A Rare Case of Thyroid Metastasis from Lung Adenocarcinoma with Papillary Morphology – A Case Report

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Introduction

Thyroid metastasis of lung cancer is rare, accounting for only less than 2% of metastatic lung cancers. [1] While papillary thyroid carcinoma (PTC) is the most common primary thyroid cancer worldwide [2], it is essential to distinguish it from metastatic carcinoma, particularly when the metastatic component exhibits papillary architecture. We hereby report a case of thyroid metastasis from lung adenocarcinoma, illustrating the importance of morphological assessment and ancillary studies in reaching the diagnosis.

Clinical History

The patient was a 70-year-old Chinese man with a past history of rectal carcinoma with operation done over 30 years ago. He also had hypertension, dyspepsia and vitamin B12 deficiency.

In mid 2019, he had a PET-CT scan (whole body + brain) performed due to rising CEA from a baseline of around 4 to 12ng/mL. Two hypermetabolic nodules up to 8 mm (with SUVmax of 3) were noted at right thyroid and isthmus. Also, a few inactive ground glass opacities at bilateral upper lobes and right middle lobe of lung were noted, the largest one 29 mm at right upper lobe of lung.

CT-guided fine needle aspiration was performed, followed by lobectomy of right upper lobe in Jan 2020, confirming a diagnosis of lung adenocarcinoma. In June 2020, total thyroidectomy was performed, revealing metastatic lung adenocarcinoma.

Subsequent follow up showed no clinical evidence of other distant metastasis. Radiologically, several lung nodules and bony lesions were noted; these, however, appeared similar on follow-up PET CT scans. The patient continued adjuvant chemotherapy and remained alive and well as of Aug 2021 (19 months post lobectomy and 14 months post thyroidectomy).

