Posterior Mediastinal Goiter*

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Because of their tendency to progressively enlarge with compression of adjacent structures, as well as the small chance of malignancy, most intrathoracic goiters should be excised surgically. Most anterior substernal goiters and some ipsilateral posterior mediastinal goiters can be removed safely through a cervical incision. Large posterior mediastinal goiters, contralateral retrorotracheal or retro-esophageal posterior mediastinal goiters, and isolated mediastinal goiters with no significant cervical connection are best removed through a combined cervical and thoracic approach. The Lahey Clinic experience with three patients with posterior mediastinal goiter is described. (Chest 1988; 94:599-602)

A cervical goiter, as it enlarges over time, may extend into the anterior substernal space. Less commonly, the intrathoracic component may be in the posterior mediastinum, usually on the same side as the thyroid lobe of origin. Among the rarest of intrathoracic goiters are those presenting in the posterosuperior mediastinum on the contralateral side from the thyroid lobe of origin, passing either between the trachea and esophagus or behind the esophagus. Also extremely uncommon are those instances of isolated posterior mediastinal thyroid with no discernible connection with the cervical gland. Within the past two decades, three patients with such unusual presentations of posterior mediastinal goiter have been identified at the Lahey Clinic.

CASE REPORTS

CASE 1

An asymptomatic 53-year-old woman presented with a 30-year history of a cervical goiter, which was slowly increasing in size. Chest roentgenography revealed a right posterosuperior mediastinal mass that did not move with swallowing. The trachea and esophagus were displaced anteriorly and to the right, the same side on which the mass was seen on the chest film.

Physical examination results showed moderate enlargement of both the left and right lobes of the thyroid gland. Radioactive 131I scanning demonstrated diffuse thyroid enlargement with heterogeneous uptake and a cold nodule in the right lobe. No uptake of tracer material by the mediastinal mass was apparent. Blood thyroxine levels were normal.

The patient underwent exploration through a transverse collar incision at which time the inferior portion of the left thyroid lobe was found to extend posteriorly as a large mass behind the esophagus and into the right posterosuperior mediastinum. Subtotal thyroidectomy was performed. The mediastinal mass could be delivered into the neck and was resected. The pathologic diagnosis was adenomatous goiter. The patient did well postoperatively except for slight hoarseness.

CASE 2

This 65-year-old woman had undergone subtotal thyroidectomy 30 years previously. On recent examination, performed because of dysphagia, she was found to have no palpable cervical thyroid gland. However, chest roentgenography (Fig 1) and computed tomographic (CT) scan (Fig 2) revealed a mass in the right posterosuperior mediastinum. The mass was posterior to the trachea and esophagus and anterior to the vertebral column. 123I scanning revealed no uptake of tracer in the chest. Results of thyroid function tests were normal. An upper gastrointestinal series revealed a mediastinal mass displacing the esophagus anterolaterally and to the right.

Surgery was performed by a combined approach. The previous collar incision was reopened, and a mass was identified projecting from the postero-inferior portion of the left thyroid lobe and passing behind the trachea and esophagus into the right posterosuperior mediastinum (Fig 3). The left recurrent nerve was identified with some difficulty. Simultaneously, a limited right postero-lateral throracotomy was performed, and a large mass was identified, bounded anteriorly by the superior vena cava and inferiorly by the azygos vein. The mediastinal pleura was opened, and the mass was dissected free. Numerous small collateral vessels were ligated. With pressure from below, it was then possible to deliver the mass through the thoracic inlet and into the left side of the neck incision where its connection to the left thyroid lobe was amputated, and the mass was removed. The patient had a benign postoperative course.

CASE 3

This 71-year-old man had presented ten years earlier with substernal chest pain and hypertension. His chest roentgenogram at that time revealed a large right posterosuperior mediastinal mass, and fluoroscopic examination results demonstrated that this mass displaced the trachea and esophagus to the contralateral left side. He had no history of thyroid disorder. The thyroid gland was not palpable in the neck. 123I scanning revealed low uptake of tracer, most of which occurred in the left lobe of the gland without any definite intrathoracic accumulation. Results of thyroid function tests were normal.

