Right Aortic Arch Simulating a Mediastinal Tumor*

A Case Report

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Right aortic arch is a developmental anomaly of the large vessels; the aortic arch lies to the right of the trachea and esophagus instead of the left side. It is frequently associated with cardiac malformations, e.g., Eisenmenger complex, 20-25 per cent of Tetralogy of Fallot. The diagnosis of right aortic arch becomes important in relation to surgical treatment. This vascular anomaly has also been known to occur independently without producing noticeable symptoms. Many cases have been discovered accidentally during routine chest examination, because of its unusual mediastinal shadow. Roentgenologically, the following features have been enumerated.1, 2

1. On a posteroanterior chest film, a small mass (right aortic knob) is observed below the right sternoclavicular joint occupying an image position of the left aortic knob. No aortic knob is found at the usual site, the first left costosternal joint.

2. The esophagogram in the posteroanterior view will show left displacement of the esophagus at the height of the right aortic knob, while it is pushed forward in the right oblique view.

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FIGURE 1: K. S. 46 years old, man. Absence of aortic knob below the left sternoclavicular joint.
3. The trachea will show almost an identical displacement as that of the esophagus. These changes are also caused by mediastinal tumors, e.g., cysts, chondroma, aberrant goiter, lymphoma, aneurysm, exostoses of the sternum, etc., and mistaken for them. If dyspnea or dysphagia is coexisting, careful examination is required for the differential diagnosis.

Generally, the right aortic arch may be classified with those accompanied with the right descending aorta (the so-called right-sided aorta), the left descending aorta and persistent left aortic arch (double aortic arch). In addition to this, the degree of regression of primitive aortic- and branchial arches and the anomalous origin of blood vessels supplying the upper half of the body will cause various displacement and compression of trachea and esophagus from any direction, which will make the interpretation of chest films difficult. Careful examination will become important.

Because of its benign nature, no operation is required for the asymptomatic one despite its false appearance as a mediastinal tumor. Recently, an exploratory thoracotomy was performed for this anomaly without fully recognizing its clinical entity by us.

Case Report

Case Report: H. S., a 46 year old man, was admitted to the University Hospital on March 5, 1958, complaining of heaviness of the neck during swallowing which was accompanied with epigastric distress. He had this symptom during the past two months and lost his appetite. The symptoms, however, ameliorated after receiving two pints of blood by a local doctor. He had no complaint referable to breathing. Barium study of the esophagus was performed at that time which revealed distortion and narrowing of the esophagus. He was referred to us for further examination.

On admission to the hospital, dysphagia had almost disappeared. He was well nour-
ished and had good appetite. Physical examination was essentially negative. Laboratory studies including electrocardiogram were within normal range. Blood pressure in the right arm was 140-85 mm. Hg., the left 136-72 mm. Hg. Serum Wasserman reaction was negative.

A roentgenogram of the chest in the posteroanterior projection showed no aortic knob in the usual position. A ribbon-like shadow defined the mediastinum on both sides. The pulmonary conus was not dilated (Fig. 1). A heavier penetrated chest film revealed a round, well localized, homogenous mass just below the right sternocostal

![Image](http://journal.publications.chestnet.org/pdfaccess.ashx?url=/data/journals/chest/21333/)

**FIGURE 3**: Right anterior oblique view. The esophagus is displaced forward by the right aortic arch.

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**FIGURE 4**: Angiocardiogram demonstrates that the aortic arch ascends to the right of the trachea with a right descending aorta. The trachea is displaced to the left and slightly stenosed. 1, 2, 3, 5, and 6, is the right subclavian, the right carotid, the left subclavian, the ascending and descending aorta, respectively. 4, is the trachea.
joint. It slightly displaced the trachea to the left and caused narrowing of the lumen (Fig. 2). In the right lateral view, a mass, measuring 3 x 4 centimeters was visible at the level of the aortic arch, which displaced the trachea slightly anteriorly.

Barium study of the esophagus showed that the esophagus was pushed laterally toward the left with a concave indentation on its right wall in the posteroanterior view, while anteriorly in the right oblique view. Its oral side was slightly dilated but the barium easily descended into the stomach in a normal way. Esophagoscopy disclosed that the upper portion of the esophagus was markedly kinked and stenosed to the left upper direction, 18 centimeters from the teeth, by a pulsating mass. The mucosal pattern was normal. The instrument could not be inserted further due to the small lumen.

The mass causing the esophagus displacement gave the impression of a mediastinal tumor in the upper middle mediastinum.

Exploratory thoracotomy was performed through the right fourth intercostal incision. No tumor was found in the right upper mediastinum. The aorta ascended toward the right side of the spinal column arching over the right bronchus and descended in the right chest. The lower portion of the thoracic aorta traversed the seventh and eighth thoracic vertebrae to the left aortic hiatus. The mass previously thought to be a mediastinal tumor was actually the right aortic arch itself. No pulsating vessel was palpated in front of the trachea.

His postoperative course was smooth. Thoracic aortography was performed on the 14th day with 70 per cent Urokonil via the right cubital vein. The aortogram confirmed the operative finding (Fig. 4). Though the right carotid and subclavian arose from the arch, the course of the left carotid and origin of subclavian artery could not be determined accurately. The possibility is that the subclavian artery may have originated as the last branch from the aortic arch and coursed behind the esophagus.

Discussion

When a chest x-ray film is taken by a conventional method, the right aortic arch may be easily overlooked as in our case if barium study of the esophagus had not been carried out. Absence or hypoplasia of the left aortic knob has been reported in several instances, e.g., persistent left superior vena cava, coarctation of the aorta, etc. In such a case, other symptoms are usually manifest and will not be mistaken for an anomalous aortic arch. A mass in the right upper mediastinum in the absence of the left aortic knob itself have not usually called doctor's attention to consider the possibility of the right aortic arch. This vascular anomaly has misled many doctors to a wrong diagnosis in the past. For instance, according to Garland, an exploratory thoracotomy was performed for the right aortic arch after treating it as a lymphoma with deep x-ray treatment. Bedford and Parkinson reported a 63 year old man who complained of dysphagia with solid food. It was thought to be caused by an intrathoracic goiter and explored to find only a right aortic arch. It has become well known that there are many mediastinal tumors, benign or malignant, which are apparently asymptomatic. Considering the prognosis, in doubtful cases, exploratory thoracotomy is recommended and justified by many surgeons. However, recently, aortography has made it possible to make correct diagnosis preoperatively without subjecting the patients to a distressing procedure. Right aortic arch is the one which should be kept in mind to differentiate from mediastinal tumors.

REFERENCES


