Original Article

Contrast-enhanced CT and PET-CT characteristics of primary tracheal lymphoepithelioma-like carcinoma: case series

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Background: Primary tracheal lymphoepithelioma-like carcinoma (LELC) is extremely rare, with only a few cases reported so far, and few studies have focused on the radiological features. This study aimed to investigate contrast-enhanced computed tomography (CECT) and positron emission tomography-computed tomography (PET-CT) presentations of primary tracheal LELC to improve diagnosis.

Methods: A retrospective analysis was conducted on the clinical and imaging data of 13 patients with confirmed primary tracheal LELC between December 2013 and August 2022. We analyzed the radiological profiles of lesions on the CECT and PET-CT images.

Results: In 92.3% (12/13) of the cases, primary tracheal LELC lesions predominantly occurred in the thoracic segment. They manifested as singular, wide-based, eccentric, irregular nodules, or exhibited mass-like thickening of the tracheal wall with invasive growth both internally and externally along the wall. The thickest dimension of the lesion ranged from 9 to 28 mm, affecting a length of 30.8±13.5 mm. Luminal stenosis was evident in all patients, with the narrowest point reaching a stenosis rate of 85%. Lesion margins were clear in 69.2% (9/13), indistinct in 23.1% (3/13), and unclear in 7.7% (1/13) of all cases. Among the patients, 92.3% (12/13) exhibited a relatively uniform density on CT plain scans, with a CT value of 44.5±7.8 Hounsfield units (HU). Enhancement scans revealed moderate to marked enhancement in 75% (9/12) of cases. In 2 cases undergoing PET-CT examination, lesion standardized uptake values (SUVs) were 4.4 and 5.1, whereas enlarged lymph node SUVs were 7.7 and 6.3, respectively. Mediastinal lymph node enlargement was observed in 8 patients (61.5%, 8/13), with a maximum short axis of 11.1±5.5 mm. After treatment, 9 out of 12 patients (75%) showed no evidence of distant metastasis upon CT re-examination.

Conclusions: Early detection of primary tracheal LELC allows for curative resection and may lead to a favorable prognosis. It presents with characteristic CT findings, and the utilization of PET-CT improves diagnosis and staging.

Keywords: Primary tracheal lymphoepithelioma-like carcinoma (primary tracheal LELC); computed tomography (CT); positron emission tomography/computed tomography (PET-CT); case series

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Introduction

Primary tracheal tumors are rare, with an annual incidence rate of approximately 0.1 per 100,000 individuals, accounting for approximately 1–2% of respiratory system tumors. Due to their rarity, there is a lack of prospective investigations into their efficacy, leading to the general discouragement of using the tumor, node, and metastasis (TNM) staging system for malignant tracheal tumors (1). In the World Health Organization (WHO) classification of head and neck tumors, primary tracheal tumors are categorized alongside hypopharyngeal and laryngeal tumors. Squamous cell carcinoma and adenoid cystic carcinoma constitute approximately 2/3 of primary tracheal tumors in adults, with the etiology and premalignant lesions of squamous cell carcinoma closely associated with smoking (1,2).

Highlight box

Key findings

- In the majority of cases, primary tracheal lymphoepithelioma-like carcinoma (LELC) lesions predominantly occur in the thoracic segment. They manifest as singular, wide-based, eccentric, irregular nodules, or exhibit mass-like thickening of the tracheal wall with invasive growth both internally and externally along the wall.
- Luminal stenosis was evident in all patients, with the narrowest point reaching a stenosis rate of 85%. Lesion margins were clear in 69.2%, indistinct in 23.1%, and unclear in 7.7% of all cases.
- 92.3% exhibited a relatively uniform density on computed tomography (CT) plain scans, with a CT value of 44.5±7.8 HU. Enhancement scans revealed moderate to marked enhancement in 75%of cases.

What is known and what is new?

