$ 8.4
Sitting height (cm)	87.8 $\pm$ 5.2	90.8 $\pm$ 6.3	82.7 $\pm$ 5.6	87.9 $\pm$ 5.5	91.0 $\pm$ 6.5	83.1 $\pm$ 5.9
Inter inner canthal distance (cm)	2.7 $\pm$ 0.6*	2.7 $\pm$ 0.7**	2.7 $\pm$ 0.6***	3.5 $\pm$ 0.7*	3.6 $\pm$ 0.8**	3.4 $\pm$ 0.7***
Upper arm distance (cm)	27.6 $\pm$ 2.9	28.6 $\pm$ 3.1	26.1 $\pm$ 2.9	28.2 $\pm$ 3.1	29.1 $\pm$ 3.3	26.6 $\pm$ 3.1
Head circumference (cm)	54.4 $\pm$ 2.3	55.4 $\pm$ 2.4	53.5 $\pm$ 2.3	55.8 $\pm$ 2.5	56.8 $\pm$ 2.7	54.9 $\pm$ 2.3

*, **, *** $P < 0.01$

upper arms or longer trunks, but a smaller inter inner canthal distance. The results presented earlier suggest the possibility that the morphogenesis of the facial bone and that of the cervical vertebrae are similar organogenetically or molecular-genetically. In the future, we hope to measure not only the anteroposterior diameter of the spinal canal but also the lengths of the vertebral bodies, pedicles and spinous processes. Furthermore, we hope to measure those of the thoracic and lumbar vertebrae, as well as of the cervical vertebrae, and examine the possible relationship between the internal canthal distance and the morphology of the spine.

The data obtained from the present study are interesting from the perspective of comparative morphology in that they suggest the pathogenesis of developmental cervical

spinal canal stenosis. It seems to be also useful in daily clinical practice, because a glance of outpatients' eyes and face may make a good speculation on the patients' cervical spinal canal stenosis.

References

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