A SHORT-TERM FOLLOW-UP OF PATIENTS WITH MILD SCOLIOSIS

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Thirty patients with mild idiopathic scoliosis were reviewed between 7 and 17 years after spinal maturity. These patients were not treated surgically because they were cosmetically acceptable, and unlikely to progress further. Standardised radiographs taken at spinal maturity and at review were comparable, so any change represented true progression in a fully mature spine. There was an increase of lateral curvature in 60 per cent of the patients; this was small and always under 10 degrees. No change was seen in rotation. Lateral curves over 30 degrees, with rotation of 25 degrees or more, were found to be almost twice as likely to progress. It is suggested that caution should be exercised in leaving these curves untreated, and follow-up into early adult life is advisable.

It has been the policy of the Birmingham Scoliosis Service not to advise surgical treatment for curves that are cosmetically acceptable at maturity, and which are of less than 45 degrees (or 50 degrees for double curves). Thirty patients, with accurately comparable radiographs and evidence that growth had ceased, were reviewed to see if this policy was justified. Change in the lateral curve and in rotation were measured. Many patients were excluded from this review either because the latest radiograph available did not show complete fusion of the iliac apophyses (progression of the curve may therefore have occurred before maturity) or because the maturity and review radiographs were not accurately comparable.

CLINICAL MATERIAL AND METHODS

The criteria applied in the selection of patients for this review were strict. Only those with mild scoliosis, where it was certain that growth had ceased and where the radiographs at review were accurately comparable to those at maturity, were included. These patients had not been operated on as their curves were cosmetically acceptable and thought unlikely to progress.

Fusion of the iliac apophyses was taken as an indication of spinal maturity (Risser 1948), and the patients were reviewed between 7 and 17 years later. Thirty patients who satisfied these criteria were re-examined by one of the authors (MMS).

An anteroposterior radiograph was taken at review; this was directly comparable to the radiograph taken at spinal maturity. Lateral curvature was measured by the Cobb technique. Rotation was measured at the apical vertebra by expressing the amount of displacement of the pedicle as a percentage of the entire width of the vertebral body (Nash and Moe 1969).

There were 24 women and six men. The average age at review was 28 years 1 month, and at skeletal maturity the average was 16 years 10 months for women and 17 years 5 months for men. The interval

between measurements ranged from 7 years 5 months to 16 years 7 months (average 11 years). There were 16 thoracolumbar curves (53 per cent); eight thoracic (27 per cent); five double (17 per cent) and one lumbar. Sixty-three per cent were convex to the right and 37 per cent convex to the left.

RESULTS

The details of the 30 patients are shown in Table I. **Lateral curvature.** There were 35 curves in 30 patients. Twenty-one (60 per cent) showed an increase ranging from 2 to 10 degrees (average 5.6 degrees), 13 (37 per cent) were unchanged, and one decreased by three degrees. The ranges of increase for the different types of curves were similar, but slightly fewer of the thoracic curves increased compared to the thoracolumbar, or double curves. There was no correlation between the amount of progression and the number of vertebrae involved, nor did there seem to be any relationship to the direction of the curve or the interval between measurements.

When curves over 30 degrees were compared with those under 30 degrees, the range of increase was again similar, but 70 per cent of the greater curves increased compared with only 46 per cent of the lesser.

Rotation. Rotation ranged from 10 to 40 degrees (average 25 degrees), but no curve showed any measurable change in rotation between spinal maturity and review. More of the curves with rotation of 25 degrees or over increased (68 per cent), compared to those with rotation of under 25 degrees (46 per cent) although again, the range of increase was similar (Table II).