- Previously, individual cases have been reported, with CT showing predominantly wide-based nodules growing into the tracheal lumen, exhibiting relatively uniform density.
- This largest case series study revealed that tracheal LELC tends to occur more frequently in the distal right wall of the trachea, presenting as nodular or mass-like growth. It can infiltrate the tracheal wall, but rarely involves the membranous posterior wall of the trachea.

What is the implication, and what should change now?

- Primary tracheal LELC predominantly manifests on the distal right tracheal wall, displaying infiltration internally and externally, with limited involvement of the tracheal membranous posterior wall.
- These lesions display a relatively uniform density on plain CT scans and show significant enhancement on contrast-enhanced CT images, with minimal liquefaction necrosis.
- The early detection of primary tracheal LELC enables curative resection and could result in a favorable prognosis.

Lymphoepithelioma-like carcinoma (LELC) is an extremely rare and distinct malignant tumor of epithelial origin. Its occurrence is strongly associated with Epstein-Barr virus (EBV) infection, particularly prevalent in Asian populations, and is typically unrelated to smoking (2). Primary tracheal LELC is exceedingly rare, with minimal case reports in Chinese and international literature (3). Morphologically, LELC exhibits similarities with undifferentiated nasopharyngeal carcinoma, posing a risk of misdiagnosis (3). The diagnosis of primary LELC necessitates the exclusion of nasopharyngeal carcinoma and positive staining for EBV-encoded ribonucleic acid (EBER) through immunohistochemistry *in situ* hybridization (4). Due to the lack of specific symptoms in clinical practice, smaller tracheal lesions are frequently overlooked and only detected after the onset of clinical symptoms. Additionally, the larger diameter of the large airway itself often results in relatively large tumors when symptomatic, leading to frequent misdiagnosis or delayed treatment. Contrast-enhanced computed tomography (CECT) and positron emission tomography-computed tomography (PET-CT) examinations are crucial in diagnosing bronchial malignancies, CECT can clearly show the location, extent, blood supply, and relationship with surrounding tissues of the tumor, while PET-CT can provide information on the metabolism inside the tumor as well as distant changes.

Currently, there is limited literature discussing the radiographic manifestations of primary tracheal LELC, with only a small number of reported cases. In a few rare case reports from domestic and international sources, the imaging manifestations of tracheal LELC mainly appear as a broad-based tumor in the lateral wall of the trachea on CT, sometimes infiltrating outside the trachea. However, due to its rarity, there is a lack of more CT features and metabolic studies with PET-CT regarding this disease. This study aimed to investigate the CECT and PET-CT findings of primary tracheal LELC to further enhance the diagnostic capabilities of radiologists in this context. We present this article in accordance with the STROBE and AME Case Series reporting checklists (available at https://tlcr.amegroups.com/article/view/10.21037/tlcr-24-333/rc).

Methods

Patients

The institutional review board of the First Affiliated Hospital of Guangzhou Medical University approved this

Table 1 Demographic and clinical characteristics of primary tracheal LELC patients

Patients	Gender	Age, years	Cough	Expectoration	Hemoptysis	Dyspnea	Chest tightness	Smoking	Disease duration
N1	Male	59	+	+	+	–	–	–	3 months
N2	Female	45	+	–	+	–	–	–	24 months
N3	Female	40	–	–	–	+	+	–	6 months
N4	Male	37	+	+	–	+	–	–	2 months
N5	Male	25	+	–	+	+	–	–	1 months
N6	Female	63	+	+	–	–	–	–	3 months
N7	Male	32	+	+	–	–	–	–	10 months
N8	Male	55	+	+	–	+	–	–	12 months
N9	Male	66	+	+	–	–	–	+	3 weeks
N10	Female	33	–	–	–	–	–	–	1 weeks
N11	Female	46	+	+	–	+	–	+	9 months
N12	Male	61	+	+	–	+	–	+	4 months
N13	Male	64	+	+	–	–	–	–	4 days

