TRACHEAL VASCULAR RING CAUSING DYSPNŒA

BY

N. COULSHED AND E. WYN JONES

From the Liverpool Regional Cardiac Centre, Sefton General Hospital

Among the causes of extrinsic pressure upon the trachea and main bronchi must be included abnormalities of the aortic arch and its branches. The presence of a syphilitic aortic aneurysm is well known as a cause of pressure on the trachea and left main bronchus, but in childhood and early adult life, as well as later, the possibility of congenital abnormalities should not be overlooked.

Case Report

A young man, aged 18, height 72 inches, weight 152 lb. underwent a medical examination late in 1955, prior to entry into the Police. Routine physical examination showed him to be of normal physique, with no skeletal or muscular abnormality. Nothing of note was made out on examination of his cardiovascular and respiratory systems, but he was found to be unduly dyspnœic on exertion, a fact that both the patient and his father had known for several years, and that had caused the patient to forego any strenuous activity. His father could easily outstrip him in a sprint.

Because of this dyspnœa he was referred to the Heart Clinic of the Liverpool Royal Infirmary for further investigation. Physical examination again revealed no abnormal features. The blood pressure in both arms was 110/85 mm. of mercury. The femoral pulses were normal. Examination of the heart disclosed no abnormality of size, sounds, or pulsations, and the lungs appeared healthy. No stridor was heard. The electrocardiogram was physiological. The blood count gave normal results and the urine contained no unusual constituents.

Radioscopy, however, revealed the presence of a right-sided aortic arch, the œsophagus being displaced anteriorly by a persistent left root (Fig. 1). Otherwise the cardiac outline was normal. Further investigation,

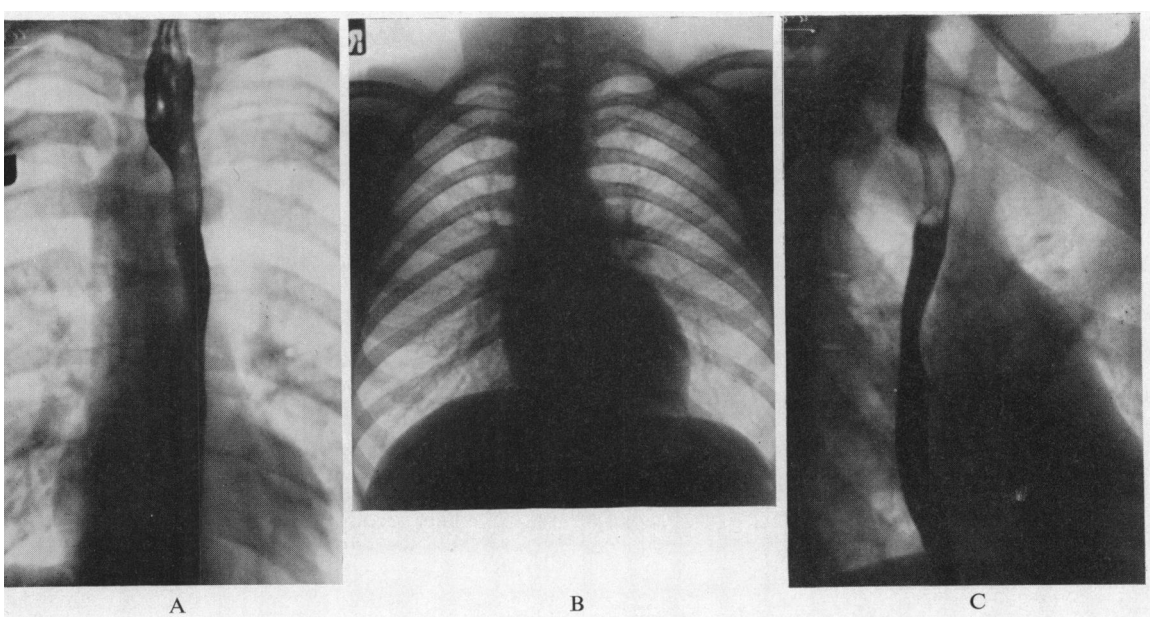

FIG. 1.—(A) Barium swallow in postero-anterior position, showing the right-sided aortic arch. (B) Showing postero-anterior radiogram. (C) Barium swallow in right anterior oblique, showing anterior displacement of œsophagus by persistent left root.

by bronchography and tomography revealed distortion of the trachea and right main bronchus, but attempts at angiography were unsuccessful. However, bronchoscopy and œsophagoscopy confirmed that the trachea was flattened on the right by a pulsatile swelling, which was also constricting the lumen of the right main bronchus to a mere slit. Oesophagoscopy showed a pulsatile swelling behind the œsophagus, pressure by the œsophagoscope producing obliteration of the left radial pulse.

