Medical Memoranda

Dextroposition of the Aorta

The purpose of this report is to stress the diagnostic importance of cardioscopy in general, with particular emphasis on the barium-filled oesophagus.

CASE REPORT

A man 45 years of age has for many years experienced occasional difficulty in swallowing solid food, associated with a sensation of delay in the upper part of the gullet, and sometimes even regurgitation of food. He had had bronchitis 13 years and pleurisy with effusion eight years previously. In 1945 he was compelled to give up his job as a bus conductor because of moderate dyspnoea on exertion, and spells of precordial oppression, without reference pain and not strictly related to effort. He was found to be a well-developed,

Dextroposition of aorta. Postero-anterior view. (By courtesy of Dr. Paul Cave.)

rather high-coloured man, with no sign of distress, dependent oedema, or clubbing. The brachial, femoral, and dorsalis pedis pulses were normal. Cardiac impulse was not perceived; the first apical sound was low-pitched; and the second basal sound to the right of the sternum markedly accentuated. Cardiac rhythm was regular; rate 64. Blood pressure in the right arm, in recumbency, was 140/105; in the left arm 135/105. Over both pulmonary bases there was diminished resonance on percussion, with scanty crepitation over the left base. Routine cardioscopy after barium swallow revealed a normal-sized heart silhouette, with a right-sided aortic arch.

The radiographic report (Dr. Paul Cave) read: "The aortic arch is small, but the vascular pedicle is slightly enlarged to the right of the midline. The descending thoracic aorta deviates to the right of the midline, but returns to its normal position just above the diaphragm. No abnormal pulsation was seen in the aorta. The oesophagus is compressed and displaced anteriorly and to the left of the midline in about three inches of its length from a level corresponding to the upper border of the clavicle. A smooth concave indentation is seen in the barium shadow on its posterior and right lateral aspects." (See illustration.)

The diagnosis of "right-sided aortic arch with persistence of the root of the obliterated left aortic arch, and left descending aorta" was made.

COMMENT

The essential feature of the dextroposition of the aorta is that the aortic arch crosses over the right main bronchus instead of over the left one. The right aortic arch is often associated with clinically and radiologically well-defined congenital malformations such as Fallot's tetralogy, isolated dextrocardia or dextrocardia within a complete transposition of all the viscera (*situs viscerum inversus totalis*), and coarctation of the aorta. It may be confused with the last-named on cardioscopy owing to the absence of the aortic knob in the normal position and to dilatation of the ascending aorta. But the evidence of high blood pressure in the upper extremities, weak or absent pulses in the leg arteries and the arterial collaterals of the trunk, scalloping of the ribs, and the familiar syndrome of coarctation is unmistakable. In Fallot's tetralogy the aorta overrides the interventricular septum, and so receives the blood from both the right and the left ventricle.

Aneurysmal dilatation of the ascending aorta is easily differentiated from the right aortic arch by studying the course of the oesophagus on barium swallow in the conventional positions. On the other hand, a right-sided aortic arch may be complicated with atherosclerosis, syphilis, or hypertension. The last-named seems to be the case in our patient.

The right aortic arch may occur in association with the following main vascular variations: (1) a left innominate artery arising as first brachiocephalic vessel from the aortic arch, the right common carotid as second, the right subclavian as third; (2) the left common carotid, the right common carotid, the right subclavian, and the left subclavian are given off the upper aspect of the aortic arch in that order; (3) a vascular ring formed by the pulmonary artery and a persistent ductus arteriosus or ligamentum arteriosum; (4) a persistent left aortic arch coursing anteriorly to the trachea, thus forming a double aortic arch.

In contradistinction to the right-sided aortic arch, the double aortic arch and vascular ring may sometimes give rise to a serious oesophageal and tracheal constriction calling for surgical relief. When such is the case there is no deviation of the oesophagus to the left, but constriction from right and left.

Finally, a vascular anomaly must be differentiated from the right-sided aortic arch—i.e., the anomalous right subclavian artery arising as the last branch from the left end of the normally placed aortic arch, and passing to the right behind the oesophagus. Rarely it gives rise to constriction of the oesophagus (*dysphagia lusoria*). The characteristic radiological signs can be elicited only upon a barium-filled oesophagus; there is just at the level of the upper margin of the aortic knob a small distinctly outlined semicircular deviation of the oesophagus to the right and ventrad; its intrinsic systolic pulsations have been observed in the antero-posterior view.

The differentiation of brachiocephalic vascular variations concomitant with a right-sided aortic arch in Fallot's tetralogy, or with a left aortic arch in dextrocardia complicated with cyanosis, is of practical importance to the surgeon who has to anastomose a suitable brachiocephalic vessel with the pulmonary artery (Blalock operation).

Only by combination of radiological and angiocardio-graphic methods of investigation can the topography of these vascular anomalies be identified.

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EDMUND FINSTERBUSH, M.D., M.R.C.S.