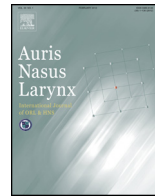




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Surgical treatment of substernal goiter: An analysis of 44 cases

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ABSTRACT

Objective: Substernal goiters are classified as primary or secondary intrathoracic goiters. Here, we report the diagnosis, symptoms, treatment, and postoperative complications of 44 substernal goiters (2 primary mediastinal goiter and 42 secondary mediastinal goiters).

Methods: A retrospective chart review of 351 patients undergoing thyroidectomy at the Department of Otolaryngology-Head and Neck Surgery of the Tokyo Metropolitan Tama Medical Center. Between 2009 and 2015, 44 patients underwent surgery for substernal goiter.

Results: The frequency of primary and secondary mediastinal goiters was 0.5% and 11.9%, respectively. The preoperative symptoms were neck mass, dyspnea, and dysphagia. Eight patients were asymptomatic. Thirty-nine patients had benign masses and 5 patients had malignant masses. Most patients were operated on for adenomatous goiters (52.2%). In ten cases beyond the aortic arch, the tumors were benign and there were eight cases of adenomatous goiter. All patients underwent a successful transcervical incision without sternotomy. Even the primary intrathoracic goiters were extracted after total thyroidectomy via the cervical approach without complications. Although one case showed unilateral recurrent nerve paralysis as a postoperative complication, phonetic function improved in 6 postoperative months. No instances of postoperative bleeding or definitive hypoparathyroidism occurred, and tracheostomy was not performed in any of the cases.

Conclusion: The cervical approach was safely performed in almost all substernal goiters without an extracervical procedure. Selected cases of primary mediastinal goiter may be excised via the cervical approach.

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1. Introduction

Substernal goiter is defined as one that either descends below the thoracic inlet or has more than 50% of its volume below this level [1]. Substernal goiters are usually classified as primary or secondary mediastinal goiters [2]. Primary substernal goiters result from an abnormal embryologic migration of the thyroid anlage that is closely associated with the aortic

sac. Secondary substernal goiters develop from the descent of the thyroid into the mediastinum.

Surgery is the only effective treatment for substernal goiters—treatment for asymptomatic patients remains controversial [3]. Most goiters are removed through a transcervical approach [4]. In some patients with giant tumors, posterior mediastinal goiter, ectopic mediastinal goiter, or malignant tumors, median sternotomy or lateral thoracotomy may be necessary [5,6].

In the present study we report 44 patients who were operated on for substernal goiters (2 primary mediastinal goiter and 42 secondary mediastinal goiters), and these cases were retrospectively analyzed focusing on the diagnosis, preoperative symptoms, surgical therapy, and postoperative complications.

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2. Patients and methods

We retrospectively reviewed all of the patients with substernal goiters who underwent thyroidectomy between 2009 and 2015 at the Department of Otolaryngology-Head and Neck Surgery of the Tokyo Metropolitan Tama Medical Center. Patients were selected on the basis of preoperative imaging studies (i.e., computed tomography [CT] and/or magnetic resonance imaging [MRI] scan). We defined a substernal goiter as a thyroid gland with more than 50% of its mass located below the thoracic inlet (same as the previous report) [1]. The medical records of all identified patients were reviewed. All of the data regarding patients’ preoperative symptoms, imaging, clinical and laboratorial findings, operation, pathological diagnosis, and complications were investigated.

Laryngoscopy was performed postoperatively to check vocal cord mobility in all patients. Postoperative parathyroid hormone, calcium, and phosphorus levels were measured in total thyroidectomy.