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Table I. Details of the 30 patients

Patient number	Sex	Curve	Direction	Measurement at maturity (degrees)	Increase or decrease in curve (degrees)	Rotation	Interval between measurement (years)
1	Female	T6-T11 T12-L4	Right Left	26 32	8 8	15 25	13
2	Female	T6-T11 T12-L4	Right Left	53 53	5 0	35 25	9
3	Female	T6-T9 T10-L2	Right Left	25 17	0 4	15 25	8.7
4	Female	T5-T10 T11-L3	Right Left	48 46	0 0	30 15	12.4
5	Female	T5-T11 T12-L4	Right Left	36 38	5 6	25 20	8
6	Female	T5-T12	Right	43	2	25	8.7
7	Female	T5-T10	Right	42	9	25	7.9
8	Male	T5-T11	Right	42	0	30	8.5
9	Male	T5-T12	Right	42	0	30	11.2
10	Female	T9-L2	Left	42	2	25	7.9
11	Female	T9-L3	Right	40	5	35	16.7
12	Female	T8-L1	Right	40	4	30	13.2
13	Female	T5-L1	Right	38	7	35	13.5
14	Female	T10-L4	Left	36	3	25	13.7
15	Female	T3-T11	Left	35	7	20	8.5
16	Female	T9-L1	Right	34	8	25	8.2
17	Female	T8-L2	Right	30	7	40	12
18	Male	T5-T12	Right	30	0	20	13.2
19	Female	T8-L1	Right	26	3	25	13.8
20	Male	T11-L4	Left	20	4	20	14.4
21	Female	T9-L4	Left	19	0	25	12.8
22	Female	T6-T12	Right	17	10	25	7.5
23	Female	T12-L4	Right	16	0	30	14.1
24	Female	T4-T10	Right	12	0	15	11.5
25	Female	T12-L4	Left	12	-3	10	10
26	Female	T7-L2	Right	12	0	25	11.5
27	Male	L1-L4	Left	10	0	20	9.5
28	Female	T5-L1	Right	7	2	20	10.5
29	Male	T9-L1	Right	6	0	15	9.7
30	Female	T11-L5	Left	5	8	20	15

Table II. The percentage of curves which increased and the range of increase according to the type of curve

Type of curve	Percentage of curves which increased	Range of increase (degrees)
All	60	-3 to 10
Thoracolumbar	68	-3 to 8
Thoracic	50	2 to 10
Double	60	4 to 8
Curves<30 degrees	46	-3 to 10
Curves>30 degrees	70	2 to 9
Rotation<25 degrees	46	-3 to 8
Rotation>25 degrees	68	2 to 10

DISCUSSION

Risser and Ferguson (1936) believed that progression of scoliosis ceased when the spine was mature. More recently it has been realised that there is a slower, but sometimes significant progression after spinal maturity. Degeneration of the intervertebral disc has been held responsible (Risser 1964; Harrington 1977; Risser, Iqbal and Nagata 1977), but Collis and Ponsetti (1969) who reported an average increase of 15 degrees in scoliosis curves after spinal maturity, could only identify one case as being due to degeneration of the intervertebral disc.

These reports have been concerned largely with severe, untreated curves reviewed in late adult life. A search of the literature revealed no information about the progression of untreated, mild curves in the first two decades after spinal maturity, and the purpose of this review is an early assessment to check that by leaving mild curves untreated at maturity we are not condemning patients to cosmetically unacceptable spines in early and middle adult life.

Since the radiographs taken at maturity and at review were strictly comparable, any difference found represented true progression in a fully mature spine; an increase in the lateral curve was seen in 60 per cent of the patients, but it was small and never more than 10 degrees. No evidence of degeneration of the disc was seen in our series, but this may be a feature appearing in middle and old age. No increase in rotation was seen but small changes may easily escape detection. Although we failed to identify any particular type of curve that was more liable to progress, we found that the largest percentage increase occurred in lateral curves over 30 degrees and in curves with rotation of 25 degrees or over.

These types of curve should be carefully considered before allowing them to go untreated as further progression is likely to occur in middle and old age. A triennial review proceeding to a quinquennial review after spinal maturity may be advisable before they are discharged from follow-up.

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