Carcinoma Showing Thymus-Like Elements: A Rare Malignant Tumor of the Thyroid Gland

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Carcinoma showing thymus-like elements (CASTLE) is a rare tumor arising in the thyroid gland. Fewer than 100 patients with this tumor, those predominantly from Eastern Asia, have been reported before. We present the first CASTLE case from Turkey. A 51-year-old male was admitted with a complaint of a neck mass and hoarseness. A laryngoscopic examination revealed left vocal cord paralysis. Neck ultrasonography showed a tumor which was compressing the esophagus and had invaded the left recurrent laryngeal nerve (RLN). The patient underwent a total thyroidectomy, a unilateral central-compartment neck dissection, and following adjuvant radiotherapy. Intraoperative nerve monitoring was performed during the operation to preserve the contralateral nerve. He completed a 3-year follow-up period after the completion radiotherapy, and no recurrence was observed. The treatment is controversial, although surgery with or without adjuvant radiotherapy appears to be the best choice. In cases of RLN destruction due to tumor invasion, we recommend using intraoperative nerve monitoring to preserve the contralateral RLN to avoid devastating complications, such as a tracheostomy. [*P R Health Sci J 2019;38:192-195*]

Key words: CASTLE, Intraoperative nerve monitoring, Recurrent laryngeal nerve, Thyroid carcinoma

Carcinoma showing thymus-like elements (CASTLE) is a rare tumor arising mostly in the thyroid gland and rarely in the extrathyroidal soft tissue of the neck. While it was first described by Miyauchi et al. (1) as an "intrathyroidal epithelial thymoma" in 1985, it was renamed "CASTLE" in 1991 by Chan and Rosai (2). To the best of our knowledge, fewer than 100 cases have been reported in the English literature, and the described cases were predominantly in Eastern Asia. Here, we present a case of CASTLE that had invaded the left recurrent laryngeal nerve (RLN) and esophagus and which was successfully treated by a total thyroidectomy, a unilateral central-compartment neck dissection, and following radiotherapy (RT). This manuscript also describes the first case of CASTLE in Turkey.

Case Report

A 51-year-old male patient was admitted to a general surgery policlinic with a complaint of a neck mass and hoarseness, for a month. He was referred to the otolaryngology department to examine the function of his vocal cords via flexible laryngoscopy. The laryngoscopic examination revealed paralysis of the left vocal cord. His thyroid function tests were normal. Neck ultrasonography (USG) showed an irregular hypoechoic mass, measuring 39 x 28 mm, in the lower part of the left thyroid lobe. A computed tomography (CT) scan confirmed that a solid thyroid nodule had invaded the left RLN and caused esophageal compression (Figure 1). A fine-needle aspiration biopsy (FNAB) revealed a suspicious epithelial malignancy. We performed a total thyroidectomy and unilateral central-compartment neck dissection because of the macroscopic extrathyroidal tumor extension. The right RLN was preserved via intraoperative nerve monitoring, but the left RLN was observed to be damaged. The postoperative period was uneventful, and the patient was discharged on postoperative day 2.

A pathological and immunohistochemical examination led to the final diagnosis of CASTLE, with CD5-positive staining (indicating a lymphocyte origin) and the overexpression of cytoplasmic B-cell lymphoma 2 (Bcl-2) (a proto-oncogene preventing cells from apoptosis) (Figures 2 & 3). No metastasis

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was found in the resected lymph nodes. The patient received adjuvant RT after surgery to prevent locoregional recurrence. He has remained well, so far, 3 years after the completion of RT, and no recurrence has been detected.

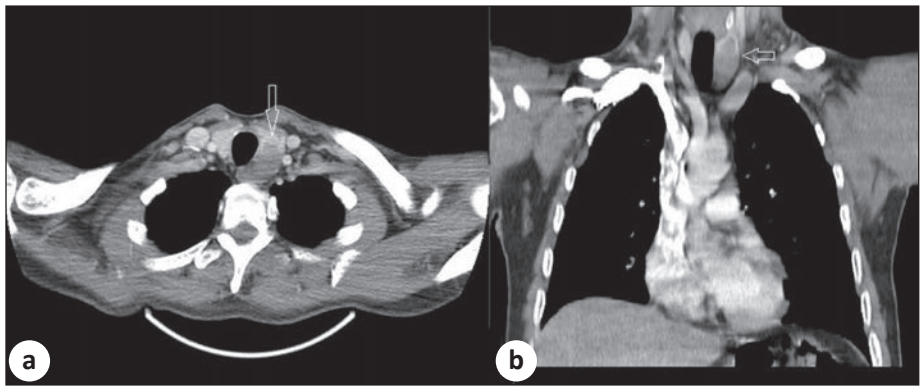

Figure 1a-b. Tomographic imaging of the thyroid tumor, by section. a) Axial tomography revealed a tumor localized at the left lobe of the thyroid, with the tumor compressing the esophagus (arrow). b) Coronal tomography of the tumor at the entrance of the superior mediastinum (arrow).