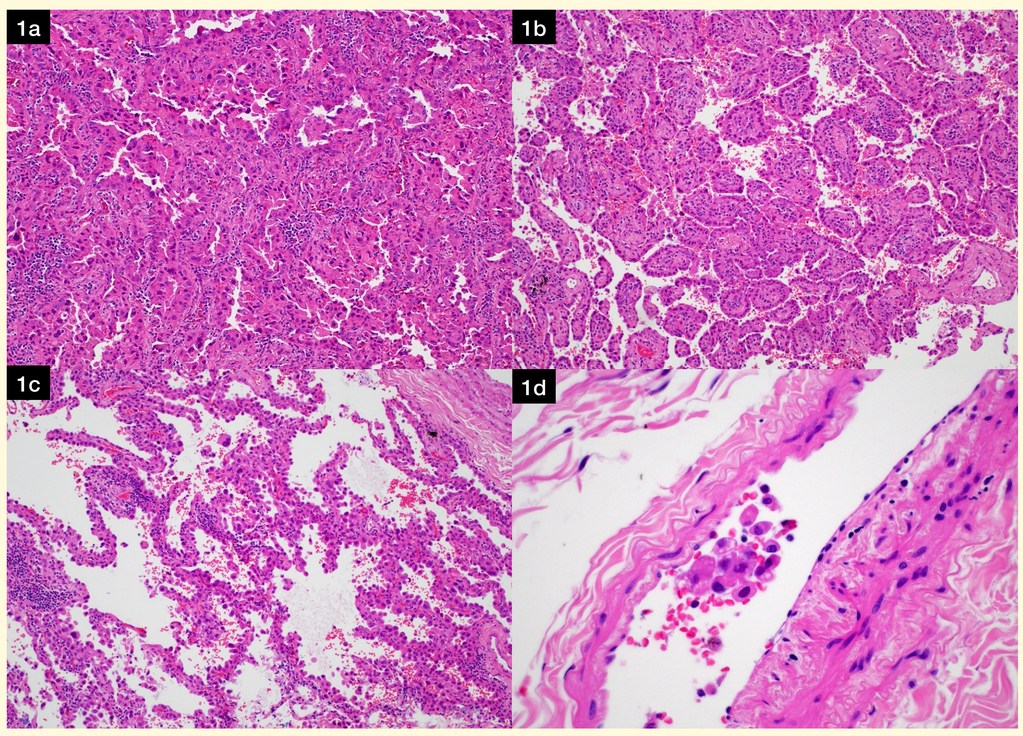
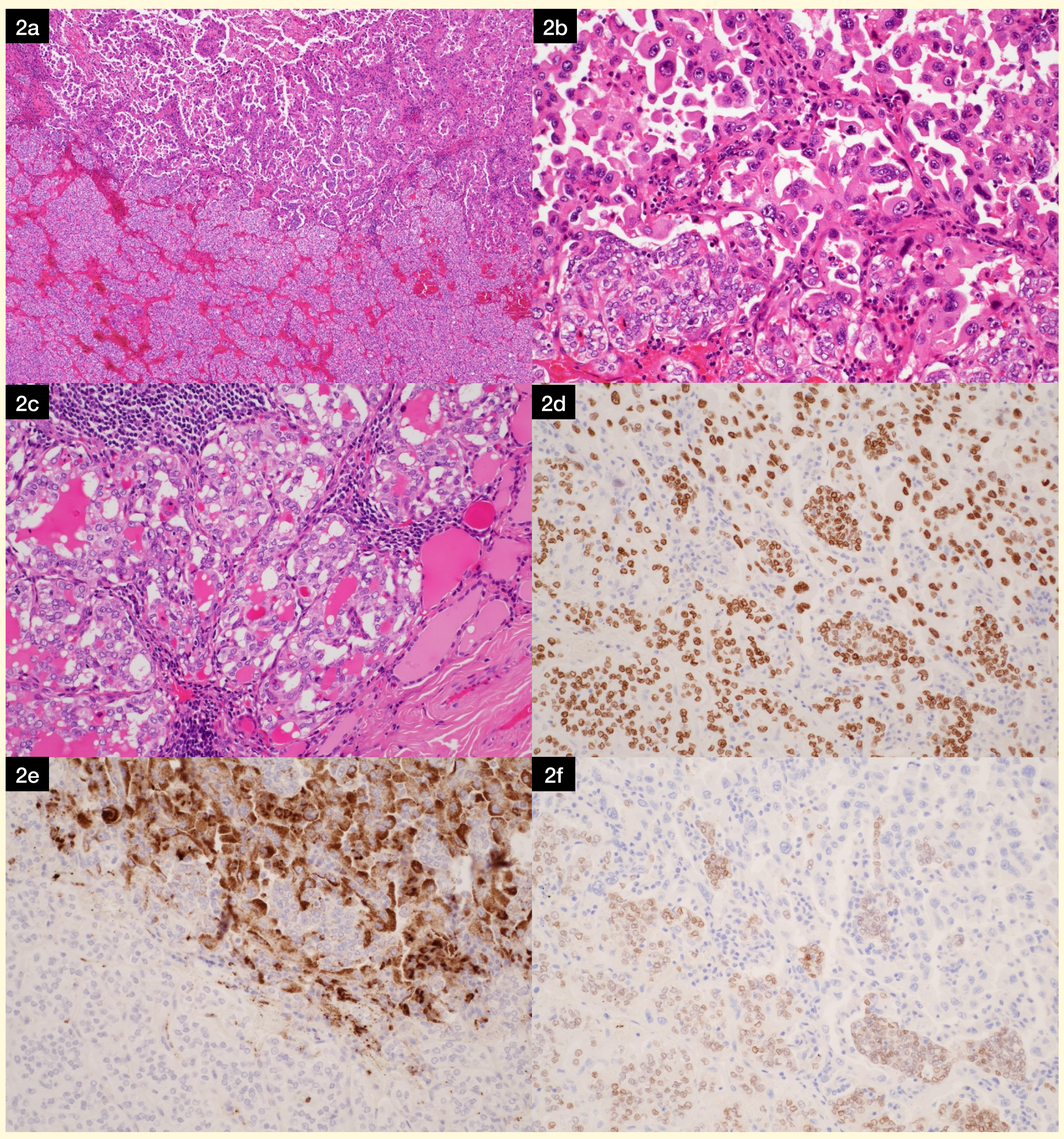