LELC, lymphoepithelioma-like carcinoma.

case-series study (No. 202270) and written consent was provided from all patients. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). Retrospective collection of clinical and imaging data was performed for patients who underwent CT/PET-CT scans and were pathologically confirmed with primary tracheal LELC at the First Affiliated Hospital of Guangzhou Medical University from December 2013 to August 2022. The inclusion criteria were as follows: (I) pathologically confirmed tracheal LELC; (II) positive staining in immunohistochemistry; (III) exclusion of metastatic nasopharyngeal LELC through nasopharyngoscopy or imaging examination; (IV) availability of complete clinical data and CT/PET-CT images before treatment. The exclusion criteria were as follows: (I) concurrent presence of other malignant tumors; (II) previous antitumor therapy before CT/PET-CT scans; (III) poor CT image quality, such as significant respiratory motion artifacts or inadequate resolution.

Finally, 13 patients, comprising 8 males and 5 females aged between 25 and 66 years (mean age, 48±14 years), met the criteria. All patients underwent tracheoscopic biopsy. The disease duration ranged from 4 days to 24 months, with a median of 3 months. Clinical manifestations included cough in 11 cases, sputum production in 9 cases, hemoptysis in 3 cases, dyspnoea in 6 cases, and chest tightness in 1 case (*Table 1*). Weight loss was observed in 4 cases. Laboratory examinations revealed that 10 patients underwent a 5-item lung tumor panel, with normal results in 6 patients. A marginal elevation of neuron-specific enolase was observed in 4 cases, whereas 1 case showed a slight increase in carbohydrate antigen 125. No abnormalities were observed in carcinoembryonic antigen, carbohydrate antigen 153, or non-small cell lung cancer-associated antigen. A total of 7 patients underwent erythrocyte sedimentation rate testing, with elevated levels in 2 cases, and no abnormalities in the remaining cases.

CECT and PET-CT examinations

All patients underwent cervical-thoracic CT plain scans, and 12 patients additionally underwent CECT using the German Siemens Definition AS+128 multi-slice spiral CT scanner (Siemens, Erlangen, Germany). The scanning parameters included a tube voltage of 120 kV, automatic modulation technology for tube current, a field of view measuring 320 mm × 320 mm, a matrix of 512×512, a rotation speed of 0.5 s/rotation, and a slice thickness of 0.6 mm. For the enhanced scan, a high-pressure injector administered a 60% non-ionic iodine contrast agent at a dose of 1.5 mL/kg through the antecubital vein at a speed of 3.0–3.5 mL/s. Arterial phase scanning was performed 22–25 s after contrast agent injection, followed by parenchymal phase scanning after 50 s. There were 2 patients who

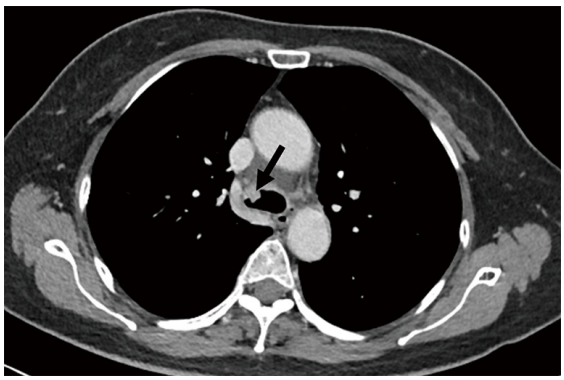

Figure 1 A 63-year-old female patient was diagnosed with primary tracheal LELC. Contrast-enhanced parenchymal phase CT reveals a uniformly enhanced irregular nodule (black arrow) on the distal anterior tracheal wall. LELC, lymphoepithelioma-like carcinoma; CT, computed tomography.

underwent PET-CT examination using the GE Discovery ST PET-CT scanner (GE Healthcare, Chicago, IL, USA). They received an intravenous injection of 2-deoxy-2-[fluorine-18] fluoro-D-glucose (5 MBq/kg) and were imaged after lying down for 60 minutes.