In anticipation of possible intrathoracic surgery, an exercise tolerance test showed severe ischemic response. Because of this finding, the patient first underwent the more limited procedure of mediastinoscopy. A mass was encountered posterior to the trachea on the right and had no continuity whatsoever with the cervical thyroid gland. Biopsy revealed normal thyroid tissue. Because the patient had a history of angina, further surgery was deferred.

Ten years later, the patient remained euthyroid and without need of thyroid medication, but he had considerable angina. Because of severe symptoms of benign prostatic hypertrophy, he underwent transurethral resection of the prostate, which was followed by an acute postoperative myocardial infarction requiring intra-aortic balloon counterpulsation. Angina persisted, and urgent coronary bypass surgery was believed necessary. A chest roentgenogram (Fig 4) demonstrated a large right posterior mediastinal mass displacing the trachea to the contralateral left side. A CT scan (Fig 5) revealed that the mass seen on the chest x-ray film was limited to the right
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[60x455]1. Chest roentgenogram of patient 2 demonstrates right superior mediastinal mass displacing trachea slightly to the right. posterior mediastinum and would not interfere with sternotomy. Urgent coronary bypass surgery was performed. At exploration the right pleural space was opened, and the posterior mediastinal location of the tumor confirmed. After a lengthy postoperative convalescence, the patient recovered and is asymptomatic.

DISCUSSION
Etiology and Prevalence
Lahey and Swinton\(^1,2\) described the anatomic factors responsible for intrathoracic extension of goiter. The thyroid is bounded superiorly by the hyoid and thyroid cartilages, posteriorly by the trachea and prevertebral fascia, and anteriorly by the sternocleidomastoid, omohyoid, sternohyoid, and sternothyroid muscles. With progressive enlargement of the gland, the path of least resistance is inferiorly into the thorax. The weight of the goiter as well as normal swallowing and respiratory motion favors mediastinal displacement.

FIGURE 2. CT scan of patient 2 shows mass in posterior mediastinum in a retrotracheal retrooesophageal location.

FIGURE 3. Operative findings in patient 2. A large goiter originated from inferior pole of left thyroid lobe and passed behind trachea and esophagus into right posterior superior mediastinum. (Reprinted with permission from the Lahey Clinic.) Because the diameter of the more caudal portions of the chest is increased, the goiter may actually enlarge with progressive downward displacement. In some patients, the connection to the cervical gland may become attenuated and be apparent only as a fatty or fibrous band or vascular pedicle. The prevalence of intrathoracic extension among all patients with cervical

FIGURE 4. Chest roentgenogram of patient 3 demonstrates a large right superior mediastinal mass displacing the trachea to the left.
goiters vary from 0.2 to 21 percent. If only total intrathoracic goiters are included, the prevalence is 0.2 to 1 percent.12

**Location**

Anterior substernal extensions make up 75 to 94 percent of intrathoracic thyroid tumors and are located anterior to the recurrent laryngeal nerve and to the subclavian and innominate vessels. Posterior mediastinal goiters, which constitute 10 to 25 percent of intrathoracic goiters, were thought by Sweet to arise from the posterolateral portion of the lobe rather than the inferolateral aspect. An ipsilateral posterior mediastinal goiter descends behind the innominate vein, carotid sheath, innominate and subclavian arteries, recurrent nerve, and inferior thyroid artery. It is most commonly found in the right posterior mediastinum, presumably because the aortic arch obstructs descent on the left side.8,12

Rarely, a cervical goiter may pass between the trachea and esophagus or behind the esophagus (as in our cases 1 and 2), terminating in the contralateral posterolateral mediastinum.4,8,11,19-22

Although some authorities doubt their existence, several reports have described isolated mediastinal goiters having no discernible connection to the cervical gland as was observed in our case 3. These are usually substernal but may be in the posterior mediastinum. Whether such apparently disconnected goiters arise from isolated embryologic anlagen27 or follow progressive attenuation of their cervical connections, little doubt exists that they do occur. We prefer the term isolated mediastinal goiter to ectopic or heterotopic, either of which implies an etiologic mechanism that cannot be proved.

**Clinical Presentation**

Most patients with intrathoracic goiter are women, and in many, a remote history of previous thyroid surgery can be elicited. From 50 to 96 percent of such patients have symptoms. These include dyspnea, neck swelling, superior vena cava syndrome, cough, dysphagia, stridor, pain, choking with recurrency, hoarseness secondary to recurrent nerve dysfunction, and thyrotoxicosis. Acute respiratory failure from hemorrhage into an intrathoracic goiter may occur, and an abscess has developed in one posterior mediastinal goiter.11 “Downhill” varices have been observed with intrathoracic goiter.32

**Diagnosis**

The radiographic features of intrathoracic thyroid glands were described by McCort and include contralateral displacement of the hyoid, trachea, and larynx; movement of the mass with swallowing; flecks of calcification; and compression of the trachea or esophagus. However, these findings apply mostly to typical anterior mediastinal or ipsilateral posterior mediastinal extensions. As Hilton and Griffin noted, contralateral retroesophageal or retrotracheal goiter produces deviation of the trachea and esophagus to the same side on which the mass presents on the chest film. This finding, the CT scan, and the patterns of anterior or posterior compression of the esophagus from barium esophagographic study usually permit the anatomic location of the mass to be characterized with great accuracy. Radioactive iodine scanning has been employed in mediastinal goiters, but intrathoracic thyroid tissue often fails to concentrate the tracer preparation.11 Imaging of mediastinal goiter is further complicated by interference from extraneous chest wall, mediastinal, and blood pool labeling. A nuclear scan giving positive results is useful, whereas a negative finding does not exclude thyroid origin of a mediastinal mass.

**Indications for Surgery**

Most intrathoracic goiters should be removed except in the presence of compelling medical contraindications. Many patients require surgery for symptomatic relief and to reduce the risk of acute exacerbation of compressive symptoms from hemorrhage or inflammation of the intrathoracic gland. Progressive enlargement of the gland inevitably occurs and makes subsequent removal difficult. Finally, the prevalence of unsuspected malignancy in intrathoracic goiter, which is comparable to that in cervical glands, ranges from 0.9 to 16 percent.7,21,28,29,34,35

**Surgical Approach**

The typical anterior substernal goiter can almost always be removed through a cervical incision, although a partial or complete sternotomy may facilitate removal of a large gland. The approach to ipsilateral posterior mediastinal goiters has been controversial. On one hand, substantial portions of the blood supply...
to the mediastinal gland may come from the inferior thyroid vessels, and inability to control this cervical blood supply from a thoracic approach may result in disastrous hemorrhage. Furthermore, the recurrent nerve cannot be visualized adequately from the thoracic approach, and concomitant removal of the involved cervical portion of the gland may not be possible. On the other hand, serious hemorrhage may result from attempts to remove some posterior mediastinal goiters through the cervical approach alone.\textsuperscript{17,36,37} Especially vulnerable are patients whose goiters have little or no cervical component and those in whom cervical thyroidectomy has been performed previously. Although the original blood supply may have been primarily from the inferior thyroid vessels, a collateral supply from mediastinal vessels often develops in such situations. Furthermore, the typical right posterolateral mediastinal goiter may be intimately related to both the superior vena cava and the azygos vein, and an attempt at transcervical removal may result in injury to these structures.

Thus, although many posterior mediastinal goiters can be removed through a cervical incision,\textsuperscript{8} most surgeons have adopted a selective approach. Thoracotomy\textsuperscript{18,19,17,38} or a combined cervicotoracic approach\textsuperscript{19,38,39} has been advocated for larger lesions and when the mass is mainly intrathoracic with little or no cervical component.

Contralateral retrotracheal or retroesophageal posterior mediastinal goiter is best resected through a simultaneous cervical and thoracic approach\textsuperscript{19,20} as employed in our case 2. This permits optimal control of both mediastinal and cervical vessels, protection of the recurrent nerve, and complete extirpation of the cervical and thoracic components of the goiter.

References

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