

Successful Resection of Posterior Mediastinal Thyroid Cancer by Partial Sternotomy Combined with Video-Assisted Thoracoscopy

Noritaka Isowa, MD,¹ Ryutaro Kikuchi, MD,¹ Yasuomi Kunimoto, MD,² Kazuyuki Ito, MD,² Hirokazu Tokuyasu, MD,³ Katsuhiko Fukuda, MD,³ and Yuji Kawasaki, MD³

We report on a rare case of substernal thyroid carcinoma extending into the posterior mediastinum of a 48-year-old man. The tumor was resected by partial sternotomy and a small anterior thoracotomy, combined with video-assisted thoracoscopy. The pathological diagnosis was of a well differentiated papillary adenocarcinoma of the thyroid with mediastinal extension. The patient had an uneventful postoperative course and no recurrence of tumor 6 months after surgical treatment. We describe this surgical approach and discuss the advantage for cervicothoracic tumors extending into the posterior mediastinum. (Ann Thorac Cardiovasc Surg 2007; 13: 47–9)

Key words: cancer, mediastinal tumor, surgery

Introduction

An enlarged thyroid gland extending into the mediastinum is referred to as a substernal goiter. Most substernal goiters are located in the anterior mediastinum. A small percentage of goiters have been reported to extend into the posterior mediastinum.^{1,2)} Although the majority of substernal goiters are histopathologically benign, a low incidence of malignancy ranging from 2 to 21% is described.²⁾ We report on a rare case of substernal thyroid carcinoma extending into the posterior mediastinum which was resected by partial sternotomy combined with video-assisted thoracoscopy.

Case

A 48-year-old man was found to have a chest roentgenogram showing a tracheal deviation on a regular checkup in July 2005 (Fig. 1A). He was referred to our hospital for further examination. His medical history and clinical

From Divisions of ¹Thoracic Surgery, ²Otorhinolaryngology, and ³Respiratory Medicine, Matsue Red Cross Hospital, Matsue, Japan

Received April 2, 2006; accepted for publication June 15, 2006. Address reprint requests to Noritaka Isowa, MD: Division of Thoracic Surgery, Matsue Red Cross Hospital, 200 Horo-machi, Matsue, Shimane 690–8506, Japan.

status were unremarkable. His daughter who was a high school student had a goiter as a child. He smoked 20 cigarettes a day for 12 years until 30 years of age. Laboratory tests revealed nothing except a high anti-thyroglobulin antibody of 11.4 U/ml. The serum levels of free thyroxine, thyroid-stimulating hormone, and thyroglobulin were normal. A computed tomographic (CT) scan of the chest demonstrated a heterogenous mass with calcification. This was located posterior to the large vessels and compressed the trachea (Fig. 1B). A fine-needle aspiration specimen from the cervical, not from the mediastinal portion, was cytologically assessed as benign.

An operation was performed on September 1, 2005. The patient was placed in a supine position with his right arm extended after placement of a double-lumen endotracheal tube. Initially, a collar skin incision (8 cm) was performed and both thyroid lobes were exposed; posteroinferiorly, the right lobe was noticeably enlarged within the mediastinum. A midsternal incision (12 cm) from the suprasternal notch to the 3rd intercostal space, which was transversely continued along the upper border of right 4th rib (5 cm)(Figs. 2 and 3). The 3rd intercostal muscles were separated, and the right internal mammary vessels were divided and ligated. The right half of the sternum was transected transversely, and the sternum was incised longitudinally up to the suprasternal notch. The