Image analysis

The contrast-enhanced CT and PET-CT images were analyzed by 2 radiologists independently using a double-blind method. In the event of discordant opinions, a third senior radiologist was consulted to establish a consensus. The evaluation encompassed the following aspects: (I) lesion distribution (multiple or solitary) and location (cervical or thoracic segments); (II) lesion growth pattern and morphology (periluminal/eccentric, wide/narrow base, intraluminal and/or extraluminal, or nodule and/or mass-like morphologies) and borders; (III) lesion extent, involving measurements of the diameters at the thickest point and narrowest points, calculation of tracheal stenosis rate, determination of maximum cross-sectional diameter value, and length of lesion involvement at that level; (IV) lesion density, with the delineation of the region of interest at the lesion on plain, arterial phase, and parenchymal phase CT images for measuring its CT value; (V) enhancement degree, categorized as mild enhancement [enhanced CT value <20 Hounsfield units (HU)], moderate enhancement (20 HU < enhanced CT value <40 HU), and marked enhancement (enhanced CT value >40 HU), with enhanced CT value defined as the difference between tumor parenchymal phase CT value and plain scan CT value; (VI) measurement of the maximum standardized uptake value (SUV) of the lesion and enlarged lymph nodes; (VII) relationship with surrounding tissues, evaluating the presence of compression or invasion into adjacent blood vessels and the esophagus; (VIII) presence of mediastinal and hilar lymph node enlargement (short axis >1 cm); (IX) assessment of distant metastasis status.

Statistical analysis

Statistical analysis was performed using SPSS 22.0 software (IBM Corp., Armonk, NY, USA). Categorical data are presented using frequency counts. The maximum diameter value of lesions, as non-normally distributed measurement data, is presented as the median, whereas lesion CT values, as normally distributed measurement data, are expressed as the mean ± standard deviation.

Results

Characteristics of patients and lesions

All 13 patients with primary tracheal LELC presented with solitary lesions. Predominantly, the lesions were located in the thoracic segment (*Figure 1*), observed in 12 cases (92.3%, 12/13). Among these, 10 cases (76.9%, 10/13) exhibited right-sided or right posterior growth in the mid/distal segment, whereas 2 cases (15.4%, 2/13) showed left wall growth in the distal segment. A total of 3 cases had relatively large lesions involving the posterior wall, whereas the remaining 9 cases showed no significant involvement of the membranous posterior wall. Only 1 case (7.7%, 1/13) had the lesion situated in the cervical segment, growing along the right side and the posterior wall (*Figure 2*), 3 mm below the glottis. The lesions manifested as wide-based, eccentric, irregular nodular or mass-like thickening of the tracheal wall, demonstrating invasive growth along the tracheal lumen and externally. They exhibited unclear demarcation from the tracheal wall. The thickest part of the lesion measured 9–28 mm (median, 15 mm), whereas the narrowest point of the tracheal lumen was approximately 3–15 mm wide (median, 6 mm), resulting in a stenosis rate ranging from 29% to 85%. The average extent of lesion involvement was 30.8±13.5 mm. The lesion borders were notably clear in 9 cases (69.2%, 9/13), indistinct in 3 cases (23.1%, 3/13), and unclear in 1 case (7.7%, 1/13).

Figure 2 A 55-year-old male patient was diagnosed with primary tracheal LELC. The CT plain scan reveals irregular thickening and soft tissue mass formation (white arrow) along the posterior and right walls of the trachea near the cervical segment, with clear demarcation from the adjacent thyroid and uniform density. LELC, lymphoepithelioma-like carcinoma; CT, computed tomography.

