ANKYLOSING SPONDYLITIS TREATED BY OSTEOTOMY OF THE SPINE

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Early ankylosing spondylitis is now so well recognized that the "question-mark" spine characteristic of the untreated late disease will not be common. It is unlikely, therefore, that any one surgeon can acquire an extensive experience of the operative treatment of this type of case. The following case is recorded as an addition to the general experience.

An operation was first described by Smith-Petersen *et al.* (1945), who had performed it in five cases of ankylosing arthritis. The operation was a formidable one, but they laid down certain general principles: that the osteotomy must be done in the lumbar spine to avoid the splintage of the ribs and their articulations; that the osteotomy must include the articular facets, as ossification at these facets is the most important single factor in preventing correction of deformity; and that the operation should not be delayed too long. The optimum time would seem to be immediately the acute phase begins to subside.

La Chapelle (1946) described a simpler single osteotomy, which we used, but he combined this with a terrifying description of forcible rupture of the anterior common ligament on the table. J.-J. Herbert (1948) described a two-stage operation. The second stage consisted in a lateral approach to the anterior aspect of the vertebral bodies, division of the anterior common ligament, and, if necessary, the placing of a wedge graft from the tibia between the bodies. All his cases did not require this second stage.

Case Report

The patient, a reasonably intelligent man aged 34, had been under our care in 1941. His back then was in good alignment, and it was maintained in this position by means of exercises and a Thomas back support until 1945, when he ceased to attend the aftercare clinic. He had apparently discarded all treatment owing to recurrent attacks of bronchitis, and his condition when he returned is strikingly shown in Fig. 1.

He was admitted to hospital in late 1947, and an attempt was made to improve his position on a divided plaster bed, but with little success. Forcible manipulation under general anaesthesia was rejected, as we had heard of several fatalities. Osteotomy of the spine was therefore considered, with some apprehension on our part in view of the history of bronchitis and his poor chest expansion. However, as his lungs were now clear, and he

was very enthusiastic (not having read the literature), the operation was performed in February, 1948.

We had anticipated that complete correction would not be obtained on the table, and for this reason it was decided to nurse him during the immediate post-operative period on a divided bed. It had the further advantage that the bed could be prepared before operation, and we should not place a further burden on the patient at the end of operation by the application of a plaster jacket. We also anticipated that there might be considerable paralytic ileus following the straightening out of the patient, analogous with the frame sickness which often occurs after a subject with a tuberculous spine or hip is first placed on a frame.

In fact, none of these difficulties was experienced. The operation (F. W. S.) was performed with the patient on his right side. This position was adopted to avoid the abdominal pressure of the prone position, and also because we wished to remove more bone on the left side to correct his lateral deviation. The osteotomy was done between the first and second lumbar vertebrae, and the bone was removed with a fine osteotome and nibbling forceps as indicated in Fig. 2. The gap began to close spontaneously as the osteotomy was almost completed, and in fact some difficulty was experienced in getting the apical bone from the left-sided wedge, as the instruments were gripped by the closing laminal remnants. The wound was closed in layers, and the patient placed on his divided bed.

It is probable that very little further correction occurred once the patient left the table, and after seven days the bed was converted into a solid one. He was turned after three weeks on to a turning case, and after three months an Albee graft was made over the osteotomy site (G. K. R.). There were no immediate post-operative complications, neither ileus nor root pains disturbed the patient at any stage, and there was no shock.

He was allowed up six months after the first operation. The result of this is shown in Fig. 3. The good correction of the whole spine which can be obtained by lumbar osteotomy is well shown. Smith-Petersen did osteotomies at several levels; but in ankylosing spondylitis, particularly if done relatively early, before the anterior common ligament is too hard, it would be easy to obtain an over-correction, a result as inconvenient to the patient as his original condition.

A late complication was the stiffening of the hips. These had been restricted in movement before operation, but, despite all we could do to keep them moving, they had stiffened considerably during his immobilization. Worse still, they had become painful. Arthroplasty was contemplated, but was rejected for the time being, as the results in ankylosing spondylitis are far from uniformly successful. A course of deep x-ray therapy was given to his hips, and a plaster spica was applied to the right hip,

FIG. 2.—Showing portion of bone removed.

FIG. 1.—Appearance before operation.

FIG. 3.—Appearance after operation.

which was giving most trouble. By this means he was able to get up and walk. After two months the plaster spica was replaced by a block leather one, and the man has steadily improved so that he now needs no splintage whilst in the house and uses his spica only for going out of doors.

Experience of this case has made us feel that the operation is a useful one in these now rare cases. Despite the fact that the patient's course was at all times smooth, we should again take the operation in easy stages and resist the temptation to do the Albee graft at the time of the original procedure, for we believe it is important to keep the patient well at all times, and a period of considerable shock following the operation might produce a disastrous chain of complications.

Summary

A case of ankylosing spondylitis with severe deformity of the spine treated by osteotomy is described.

The operation in this instance proved reasonably easy to perform and there were no complications. However, it is thought that the potential dangers are great and that all precautions should be taken, including limiting the initial operation to correction of the deformity and leaving any grafting until a later date.

