Aortic Body Tumors*

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Aortic body tumors, though comparatively rare, nevertheless have a place in the differential diagnosis of intrathoracic tumor. A review of the literature reveals ten previous case reports beginning with Lattes' two cases in 1950.1,2,6,7,8,9,10,11

This type of tumor has variously been referred to as a non-chromaffin paraganglioma,* chemodectoma,2,6,9,11 and aortic body tumor. Lattes' suggested the term "non-chromaffin paragranuloma," and de Castro the term "chemodectoma." The latter is a term describing the tumor on the basis of function (of the aortic body). Each of the terms would appear equally appropriate to describe this group. The other functionally related tumors include those of the carotid body, the glomus jugulare, paraganglion tympanicum, and paraganglion intravagale.

Function of Chemoreceptor Tissue

Comroe,1 and Dripps and Comroe have pointed out that the chemoreceptor mechanism responds to a decrease in oxygen tension, to a decrease in pH of the plasma, and to an increase in the temperature of the blood. The vagus nerve transmits these impulses to the medullary vasomotor and respiratory centers.

Anatomic Location of Chemoreceptor Bodies

The usual anatomic position of the chemoreceptor bodies has been described by Comroe,1 Dripps,1 Hollinshead,1 and Barnard.1 Aortic bodies are situated on the anterolateral portion of the left aortic arch near the origin of the left subclavian artery, near the innominate artery either lateral to the right subclavian artery or close to the bifurcation of the subclavian and common carotid artery, near the pulmonary end of the ductus arteriosus, or on the right side on the surface of the pulmonary trunk; and in an area adjacent to the ascending aorta and the left coronary artery.

Location of Reported Tumors

The following are the reported anatomic locations in which tumors have arisen: (1) the immediate vicinity of the aortic arch and innominate artery;2 (2) in the adventitia of the aortic arch near the obliterated ductus arteriosus;2 (3) anterolateral aspect of the right lower lobe of the lung;2 (4) the left subclavian artery,11 and on the artery immediately distal to the thyrocervical axis and completely encircling the artery;11 (5) the right posterior costovertebral sulcus,1 and the sulcus at the ninth to 11th rib related to the descending aorta on the right;4 (6) right posterior mediastinum;11 (7) between the lobes of the left lung;11 (8) questionable right hemithorax adherent to the diaphragm;11 and (9) anterior aspect of pericardium overlying the right atrium.1

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Case Report: Mrs. E. M. was a 28 year-old housewife who appeared to be an unusually emotionally labile individual. She had had anorexia and insomnia for years and for the last five to six months had had vomiting attacks, sometimes daily, sometimes weekly. There was a history of an automobile accident one year prior to hospital admission when she sustained a deep laceration of the left shoulder and developed chest pain which cleared over a period of several months.

On physical examination, the blood pressure was 115/60 in the left brachial artery and 120/80 in the right. Pulse was regular sinus rhythm, good volume. The brachial pulses and femoral pulses were equal bilaterally. The trachea was mid-line and the lungs were clear to auscultation and percussion. There was no clubbing, no cyanosis, the liver was not palpable, and there was no elevation of the jugular venous pressure. There was a keloid scar over the left shoulder at the base of the left neck. There was no murmur auscultated over the precordium and no evidence of cardiac abnormality. She was a moderately thin woman in no immediate distress. X-ray film of the chest (Fig. 1) February 26, 1960, revealed a 4 x 5.8 cm. mass off the left margin of the aortic arch apparently being adjacent to or in the wall of the aorta in the area of the left subclavian artery or immediately below it.

On March 9, 1960, the left hemithorax was explored through a posterolateral thoracotomy utilizing the rib bed beneath the inferior margin of the fifth rib. A smooth rounded extrapleural mass 6 cm. in diameter was found overlying the posterolateral portion of the aorta beginning 1 cm. below the origin of the left subclavian artery. Its surface was covered with many venous radicals and in its entirety lay subpleurally. Utilizing sharp dissection the tumor was dissected from off the aorta and reflected posteriorly. There were numerous large vascular and nervous tissue communications, the latter appeared to be continuous with a large and distorted sympathetic chain. There were many frank nervous tissue communications in this area and the chain itself appeared to be more or less a thick network of nervous tissue strands. The impression at operation was that this represented a neurogenic tumor. It appeared to be encapsulated and was not believed to be malignant. Postoperatively she convalesced without event and six months postoperatively there was no evidence of recurrence.

Gross pathology of the specimen: The specimen consisted of a moderately firm ovoid, somewhat resilient lesion 6 cm. in maximum dimension. Externally it was slightly lobulated, well encapsulated and red-tan. Sections showed a homogenous gray-pink to red-brown, smooth surface with a centrally located dark brown 0.8 cm. hemorrhagic area of discoloration. The lesion was surrounded by a 1 mm. gray capsule.

