American children start school at 6-6½, but schools will usually accept foreign children who have started school at home.

Inoculation against measles, mumps, and German measles in addition to diphtheria, pertussis and tetanus and polio may be required before admission to school, but this can be arranged on arrival.

Lectures

Prepare a couple of seminars, with slides, on any original work or investigation previously performed. In addition, slides of British cities and countryside are worth having for informal lectures to show at the children's school and to friends.

Departure

Transatlantic flying is no longer romantic, especially when you are travelling with children. Try to reserve seat numbers in advance and telephone again on the morning of departure to reinforce the request and thereby avoid the all too frequent attempts to separate families on aircraft. Motel accommodation for the first night and transport from the airport can be arranged in advance with local advice.

With advance planning a period abroad can be painless and highly recommended.

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Lesson of the Week

Painful scoliosis: a need for further investigation

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When scoliosis presents in an adult it is often painful. A painful scoliosis in a child or adolescent, particularly with night pain, often indicates the presence of an underlying osteoid osteoma, osteoblastoma, severe spondylolisthesis, or spinal tumour. Routine radiographs may fail to delineate the lesion and tomography, a CT scan, radionuclide bone scan, radiculogram, or lumbar puncture may be necessary.

I describe 10 young patients who presented with painful scoliosis and in whom special investigative techniques disclosed a serious underlying cause.

A painful scoliosis in a child or adolescent requires further investigation to exclude an underlying pathological cause

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Case histories

Table I gives the clinical details of all 10 patients. Two cases are described below.

Case 2—An 11 year old boy was referred to the Royal National Orthopaedic Hospital in August 1983 for a second opinion about an 11 month history of right sided lower lumbar pain of spontaneous onset. The pain was increased by sitting and caused him to wake at night. The pain was not relieved by aspirin. Examination showed a healthy child with a rigid 20° left thoracolumbar scoliosis. He was able to localise his pain to the clinical site of L3, but there was no local tenderness. A plain anteroposterior radiograph suggested increased sclerosis in the right pedicle of L3 (fig 1). A technetium-99m bone scan confirmed the presence of a hot spot over the site and a tomogram clearly delineated the lesion (fig 2). One year later the pedicle and lesion were excised. Relief of pain was immediate. Histological

TABLE I—Details of individual cases

Case No	Age (years)	Sex	Duration of symptoms (months)	No of specialists before diagnosis	Curve characteristics*	Resolution after treatment	Diagnosis
1	11	F	15	2	22° r/TLS	Yes	Osteoid osteoma
2	11	M	11	2	20° l/TLS	Yes	Osteoid osteoma
3	12	F	48	2	23° l/LS	Yes	Osteoid osteoma
4	12	M	6	2	94° TK	No	Osteoid osteoma
5	11	M	14	2	28° l/TLS	Yes	Osteoid osteoma
6	12	F	15	2	15° r/TS	Yes	Osteoid osteoma
7	12	F	11	2	18° r/TLS	Yes	Osteoid osteoma
8	14	F	24	2	70° r/TLS	No	Spondylolisthesis (grade IV)
9	19	M	33	4	10° l/LS	Yes	Spondylolisthesis (grade III)
10	19	M	18	1	21° l/TLS	Yes	Spondylolisthesis (grade IV)
					52° r/TS	No	Astrocytoma of central cord
					40° l/TLS	treatment	Neurilemoma
					17° r/TLS	Yes	

* r=Right. l=Left. T=Thoracic. L=Lumbar. S=Scoliosis. K=Kyphosis.

TABLE II—Investigative techniques for evaluating painful scoliosis

Lesion	Plain radiograph	Tomogram	^{99m} Tc scan	Radiculogram	Lumbar puncture	CT scan
Osteoid osteoma or osteoblastoma	Nidus with sclerotic margin at base of pedicle	Define position	Diagnostic in this age range			Define position
Spondylolisthesis	Diagnostic			Assess cauda equina compression and level		
Spinal tumours	Erosion of neural arch; erosion of vertebral body; widening of canal; paraspinal calcification; tumour shadow	May define plain x ray findings		High diagnostic rate. Defines extent	High diagnostic rate. Raised protein values. Normal protein value should not preclude radiculography	Metrizamide enhanced. May define cystic nature or intramedullary syrinx

examination confirmed the diagnosis of an osteoid osteoma. At review in October 1984 the scoliosis had disappeared and the patient was symptom free.