2.1. Operative procedure

A lower collar incision was performed along a wrinkle. We used monopolar, bipolar electrotome, and multifunctional tissue sealing systems in all cases. The strap muscles are usually separated along the midline. In selected cases, the strap muscles are divided to obtain better exposure and then sutured at the end of the operation. The upper pole is mobilized after the superior and middle thyroid vessels are ligated close to the thyroid capsule, avoiding injury to the external branch of the superior laryngeal nerve, which is not routinely exposed. Superior parathyroid glands were identified and preserved. The recurrent nerve was visually identified and completely divided from the tumor. In some patients the isthmus was divided in order to facilitate mobilization. The retrosternal part of the thyroid gland was digitally mobilized and delivered by cervical manipulation. It is important to operate gently so that a recurrent nerve is not pulled, although sublation of the tumor is performed blindly. Using a blunt finger dissection technique, the tumor is gradually elevated out of the mediastinum, ligating the inferior vascular structures using a multifunctional tissue sealing device. The inferior parathyroid glands were preserved when possible. After complete removal, the wound was irrigated and closed over suction drains.

3. Results

Between 2009 and 2015, 351 patients with various benign and malignant thyroid disorders underwent thyroid surgery at the Department of Otolaryngology-Head and Neck Surgery of the Tokyo Metropolitan Tama Medical Center. Forty-four patients had substernal goiters (12.5%). The inferior pole of the tumor extended over the aortic arch in ten cases of substernal goiters (2.8%), and the tumor extended beyond the tracheal bifurcation in three cases (0.8%). Of all operated patients, 33 were female (75.0%) and 11 were male (25.0%). The median age of the patients was 60.0 years (range: 33–93 years).

Table 1
Occurrence of clinical symptoms (n = 44).

	Patients (n)	Clinical symptoms	Patients (n)
Symptomatic	36 (81.8%)	Neck mass	34 (77.2%)
		Oppressive feeling	14 (31.8%)
		Dyspnea	5 (11.4%)
		Dysphagia	6 (13.6%)
		Cough	1 (2.2%)
Asymptomatic	8 (18.2%)		

The symptoms at presentation are outlined in Table 1. Symptoms include neck mass (77.2%), oppressive feeling (31.8%), dyspnea (11.4%), dysphagia (13.6%), and cough (2.2%). Eight patients (18.2%) were asymptomatic at the time of surgery.

Postoperative pathological findings are shown in Table 2. Thirty-nine patients had benign tumors (88.6%) and five patients had malignant tumors (11.4%). Most patients were operated on for adenomatous goiters (52.2%), and adenoma (29.2%). Only one case was the schwannoma in the benign tumors. In all ten cases beyond the aortic arch, the tumor was benign and there were eight cases of adenomatous goiter (Table 2-2).

Total thyroidectomy was performed in nine patients (20.5%) and hemithyroidectomy was performed in 35 patients (79.5%). The operation was accomplished through a cervical incision in all cases. The technique was also conducted in the collar incision in Case 1 (Fig. 1) where a tumor exceeded the aortic arch. Moreover, the ectopic goiters of Case 2 (Fig. 2) and Case 3 (Figs. 3 and 4) were extracted manually after total thyroidectomy through the transcervical approach without sternotomy. There were no postoperative complications in either Case 2 or Case 3. In these substernal goiters, the reason why malignant tumors could extract via cervical approach was that those were not adhered to the peripheral tissue in 5 malignant cases. However, these 5 malignant cases were diagnosed malignant postoperatively.

Although a recurrent nerve palsy arose after the operation in one case, the patient’s maximum phonation time improved 20 s after half a year. No instances of postoperative bleeding or

Table 2-1
Pathology in all patients (n = 44).

Pathology	Patients (n)	Percentage	
Benign	Adenomatous goiter	23	52.2
	Adenoma	13	29.5
	Schwannoma	1	2.2
Malignant	Papillary carcinoma	3	6.8
	Follicular carcinoma	2	4.5

Table 2-2
Pathology in patients extended beyond aortic arch (n = 10).

Pathology	Patients (n)	Percentage	
Benign	Adenomatous goiter	8	80.0
	Adenoma	2	20.0

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