Microscopic examination: The tumor was composed of large polyhedral cells which tended greatly to reproduce the architecture of a normal aortic body except there was greater variation in size and shape of cells than in the normal tissue. The tumor cells were arranged in nests (Zellballen), and between the latter there were fibrous septa rich in capillaries. No mitotic figure was seen. The tumor cells were oval, vesicular,
FIGURE 2 (upper): The tumor cell arrangement is one of nests of cells, separated in part by fibrous connective tissue septa rich in capillaries. FIGURE 3 (center): The individual tumor cells are uniform in size and shape, plump in configuration, and contain oval to round, even-sized vesicular nuclei. FIGURE 4 (lower): The nests of tumor cells are clearly seen and are separated by the darker staining reticulum of the fibrous septa.
central or slightly eccentric nuclei with a fine minutely stippled chromatin pattern. The nucleoli were solitary, small, and often eosinophilic (Figs. 2 and 3). The cytoplasm of each cell was abundant, clearly outlined, finely granular and eosinophilic. Reticulum stain (Fig. 4) brings out the typical cellular nests of the tumors cells. Microscopic sections of the lesion were reviewed by Dr. Malcolm B. Dockerty of Rochester, Minnesota, who concurred in the diagnosis of chemodectoma.

Treatment

The treatment for these tumors has been surgical excision with deep x-ray on occasion for recurrence and for apparent metastasis. In Persiolo's case, a "fist sized" tumor was excised between the lobes of the left lung. Five and one-half years later a second tumor the size of a "child's head" was excised from off the right hemidiaphragm. Later a questionable metastasis to bone was treated with deep x-ray.

Of Duncan's two cases, the first had a 6.4 cm. mass removed from the right posterior portion of the thorax adjacent to the ninth and tenth thoracic vertebrae with erosion of the tenth rib. Fourteen years after operation and removal of the tumor his second case developed a tumor in the vertebral column which led to spastic paraplegia of both lower extremities. This recurrence, if it was such, was not biopsied and thus the histology of the recurrence is not available.

Monroe's case was a 22 year-old man who was given deep x-ray over the tumor mass in the left subclavian region on two occasions (receiving 400 r the first time) without response. It is stated that he deteriorated over the next four years developing liver and probably lung metastasis.

In MacDonald's case, a 79 year-old man was found to have an incidental aortic body tumor about the left subclavian artery located immediately distal to the thyrocervical trunk. There was no connection at the carotid artery or the vagus nerve.

Gillis' case was treated surgically with the tumor in the right lower lobe, removed by lobectomy. Two years postoperatively there was a recurrence in the wound. This was excised, but it recurred again, growing at such a rate that it was considered inoperable when next seen. It was treated with the cobalt bomb without response. The patient died.

Lattes' first case was a 59 year-old man with a mass in the right side of his neck behind the right lower sternomastoid muscle extending beneath the right clavicle, with a mediastinal mass displacing the trachea and esophagus to the left. The cervical portion was removed from above and one month later the thoracic portion was explored and found not resectable. The tumor was well encapsulated below and intimately associated and connected with the innominate artery and the internal jugular vein. The tumor was essentially intrathoracic. Lattes' second case was a man who died from bulbar poliomyelitis. At necropsy, a 2 cm. carotid body tumor was found at the bifurcation of the carotid artery, a chemodectoma found in the vagus nerve in the region of the styloid process at the base of the skull (ganglion nodosum), and a one and one-half cm. aortic body tumor found at the site of the obliterated ductus arteriosus, loosely attached to the adventitia.
McDonald's case report dealt with a 38 year-old woman with a contiguous superior mediastinal right neck mass. It was removed via a collar incision, its weight was 70 gm., and it was encapsulated and fixed posteriorly in the region of the vertebra. It was believed benign.

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**BIBLIOGRAPHY**


**CORONARY ANGIOGRAPHY**

Bjork and Hallen report a modified method of coronary angiography originally introduced by Arnulf and Chacornac with cardiac arrest induced by acetylcholine for clinical use. A small dose of acetylcholine is placed in the catheter, the tip of which is placed in the ascending aorta near the aortic valve. When the contrast medium is injected through the catheter, it pushes the acetylcholine into the coronary circulation. Cardiac arrest is induced within one to two seconds. The length of the cardiac arrest is easily controlled with the help of atropine sulphate, which is injected through the catheter into the coronary circulation. The method has been applied to patients with severe angina pectoris. Coronary angiography during cardiac arrest with the very low systemic flow and with x-ray exposure in one plane gives radiograms with very good clarity and of high quality.


**THE DIAPHRAGM IN PRIMARY LUNG CANCER**

The authors examined changes in the position and structure of the diaphragm in primary lung cancer and investigated their relation with the type of growth of carcinoma and with the functional condition of the lung.

In the instances where the diaphragm appeared to be elevated, three different anatomic-histologic situations were observed. In a first group, atrophy of muscle bundles and its replacement by connective tissue were observed. It was carcinomatous infiltration of the phrenic nerve. The lung parenchyma maintained sometimes its complete ventilation. In some other cases, atrophy or connective tissue substitution resulted from direct invasion of the muscle by the new growth or by compression of nerve fibers in the muscle. In this second group, infiltrative spread of cancer from the hilum was also observed.

In a third group, including one large nodular and one of the massive type, the diaphragm conserved its complete structural integrity: its elevation was in close relation to the appearance of hypoventilation and atelectasis of the lung: