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THE SPINAL ABNORMALITIES IN THALIDOMIDE EMBRYOPATHY

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In 1968 a study was made of the spinal changes in 32 children with multiple congenital abnormalities due to thalidomide. Twenty-eight of these children have been traced and their spinal changes reviewed. Only four patients had normal spines on radiography. In eight children, scoliosis was present and had progressed though it was still of mild degree. Disc and end-plate abnormalities were seen in 14 children, and in some appeared to be progressive, leading to intervertebral fusion.

Key words: thalidomide; congenital defects; scoliosis; spinal deformity

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The limb defects of children affected by thalidomide and the problems associated with their management have been the subject of considerable attention in the orthopaedic and prosthetic literature. However, almost any system of the body may be involved in the syndrome of thalidomide embryopathy (Smithells 1973). Marquardt first drew attention to changes in the vertebral column in this syndrome in 1967. A radiological study of the spines of 64 children with thalidomide-induced deformities was made by Andrian-Werburg (1966). Thirty-nine had scoliosis and 16 had a dorsi-lumbar kyphosis. Similar changes have been reported in the German literature by Petersen (1967), Jäger et al. (1967) and Ruffing (1974).

The spinal abnormalities of 32 children, who were then between 4 and 8 years of age, were reported by Nichols et al. in 1968. These children are now between 10 and 14 years of age, at the start of their adolescent growth spurt, which is an appropriate time to review the extent of their spinal deformities.

MATERIAL

Limb defects

All 32 children have upper limb defects; one child has one normal arm. Nineteen children have normal lower limbs; three have normal lower limb bones with one or both hip joints dislocated, and one has proximal focal femoral deficiency but otherwise normal legs.

Previous spinal changes

The spinal abnormalities were previously classified as follows:

	Children
1. Local anomalies of bone development:	
(a) Spina bifida	3
(b) Fusion of adjacent spinous processes	2
2. Scoliosis	18
3. Wedge deformity of solitary vertebral bodies	4
4. Calcification in intervertebral spaces seen in the form of horizontal flakes	3

5. End-plate and disc deformities:
   (a) Disc space narrowing alone 2
   (b) Deformities of discs and end-plates resulting in abnormal vertebral body shape, one vertebra overgrowing to compensate for a defect in an adjacent vertebra, usually of the anterior surfaces 9
   (c) Disc narrowing and deformity leading to partial or complete fusion of adjacent vertebral bodies 5

Present review

Recent radiographs of the spines of 28 of the children were obtained. The changes between the original study and the current review were as follows:

Local anomalies of bone development. Defects of the neural arch were more obvious in the follow-up series. In seven children minor changes, such as asymmetry between the size of ribs, transverse processes or pedicles, were apparent on the follow-up films but not on the earlier ones.

Scoliosis. In all, 20 children had scoliosis of varying degrees. In eight children the scoliosis had become worse. In two, the scoliosis was of mild degree originally, and later reversed. In two, no scoliosis was apparent on review. Two children developed scoliosis which was not noted originally. In most of the children the scoliosis measured less than 15° and was of the long, paralytic type. In one child the curve measured 25°. One child in the earlier series had a severe scoliosis, but in addition to being exposed to thalidomide he had multiple epiphyseal dysplasia, and he died before review.

Wedge deformity. In four cases, additional deformities of the vertebrae were noted.

Disc space calcification. In two additional children, disc space calcification had appeared. In one this was seen at only two levels, but in the other it was extensive.

Disc and end-plate abnormalities. In the earlier study this type of change was present in 12 patients; it had appeared in two or more in the current review. In two children frank intervertebral fusion which had not been noted before had occurred. In two others, intervertebral fusion had extended to other levels in the spine, as seen in Figures 1 and 2. Reduction of the lumbar lordosis was noted in 10 children. Only two of the latter had normal legs.

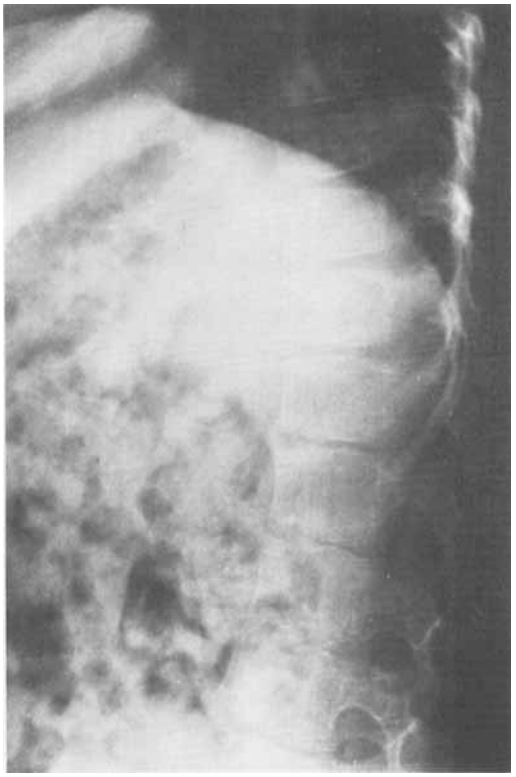

Figure 1. Lumbar spine of child aged 4 years 2 months, showing deformities of the discs and end-plates from T.9 to S.1, and partial anterior fusion of L.3 and L.4 vertebral bodies.