Radiological profiles of primary tracheal LELC

In 12 cases (92.3%), the lesions exhibited a relatively uniform density on CT plain scans (*Figure 3A*), with a CT value of 44.5±7.8 HU. Following contrast-enhanced scanning, the average CT values during the arterial and parenchymal phases were 83.4±21.8 and 91.8±10.5 HU, respectively, resulting in an enhancement differential of 47.7±8.9 HU, indicating moderate to marked enhancement (*Figure 3B*). Among these cases, 9 (75%, 9/12) displayed non-uniform enhancement, and 2 (16.7%, 2/12) exhibited uniform enhancement. There was 1 case (8.3%, 1/12) that presented uneven enhancement on plain and enhanced scans, revealing internally small patchy areas of lower density. In 1 patient who underwent PET-CT imaging, lesion SUVs were 4.4 and SUVs for the enlarged lymph node were 7.7. In another patient, who showed rich surface blood vessels under

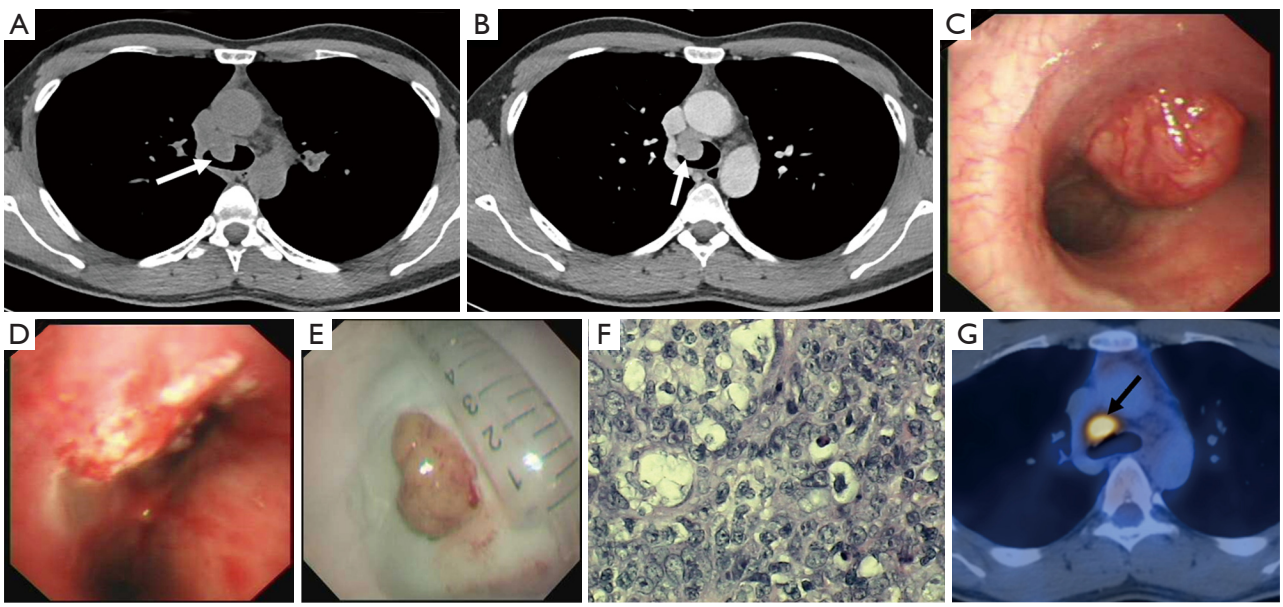

Figure 3 A 25-year-old male patient was diagnosed with primary tracheal LELC. (A) A mediastinal window plain CT scan, revealing the lesion (indicated by white arrow) in the distal right anterior tracheal wall, infiltrating internally and externally with an irregular morphology. It reveals relatively uniform density with CT values of 43 HU. (B) Contrast-enhanced parenchymal phase revealed relatively uniform density with CT values of 86 HU (indicated by white arrow). (C) An endoscopic view showed a lesion with abundant surface vasculature that was prone to bleeding upon touch. (D) Microscopic examination after partial endoscopic removal of the intratracheal lesion demonstrated residual irregular wide-based changes. (E) The excised specimen had a smooth surface with shallow lobulation. (F) Histopathological analysis revealed squamous metaplasia with nests of cancer cells arranged beneath the mucosa. The cancer cells displayed round and elliptical nuclei, visible nucleoli, and mitotic