

## Benign Teratoma of the Thyroid Gland

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Although pathology reports of thyroid tissue in ovarian teratomas are abundant, benign teratomas of the thyroid are extremely rare in adolescents and adults. Therefore, their clinical characteristics are still not well characterized. We report a case of a 54-year-old woman with a growing mass in her neck. Left lobectomy of the thyroid revealed it to be a benign thyroid teratoma composed of tissues from all three germ layers. Preoperative evaluations included thyroid ultrasonography (US), ultrasound-guided fine needle aspiration cytology (FNAC), and computed tomography (CT) of the neck. A 4.7-cm, well defined, predominantly hypoechoic mass intermingled with hyperechoic internal lesions, was observed in the inferior portion of the left thyroid lobe with substernal extension on US. The posterior extent of the nodule was not visualized due to deep attenuation of the echo. US-guided FNAC failed to reveal any thyroid follicular cells, but suggested a benign cystic tumor. Neck CT hinted at the diagnosis of teratoma because the mass contained large amounts of fat, and the margin was well defined. Extrathyroidal extension and cervical lymphadenopathy were not seen. She underwent left thyroid lobectomy, and histologic examination confirmed benign thyroid teratoma. To the best of our knowledge, this is the first case report of benign thyroid teratoma in Korea.

**Keywords:** Teratoma; Thyroid; Ultrasonography

### INTRODUCTION

Teratomas are germ cell tumors that are characterized by three germ layers: the ectoderm, mesoderm, and endoderm. Teratomas are usually diagnosed in unborn babies and infants, but rarely occur in adults [1-3]. This tumor normally arises inside the gonad, but it can also occur outside the gonad. About 40% of extragonadal teratomas originate from the sacrococcygeal region, followed by (not in order of incidence) the central nervous system, globe, pharynx, mediastinum, and retroperitoneum [4]. Head and neck teratomas account for 3% to 6% of all teratomas [5].

Thyroid tissue is occasionally found in extrathyroidal tera-

tomas [6], but a thyroid teratoma is a very rare form of germ cell tumor. Only a single case of malignant teratoma of the thyroid that included primitive neuroectodermal tissue has been published in the local literature [7]. Teratomas that occur in unborn babies and infants are mostly benign, but can be malignant in adults [2,3,8]. Benign thyroid teratoma is very rare in adults, and its associated clinical characteristics are not well understood [9]. Here the authors diagnosed a benign teratoma of the thyroid through a lobectomy in a patient with a cervical mass. We present the clinical outcome and diagnostic imaging findings, along with a review of the literature. It is the first case, to our knowledge, of a benign thyroid teratoma in South Korea.

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## CASE REPORT

**Patient:** A 54-year-old woman.

**Main symptom:** A growing thyroid mass found during a routine check-up.

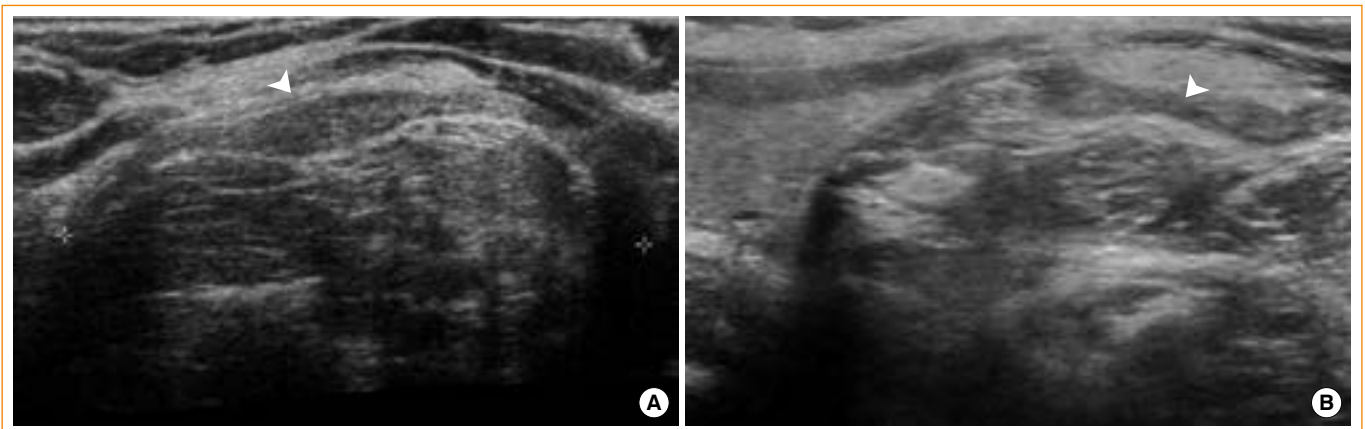
**History of present illness:** A thyroid mass was detected by ultrasound during a routine medical check-up 4 years ago. Since then her doctor took a wait and see approach. However, the mass became larger. She had a repeat thyroid ultrasound examination, which revealed that the mass had extended sub-sternally, and she was subsequently transferred to our hospital.

