Cord compression in Scheuermann's kyphosis

A case report

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A 20-year-old man with cord compression at the apex of a Scheuermann's kyphosis was successfully treated using posterolateral decompression and posterior fusion.

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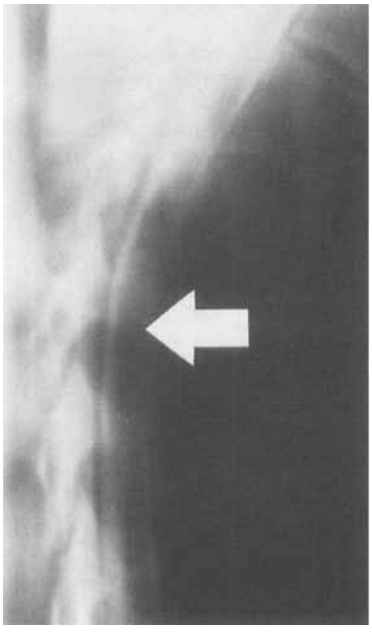
Case report

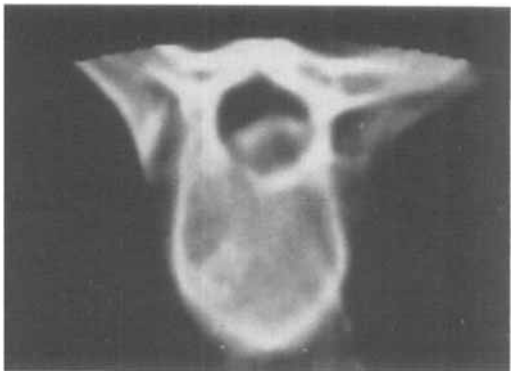
A 20-year-old, previously healthy bus driver presented with a slowly progressing spastic paraparesis of 6 months' duration. Initially, he had experienced weakness only after physical exertion; but the symptoms slowly progressed, and after a couple of months, weakness became manifest also at rest. He did not suffer from back pain, but had experienced decreased sensibility and paresthesia in his legs that increased when bending forward. Because of the decreased sensibility, he found it difficult to walk in the dark; he has also complained of urinary urgency.

On physical examination, he appeared healthy and had only a moderate thoracic kyphosis. The straight-leg raising test and Babinski's sign were negative. The deep tendon reflexes in his legs were increased, more so on the right side, and there was a bilateral ankle clonus. All the sensory modalities were slightly diminished below T9. Laboratory tests of serum and cerebrospinal fluid were normal.

Radiographs showed a Scheuermann's kyphosis with a Cobb angle of 60° between T5 and T11, which was mainly due to anterior wedging of T5 to T7. On myelograms, contrast medium was found posterior to the cord, but not anteriorly over the sharpest portion of the kyphosis. Computed tomography demonstrated a partial occlusion of the subarachnoid space at the apex, a displacement of the cord anteriorly and to the left, and an increased amount of epidural fat posteriorly (Figure 1). Somatosensory-evoked potentials revealed a blockage compatible with a thoracic lesion.

The patient was operated on 8 months after the initial appearance of symptoms. The spinal canal was explored through a posterolateral exposure





Computed tomography showing an increased amount of epidural fat posteriorly and displacement of the cord anteriorly and to the left.

Myelogram showing no contrast medium anterior to the cord over the sharpest portion of the kyphosis.

Figure 1. A 20-year-old man with cord compression at the apex of a Scheuermann's kyphosis.

involving laminectomies of T5 and T6, a left-sided hemilaminectomy of T7, and removal of the transverse processes, pedicles, and costal endings on the left side of T5 to T7. No tumor was found, but there was an increased amount of epidural fat posteriorly, and the cord was tightly stretched across the apex of the kyphosis. The intruding parts of the vertebral bodies were drilled away; a considerable amount of bone had to be removed to achieve decompression. A posterior fusion was performed between T3 and T9; the spine was stabilized by two Harrington compression rods. A second bone grafting operation wasperformed 3 months later because of the wide exposure. The patient wore a brace for a further 3 months and the fusion healed uneventfully.

The neurologic deficits regressed slowly; and after 6 months, only a slight spasticity remained. The evoked somatosensory potentials were also improved. A month later, he took up jogging; but he still felt weak in his right leg. He had no genitourinary complaints. At follow-up, nearly 5 years postoperatively, he had almost completely recovered: the only remaining symptom was a slight intermittent spasticity in his right leg. He has been working full time and has resumed regular athletic activities.

Discussion

Scheuermann's disease is rarely complicated by neurologic deficits. Three different types of neural compression have been reported: (1) intraspinal extradural cyst, (2) herniated intervertebral disc, and (3) mechanical compression of the cord at the apex of the kyphosis. Upon reviewing the literature, we have found only 16 cases falling into the last category, and these are briefly presented in Table 1.