Case 6—A 12 year old girl was referred to the Middlesex Hospital in May 1984 for a second opinion about a 15 month history of a painful 70° right lordoscoliosis (fig 3). Examination confirmed the scoliosis and also a palpable step at the lumbosacral junction with bilateral gluteal wasting, bilateral restriction of straight leg raising to 25°, and absent ankle jerks. A radiculogram showed a severe stenosis at the level of the spondylolisthesis (grade IV) (fig 4). At operation in July the loose lamina of L5 was removed, the S1 nerve roots decompressed, and an ala-transverse fusion performed

FIG 1—Case 2. Anteroposterior radiograph showing nidus of osteoid osteoma in pedicle of L3.

from L4 to S1. Six months after operation the lesion signs had completely subsided, ankle jerks had returned, and radiographs showed a solid ala-transverse fusion but with the scoliosis unchanged above the fusion (fig 5).

Discussion

Since the advent of school screening scoliosis has been identified in 4.6-13.6% of adolescents. Only 2% of curves identified are greater than 10° and, of these, 5.0-6.8% progress; treatment, however, is required in only 2.75/1000 cases screened.¹²

The commonest cause of a painful scoliosis in adolescence is an osteoid osteoma or osteoblastoma, these being distinguished by size alone.³ The first series of six cases was reported by MacLellan and Wilson in 1967.⁴ The lesion almost always occurs in the thoracolumbar spine, on the concave aspect of the curve, and is almost always situated at the base of the pedicle.^{4,8} The curve in adults disappears after excision⁷ but in children the severity of the curve depends on the duration of symptoms, and if prolonged structural changes may develop.^{5,7} A technetium bone scan carries a high diagnostic rate.

Spondylolisthesis is associated with a scoliosis in 36-67% of cases.^{9,11} The curve may be of the true idiopathic variety, a structural curve due to an asymmetrical slip, or a "sciatic" curve. Any of these curves may cause low back pain owing to the spondylolisthesis, but a rigid curve should give a high index of suspicion of severe spondylolisthesis with a cauda equina tension-

FIG 2—Case 2. Tomographic cut of L3 clearly delineating lesion in pedicle of vertebra.

syndrome (cases 6-8). All sciatic curves disappear on decompression and posterolateral fusion (cases 7 and 8).^{10,11}

Spinal tumours are very rare and notoriously difficult to diagnose, but weakness in the legs (67%), localised or radiating back pain, particularly at night (60%), or sphincter disturbance (22%) are strong clinical indicators of the diagnosis.¹²⁻¹⁴ More recently it has been recognised that spinal tumours may present as a structural

FIG 3—Case 6. Anteroposterior radiograph showing 70° scoliosis above spondylolisthesis.

FIG 4—Case 6. Lateral radiograph showing severe compression of cauda equina as a result of spondylolisthesis.

scoliosis.¹⁵ Most tumours are extradural (60%), 60% occur before the age of 6, and 75% are malignant.

Table I shows the difficulty in diagnosis, the average time from onset of symptoms to diagnosis being 20 months and all but one patient having seen at least two orthopaedic surgeons. Table II lists the most useful diagnostic tests. Lumbar puncture is of particular value in early cases of spinal tumour, in which a radiculogram may be normal (as in case 10).

All curves will resolve unless they include a true structural element (case 6) or treatment is inadequate or impossible (case 9). It is suggested that any child or adolescent who has persistent pain

FIG 5—Case 6. Anteroposterior radiograph six months after posterolateral fusion and decompression showing solid bone fusion with residual scoliosis remaining.

over their scoliosis, particularly if associated with night pain, should be further investigated to exclude an additional underlying cause.

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