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TRANSTHORACIC APPROACH FOR VERTEBRAL EPIPHYSEODESIS

By

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The experiences of spinal fusion in the treatment of scoliosis have in our hands been rather discouraging. On the average, the progression of scoliosis in the more severe cases has been checked, but only to a minor degree has it proved possible to improve a curve that has already been established (7). Since the results have proved uncertain and the time of treatment is long (approximately 1 year) this method has been reserved for the most severe cases, and we have tried to find other methods for the operative treatment of scoliosis.

A characteristic feature of a scoliotic curve is that the vertebrae are wedge-shaped, so that they are lower on the concave than on the convex side of the scoliosis (Figs. 1 and 2). This means an increased load on the vertebral epiphyses on the concave side, the growth of which is thus checked. On the convex side, on the other hand, growth is relatively too fast, which can further accentuate the development of the curve.

Working on this basis, a number of attempts have been made to produce scoliosis in animals by bringing about an asymmetric growth of vertebrae. This has been done by blocking the vertebral epiphyses on one side with some form of staples or by the excision of the epiphyses over half the vertebrae. In this way *Haas* (2), *Nachlas & Borden* (5) and others have produced scoliosis in dogs and *Pacher* (8) in pigs. *Nachlas & Borden* (6) also succeeded in straightening out an experimentally induced scoliosis by destroying the growth centres on the convex side.

This naturally suggested the possibility of influencing a human scoliosis by directing the growth of the vertebrae. It is surprising, however, how few such attempts have been made. This can partly be explained by the disagreement long prevalent as to what extent the

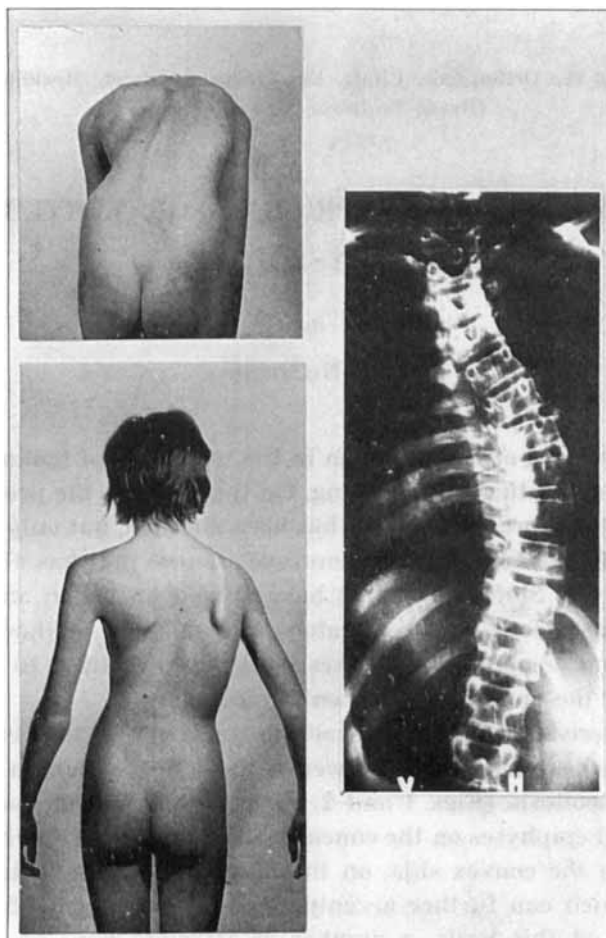


Fig. 1.

Changes in scoliotic spine in 8 months. Progressive wedge-shape of the vertebrae.

longitudinal growth of human vertebrae is analogous with that of quadrupeds. It now, on other hand, seems to be generally agreed that the epiphyseal plates in human vertebrae have a histological structure and a manner of functioning that have their counterparts in the epiphyseal plates in the long bones (1, 3, 4, 10).

Only a few reports on the blocking of the epiphyses in *lumbar* scoliosis are to be found in the literature (12). In some cases this treatment is reported to have been effective, in others not. The need for treatment is, however, most urgent in the thoracic scolioses, which can develop