Discussion

CASTLE is a rare tumor which has been described to occur in the ectopic thymus, remnants of the thymopharyngeal duct, or branchial pouches (2, 3). Chan and Rosai classified tumors originating in the ectopic thymus into 4 groups: ectopic hamartomatous thymoma, ectopic cervical thymoma, spindle epithelial tumor with thymus-like differentiation (SETTLE), and CASTLE (2). In 2004, however, the World Health Organization recognized it as an independent clinicopathological entity and classified it as a type of thyroid malignancy (4). It is important to differentiate CASTLE from other tumors, such as thymic carcinoma, anaplastic thyroid carcinoma, lymphoepithelioma, primary or metastatic squamous cell carcinoma of the neck, and squamous cell thyroid carcinoma, because its therapy and prognosis are quite different (2). Compared with the biological behaviors of other thyroid carcinomas, that of CASTLE is such that the prognosis of patients with this tumor is favorable (5, 6).

CASTLE tumors predominantly arise in the lower part of the thyroid; these tumors originate in ectopic thymic tissue adjacent to the thyroid gland and remnants of branchial pouches (2, 7). According to a recent comprehensive review of published studies (7), the male-to-female CASTLE incidence ratio is 1/1.2 and the average patient age at the time of diagnosis is 48 years. The most common symptoms are neck mass (48.78%) and hoarseness (15.85%). The presented case was a 51-year-old man who had been admitted to the general surgery policlinic with a complaint of a neck mass and hoarseness due to a tumoral invasion of the left RLN.

Thyroid function tests are insignificant in CASTLE cases. On a USG, a CASTLE tumor appears as a solid, hypoechoic mass. Our CT examination showed a well-circumscribed lesion without calcification. An FNAB may support a diagnosis of malignancy but will rarely supply definitive diagnosis of CASTLE (7, 8). Thyroid function tests for our patient were normal. The USG and CT indicated the presence of a solid thyroid nodule. And after the FNAB was performed, an epithelial tumor was diagnosed.

The preoperative diagnosis of CASTLE is difficult, but a pathological examination, especially with an immunohistochemistry, makes a definitive diagnosis possible. Similar to what occurs with thymic carcinoma, most CASTLE

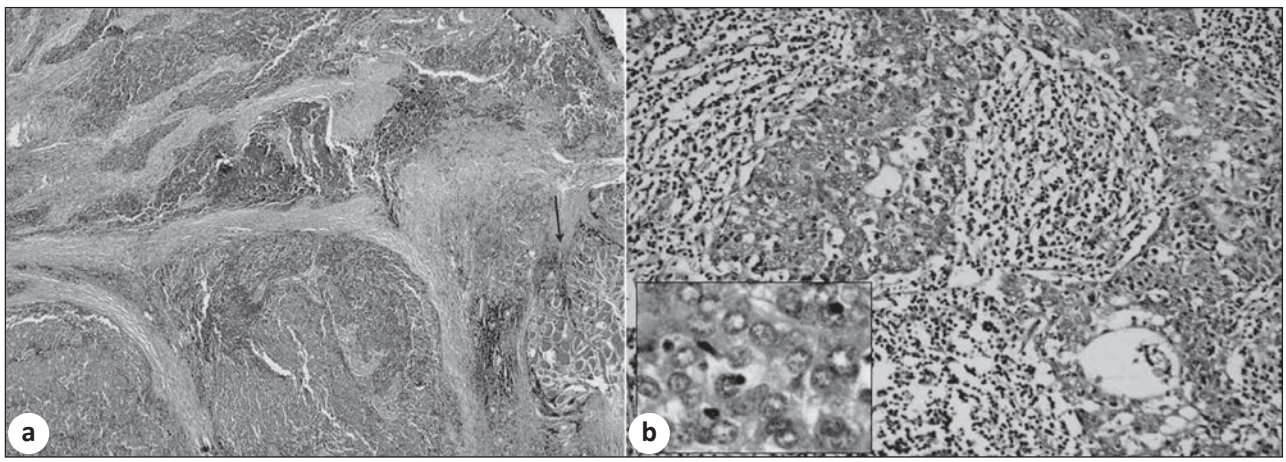

Figure 2a-b. Microscopy of the tumor. a) Tumor islands are separated into nodules by fibrous septa and can be seen to be invading the thyroid gland (right lower quadrant; arrow) (hematoxylin & eosin X 40). b) Non-neoplastic lymphocyte deposits are seen around solid tumor islands (hematoxylin & eosin X 200). Tumor cells have vesicular cytoplasm, eosinophilic nucleoli, and uncertain cytoplasmic borders (figure on the lower left; hematoxylin & eosin X 400).