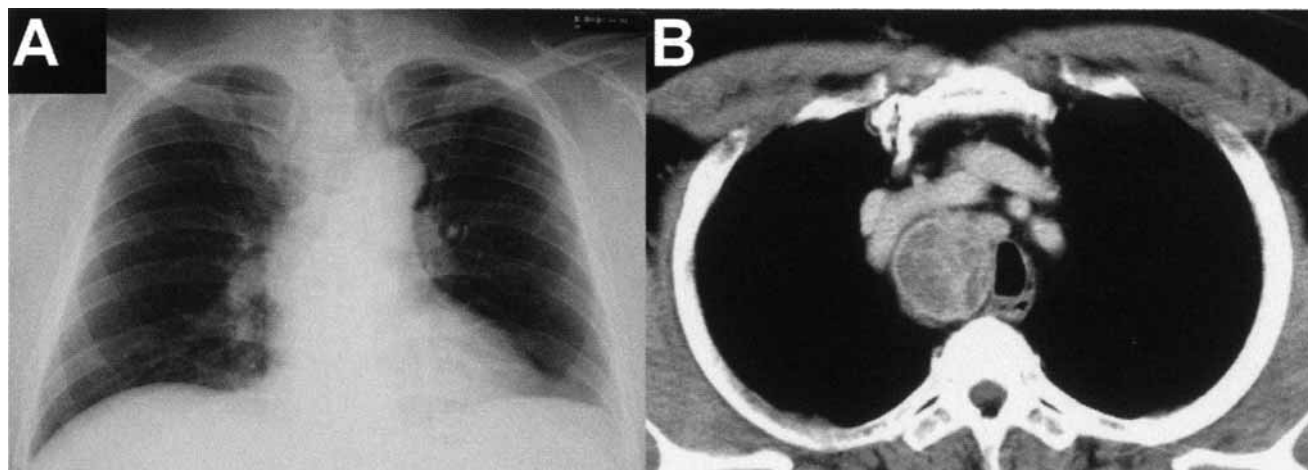


Fig. 1. Mediastinal mass posterior to the large vessels and tracheal deviation to the left side are shown in the chest roentgenogram (A) and CT (B) on admission.

left brachiocephalic vein, superior vena cava (SVC) and right brachiocephalic vein were exposed and taped. The SVC was retracted to the right and the ascending aorta to the left after division of the upper anterior and posterior layers of the pericardial sac. The tumor and pretracheal lymph nodes were densely adherent to the right side of trachea. These were carefully dissected from the right recurrent laryngeal nerve. Due to the upper and lower posterior sides of the tumor being adherent to the right brachiocephalic vein and the posterior portion of the azygos vein, the tumor was dissected from these veins with a 5-mm thoracoscopic viewing through 5.5-mm thoraco-ports embedded in the right 4th and 6th intercostal spaces on the anterior axillary line (Fig. 2). The postoperative recovery was uneventful. In the *en bloc* resected specimen, the tumor measured 10×4×3.5 cm in size and weighted 95 g. Histopathologically, the tumor showed well differentiated papillary adenocarcinoma of thyroid with mediastinal extension. Non-carcinomatous thyroid tissue was not found in the mediastinal portion of the tumor. The pathological stage was stage III (pT4N1bM0) because of the presence of one prelaryngeal and 2 mediastinal lymph nodes metastases.

Discussion

Substernal goiters are classified according to whether they are completely confined in the thorax arising from heterotopic thyroid tissue, or originate from the downward extension of the cervical goiters.³⁾ In the present case,

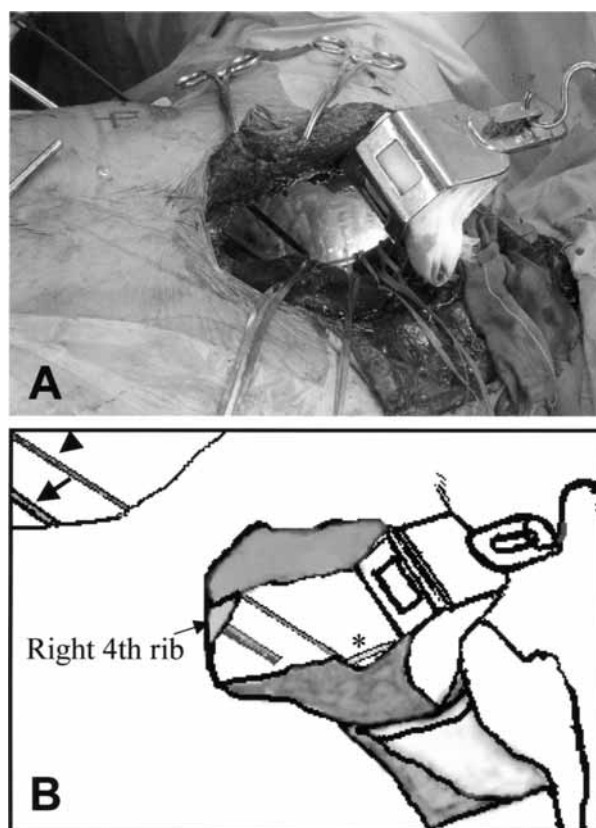


Fig. 2.