Figure 1. *1a to 1c:* Adenocarcinoma of lung with (1a) acinar, (1b) papillary and (1c) lepidic patterns (100x) . *1d:* Lymphovascular invasion (400x)



Pathological Examination

CT-guided fine needle aspiration of the right upper lobe lung mass showed atypical pneumocytes with a lepidic pattern, and a possibility of adenocarcinoma in-situ was raised.
Subsequent lobectomy of the right upper lobe showed adenocarcinoma, 30 mm in maximum dimension. The excised tumour showed mostly acinar (70%) and less commonly papillary (20%) and lepidic (10%) growth patterns *[Fig 1a to 1c]*. Lymphovascular invasion was focally noted *[Fig 1d]*.
Immunohistochemical and molecular studies revealed no mutations of EGFR, ALK and ROS-1. PD-L1 expression was observed in less than 1% of tumour cells.

Total thyroidectomy specimen revealed two foci of metastatic adenocarcinoma in the right upper and right lower poles of the thyroid gland, in close relation with hyperplastic/adenomatoid nodules. It consisted of well-formed papillae lined by hobnailed to columnar cells, featuring moderate amount of eosinophilic cytoplasm, markedly pleomorphic vesicular and hyperchromatic nuclei with prominent nucleoli. *[Fig 2a, 2b]* The two foci measured 9 mm and 12 mm respectively, and resection margins were clear. Two incidental foci of papillary microcarcinoma were present, measuring 1.5 mm in greatest dimension *[Fig 2c]*. Immunohistochemical studies showed that both components were positive for TTF-1. *[Fig 2d]* The metastatic lung adenocarcinoma was highlighted by Napsin A *[Fig 2e]* and CEA, while the hyperplastic nodule was highlighted by PAX8 *[Fig 2f]* and thyroglobulin. Both components were negative for Calcitonin, Synaptophysin and Parathyroid hormone. The tumour biomarkers of the metastatic tumour were identical to those of the primary lung tumour.

Figure 2. *2a & 2b:* Metastatic lung adenocarcinoma in close relation to hyperplastic/adenomatoid nodule of thyroid (40x & 200x). *2c:* Papillary microcarcinoma of thyroid (200x). *2d to 2f:* Immunohistochemical staining against (2d) TTF-1, (2e) Napsin A and (2f) PAX8.

Discussion

To date, less than 10 cases of solitary thyroid metastasis from lung adenocarcinoma have been reported in literature [3, 4]. Interestingly, solitary thyroid metastasis accounts for up to 40% of metastatic carcinomas to the thyroid [5]. As in our case, no other sites of metastasis had been identified clinically.

When assessing the tumour morphology between PTC and metastatic lung adenocarcinoma with papillary architecture, it is essential to recognise the higher histological grade of metastatic lung adenocarcinoma when compared to that of PTC. Absence of longitudinal nuclear grooves and prominent eosinophilic nucleoli also speak against the diagnosis of PTC. While nuclear pseudoinclusions are a common feature of PTC, one has to distinguish them from true nuclear inclusions of surfactant in lung adenocarcinomas. The former is membrane bound, single, having a similar colour or darker than the cytoplasm of the tumour cell; the latter is not membrane bound, lightly eosinophilic and may be multiple within a tumour cell [6].

Immunohistochemical staining then comes into place to establish the diagnosis. While TTF-1 is positive in both PTC and lung adenocarcinoma, PAX-8 is positive in around 90% of PTC and negative in all cases of lung adenocarcinomas. Napsin A, on the other hand, is positive in more than 50% of lung adenocarcinomas and negative in all thyroid carcinomas [7].

While metastatic lung adenocarcinoma generally carries a poor prognosis, further studies may be warranted to determine whether solitary metastasis to the thyroid gland will carry a better prognosis or not.

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