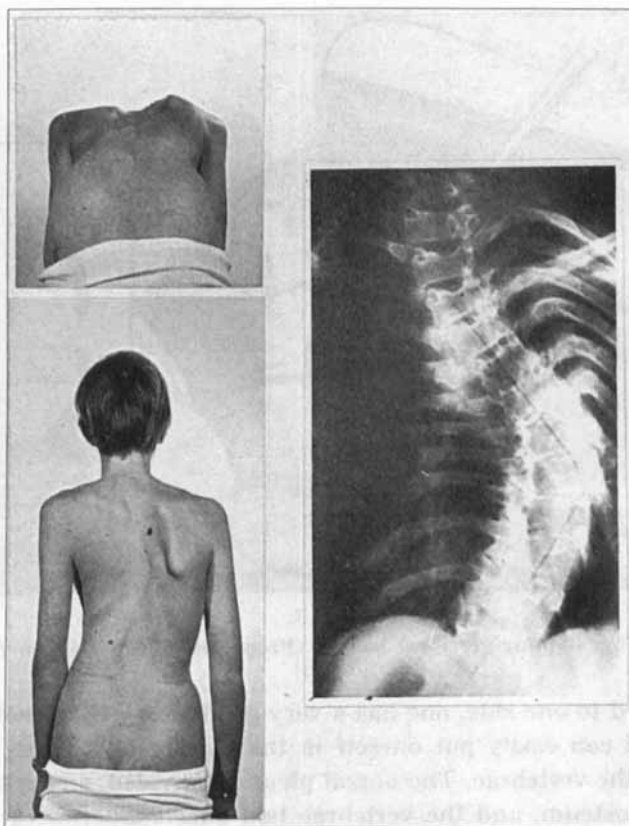


Fig. 2.

Changes in scoliotic spine in 8 months. Progressive wedge-shape of the vertebrae.

into serious deformity. On the other hand the vertebral epiphyses are more difficult of access in this region. The best view of the vertebrae is obtained by a transthoracic approach, and *Smith, van Lackum & Wylie* (11) have carried out epiphyseodesis with staples on the convex side of the scoliosis in this way (Fig. 3). This method did not, however, have the required effect on the development of the scoliosis, probably because the staples could not check growth sufficiently in such a localization.

Stimulated by *Roaf's* (9) interesting works on epiphyseodesis in the form of excision of the vertebral epiphyses on the convex side of the scoliosis, in combination with fusion, I have tried to simplify the method of directed growth control. I have chosen the transthoracic approach. The thoracotomy is made on the convex side of the scoliosis. No rib resection is made to avoid cosmetic inconvenience. When the lung has

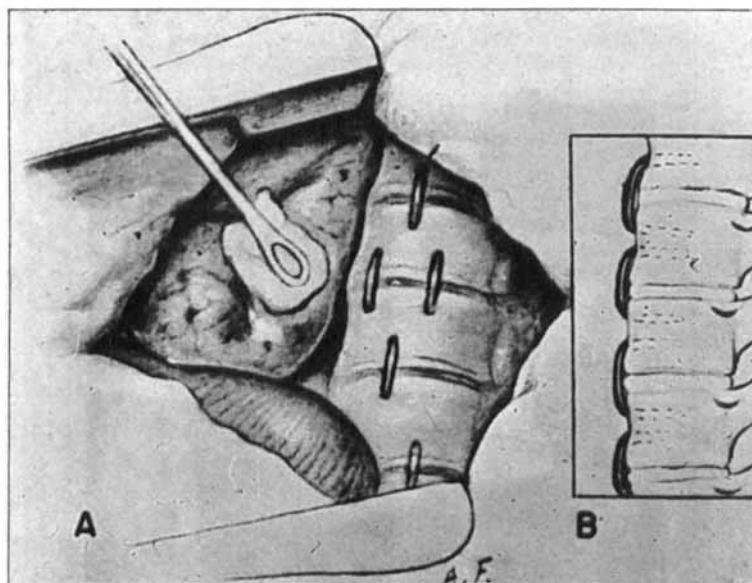


Fig. 3.

A method for stapling vertebral bodies. (From *Smith, von Lackum & Wylie.*)

been pushed to one side, one has a very good view of the scoliotic convexity, and can easily put oneself in the picture as regards the topography of the vertebrae. The dorsal pleura is divided, an incision made in the periosteum, and the vertebrae laid bare subperiosteally to half their extent, on the convex side (Fig. 4). The epiphyseal plate is then removed with a chisel to half the extent of the vertebra on the cranial and caudal sides of the vertebrae within 4–5 levels of the vertex of the scoliosis. The intervertebral disc tissue is also removed to half the extent of the vertebrae (Fig. 5). Afterwards careful staunching of blood is carried out, the resection surfaces, for instance, are waxed. Suture of periosteum and pleura and closure of thoracotomy in layers take place. A drainage tube is routinely put in for 24 hours.

Postoperative development has been entirely free from complications.

Figs. 4–5.

Fig. 4. Transthoracic view of the vertex of the scoliosis. The lung is pushed to the right side. The periosteum is dissected from the vertebrae and discs which appear grey and white respectively in the picture.

Fig. 5. After excision of epiphyseal plates and discs within half the extent of the vertebrae.

