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Congenital Cervical Spinal Stenosis
A Factor in Myelopathy

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With 3 Figures

Summary

Ten patients are reported who had congenital stenosis of the cervical spinal canal associated with varying degrees of neurological deficit.

The term cervical spinal stenosis refers to the condition in which there is a congenitally small cervical neural canal distinct from any narrowing due to spondylotic ridges. The critical measurement in the spinal canal is the sagittal or AP diameter (Payne and Spillane, 1957). The sagittal diameter is defined by Hinck *et al.* (1964), as the shortest distance between the mid-dorsal surface of a given vertebral body and the ventral aspect of its spinous process as seen on the lateral spine radiograph. In adults the sagittal diameter from C 4 to C 7 ranges from 12 to 22 mm with an average of 17 mm (Wilkinson, 1971). This is measured on lateral X-rays taken at a 72 inch distance to minimize magnification (Symon and Lavender 1967). Even so, an AP diameter of 12 mm, for example, equals a true measurement of approximately 10.5 mm. As the average spinal cord is close to 10 mm in its AP dimension the unfortunate individual with a minimal AP canal measurement of 12 mm or less is at risk, particularly if cervical spondylosis and/or trauma is added.

Kessler (1975) has said that values below 14 mm are uncommon, and Burrows (1963) found only six below 14 mm in 2100 segmental measurements in 300 individuals. Prior to the report of Kessler (1975) there had been 15 patients described in the literature with congenital stenosis and myelopathy (Hinck *et al.* 1964, Hinck and Sachdev 1966,

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Moiel *et al.* 1970). Kessler (1975) recorded an additional 6 cases, using a sagittal diameter of 14 mm or less as the basis for congenital cervical canal narrowing.

In the present series of 10 patients (Stratford 1975) measurements were taken on the lateral X-ray film of the canal at C 4, C 5 and C 6, from the posterior aspect of the vertebral body to the point opposite, in the midline, where laminae and spinous process meet. These measurements did not include additional narrowing of the spinal canal in some patients due to cervical spondylosis. Each of the ten patients to be reported here had at least one sagittal or AP diameter of 12 mm or less. Most of the patients had some added narrowing due to spondylotic ridging, and half had a history of trauma, either acute or chronic. Table 1 summarizes the ten patients together with related factors of spondylosis and trauma as well as sagittal measurements of the cervical canal at C 4, C 5 and C 6. Nine of the ten patients were male.

Table 1. *Ten Patients With Cervical Spinal Stenosis, Each With at Least One Sagittal Diameter of 12 mm or Less. All Were Males Except Case 9, a 72 Year Old Female*

	Case	Age	C-4	C-5	C-6	Spondylosis	Trauma
1.	A. H.	55	11	10	10	++	chronic
2.	A. O.	37	11	11	13	+	acute
3.	J. H.	54	12	12	12	++	0
4.	J. M.	59	12	12	13	++	0
5.	R. S.	47	13	12	12	++	acute
6.	H. W.	60	13	12	12	++	acute
7.	B. M.	23	12	12	13	0	acute
8.	K. M.	48	13	13	12	+	0
9.	A. R.	72	13	13	12	+++	0
10.	J. P.	26	12	13	13	+	0

Case 1. A. H., was a 55-year-old man from Barbados who presented with a severe Brown-Sequard syndrome. Fig. 1 shows the extremely small sagittal diameter of 10 mm, plus moderate spondylosis. This patient had repeatedly traumatized his spinal cord while hyperextending his neck to inspect his coconut trees. Myelography revealed an almost complete block at C-4–5. Following extensive laminectomy he made a significant and worthwhile recovery, although some signs of myelopathy persisted.

Case 2. A. O., was a 37-year-old carpet-layer who fell downstairs sustaining a hyperextension injury which rendered him quadriparetic. Fig. 2 revealed a sagittal diameter of 11 mm and minimal spondylosis. Five weeks after the accident a decompressive laminectomy was done with further improvement noted in subsequent months.

Fig. 1. Lateral cervical spine radiograph of A. H., male age 55, showing a sagittal diameter of 10 mm with added spondylosis at C-4–5 narrowing the canal to 9 mm

Fig. 2. Lateral cervical spine radiograph of A. O., male age 37, showing a sagittal diameter of 11 mm at C-4 and C-5

Case 5. R. S., was a 47-year-old man who had a fall facedown while skiing, rendering him temporarily quadriplegic. Cervical spine X-rays disclosed a sagittal diameter of 12 mm and moderate spondylosis, as seen in Fig. 3. During a period of several months marked improvement in his neurological status took place. Because of his determination to continue skiing and fly float-equipped aircraft a cervical laminectomy of C-5, C-6 and C-7 was done to safeguard him against future risks of cervical spine hyperextension.

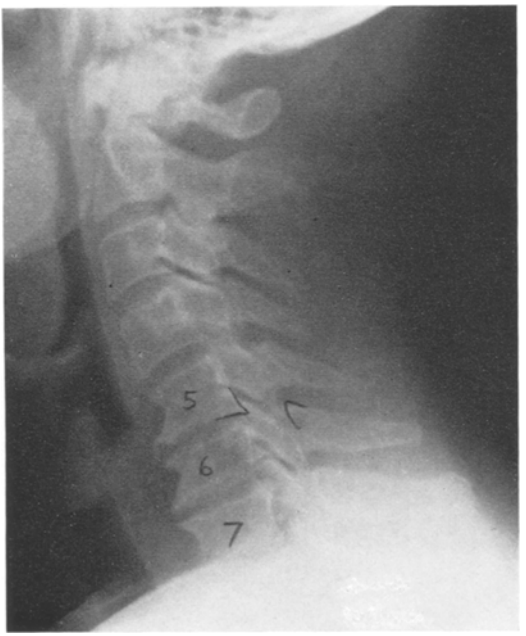

Fig. 3. Lateral cervical spine radiograph of R. S., male age 47, showing a sagittal diameter of 12 mm with added spondylosis at C-5–6 narrowing the canal to 10 mm

Case 7. B. M., was a 23-year-old professional football player who sustained a hyperextension injury resulting in minimal temporary neurological deficit. X-rays revealed a sagittal diameter of 12 mm and no spondylosis. This patient was the only one of the ten patients who did not have a laminectomy done. He was advised strongly to avoid any contact sports activity in the future. This case is similar to that of the 18-year-old football player with cervical stenosis reported by Grant and Puffer (1976).

Treatment

Nine of the ten patients had multiple level cervical laminectomy operations; the dura was not opened. Because of the extremely tight canal and an already damaged spinal cord, particular care must be

taken in positioning for operation and in the actual operative decompression. The anterior approach at multiple levels is not suitable in this condition and may in fact be hazardous (Galera and Tovi 1968). All operations were done prone, the Gardner head rest holding the patient in a neutral or slightly flexed position. It is to be emphasized that none of the cases was operated on in the sitting position to avoid the hazard of possible vascular insufficiency in the cervical cord. None of the acute traumatic cases was operated on until a month or more after the accident, by which time some improvement had already taken place in the neurological deficit.

Conclusion

Patients with an abnormally small sagittal diameter of the cervical spinal canal are at risk, and particularly so if cervical spondylosis or trauma, or both, are present. Although congenital narrowing of the cervical spinal canal may be asymptomatic for many years, the triad of congenital spinal stenosis, spondylosis, and trauma (acute or chronic), may result in a significant myelopathy. Decompressive laminectomy at multiple levels should be done after the acute phase has subsided.

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