**Past history, medical history of family:** She underwent a laparoscopic hysterectomy for the treatment of a uterine myoma 7 years ago. There was no medical history of diseases, particularly thyroid-associated diseases, in her family. She had no

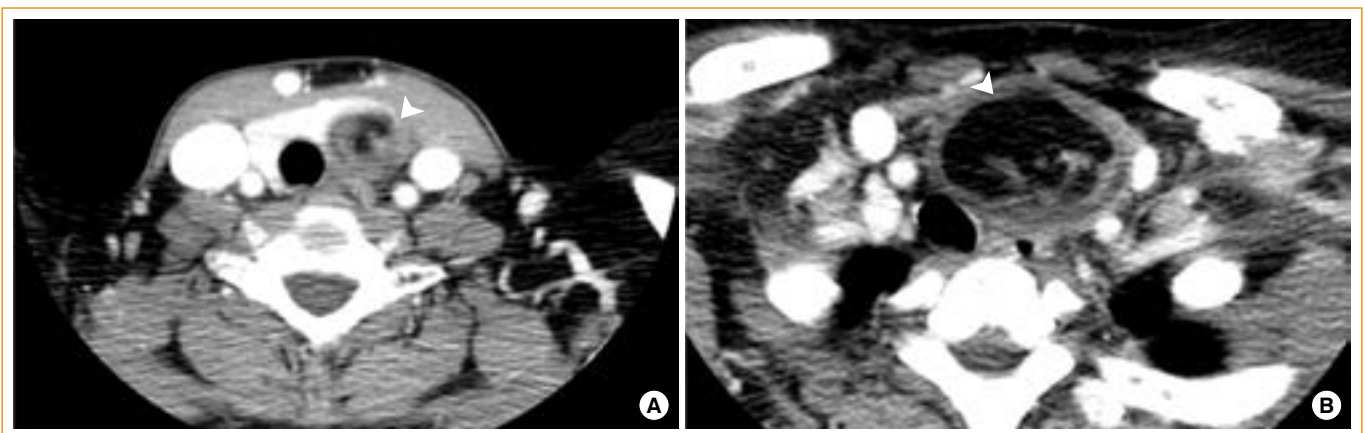
drinking and smoking history.

**Physical examination:** She had a blood pressure of 132/65 mm Hg, pulse of 59 beats per minute, respiration rate of 20 breaths per minute, and temperature of 36.0°C. She was conscious without acute distress. A solid and fixed mass was identified on the left side of the neck, but the cervical lymph nodes were not affected.

**Lab results:** Complete blood count revealed a white blood cell count of 8,300/mm<sup>3</sup>, hemoglobin of 12.8 g/dL, hematocrit of 36.7%, and platelet count of 18,100/mm<sup>3</sup>. Biochemical examination of serum revealed blood urea nitrogen/creatinine of 13.2/0.4 mg/dL, total protein/albumin of 6.5/4.0 g/dL, aspartate aminotransferase/alanine aminotransferase of 22/16 IU/L, alkaline phosphatase of 68 IU/L, and Ca of 8.2 mEq/L. Measurement of electrolytes showed Na/K of 143/3.6 mEq/L.

