PARTIAL COSTECTOMY AS A COSMETIC OPERATION IN SCOLIOSIS

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Many patients with spinal curvature are successfully treated by orthopaedic measures but are left with an unsightly "hump" caused by rotation of ribs secondary to rotation of vertebral bodies. This may be a cause of embarrassment and self-consciousness to young adults. The patients are often far more concerned with the hump than with the spinal curvature. Their commonest complaint is of being unable to sit back comfortably in a chair, to wear clothes bought "off the peg", or to dance without feeling that their partners are embarrassed by their hump.

Removal of parts of ribs causing asymmetrical posterior prominence is a well established procedure and has been mentioned by many authors dealing with the surgical treatment of structural scoliosis. There is a body of opinion, however, which considers that interference with the integrity of the chest wall in patients with scoliosis must have a detrimental effect upon respiratory function. It was decided therefore to investigate the respiratory function of patients undergoing this procedure, before and after operation.

During the past eight years we have jointly surveyed over 450 patients with spinal curvature, and have seen twenty-eight patients who have had costectomy. The mean age at costectomy was seventeen and a half years. The operation involved removal of the posterior aspect of three to six ribs.

Structural scoliosis implies a lateral curvature accompanied by rotation of the vertebral bodies towards the convexity of the curve. In the thoracic region, because of their attachment to the vertebrae, the ribs are rotated so that on the convex side the ribs are prominent posteriorly, and conversely on the concave side (Figs. 1 to 4).

Treatment of severe structural scoliosis may consist of posterior spinal fusion after reduction of the curve as far as feasible by mechanical means. The improved appearance is largely due to lateral bending and the rotational element is proportionately far less corrected than the lateral curve (Figs. 5 to 8).

The posterior rib hump remaining can be reduced substantially by subperiosteal resection of the most prominent ribs, allowing the bones as they reform to be moulded by the muscles of the chest wall. The flattening produced depends upon the amount of compressible lung tissue lying between the rotated vertebral bodies and the posterior ribs (Figs. 9 to 13).

In patients with severe rotation and rib droop due to paralytic scoliosis the distance separating bodies and ribs may be small, and in some patients negligible.

The possible gain by operation can be estimated beforehand by a radiograph taken tangentially along the spine with the patient bending forwards, which shows the distance separating vertebral bodies and ribs. This was described by James (1967) as the "silhouette" view (Figs. 14 and 15). Langenskiöld and Michelsson (1961) have shown, and it has been confirmed by others, that removal of parts of ribs in the growing skeleton of normal animals can produce a scoliosis convex towards the side of operation. Operation is not done, therefore, until spinal growth is complete, so that stability has been reached and further rotation should not occur; this applies even if the spine has been fused before skeletal maturity.

TECHNIQUE OF OPERATION

Operation is undertaken under general anaesthesia with the patient prone, supported so that the abdomen is not compressed. The skin is incised over the apex of the rib rotation, the number of ribs resected depending upon the individual deformity: usually five or six ribs.
Case 1—A patient aged 15, standing, before spinal fusion for adolescent idiopathic scoliosis.
Case 1—Two and a half years after posterior spinal fusion. The rib hump is still obvious though trunk balance is improved.
Fig. 11—Case 1—Fifteen months after costectomy.
Case 1. Figure 13—The chest radiograph immediately after operation showing wires in position. Figure 14—Tangential view of spine showing posterior fusion. The spinous processes have been resected. There is rotation of bodies and ribs. Figure 15—Tangential view after operation.
are resected. The superficial posterior muscles are incised in the line of the skin incision, the ribs exposed and resected subperiosteaIy from the costo-transverse joint distally for about 10 centimetres (4 inches) depending upon the acuity of the angle. Care is taken to avoid damage to the pleura. If the transverse processes are prominent because of severe vertebral rotation, these also are removed. To reduce instability of the chest wall after operation three or more of the distal ends of the partly resected ribs are fixed to the spinal column with wire sutures drawn through holes drilled through the rib and the transverse process or posterior spinal bone graft, and secured with moderate tension. The wound is closed in layers with suction drainage deep to the superficial muscle layer. If the pleura has been damaged a wide bore underwater or valvular chest drain is used.

**Care after operation**—The patients start respiratory exercises when they recover consciousness, and are allowed out of bed on the next day. They should be normally active by the time stitches are removed and can usually leave hospital within two weeks of operation.

Lung function tests, a chest radiograph and an electrocardiogram were done nine months before costectomy and after operation, the lung function tests being repeated firstly within eight months, secondly within nine to eighteen months, and thirdly, in five patients at thirty-four months.

**RESULTS**

The results are shown in Tables I and II.

The operation is done mainly for its cosmetic effect. There is almost always a small loss of ventilatory function after operation but this largely recovers. The transthoracic diameter,
measured on a postero-anterior chest film, is altered following operation, the hemi-thorax having been stabilised by wiring, and the change does not accurately reflect any change in lung volumes. All patients were strikingly pleased with the cosmetic result, saying without exception that they thought the operation well worth while, and in many cases it seemed to help them overcome self-consciousness.

**SUMMARY**

It is suggested that the operation of partial costectomy is so beneficial psychologically to some young scoliotic patients that it is worth the very small physiological cost demonstrated here in patients who found their "hump" sufficiently embarrassing to curtail their normal social life.

We are grateful to the National Fund for Research into Crippling Diseases, the Research Committee of the Brompton Hospital, the Sir Halley Stewart Trust and the Variety Club of Great Britain for financial assistance; to Miss Pauline Glass and Mrs Ailie Harrison for compilation of facts and for statistical analysis, and to Mr R. J. Whitley of the Medical Photographic Department, Institute of Orthopaedics, for photographic work.

**REFERENCES**