Thoracotomy was undertaken on 8/3/56. Fig. 2 is a semi-diagrammatic appearance of the operative findings. The presence of a tight vascular ring around the trachea was confirmed, the right aortic arch

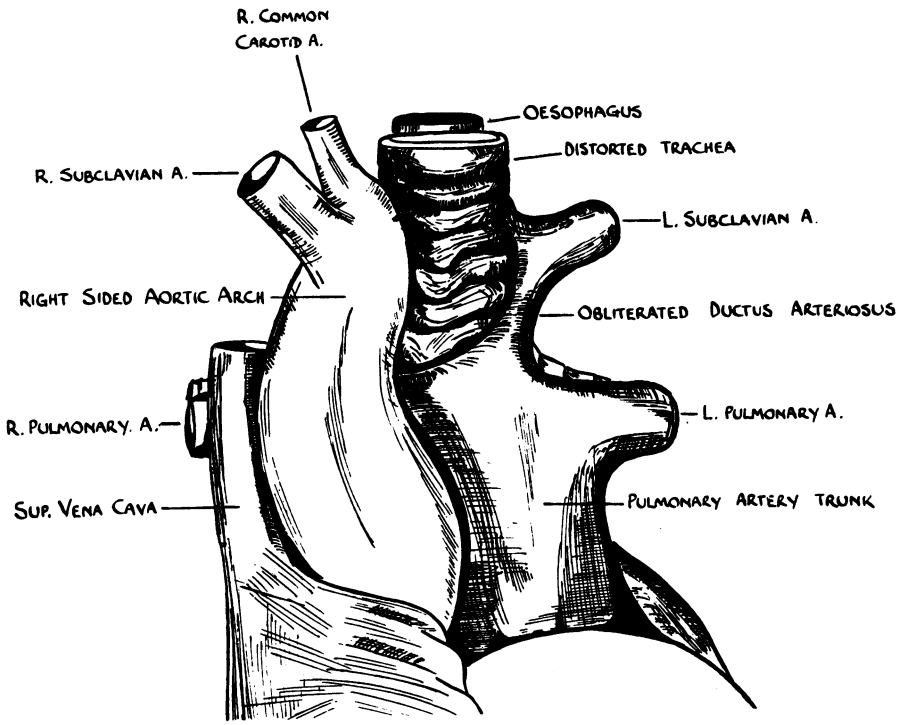

FIG. 2.—Appearance at thoracotomy, showing right-sided aortic arch, with persistent left root, from which the left subclavian arises. Note the tracheal distortion.

causing pressure on the right main bronchus and the trachea, the ring being completed by the pulmonary artery, and the short tough ligamentum arteriosum, which was attached to the persistent left root. All the main branches of the aorta were identified except the left common carotid which could not be located. The descending aorta was on the left.

The obliterated ductus was transfixed and divided; this at once relieved the pressure on the trachea and right main bronchus. Further dissection produced complete relief of pressure on the bronchus, and the pericardium over the pulmonary artery was fixed to the anterior chest wall, thus opening up the space still further.

Postoperative recovery was uneventful. Bronchoscopy three weeks later still showed tracheal distortion, but the right main bronchus was widely patent. Subsequent progress has been excellent; the patient is subjectively much better, and his exercise tolerance can now be regarded as normal.

Discussion

An excellent review of previously reported cases of abnormality of the aortic arch is given by Brown (1950) quoting extensively the classification of these abnormalities by Edwards (1948). Brown makes it clear that a right-sided aortic arch alone does not cause symptoms, especially when the descending aorta is on the same side. Even when the descending aorta is on the left, and a vascular ring is present, symptoms often only begin when degenerative changes in the aorta cause the pressure to become more severe.

Nevertheless, our case shows that where the vascular ring is narrow, symptoms may become manifest for the first time after childhood has passed by. Further investigation should be

undertaken, therefore, when a right-sided aortic arch is found in a patient complaining of dyspnœa for which no other cause can be found. In particular, angiography can be of great help, particularly where operative treatment is being considered.

Summary

A young man complaining of dyspnœa on exertion was found to have a right-sided aortic arch. At operation the trachea was found to be compressed by a tight vascular ring made up of the right aortic arch, the pulmonary artery, and the ligamentum arteriosum. Division of the obliterated ductus relieved the pressure and after operation the effort tolerance became normal.

The endoscopic examinations and the surgical treatment were performed in this case by Mr. L. J. Temple, to whom we are indebted for his help.

References

Brown, J. W. (1950). *Congenital Heart Disease*. London.
Edwards, J. E. (1948). *Proc. Mayo Clin.*, **23**, 108.
——, (1948). *Med. Clin. N. Amer.*, **32**, 925.