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Contents

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Contents

CASE REPORT

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Contents

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CASE REPORT

Parotid metastasis of rare lung adenocarcinoma: A case report

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Abstract

BACKGROUND

Lung cancer (LC) is the leading cause of malignancy-related deaths worldwide. The most common sites of metastasis include the nervous system, bone, liver, respiratory system, and adrenal glands. LC metastasis in the parotid gland is very rare, and its diagnosis presents a challenge. Here, we report a case of parotid metastasis in primary LC.

CASE SUMMARY

The patient was a 74-year-old male who was discovered to have bilateral facial asymmetry inadvertently two years ago. The right earlobe was slightly swollen and without pain or numbness. Computed tomography (CT) examination showed bilateral lung space-occupying lesions. Pulmonary biopsy was performed and revealed adenocarcinoma (right-upper-lung nodule tissue). Positron emission tomography-CT examination showed: (1) Two hypermetabolic nodules in the right upper lobe of the lung, enlarged hy-permetabolic lymph nodes in the right hilar and mediastinum, and malignant space-occupying lesion in the right upper lobe of the lung and possible metastasis to the right hilar and mediastinal lymph nodes; and (2) multiple hypermetabolic nodules in bilateral parotid glands. Parotid puncture biopsy was performed considering lung adenocarcinoma metastasis. Gene detection of lung biopsy specimens revealed an *EGFR* gene 21 exon L858R mutation.

CONCLUSION

This case report highlights the challenging diagnosis of parotid metastasis in LC given its rare nature. Such lesions should be differentiated from primary tumors of the parotid gland. Simple radiological imaging is unreliable, and puncture biopsy is needed for final diagnosis of this condition.

Key Words: Lung cancer; Metastasis; Parotid gland; Pathology; Positron emission tomography/computed tomography; Case report

Core Tip: A 74-year-old male presented with a bilateral facial asymmetry. Computed tomography examination revealed bilateral lung space-occupying lesions. Pulmonary biopsy was performed on the right-upper-lung nodule tissue and revealed the presence of adenocarcinoma. Parotid puncture biopsy was performed considering lung adenocarcinoma metastasis. This work highlights the challenging diagnosis of parotid metastasis in lung cancer and the need for biopsy in the final diagnosis.

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INTRODUCTION

Lung cancer (LC) refers to the second most common malignant tumor in the world, next to breast cancer, and is a serious threat to human life and health[1]. LC can be classified as small-cell or non-small-cell carcinoma (*e.g.*, adenocarcinoma, squamous-cell carcinoma, and large-cell carcinoma). Non-small-cell LC (NSCLC) accounts for nearly 85% of all LCs[2]. The most common metastatic sites of LC comprise the nervous system, bone, liver, respiratory system, and adrenal glands[3]. Reports on the metastasis of LC in the parotid gland are extremely rare. In this study, we report a case of parotid metastasis from lung adenocarcinoma and review the published literature.

CASE PRESENTATION

Chief complaints

A 74-year-old male presented with a bilateral facial asymmetry for 2 years.

History of present illness

The patient was a 74-year-old male who was discovered to have bilateral facial asymmetry inadvertently two years ago. The right earlobe was slightly swollen and without pain or numbness.

History of past illness

He used to be healthy, denied diabetes, heart disease, hypertension for 15 years, and denied trauma surgery.

Personal and family history

He denied any history of exposure to special chemicals and radiation. He had a smoking history of 50 years and had quit smoking for 7 years. He denied drinking alcohol. There were no infectious diseases, metabolic diseases, diabetes, hemophilia, hereditary diseases, tumors and similar diseases in the family.

Physical examination

The patient's vitals were stable upon examination. The following conditions were noted: asymmetric left and right sides of his face, swollen posterior inferior pole of the bilateral parotid glands, intact surface skin without ulceration, low local skin temperature, the left tumor measuring approximately 5.0 cm × 4.0 cm, right tumor with a size of around 3.0 cm × 3.0 cm, smooth surface, clear boundary with the surrounding tissues, good mobility, no evident spontaneous pain or tenderness, and the facial nerve showing no sign of involvement. In addition, the patient showed normal mouth opening degree, good oral hygiene condition, minimal swelling of the corresponding parotid duct opening, and normal saliva secretion.