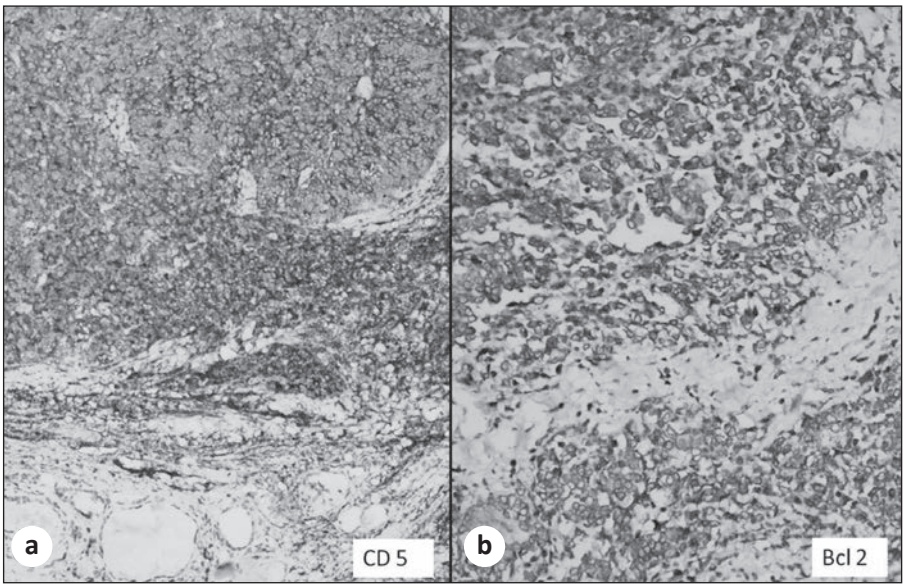

Figure 3a-b. Immunohistochemistry of the tumor. a) Immunohistochemically positive (CD5) tumor cells (blue), (hematoxylin & eosin X 200). b) Positive staining of another diagnostic marker, Bcl-2 (blue), in tumor cells (hematoxylin & eosin X 200).

tumors are positive for CD5 and CD117. CD5 is negative in many carcinomas of the thyroid, such as squamous cell carcinoma, follicular adenoma/carcinoma, and (mostly) papillary carcinoma (5). In the study of Ito et al. (6), the sensitivity and specificity of CD5 positivity for the diagnosis of CASTLE was reported to be 82 and 100%, respectively. In the study of Reimann et al. (3), positive staining of CK, CEA, and TP63 was reported as evidence of the thymic origin of the tumor and was useful in differentiating CASTLE from other thyroid neoplasms. In a study by Ge et al. (7), Bcl-2 staining was found to be 100% accurate in diagnosing CASTLE. In our case, though the FNAB did not result in a definitive diagnosis, we were able to achieve such a diagnosis following a histopathological assessment.

There is no consensus on the treatment of CASTLE, although it appears that the first line treatment of choice is surgery with or without adjuvant RT (2, 3, 6). In the study by Ito et al. (6), no locoregional recurrence occurred in the patients who received RT, while 3 locoregional recurrences occurred in those who did not receive RT. In contrast, a recent comprehensive review and another study reported that post-operative RT was not able to reduce the locoregional recurrence rate (7, 9). Another comprehensive review, this one including 89 cases, showed lobectomy to be the preferred procedure and indicated that the survival of the CASTLE patients being reviewed was significantly improved in the group that received surgery plus RT, especially in the patients without lymph node metastasis (10). Routine lymph node dissection and RT was recommended to avoid locoregional recurrence (10). We performed a total thyroidectomy and unilateral central-compartment neck dissection because of the macroscopic extrathyroidal tumor extension. The patient received adjuvant RT after surgery to prevent locoregional recurrence due to any remaining tumor.

Most CASTLE cases can be treated surgically with or without adjuvant RT. In the presence of an extrathyroidal tumor extension, we believe that RT is necessary in order to prevent locoregional recurrence. In addition, in cases of RLN destruction due to tumor invasion, we recommend using intraoperative nerve monitoring to preserve the contralateral RLN to avoid devastating complications, such as tracheostomy.

Resumen

El carcinoma que muestra elementos similares al timo (CASTLE, por sus siglas en inglés) es un tumor raro que se origina en la glándula tiroides. Se han reportado menos de 100 pacientes, predominantemente de Asia oriental. Presentamos el primer caso de CASTLE de Turquía. Un hombre de 51 años de edad fue admitido con una queja de la masa del cuello y una ronquera. El examen laringoscópico reveló parálisis de las cuerdas vocales izquierdas. La ecografía de cuello mostró un tumor que comprimía el esófago e invadía el nervio laríngeo recurrente izquierdo (RLN, por sus siglas en inglés). El paciente se sometió a tiroidectomía total, disección unilateral del cuello del compartimento central y luego recibió radioterapia adyuvante. La monitorización nerviosa intraoperatoria se aplicó durante la operación para preservar el nervio contralateral. Completó un período de seguimiento de 3 años después de completar la radioterapia y no se observó recurrencia. El tratamiento es controversial, aunque la cirugía con o sin radioterapia adyuvante parece ser la mejor opción. En casos de destrucción de RLN debido a la invasión tumoral, recomendamos utilizar la monitorización nerviosa intraoperatoria para preservar el RLN contralateral para evitar complicaciones devastadoras como la traqueostomía.

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