DISCUSSION

In the earlier study of this group of 32 children with multiple congenital limb deformities, believed to be due to thalidomide, only eight (25 per cent) had no radiological abnormality of the spine. Mild scoliosis was noted in 17 patients. Twelve patients had abnormalities of the end-plates and intervertebral discs ranging from narrowing of the disc space to severe deformities of the end-plates and anterior fusion of the vertebral bodies. It was first thought that the changes might be secondary to frequent hyper-flexion associated with using the feet for dressing, feeding and playing, but abnormalities were found in children with severely deformed lower limbs who were unable to use their feet in this way. Though there was no evidence of progression of abnormalities in the spine, it was thought that secondary degenerative changes

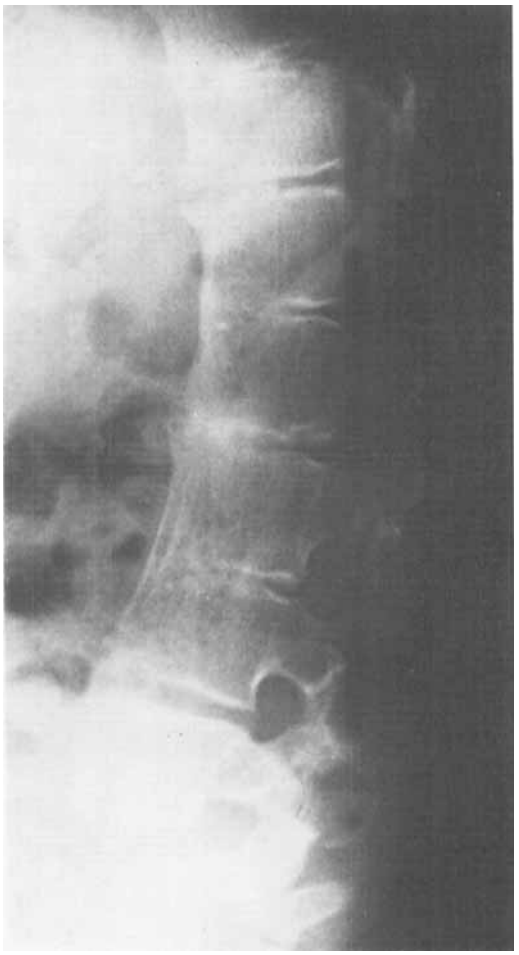

Figure 2. Same subject aged 11 years 11 months. Intervertebral fusion T.11 to T.12, and L.1 to L.4.

with associated symptoms and functional restriction might occur relatively early in life, and the need for continuing observation and for wider study of similar children was emphasized.

In the current review, two main types of spinal abnormality were noted—scoliosis, and disc changes. The presence of even a mild scoliosis at the start of the adolescent growth spurt is a cause for concern. The degree of scoliosis present, though minor in most cases, was nevertheless measurable, and in eight children became significantly worse. The curves were all long and paralytic in type. In this small series there did not appear to be a correlation between the presence of scoliosis and limb asymmetry. Four children with thoracic curves had asymmetrical upper limbs, whereas ten children with thoraco-lumbar curves and two with lumbar curves all had symmetrical, indeed normal, lower limbs.

Changes in the discs and end-plates were found in 12 of the 32 children in the initial study; they were present in fourteen of the 28 children in the current review, and in eight of these intervertebral fusion had occurred. The only other spinal condition in which fusion such as this takes place is ankylosing spondylitis, but there was no evidence that these children were suffering from this disease. It was thought at first that decreasing lumbar lordosis might result from the presence of fusion of the anterior parts of the vertebral bodies, with cessation of growth at this site and continuing growth of the posterior elements. In only three of the 14 children in whom repeated measurements have been made, has the lumbar curvature decreased, and it does not appear to be related to the type of limb deformity which is present, or to foot usage. The point we wish to emphasize is that in some children disc and end-plate abnormalities which may lead to vertebral fusion do seem to be extending to other levels in the spine. The implications of this in these children who depend so much on supple spinal movements to use their deficient limbs to best advantage are obvious. Further studies are in progress, and careful follow-up is essential.

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