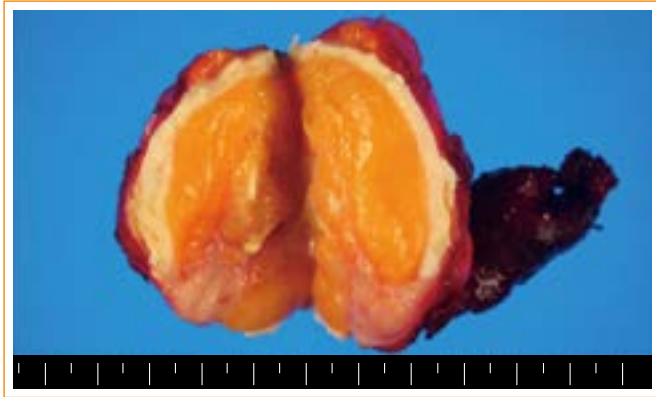


**Fig. 1.** (A) Transverse and (B) longitudinal ultrasonographic scans show the well defined, heterogeneously hypoechoic nodule, intermingled with hyperechoic foci in the lower portion of left thyroid lobe (arrowheads).



**Fig. 2.** Computed tomography scans of the neck show (A) a heterogeneous enhancing mass (arrowhead) in the left lobe of the thyroid, and (B) a large cystic fat-containing mass extending into the mediastinum (arrowhead).

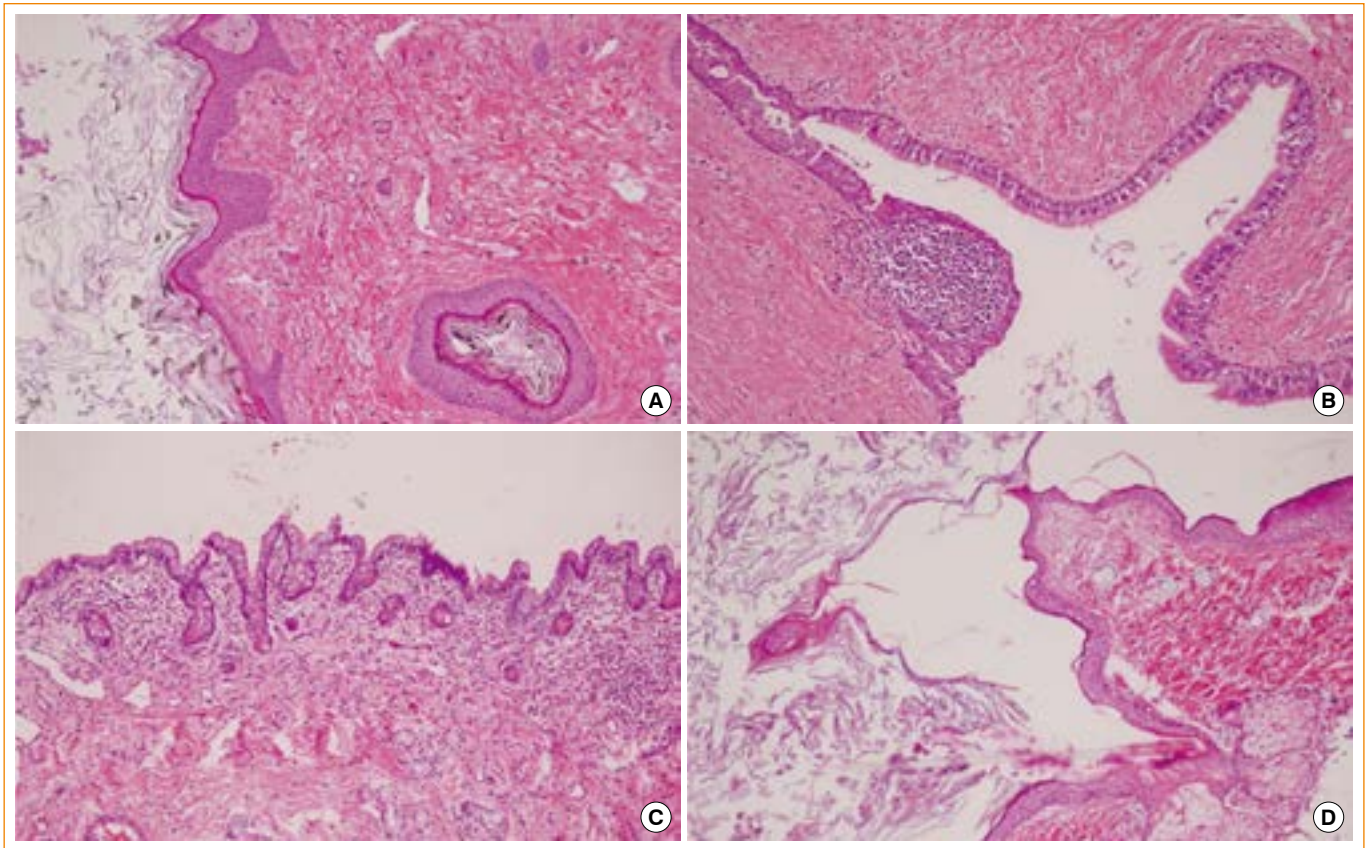
**Endocrine test:** Thyroid hormone tests revealed thyroid stimulation hormone of 1.88  $\mu\text{IU/mL}$  (normal range, 0.4 to 4.8), free thyroxine of 1.48  $\text{ng/dL}$  (normal range, 0.8 to 1.71), and triiodothyronine (T3) of 1.44  $\text{ng/mL}$  (normal range, 0.6 to 1.6), showing normal thyroid function. Results of antithyroid per-