Laboratory examinations

Parotid puncture biopsy: Considering lung adenocarcinoma metastasis. Pulmonary biopsy was performed: (right upper lung nodule tissue) adenocarcinoma; Gene detection of lung biopsy specimens showed *EGFR* gene 21 exon L858R mutation.

Imaging examinations

Computed tomography (CT) examination revealed bilateral lung space-occupying lesions. Pulmonary biopsy was performed and revealed adenocarcinoma in the right-upper-lung nodule tissue. Positron emission tomography (PET)-CT examination showed the following: (1) Two hypermetabolic nodules in the right upper lobe of the lung, enlarged hypermetabolic lymph nodes in the right hilar and mediastinum; malignant space-occupying lesion in the right upper lobe of the lung and possible metastasis to the right hilar and mediastinal lymph nodes; and (2) multiple hypermetabolic nodules in bilateral parotid glands.

Diagnostic assessment and interventions

The patient's was assessed further. Color ultrasound examination indicated multiple heterogeneous hypoechoic nodules in bilateral parotid glands. The patient had smoked for 50 years and had no crucial medical history. CT of the chest revealed density shadows of solid nodules at the posterior and anterior ends of the right upper lobe (2.5 and 1.3 cm in diameter, respectively), with burrs at the edges and pulling adjacent to the pleura. Given the possibility of metastatic lymphatic lesions in the neck, systemic PET/CT showed 18F fluorodeoxyglucose (FDG) in hilum and mediastinum [maximum standardized uptake value (SUV_{max}): 12.1], bilateral cervical lymph nodes (SUV_{max}: 10.2), and bilateral parotid glands (SUV_{max}: 27.3), which indicate the possibility of LC metastasis (Figure 1). The disseminated tumor was characterized by multifocal FDG accumulation, and thus, we decided to conduct further study of the parotid gland mass. The left upper pulmonary nodule was subjected to transthoracic puncture biopsy. The histopathology of the puncture biopsy revealed LC (primary adenocarcinoma of the lung). Subsequently, fine-needle aspiration cytology of the left mandibular angle lymph node confirmed the parotid mass as metastatic lung adenocarcinoma (Figure 2) and ruled it out as a LC coexisting tumor. After consultation with the patient's family, chemotherapy was refused, and the targeted drug Ectinib was administered to the patient.

FINAL DIAGNOSIS

Right lung adenocarcinoma stage 4; Bilateral parotid gland lung metastatic cancer.

TREATMENT

The patient is currently receiving immunotherapy.

OUTCOME AND FOLLOW-UP

The patient's condition was stable upon reexamination in May 2023 but showed slight progression during another assessment in August 2023.

DISCUSSION

Clinically, the metastasis of LC to the parotid gland rarely occurs. The metastatic routes of LC include direct diffusion, lymphatic metastasis, and hematogenous metastasis. In this case, metastatic signs of lymph node enlargement were observed on the neck of the patient, and parotid gland metastasis of LC was considered lymphatic. LC usually shows no distinct sequence of metastatic sites. The most common sites of metastasis comprise the nervous system, bone, liver, respiratory system, and adrenal gland[3].

Gupta *et al*[4] retrospectively reviewed published literature over the past 44 years (August 1977 to December 2021) and discovered 122 documented cases of oral soft tissue metastasis (OSTM) from LC as the sole primary source (Table 1). In Sonia Gupta's study, no difference was observed in the age of onset of OSTM, which occurred in 5-6 years, between sexes. The male majority showed a clear gender advantage. A total of 35 patients (28.7%) had a history of LC. This number is more than the average patients who present with oral soft tissue as the only metastatic site. LC is the most common primary source of OSTM, and attached gums are the most common site[5,6]. A total of 80% of the 122 patients had a history of smoking, and the study suggested that nicotine and its derivatives, which are found in tobacco smoke, may contribute to tumor cell growth and metastasis[7]. The clinical features of the patient reported in this case are consistent with the findings of Gupta *et al*[4].

Of the 122 cases of LC metastasis, 14 involved the parotid gland. The submandibular and sublingual glands lack lymph nodes, and the route of metastasis is primarily blood derived. Thus, metastasis to these salivary glands is very rare. Gupta *et al*[4] reported five cases of LC-induced submandibular gland metastasis but found no cases involving sublingual gland metastasis.