figures, along with scattered lymphocytes in the background, confirmed the altered tissue as pulmonary lymphoepithelioma-like carcinoma (hematoxylin and eosin, ×400). (G) A postoperative reassessment PET-CT scan showed residual lesions with high metabolism, indicated by an SUV of 5.1 (indicated by black arrow). LELC, lymphoepithelioma-like carcinoma; HU, Hounsfield units; CT, computed tomography; PET, positron emission tomography; SUV, standardized uptake value.

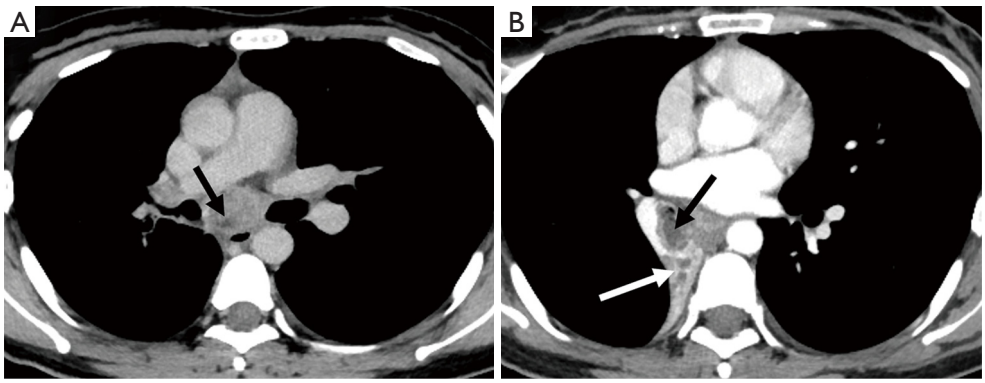

Figure 4 A 33-year-old female patient was diagnosed with primary tracheal LELC. (A) A contrast-enhanced parenchymal phase CT scan reveals the enlargement of group 7 lymph nodes with uneven enhancement, displaying small areas of necrosis (indicated by black arrow). (B) The enhanced arterial phase image demonstrates mucus plug formation (indicated by black arrow) in the adjacent right main bronchus, corresponding to obstructive atelectasis in the lower right lung (indicated by white arrow). LELC, lymphoepithelioma-like carcinoma; CT, computed tomography.

bronchoscopy (*Figure 3C*), and underwent post-partial resection via tracheoscopy (*Figure 3D,3E*), the pathological examination confirmed the altered tissue as pulmonary LELC (*Figure 3F*), exhibited a residual lesion with an SUV of 5.1 (*Figure 3G*) and an enlarged lymph node with an SUV of 6.3. Mediastinal lymph node enlargement was observed in 8 cases (61.5%, 8/13), predominantly involving group 7 lymph nodes (5/8), with a maximum short-axis diameter of 11.1±5.5 mm. These nodes displayed uneven enhancement after contrast administration (*Figure 4A*). There was 1 case that exhibited vessel invasion, accompanied by obstructive pneumonia in the right lower lung (*Figure 4B*). A total of 2 patients underwent PET-CT, 8 underwent cranial MRI, and 5 had emission computer tomography (ECT) examinations, all showing no evidence of distant metastases.