**Fig. 3.** Cut surface of the teratoma demonstrates a well encapsulated, mixed solid and cystic mass, which has rich fat contents. Compressed thyroid gland is seen at the periphery in continuity with the teratoma.

oxidase antibody and antithyroglobulin antibody tests were negative.

**Radiological evaluation:** Thyroid ultrasonography (US) revealed a hypoechoic and heterogeneous nodule measuring 4.7 cm in diameter, with substernal extension of the inferior portion of the left thyroid lobe. Hyperechoic internal lesions were also observed (Fig. 1). The posterior boundary of the nodule was not clearly visualized due to deep attenuation of ultrasound. Ultrasound-guided fine needle aspiration cytology (FNAC) was performed. Based on the cytological examination, thyroid follicular cells were not detected, but cystic liquid was mainly observed, leading to a suspicion of cystic tumor. Computed tomography (CT) scan, which was performed to evaluate the mass due to its substernal extension, exhibited a mass ( $6.1 \times 5.0 \times 3.6$  cm in size) that extended from the left thyroid lobe to the anterior mediastinum, with irregular enhancement, and clear margins that contained fat (Fig. 2). The mass caused deviation of the airway to the right, but there was neither a change in shape nor adhesion. Abnormal enlargement of lymph nodes was not observed in the neck.



**Fig. 4.** Histologic findings of the benign thyroid teratoma. (A) Pilosebaceous structures. (B) Ciliated respiratory epithelium. (C) Intestinal columnar epithelium with goblet cells. (D) Muscular structures (H&E stain,  $\times 100$ ).



**Treatment and clinical outcome:** Results of FNAC and CT scan of the neck revealed a low possibility for a malignant tumor. However, the large size of the mass was concerning, and a lobectomy was performed to remove the left lobe. In histological examination, the removed mass was soft, but extended to the anterior mediastinum from the left thyroid lobe. The cut surface was dark yellow. There were multiple cystic masses, which were encapsulated in a wall of fibrotic capsule (Fig. 3). A microscopic examination revealed cystoma multiplex in which pilosebaceous structures, ciliated respiratory epithelium, intestinal columnar epithelium with goblet cells, and muscular structures were mixed (Fig. 4). Since there was no infiltration into surrounding tissues, benign thyroid teratoma was diagnosed. The patient is currently taking 50 µg of levothyroxine daily and attending outpatient clinic.