The detection of distant metastases in the diagnosis of malignant tumors plays a crucial role in the accurate prognosis and guidance of treatment strategies[8,9]. In the case of LC, FDG-PET/CT sensitively identifies extrathoracic metastases, especially bone and adrenal lesions. However, several benign diseases (infection or inflammation) or malignant lesions

Table 1 Summary of results documented from literature describing the characteristics of oral soft tissue metastasis from lung cancer (August 1, 1977 to December 31, 2021)

Feature	
Total number of papers published	120
CR	111
SC	3
LTE	3
Co	2
RA	1
Total number of patients	122
World-wide distribution of cases, *n* (%)	
Japan	31 (25.8)
India	14 (11.7)
United States	13 (10.8)
China	10 (8.3)
Turkey	9 (7.5)
Italy	7 (5.8)
Korea = United Kingdom	5 (4.2)
Brazil	4 (3.3)
Morocco = Taiwan = France = Greece = Tunisia = Germany = Switzerland = Australia = Spain	2 (1.7)
Israel = Beirut = Bangladesh = Victoria	1 (0.8)
Gender, *n* (%)	
M	100 (82)
F	22 (18)
Average age of patients (range), yr	60.8 (25-87)
Average age of male patients (range), yr	61.4 (25-87)
Average age of female patients (range), yr	58.3 (36-87)
Chief complaint, *n* (%)	
Related to oral health	97 (79.5)
Not related to oral health	22 (18)
Routine check-up	3 (2.5)
Previous history of LC, *n* (%)	35 (28.7)
No previous history LC, *n* (%)	78 (63.9)
NA data on previous history of LC, *n* (%)	9 (7.4)
Associated risk factors, *n* (%)	66 (54.1)
S	53 (80.3)
A	9 (13.6)
HT	7 (10.7)
As	6 (9.1)
TB	3 (4.5)
Others	15 (27.2)
No risk factors, *n* (%)	38 (31.1)

NA data on associated risk factors, *n* (%)	18 (14.8)
Site of metastasis, *n* (%)	
G	51 (41.8)
Max (Ant-6, Post-12, Both-1, SNA-5/R-10, L-5, Both-4, SNA-5)	24 (47)
Mand (Ant-6, Post-9, Both-2, SNA-8/R-8, L-12, Both-2, SNA-3)	25 (49)
SNA-2	2 (4)
T (Ant-6, Base-4, DL-6, SNA-3, Tip-2)	21 (17.2)
To [Palatine-19 (R-10, L-9), Lingual-2]	21 (17.2)
P (R-8, L-4, BL-2)	14 (11.5)
SMG (L-3, R-1, BL-1)	5 (4.1)
Pa	3 (2.5)
Lip (U-1, L-1)	2 (1.6)
BM	1 (0.8)
RMT	1 (0.8)
MS	3 (2.5)
Oral soft tissues as the initial site of metastasis, *n* (%)	
Y	74 (60.6)
N	44 (36.1)
NA	4 (3.3)
Oral soft tissues as the only site of metastasis, *n* (%)	
Y	63 (51.6)
N	54 (44.2)
NA	5 (4.2)
Average time of detection of metastasis from diagnosis of LC	Few days to 10 yr
Most common clinical features, *n* (%)	
Swelling	100 (81.9)
Ulceration	13 (10.6)
Exophytic	12 (9.8)
Pedunculated	10 (8.2)
Nodules	6 (4.9)
Edema	5 (4.2)
Erosive	2 (1.6)
BOP	10 (8.2)
ST = LP = FNP	1 (0.8)
Type of LC, *n* (%)	
AD	46 (37.7)
SCLC	19 (15.6)
MT	17 (13.9)
SCC	10 (8.2)
NSCLC	8 (6.5)
LCC	6 (4.9)
NEC	5 (4.1)
Sa	3 (2.4)