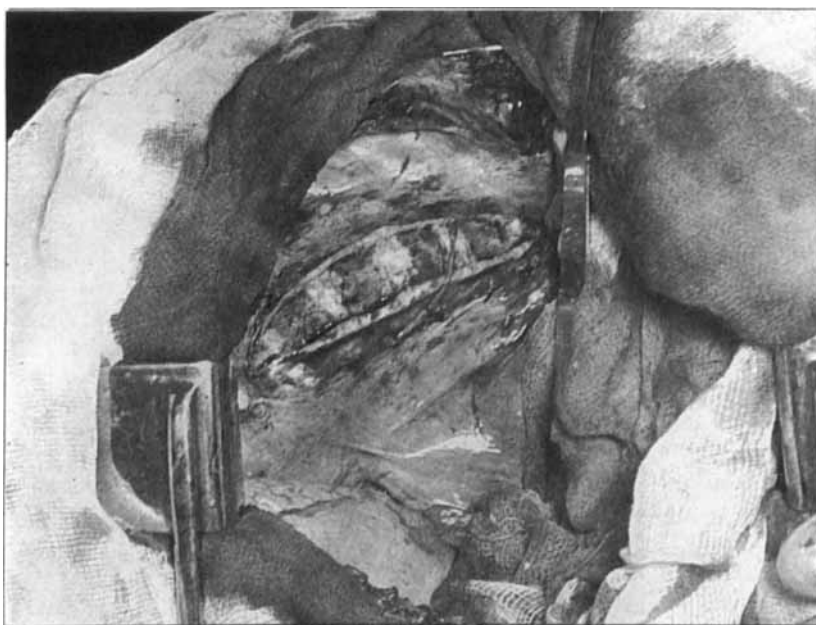


Fig. 4.

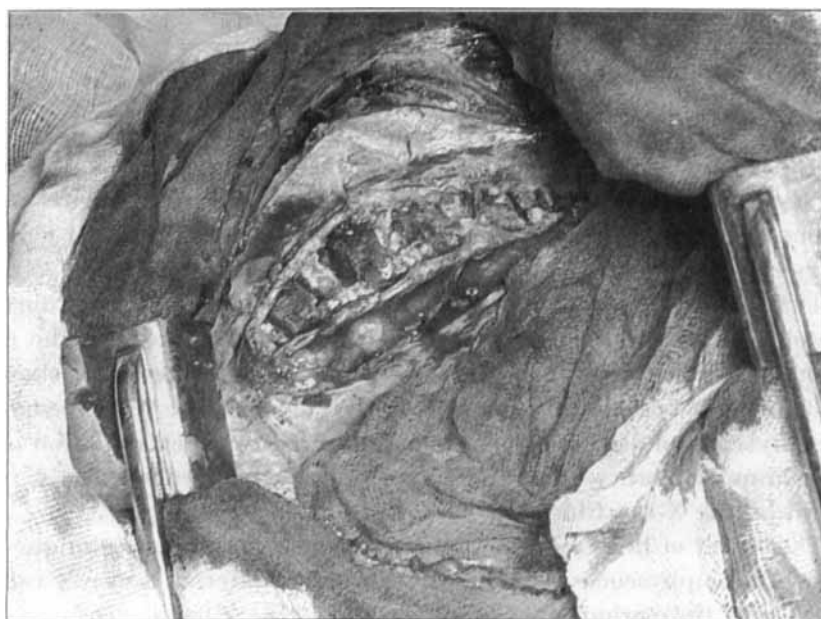


Fig. 5.



Fig. 6.

The X-ray picture immediately after the operation.

The patients have been allowed to get up on the 4th or 5th day after the operation without support in the form of a brace or similar aid. No back pains have been reported. After some 6 weeks patients were attending school in the normal way, although they did not take part in Physical Training.

That an epiphyseal plate really had been excised was clear from the histological picture, in which the "palisade" arrangement of the cartilage cells could be seen. The picture taken at the operation showed that the local operation defect was quite extensive. The tissue removed (epiphyseal and disc tissue), however, absorbs roentgen radiation only to a minor extent, so that the operation defect appears as only very slight on the X-ray film (Fig. 6).

The object of this report is just to present a simplified technique for vertebral epiphyseodesis. Since the operation material is as yet rather small and the period of observation short, the clinical effect of the method will be presented when the series has been increased.

SUMMARY

The author describes a method for directed growth control in scoliosis. The operation consists of resection of the epiphyseal plates and the discs to half the extent of the vertebrae on the convex side of the scoliosis. The operation is performed by a transthoracic approach.

RESUME

L'auteur décrit une méthode de contrôle de croissance dirigée dans la scoliose. L'opération consiste en une résection des plaques épiphysaires et des disques dans la moitié de l'étendue des vertèbres du côté convexe de la scoliose. L'opération est accomplie par approche transthoracique.

ZUSAMMENFASSUNG

Der Verfasser beschreibt eine Methode zur geleiteten Wachstums-kontrolle bei der Skoliose. Die Operation besteht in der Resektion der Epiphysenplatte und des Diskus bis zur halben Ausdehnung des Wirbels and der konvexen Seite der Skoliose. Die Operation wird mittels eines transthorakalen Zuganges ausgeführt.

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