## DISCUSSION

Cervical teratomas are divided into thyroid teratomas and extrathyroid teratomas depending on where they originated [10]. Although diagnostic criteria for thyroid teratomas still stir controversy among researchers, thyroid teratomas must meet at least one of the following criteria: 1) the tumor occupies part of the thyroid, 2) the tumor is located in direct continuity with the thyroid, or 3) the thyroid is not completely developed, but teratoma exists in the neck [3,11]. In this report, the mass met two criteria by occupying part of the thyroid and being located in direct continuity with the thyroid. Besides, the mass was comprised of all three germ layers identified with histological evidence [3,11]. As there was no infiltration into surrounding tissues, or metastasis to lymph nodes, the possibility of a malignant teratoma was ruled out. Benign thyroid teratoma in adults is a very rare tumor that is composed of solid and cystic portions. This tumor can grow fast in adolescents and young adults [5,12,13].

Many case reports have discussed thyroid cancer, thyroiditis, and other thyroid disorders, which originate from struma ovarii that contains thyroid tissue [6]. This is the first case of benign thyroid teratoma in South Korea. Kim et al. [7] reported a case of malignant thyroid teratoma that included primitive neuroectodermal tissue. In that case, the infiltration into extrathyroid soft tissue and metastasis of lymph nodes was evident even during diagnosis. Radical neck dissection on both sides was combined with strong chemotherapy for treatment [7].

In US, hypoechogenicity, spiculated margin, microcalcification, and taller than wide shape are considered specific fea-

tures that increase the risk for thyroid cancer. Particularly, a hypoechoic mass is an important ultrasound finding with a sensitivity of 41%, and specificity of 92% [14]. In this case, the boundary between the thyroid tissue and the mass was clear and the nodule appeared hypoechoic, but hyperechoic internal lesions were observed within the nodule making it difficult to differentiate malignant tumor from benign tumor in US. The posterior boundary of the nodule was not clearly visualized due to excessive attenuation of ultrasound in the nodule. It was said that an ovarian teratoma with fatty tissue and hair results in hyperechoic and excessive ultrasound attenuation [15]. It appears that the same ultrasonic features were induced by fatty tissue in this case. Schmitz et al. [16] reported mixed hyperechoic, hypoechoic, and nonechoic lesions as characteristics of teratoma in ultrasonic evaluation. However, they also added that teratoma-specific ultrasonic features are not clear.

CT scan is known to be more effective than ultrasound in diagnosing teratoma that occurs in the mediastinum or retroperitoneum [17,18]. In this case, a CT scan of the neck exhibited a benign tumor containing inhomogenously enhancing cystic portions, with a clear margin that extended to the anterior mediastinum from the left thyroid lobe without invasion into lymph nodes or surrounding tissue, and with fatty components suggesting the diagnosis of a teratoma. Mediastinal teratoma can be diagnosed with the presence of a cystoma in a thick wall with fatty tissue and calcification [19].

When thyroid teratoma is suspected, the differential diagnosis should include lymphoid hyperplasia, lymphoma, cystic hygroma, and thyroglossal duct cyst. If fatty components or calcifications are not found in imaging tests, further aggressive testing should be performed to differentiate malignant disease [3]. In this case, although CT scan and FNAC indicated a benign tumor, the possibility of malignant tumor was not completely ruled out. A lobectomy was performed for further analysis and treatment, and a benign teratoma was diagnosed based on histological evidence.

Thyroid teratoma is a rare form of benign tumor that can cause airway compression and adverse symptoms, depending on site and size of the lesion. The tumor may arise in conjunction with malformation of the neck. The likelihood of a malignant thyroid teratoma is high in adults. Diagnostic imaging tests are not enough to differentiate malignant tumors from benign tumors, so a surgical resection is required for diagnosis and treatment [5,7].

In summary, this case had a rather large mass with a clear boundary showing a combination of hypoechoic and hyper-

echoic lesions. The posterior boundary of the nodule was not clearly visualized due to excessive ultrasound attenuation. CT scan of the neck exhibited fatty tissue, and thyroid teratoma was suspected before surgery. After lobectomy, a benign teratoma was diagnosed. Since the possibility of a malignant thyroid teratoma is high in adults, a final diagnosis needs to be made with surgical resection in doubtful cases.

## CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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