Because Scheuermann's disease has a uniform sex distribution (Sørensen 1964, Taylor et al. 1979, Montgomery and Erwin 1981, Ascani and Montanaro 1985), it is notable that all but 1 were males; however, in Cases 6 and 7, gender was not reported. This corresponds to neurologic complications of spinal deformities in general, which have a marked overrepresentation of males (McKenzie and Dewar 1949, Lonstein et al. 1980). The obvious difference between the sexes may indicate that additional factors besides vertebral wedging are implied in the pathomechanism. Boys have more longitudinal spinal growth than girls, and their maximum growth in trunk length occurs about 2 years later (Anderson et al. 1965). Consequently, it is pos-

Table 1. Available data from published cases and the present case of cord compression caused by Scheuermann's kyphosis

A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	5	M	21	7–10	80	1	1	T10	p	2, 3	I	9/12	–
2	7	M	17	5–9	37	3	1	T8	p	4–6	F	2	–
3	8	M	21	8–9	–	4	1	T7	p	2	I	–	T
4	8	M	43	6–8	–	8	1	T7	p	7	I	3/12	–
5	8	F	34	3–10	–	3	2	T4	p	7	I	3/12	T
6	9	?	16	–	–	–	1	–	p	4	F	3	I
7	9	?	17	–	–	–	1	–	p	6–4	F	2	P
8	12	M	18	7–10	56	1	1	T10	p	2, 3–7	F	3	U
9	12	M	20	7–10	47	A	1	T7–8	p	6	F	1	T
10	12	M	14	6–9	58	1	1	–	–	6–4	F	1	S
11	15	M	22	7–9	–	1	1	T12	0	2, 3	F	4	–
12	15	M	21	6–7	–	2	2	T7	p	2, 3	F	3	–
13	15	M	28	8–10	–	24	1	T10	p	1	I	0	T
14	15	M	18	8–10	–	24	1	L4	p	0	F	4	–
15	15	M	21	7–10	–	36	1	T10	p	2, 3	D	–	I
16	15	M	22	6–8	–	12	2	T9	p	2, 3	F	2/12	–
17	p	M	20	5–11	60	6	1	T9	p	5	F	5	–

A Case
B Reference; p present case
C Sex
D Age
E Level of the thoracic kyphosis
F Angle of kyphosis
G Duration of neurologic symptoms, months; A acute onset
H Preoperative neurologic deficit
  1 paraparesis
  2 paraplegia
I Upper level of sensory deficits; – no sensory loss
J Myelography; 0 negative findings; p partial block
K Treatment, digits separated by hyphens indicate operation in two seances
  0 none
  1 plaster
  2 laminectomy
  3 splitting of dura
  4 posterior fusion
  5 posterolateral decompression, spinal fusion
  6 anterior decompression, spinal fusion
  7 anterolateral decompression, spinal fusion
L Postoperative course:
  F full or almost full neurologic recovery
  I improved
  D dead
M Follow-up, years
N Remarks
  I postoperative infection
  P pulmonary embolus
  S coexistant scoliosis
  T trauma
  U unsatisfactory result after the first operation

sible that in males with Scheuermann's disease the kyphosis may still progress in the late teens.

In the 6 cases in which the deformity was reported, the average angle was only 56° (37°–80°), and there was no obvious correlation between the magnitude of the deformity and the severity of the neurologic deficits. This peculiarity of cord compression in Scheuermann's kyphosis, described by Ryan and Taylor (1982) and Klein et al. (1986), is in sharp contrast to the pronounced deformities usually found in patients with neurologic complications due to other kinds of kyphosis. In 43 patients with cord compression due to untreated spinal deformity, the kyphosis averaged 95° (Lonstein et al. 1980). One possible explanation might be that the degree of vertebral wedging may not be a decisive factor in the development of neurologic symptoms in Scheuermann's disease.

The median lesion level was T9 (Table 1). Cord compression secondary to deformity has been reported to be most common in the thoracic spine (Lonstein et al. 1980, Kaneda 1985), where the spinal canal is narrowest (Dommisse 1974) and the cord is least elastic (Breig 1960). In our patient, however, the medullary canal was wide. If tethering of the cord was the only etiologic factor, neurologic symptoms would certainly have presented at an earlier age; the mean age in the published cases was 22 years.

Because the compressive force is acting from the front, a posterior decompression is ineffective. This is clearly illustrated by Case 8, which initially underwent laminectomy and later had to be reoperated on because of persistent neurologic deficits. When different surgical methods of decompression are compared, laminectomy gives the worst results, and may even be directly harmful by removing posterior stabilizing elements, thus permitting the kyphosis to increase (Lonstein et al. 1980). Simultaneous splitting of the dura undoubtedly exerts a certain decompressive effect and can account for the improvement seen in some of the patients. Today, most authors favor an anterior decompression in cases of neurologic deficit secondary to spinal kyphosis (Lonstein et al. 1980, Ryan and Taylor 1982, Kaneda 1985, Klein et al. 1986). In our case the possibility of an extradural tumor had been raised preoperatively; and this was the reason for the posterolateral exposure, because such a lesion would not have been accessible by an anterior approach.

The moderate spinal deformity present in these cases of Scheuermann's disease implies that multiple etiologic factors—such as vascular impairment, relative spinal stenosis, and/or tethering of the cord—might be operative in causing the neurologic deficit. The results in terms of neurologic recovery are good if the intruding parts of the posterior vertebral bodies are removed and the spine is stabilized without delay.

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