Ha	2 (1.6)
AC	2 (1.6)
AS	2 (1.6)
PI	2 (1.6)
LC Metastasis, *n* (%)	
IL	55 (45.1)
CL	33 (27)
BL	2 (1.6)
NA	32 (26.2)
Treatment aids, *n* (%)	
RT + CH	31 (25.4)
CH	27 (22.1)
RT = SU	12 (9.8)
CH + RT + SU	8 (6.5)
CH + SU	2 (1.6)
SU + Ta = SU = Sy	1 (0.8)
NG	11 (9)
NA	5 (4.1)
RBP	4 (3.3)
STO	2 (1.6)
Death, *n* (%)	66 (54.1%)
Reasons of death, *n* (%)	
MM	18 (27.2)
DC	18 (27.2)
RF	4 (6.1)
Others	13 (19.7)
NA	13 (19.7)
Average time of death from diagnosis of metastasis	1 wk to 2.5 yr
Partial relief of symptoms, *n* (%)	1 (0.8)
Favorable prognosis, *n* (%)	13 (10.6)
TGO, *n* (%)	5 (4.1)
LFU, *n* (%)	6 (4.9)

A: Alcohol; AC: Acinar cell carcinoma; AD: Adenocarcinoma; AFP: Anterior faucial pillar; Ant: Anterior; AS: Adenosquamous carcinoma; As: Arsenic; BL: Bilateral; BM: Buccal mucosa; BOP: Bleeding on probing; CH: Chemotherapy; CL: Contralateral; Co: Correspondence; CR: Case report; DL: Dorsolateral left; LC: Lung cancer; LCC: Large cell carcinoma; LFU: Lost to follow up; M: Male; MS: Multiple sites; MM: Multiple metastasis; MT: Mesothelioma; N: No; NA: Not available; NEC: Neuroendocrine carcinoma; NG: Not given; NSCLC: Non-small-cell lung carcinoma; P: Parotid; Pa: Palate; Pl: Pleomorphic; Post: Posterior; R: Right; RA: Retrospective analysis; RBP: Refused by patient; RF: Respiratory failure; RMT: Retromolar triagone; S: Smoking; Sa: Sarcomatous; SC: Short communication; SCC: Squamous cell carcinoma; SCLC: Small-cell lung carcinoma; SMG: Submandibular gland; SNA: Site not available; ST: Sore throat; STO: Sent to oncologist; SU: Surgery; Sy: Symptomatic; T: Tongue; TB: Tuberculosis; To: Tonsil; TGO: Treatment going on; Y: Yes. Citation: Gupta S, Jawanda MK, Kedia NB, Deb AR, Ganganna A, Saurabh K, Yadav SK, Yadav AB. Lung cancer metastasis to oral soft tissues; Systematic review of 122 cases. *J Clin Exp Dent* 2022; 14: e854-e874. Copyright ©2022 Medicina Oral SL[4].

that are unrelated to primary NSCLC may show strong FDG uptake, similar to distant metastases such as adenomas[10]. Studies have reported cases of misdiagnosis of Warthin tumor (WT) as a metastatic disease based solely on radiological imaging of LC patients[11]. High FDG-PET/CT uptake cannot be used to distinguish metastatic disease from WTs. WT is the second most common benign tumor in salivary glands after pleomorphic adenoma, and most of related cases occur in the parotid gland. Most of the WTs are benign, and the incidence of malignancy reaches 0.3%[11]. Differential diagnosis relies on a detailed medical history and imaging studies. Clinically, benign tumors of the parotid gland have a long cour-

