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Normal electroencephalograms in idiopathic scoliosis

Twenty-five children with idiopathic scoliosis and without known neurologic disease and 25 age- and sex-matched controls had a standard electroencephalogram (EEG) performed and scrutinised blind. The EEGs were normal in the 25 children with idiopathic scoliosis and 24 controls were normal. Our study does not support the view that idiopathic scoliosis has a central neurologic cause.

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Although there is no firm evidence in favour of a neuromuscular or central cause of idiopathic scoliosis, two recent reports (Leonard 1981, Petersen et al. 1979) have shown that about 30 per cent of children with this condition have abnormal electroencephalograms (EEGs). The inference from these two studies is that centrally situated subcortical structures may be involved in the pathogenesis of scoliosis. We carried out an EEG study in idiopathic scoliosis using a contemporary control group, and had the EEGs read blind.

Patients and methods

Twenty-five children (Table 1) with idiopathic scoliosis, 18 girls, 7 boys, median age 13 (3–18) years had a standard 16-channel EEG recording made using a 10/20 international electronic system. None of the children had undergone scoliosis surgery.

Twenty-five children with straight spines, sex- and age-matched to within 3 months, drawn from local schools or who were offspring of hospital staff, were similarly assessed. All EEGs were performed by one senior EEG technician after informed consent had been obtained. None of the 50 children had any previous history of conditions known to cause an abnormal EEG, and all were normal on neurologic examination.

We defined a normal EEG in children as one having a moderate well-formed posterior alpha rhythm with random slower activity in most regions without focal or paroxysmal features, and without an abnormal response to hyperventilation or photostimulation. Additional but normal features included: sharp wave complexes in central regions coinciding with sleep, general theta activity when drowsy with slight alpha asymmetry following stroboscopic stimulation and slow posterior rhythms. The EEG recordings were scrutinised by one of us (JBPS) who had no prior knowledge of the clinical details, other than the age and sex of the child.

Table 1. The scoliotic curves at presentation and their treatment

Case	Age	Sex	Side	Site	Degree	Treatment
1	3	M	R	T6–12	55	L
2	4	M	L	T8–L2	74	L
3	7	M	L	T6–11	41	B
4	8	M	L	T6–12	32	B
5	8	M	R	T5–10	73	H
6	8	M	R	T5–10	16	N
7	10	F	R	T5–12	46	H
8	13	F	L	T11–L4	23	N
9	13	F	R	T6–L1	43	H
10	14	F	L	T5–L1	57	H
11	14	F	R	T8–12	35	B
12	14	F	R	T5–L1	45	H
13	14	F	R	T4–11	68	H
14	14	F	L	T5–11	34	B
15	14	F	R	T6–11	60	H
16	15	F	L	T12–L4	32	B
17	15	F	R	T6–11	40	B
			L	T12–L4	40	
18	15	F	R	T4–L2	47	H
19	15	F	R	T3–8	38	N
			L	T9–L3	34	
20	15	F	R	T12–L4	30	B
21	16	F	R	T5–L1	60	H
22	16	F	R	T5–10	42	B
			L	T11–L4	50	
23	16	F	R	T5–11	48	H
24	18	F	R	T7–L2	45	H
25	18	F	R	T6–11	55	H

B Braced: non-progressive, H Harrington, L Luque, N No treatment: non-progressive.

Results

All the children with idiopathic scoliosis, had normal EEGs. Of the 25 children in the control group, 24 had normal EEGs and one 16-year-old girl showed a minor photoconvulsive response, considered to be a minor abnormality.

Discussion

All our patients and controls fulfilled Petersen's and associates' (1979) criteria of normality. Not all the children with idiopathic scoliosis in their study fulfilled these criteria, but in those that did, the resting EEG pattern in 18 per cent showed "paroxysmal activity at rest" as compared with 3 per cent of children who acted as historic controls. Leonard (1981) found that 38 per cent of children with idiopathic scoliosis had "grossly abnormal" EEGs and although a control group was used the EEGs were not read blind.

Our study does not support the view that idiopathic scoliosis has a central neurologic cause. Yamada et al. (1984) noted equilibrium dysfunction with abnormalities in proprioceptive and ocular reflex systems, and several reports (Sahlstrand & Petruson 1979a, b, Sahlstrand et al. 1979) found dysfunction in labyrinthine or postural control mechanisms. These phenomena may be secondary to the existing spinal deformity, although if the observed disturbances are of etiologic importance in idiopathic scoliosis, the area implicated in the central nervous system would not be the subcortical structures, as suggested by the EEG studies, but the brain stem.

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