The fact that the anterior common ligament in this case was not highly ossified probably contributed largely to the smoothness of the correction, and for this reason once the operation is indicated it should not be unduly delayed.

REFERENCES

- Herbert, J.-J. (1948). *J. Bone Jt Surg.*, **30A**, 680.
La Chapelle, E. H. (1946). *Ibid.*, **28**, 851.
Smith-Petersen, M. N., Larson, C. B., and Aufranc, O. E. (1945). *Ibid.*, **27**, 1.

Medical Memorandum

Fatal Air Embolism in Artificial Pneumoperitoneum

This fatal accident is reported as a reminder that the simple procedure of artificial pneumoperitoneum is attended by the risk of air embolism. The operation is otherwise relatively safe and, in contrast to pneumothorax, is rarely attended by complications. Fatal cases of air embolism have been described by Simon (1925), Trimble and Wardrip (1937), Warring and Thomas (1940), Simmonds (1946), Mitchell *et al.* (1947), Bailey (1948), and Trimble *et al.* (1948), and there are several reports of less serious cases. Most authors stress the infrequency of the accident and note that it usually results from a breach of technique.

CASE REPORT

A woman aged 38 was admitted to hospital with left lower-lobe pneumonia in March, 1946. The sputum contained tubercle bacilli, and there was later a small spread of the disease to the right upper zone. In August, 1946, the left phrenic nerve was crushed and a week later a pneumoperitoneum was induced. Refills were given below the right costal margin, as the patient complained of pain and discomfort when the needle was inserted in the left hypochondrium. The left lung became atelectatic, cavitated, and fibrotic, and the right upper-lobe lesion eventually broke down to form a small cavity. The patient's general condition improved enough for a left thoracoplasty to be considered, and the pneumoperitoneum was gradually reduced. A right artificial pneumothorax induced on February 1, 1949, produced selective collapse of the right upper lobe.

On February 21 she was given a refill of her pneumoperitoneum, the needle being inserted as usual 1 in. (2.5 cm.) below

the right costal margin at the outer border of the rectus sheath. The pneumoperitoneum was small at the time, most of the air had collected under the stretched and paralysed left hemidiaphragm, and there were adhesions between the right cupola and the liver. A pressure of +6 to +10 mm. H₂O was obtained and air ran in easily, but after 50 to 100 ml. the patient complained of breathlessness and a bubbling sensation in the chest. She rapidly became unconscious and deeply cyanosed. She gave a few gasps, and died.

At necropsy (Dr. H. Williams) the needle was found to have entered the liver, the venous channels of which contained air. The gastro-hepatic omentum was distended with air. Frothy blood was present in the right heart and the pulmonary and cerebral vessels. The left lung was fibrotic and shrunken, with excavation of the upper lobe. The right lung was about half collapsed.

It was considered that because of her low respiratory reserve the patient died from a comparatively small air embolism which might not have proved fatal in a normal person.

COMMENT

In the experience of one of us (E. G. S. L.) this was the only case of air embolism recognized in some 2,750 refills in 110 patients.

Most cases of air embolism during pneumoperitoneum treatment have followed injection of air into the liver. Occasionally, as in Stokes's (1938) second case, air had entered a mesenteric vein. In the few cases occurring at induction air may have been injected into a vein in the abdominal parietes. In the present instance the point of the needle was probably lying at first in the peritoneal cavity near the gastro-hepatic omentum, and the liver was impaled upon it by a respiratory movement of the right hemidiaphragm, to which the liver was bound by adhesions.

If it can be avoided, refills should not be given in the right upper quadrant of the abdomen, because of the risk of haemorrhage or air embolism from damage to the vascular liver. The risk is particularly great if the right cupola is not paralysed and if there are adhesions between it and the liver. The intercostal route is attended by risk of accidental pneumothorax and by air embolism through puncture of a lung. The site of election for the induction of a pneumoperitoneum and for refills is 1 in. (2.5 cm.) below the left costal margin at the lateral border of the rectus sheath, as dense adhesions are rarely encountered there and the only vascular solid organ, the spleen, lies posteriorly.

We wish to thank H.M. Coroner, Mr. L. F. Beccle, for permission to publish the necropsy report.

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REFERENCES

- Bailey, W. H. (1948). *Amer. Rev. Tuberc.*, **57**, 621.
Mitchell, R. S., *et al.* (1947). *Ibid.*, **55**, 306.
Simmonds, F. A. H. (1946). *Lancet*, **1**, 530.
Simon, T. (1925). *Med. Klinik*, **21**, 589.
Stokes, J. B. (1938). *Illinois med. J.*, **73**, 137.
Trimble, H. G., and Wardrip, B. H. (1937). *Amer. Rev. Tuberc.*, **36**, 111.
— *et al.* (1948). *Ibid.*, **57**, 433.
Warring, F. C., and Thomas, R. M. (1940). *Ibid.*, **42**, 682.

According to the Ministry of Labour's Report for the Year 1948, 234,494 men and women were medically examined for National Service (some of these were re-examinations), and 78 men were prosecuted for refusing to submit to medical examination. At the end of the year about 913,000 were voluntarily registered as disabled persons under the Act of 1944. The great majority of these were in employment.