A: Intraoperative photograph shows the partial sternotomy and small anterior thoracotomy combined with video-assisted thoracoscopy.

B: The schema of (A).

Arrow, thoracoscopy; arrowhead, endoscopic forceps; *, right phrenic nerve.

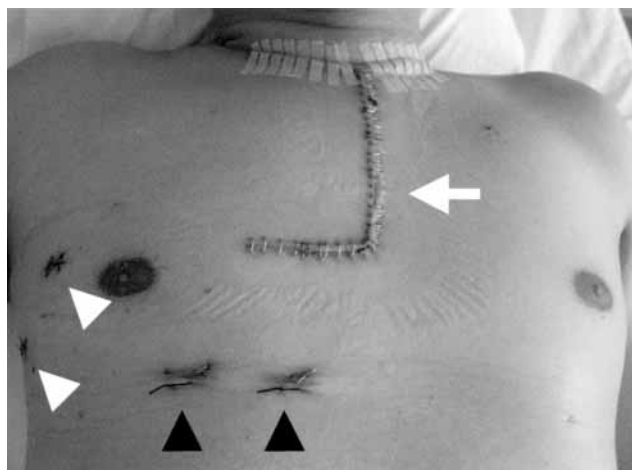


Fig. 3. Postoperative photograph.

Arrow, main skin incision; white arrowheads, thoracoscopic incision; black arrowheads, drainage wound.

normal thyroid tissue was not demonstrated within the mediastinal mass pathologically, suggesting that the tumor did not derive from the heterotopic goiter. If the goiter arising from the inferior pole of the thyroid gland is sufficiently large, it will extend outside the normal confines of the thyroid bed and grow into the anterior mediastinum, which is a common location for a substernal goiter. However, 7–15% of substernal goiters developing from the posterolateral aspect of the gland have been reported to project down into the posterior mediastinum.^{1,2,4} The majority of substernal goiters can be successfully removed through a cervical collar incision.^{2,3,5,6} However, the sternotomy has been reported to be required in 3.3–30.4% of patients undergoing surgery for substernal goiters.^{3,5} Other authors have proposed that cervical access combined with a median sternotomy or thoracotomy should be considered in cases of recurrent intrathoracic

goiter, vasoaggressive lesions causing SVC syndrome, or carcinomas requiring mediastinal lymph node dissection.^{3,5,6} In the present case, with the right recurrent laryngeal nerve passing between the tumor and trachea, a thoracoscopic approach did not allow us to preserve the nerve. The required meticulous dissection of the tumor, because of suspected malignancy was impracticable with partial sternotomy alone without large thoracotomy. Although a thoracoscopic approach to mediastinal tumors is well established, few reports about thoracoscopic surgery, combined with partial sternotomy for the cervicomediastinal tumor extending into the posterior mediastinum have been published.

A partial sternotomy with thoracoscopic assistance in this case enabled us to resect the tumor without changing the position of the patient. This is less invasive and will possibly be applied not only for substernal thyroid cancer but also for malignant cervicomediastinal tumors extending into the posterior mediastinum.

References

1. De Andrade MA. A review of 128 cases of posterior mediastinal goiter. *World J Surg* 1977; **1**: 789–97.
2. Mack E. Management of patients with substernal goiters. *Surg Clin North Am* 1995; **75**: 377–94.
3. Vadasz P, Kotsis L. Surgical aspects of 175 mediastinal goiters. *Eur J Cardiothorac Surg* 1998; **14**: 393–7.
4. Chin SC, Rice H, Som PM. Spread of goiters outside the thyroid bed: a review of 190 cases and an analysis of the incidence of the various extensions. *Arch Otolaryngol Head Neck Surg* 2003; **129**: 1198–202.
5. Flati G, De Giacomo T, Porowska B, et al. Surgical management of substernal goitres. When is sternotomy inevitable? *Clin Ter* 2005; **156**: 191–5.
6. Newman E, Shaha AR. Substernal goiter. *J Surg Oncol* 1995; **60**: 207–12.