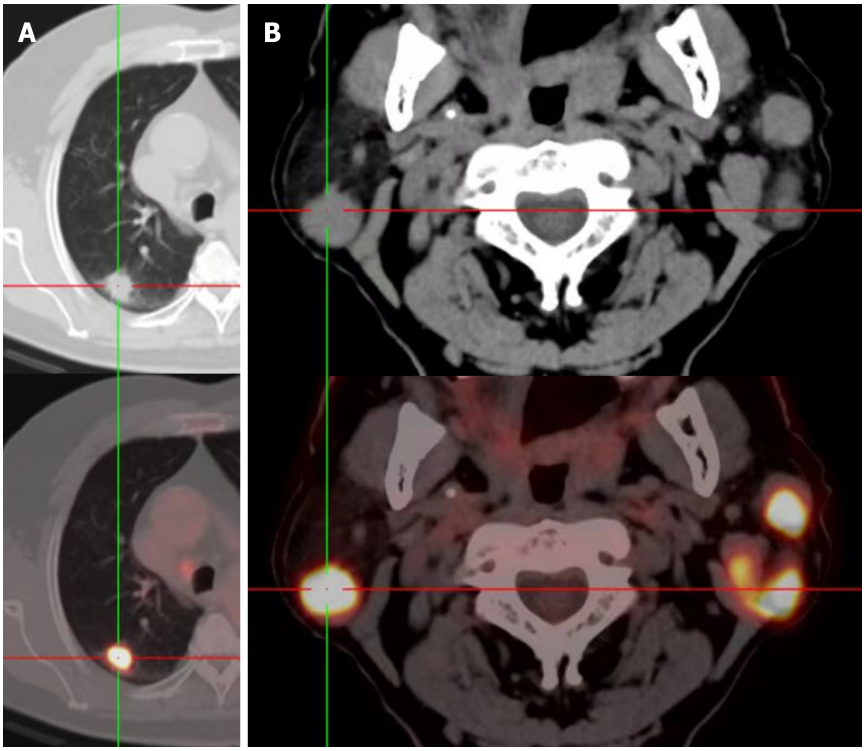

Figure 1 18F fluorodeoxyglucose values shown by positron emission tomography. A: Superior lobe of right lung (18.2); B: Bilateral parotid gland (27.3).

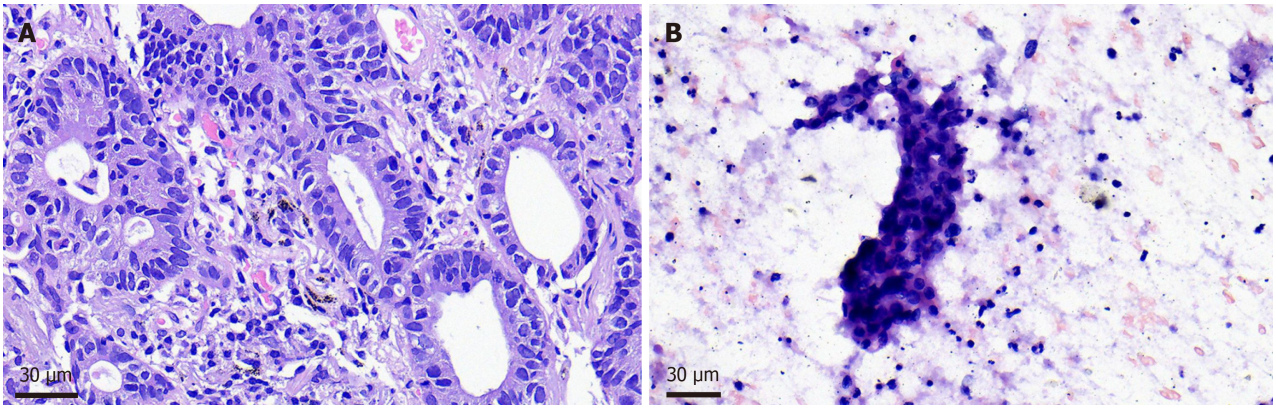

Figure 2 Histopathological examination. A: Lung (× 400); B: Parotid gland (× 400).

se and develop slowly; they are usually located in the superficial lobe of the parotid gland, with no surrounding tissue infiltration and distinct borders. By contrast, parotid malignancies usually exhibited rapid grow, are usually found in deep or superficial and deep lobes, invade the facial nerve or surrounding tissue, and have ambiguous borders[13]. Emerging imaging techniques, such as the use of apparent diffusion coefficient, diffusion-weighted imaging, and dynamic contrast-enhanced magnetic resonance imaging, can effectively aid in distinguishing malignancies. However, although pathological biopsy can be used for the above features, it still cannot accurately distinguish LC parotid metastasis and LC coexisting with WT[12]. The coexistence of LC and WT is rarely reported in the literature. A retrospective study by White *et al*[13] revealed that nearly one-fifth of patients diagnosed with WT were associated with LC. Patients with WTs have a high risk of lung malignancy, and thus, the early detection of WT may contribute to the early diagnosis of LC. However, the association between LC and WT has not been confirmed in published literature and requires further exploration.

CONCLUSION

The diagnosis of LC parotid metastases presents a challenge because of rare nature. Lesions should be differentiated from primary parotid tumors. Radiological imaging alone is unreliable, and puncture biopsy is needed for final diagnosis.

FOOTNOTES

Co-corresponding authors: Hong-Hai Ji and Yan-Cong Zhang.

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