Treatment and prognosis

Among the patients, 9 (75%, 9/12) exhibited no signs of distant metastasis upon CT re-examination after treatment. Among these,6 patients underwent radical resection via video-assisted thoracoscopic surgery (VATS), comprising two patients who underwent tumor resection with mediastinal lymph node dissection, two patients who underwent tracheal tumor resection with reconstruction of the tracheal carina and mediastinal lymph node dissection, one patient who underwent tracheal tumor resection along with wedge resection of the right upper lung and reconstruction of the tracheal carina and mediastinal lymph node dissection, and one patient who underwent tracheal tumor resection with resection of the right upper lobe and partial resection of the carina with reconstruction. Postoperative pathology confirmed that all patients achieved R0 resection. and a favorable prognosis. There was 1 patient who received neoadjuvant chemotherapy (300 mg of carboplatin on day 1 + 400 mg of paclitaxel on day 1 + 200 mg of dabrafenib on day 1) followed by surgical resection, for whom follow-up revealed mediastinal lymph node metastasis in the 16th month. This patient underwent 20 sessions of radiotherapy (40 Gy) and demonstrated improvement. Another patient responded positively after 4 cycles of chemotherapy (0.9 mg of pembrolizumab + 120 mg of cisplatin) and 33 sessions of radiotherapy (66 Gy). Exploratory surgery was performed on 1 patient and they were scheduled for neoadjuvant chemotherapy. Unfortunately, 4 patients chose not to pursue treatment, requested discharge, and were subsequently lost to follow-up.

Discussion

LELC is a rare and distinctive malignancy that manifests outside the nasopharynx; however, its histological morphology resembles undifferentiated nasopharyngeal carcinoma. First reported by Bégin *et al.* (5) in 1987, LELC is closely linked to EBV infection and exhibits a prevalence in southern China, consistent with the distribution of EBV. The cases examined in this study correspond to findings in the existing literature (6-9), with nearly all cases originating from Guangdong and adjacent coastal areas, and 1 case from Hubei. Primary LELC can manifest in various

organs, including the lungs, salivary glands, thymus, liver, stomach, genitourinary system, and skin, with extremely rare instances occurring in the trachea. Both Chinese and international literature primarily comprises minimal cases, totaling less than 10 (9-11). In our group, the male-to-female ratio was 1:1.6, with an average age of 48±14 years, and only 2 cases were identified as smokers (15.3%).

Patients with primary tracheal LELC might exhibit various clinical symptoms, including coughing, sputum production, hemoptysis, dyspnea, chest tightness, and weight loss. In this study, among the 13 patients, 11 presented with a cough, 9 with sputum production, 3 with hemoptysis, 6 with dyspnoea, and 1 with chest tightness, whereas 4 experienced weight loss. A total of 6 of the patients underwent lung tumor panel testing, revealing only a marginal elevation of neuron-specific enolase in 4 cases, with the remainder showing no abnormalities. The clinical symptoms and tumor indicators are similar to those of other respiratory diseases, lacking significant specific changes and thereby posing a challenging diagnosis.

Among these 13 patients, 12 exhibited lesions located in the mid/distal thoracic segment, with predominant right-sided growth in 10 cases and predominant left-sided growth in 2 cases. Within these 12 cases, excluding 3 with larger lesions involving the posterior wall, 9 cases displayed minimal involvement of the membranous posterior wall. Only 1 case had the lesion situated in the cervical segment, growing along the posterior and right walls of the trachea. Consequently, the distribution of this disease displays characteristic features, predominantly occurring on the distal right wall of the trachea. The author speculates that this observation might stem from anatomical factors of the airway itself, where gas creates vortices, leading to the retention of bacteria, viruses, and harmful substances. This contrasts with squamous cell carcinoma and adenoid cystic carcinoma of the trachea, which typically arise in the upper segment of the trachea and the membranous portion or junction of the membranous and cartilaginous rings of the posterior wall (12,13). This distinction might be associated with the abundance of mucous glands in that area (14). Additionally, 8 patients (61.5%, 8/13) presented with mediastinal lymph node enlargement, predominantly affecting group 7 lymph nodes, indicating a potential association with the distribution pattern of this disease.

