Primary tracheal lymphoma with thyroid carcinoma

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ABSTRACT
Malignant lymphoma (ML) and papillary thyroid carcinoma (PTC) are the most common hematological and endocrine malignancies. However, ML originating from the intratracheal region is rare, with few reported cases in the literature. We report a case of a 57-year-old woman with double primary cancer, consisting of ML of the intratracheal region and PTC in the isthmus. She complained of hoarseness and exertional dyspnea. Adjacent tumors through the anterior tracheal wall were initially considered as tracheal invasion of the thyroid carcinoma. However, MRI and PET-CT suggested that these tumors had different radiological signs. We performed thyroidectomy and biopsy of the intratracheal tumor with a tracheostomy. Pathological examination revealed PTC and CD-5-positive B-cell indolent intratracheal lymphoma. She received weekly infusions of rituximab for eight weeks after surgery. The intratracheal ML showed complete response, and the tracheocutaneous fistula was closed six months after the initial surgery.

Introduction
Malignant lymphoma (ML) and papillary thyroid carcinoma (PTC) are the most common hematological and endocrine malignancies. However, ML originating from the intratracheal region is rare, with few reported cases in the literature. We present the case of double primary cancer, consisting of ML of the tracheal region and PTC in the isthmus.

Case report
A 57-year-old woman, nonsmoker with unremarkable medical history, complained of hoarseness and exertional dyspnea. Her physical examination and laboratory tests were normal. Laryngoscopy showed submucosal swellings in the subglottic and anterior tracheal wall (Figure 1). The movements of larynx and vocal cords were normal. Computed tomography (CT) of the neck revealed tumors in the thyroid isthmus and subglottic anterior tracheal wall. These tumors had similar densities on the CT scan (Figure 2). Fine needle aspiration of the thyroid gland confirmed the diagnosis of PTC. The adjacent tumors through the anterior tracheal wall were initially identified as thyroid carcinoma invasion. Thus, we considered performing total thyroidectomy and total laryngectomy for the patient. However, the CT revealed that the tumors had no tracheal cartilage invasion, and they were separated by the tracheal wall (Figure 2). The subglottic tumor was located submucosal region, and the risk of choking due to bleeding made it difficult to perform a sufficient biopsy without tracheostomy. So, we reevaluated the tumors using other imaging modalities.

Magnetic resonance imaging (MRI) and Fluorodeoxyglucose-position emission tomography/CT (FDG PET/CT) suggested that these tumors had different radiological signs. Thyroid cancer exhibited nonuniform signal intensity. It was iso on T1-weighted imaging (T1WI) and high on T2-weighted imaging (T2WI). With contrast, the intratracheal tumor had a uniform signal intensity. It was low on T1WI and high on T2WI. FDG PET showed abnormal uptake in each tumor, but the tracheal tumor had a lower level than thyroid cancer. Therefore, we suspected that the tracheal tumor was not PTC (Figure 3).

A few weeks later, we performed thyroid isthmusectomy and biopsy of the tracheal tumor with a
tracheostomy. A pathological examination found thyroid papillary carcinoma and CD-5-positive B-cell indolent tracheal lymphoma (Figure 4). The tumor of isthmus was well-circumscribed, round mass of 12 mm in diameter consisted of well differentiated papillary carcinoma cells. There was no extra-glandular infiltration (pT1b, pEx1). Immunohistochemical staining on lymphoma specimen showed that the

Figure 1. Laryngoscopy revealed submucosal swellings located in the bilateral subglottic and anterior tracheal wall obstructing the airway.

Figure 2. Contrast-enhanced CT showed tumors in the thyroid isthmus, subglottic, and anterior tracheal wall. These tumors had the same radiological signs, but the structure of tracheal cartilages was preserved.

Figure 3. (a) Thyroid tumor had iso and nonuniform signal intensity on T2WI, but the tracheal tumor had high and uniform signal intensity. (b) PET/CT showed different radiological signs between tumors in the thyroid and trachea.
tumor cells expressed CD20 and CD5 proteins, but not expressed CD3 and CD10 proteins (Figure 5). As the hematologists diagnosed extranodal marginal zone lymphoma of mucosa-associated lymphoid tissue and according to the standard treatment of MALT lymphoma, the patient received weekly infusions of rituximab for eight weeks after surgery. Finally, the intratracheal ML showed complete response, and we closed the tracheocutaneous fistula without the risk of suffocation six months after the initial surgery. Verbal informed consent was obtained from the study participant.

**Discussion**

Most tracheal tumors are malignant and have metastasized from other sites, such as the lung, thyroid, esophagus, and larynx. Primary tracheal tumors are uncommon. Moreover, ML of tracheal origin is particularly rare. Primary tracheal non-Hodgkin’s lymphoma accounts for only 0.2–3.0% of all tracheal tumors [1–3]. Zhao et al. reviewed laryngeal lymphoma in China [4], where the male-to-female ratio was reported as 3.4:1, and the estimated 3-year, 5-year and 10-year survival rates were 70.9 ± 6.4, 63.4 ± 7.6
and 56.4 ± 9.5%, respectively, as determined by Kaplan-Meier analysis. Additionally, the T-cell sub-type and lymph node involvement might indicated worse prognosis.

The cervical chest CT scan is the most useful method to assess tracheal tumors radiologically because it assesses tumor extent and its relationship to the adjacent structures. Tumors sometimes infiltrate the trachea in PTC. Therefore, tracheal invasion is suspected when both PTC and an intratracheal tumor are observed, although the significant tracheal inversion to the extent that impairs breathing is quite rare. It is not difficult to diagnose typical ML. However, if the lymphoma is located in unusual sites, like the trachea, or if it mimics another disease, such as in this case, it will be more challenging to diagnose accurately, and tissue biopsy may be challenging to perform [5].

ML shows various patterns on MRI. T1WI shows low-iso density, and T2WI shows low-high density. It is characterized by a relatively uniform signal and high signal intensity on DWI [6]. On the other hand, PTC exhibits iso intensity on T1WI, high signal intensity on T2WI, and nonuniform signal intensity. Pathological examination is necessary to diagnose this disease accurately. Several imaging modalities are also useful for distinguishing between ML and PTC.

To the best of our knowledge, this was the first report on primary tracheal lymphoma adjacent to thyroid carcinoma. Initially, we considered laryngectomy necessary for complete resection of the patient’s tracheal tumor. Before surgery, histological diagnosis was difficult because of the tumor’s subglottic location, and the risk of airway stenosis and tumor dissemination in the trachea. The CT scan showed similar radiological signs between the thyroid and intratracheal tumors. However, MRI and PET/CT suggested that the tracheal and thyroid tumors were completely different, and the patient can be appropriately treated without laryngectomy.

**Conclusion**

We reported a case of double primary cancer consisting of ML of the intratracheal region and PTC in the isthmus. These tumors showed the same radiological signs on CT, but these were different on MRI and PET/CT. Since his initial diagnosis and treatment, the patient has remained cancer-free with laryngeal preservation. In atypical cases, it is necessary to evaluate using several imaging modalities.

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**Ethical statement and informed consent**

This manuscript was written in accordance with the Code of Ethics of the World Medical Association (Helsinki Declaration). We confirmed a patient’s anonymity. We have obtained informed consent from the participant presented in the study, and the study design was approved by the appropriate ethics review board.

**Disclosure statement**

The authors declare that they have no conflict of interest.

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