In this case series, all patients presented with solitary, wide-based, irregularly thickened tracheal wall lesions that exhibited internal and external growth. These lesions demonstrated indistinct demarcation from the corresponding tracheal level, resulting in varying degrees of tracheal stenosis over a relatively extensive range (30.8±13.5 mm). However, most lesions displayed clear boundaries with surrounding tissues, and adjacent fat interspaces were generally evident. Primary tracheal LELC exhibited characteristics similar to those of common malignant/low-grade malignant tracheal tumors, including wide-based growth, eccentric stenosis, and extensive tracheal involvement. Nevertheless, the density of these lesions typically appeared uniform on plain scans but exhibited heightened enhancement after contrast administration, with a substantial difference between parenchymal phase enhancement and plain scan values (47.7±8.9 HU). In 1 patient, arterial phase reconstruction revealed aberrant small chaotic vascular shadows within the lesion, originating from bronchial arteries, indicating neoangiogenesis and rich tumor vascularity, making the lesion less prone to necrosis. However, larger or rapidly growing tumors might also exhibit liquefaction necrosis and calcification changes. The uniform density, infrequent necrosis, and high enhancement of primary tracheal LELC serve as distinguishing features from squamous cell carcinoma. In 2 patients who underwent PET-CT examinations, the lesions exhibited mildly elevated SUVs ranging from 4.4 to 5.1, overlapping with other malignant tracheal tumors. Nonetheless, PET-CT is shown to be beneficial for evaluating lymph node metastasis, distant metastasis, and postoperative residual lesions.

Out of the 13 cases, 6 patients underwent curative surgery, resulting in complete disappearance of the lesion postoperatively. Subsequent CT follow-ups revealed no recurrence or metastasis. In the case of 1 patient, who underwent neoadjuvant chemotherapy followed by surgical resection, mediastinal lymph node metastasis was experienced, which improved with subsequent radiotherapy. Another patient responded positively to combined radiotherapy and chemotherapy. Additionally, 1 patient underwent exploratory surgery and was scheduled for neoadjuvant chemotherapy. Typically, patients with primary malignant tracheal tumors have a poor prognosis, with reported 5- and 10-year survival rates ranging from 5% to 15% and 6% to 7%, respectively. However, among the diagnosed and treated patients in this series, 5 survived for 3–5 years, suggesting a potentially lower degree of malignancy in tracheal LELC. Early curative surgery yielded favorable results, whereas comprehensive treatments such as radiotherapy and chemotherapy can be considered for patients who have lost the opportunity for surgical

intervention at a later stage (15). Although the literature indicates high expression of programmed death-ligand 1 in LELC (16,17), future research is necessary due to its rarity and lack of experience in immunotherapy.

Conclusions

In conclusion, primary tracheal LELC is not associated with smoking. It predominantly manifests on the distal right tracheal wall, displaying infiltration internally and externally, with limited involvement of the tracheal membranous posterior wall. These lesions exhibit relatively uniform density on plain CT scans and infrequently present with liquefaction necrosis. They showed significant enhancement, demonstrating typical CECT features. PET-CT plays a crucial role in improving diagnosis and staging. The definitive diagnosis relies on pathology. Early detection allows for curative surgical treatment, leading to favorable outcomes in most cases.

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Footnote

Reporting Checklist: The authors have completed the STROBE and AME Case Series reporting checklists. Available at https://tlcr.amegroups.com/article/view/10.21037/tlcr-24-333/rc

Data Sharing Statement: Available at https://tlcr.amegroups.com/article/view/10.21037/tlcr-24-333/dss

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Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://tlcr.amegroups.com/article/view/10.21037/tlcr-24-333/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The institutional review board of the First Affiliated Hospital of Guangzhou Medical University approved this case-series study (No. 202270) and written consent was provided from all patients.

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