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**Mucosa-Associated Lymphoid Tissue Lymphoma of the Trachea Treated with Radiotherapy: Case Report and Literature Review**

BALT lymphoma with Radiotherapy

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## **Abstract**

### **BACKGROUND**

Mucosa-associated lymphoid tissue(MALT)lymphoma originates in the marginal zone of lymphoid tissue. lung is one of the most frequent non-gastrointestinal organs involved, here known as bronchus-associated lymphoid tissue (BALT) lymphoma. BALT lymphoma of unknown etiology, and most patients are asymptomatic. The treatment of BALT lymphoma is controversial.

### **CASE SUMMARY**

A 55-year-old man admitted to hospital had a three-month history of progressively coughing up yellow sputum, chest stuffiness, and shortness of breath. Fiberoptic bronchoscopy revealed mucosal visible beaded bumps 4 cm from the tracheal carina at 9 o'clock and 3 o'clock, the right main bronchus, and the right upper lobe bronchus. Biopsy specimens showed mucosa-associated lymphoid tissue(MALT)lymphoma. Computed tomography virtual bronchoscopy (CTVB) showed uneven main bronchial wall thickening and multiple nodular protrusion. Bronchus-associated lymphoid tissue (BALT) lymphoma stage IE was diagnosed after a staging examination. We treated the patient with radiotherapy (RT) alone. A total dose of 30.6 Gy/17 f/25 d was given. The patient had no obvious adverse reactions during RT. The CTVB was repeated after RT and showed that the right side of the trachea was slightly thickened. CTVB was repeated 1.5 mo after RT and again showed that the right side of the trachea was slightly thickened. Annual CTVB showed no signs of recurrence. The patient now has no symptoms.

### **CONCLUSION**

BALT lymphoma is an uncommon disease and shows good prognosis. The treatment of BALT lymphoma is controversial. In recent years, less invasive diagnostic and therapeutic approaches have been emerging. Radiotherapy was effective and safe in our

case. The use of CTVB could provide a noninvasive, repeatable, and accurate method in diagnosis and follow-up.

**Key Words:** Mucosa-associated lymphoid tissue (MALT) lymphoma; Computed tomography virtual bronchoscopy; Radiotherapy; Prognosis; Case Report

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**Core Tip:** The treatment of BALT lymphoma is controversial. A patient with BALT lymphoma received RT alone. A total dose of 30.6Gy/17f/25d was given. The patient had no obvious adverse reactions during RT. The CTVB was repeated after RT and showed that the right side of the trachea was slightly thickened. CTVB was repeated 1.5 mo after RT and again showed that the right side of the trachea was slightly thickened. Annual CTVB showed no signs of recurrence.

## INTRODUCTION

Primary pulmonary non-Hodgkin's lymphomas are uncommon. They represent 3.6% of all extranodal lymphomas and 0.4% of all non-Hodgkin's lymphomas. Extranodal marginal zone lymphoma of the mucosa-associated lymphoid tissue (MALT) type is the most frequent [1]. MALT lymphoma originates in the marginal zone of lymphoid tissue. The gastrointestinal tract is associated with more than two-thirds of cases, but the lung is one of the most frequent non-gastrointestinal organs involved, here known as bronchus-associated lymphoid tissue (BALT) lymphoma. BALT lymphoma of unknown etiology, and most patients are asymptomatic. The treatment of BALT lymphoma is controversial. A patient with BALT lymphoma received radiotherapy (RT) alone, leading to complete remission of the tumor. A case description as follows.

## **CASE PRESENTATION**

### ***Chief complaints***

A 55-year-old man had progressively coughing up yellow sputum, chest stuffiness, and shortness of breath.

### ***History of present illness***

A 55-year-old man, had a three-month history of progressively coughing up yellow sputum, chest stuffiness, and shortness of breath. He had no chest pain, fever, night sweats, or weight loss.

### ***History of past illness***

No lymphadenopathy or chronic lung disease was present.

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### ***Personal and family history***

The patient had no history of smoking or alcohol abuse. Without family history of carcinomas.

### ***Physical examination***

Physical examination did not show any signs of superficial lymph node enlargement. No rales, two lungs breathing clearly.

### ***Laboratory examinations***

Hematological and biochemical examination results largely normal.

### ***Imaging examinations***

An enhanced CT scan revealed the left upper lobe nodules, considered benign. Two-side pleural multiple heterogeneous hypertrophy with calcification was found. Fiberoptic bronchoscopy showed mucosal visible beaded bumps 4 cm from the tracheal carina at 9 o'clock and 3 o'clock, the surface flow was rich, and the bronchus extended

to the tracheal carina, the right main bronchus, and the right upper lobe bronchus (Figure 1). Biopsy specimens showed MALT lymphoma (Figure 2). Immunohistochemical staining was performed with Bcl - 6 (-), CD10 (-), CD20 ( + ), CD21 (remaining FDC net), CD3 (-), CD56 (-), CKpan (lymphatic epithelial lesions), Ki67 ( + 5%), Syn (-), and TTF-1 (-) (Figure 3). Physical and laboratory examinations were normal. Bone marrow was not infiltrated by abnormal lymphocytes. Computed tomography virtual bronchoscopy (CTVB) showed uneven main bronchial wall thickening and multiple nodular protrusion (Figure 4A). No lymphadenopathy or chronic lung disease was present.

### **FINAL DIAGNOSIS**

BALT lymphoma stage IE was diagnosed was diagnosed.

### **TREATMENT**

We treated the patient with radiotherapy (RT) alone. Intensity-modulated radiation therapy(IMRT) was performed with Elekta linear accelerator. A total dose of 30.6Gy/17f/25d was given. The process went well.

### **OUTCOME AND FOLLOW-UP**

The patient had no obvious adverse reactions, and all symptoms disappeared. After completing RT, CTVB was repeated and showed the right side of the trachea was slightly thickened (Figure 4B). CTVB was repeated 1.5 mo after RT and showed again that the right side of the trachea was slightly thickened (Figure 4C). The case had been followed up for more than 3.5 years, and annual CTVB showed no signs of recurrence (Figure 5A-D). The patient now shows no symptoms. Long-term efficacy requires further follow-up.

### **DISCUSSION**

<sup>4</sup> BALT lymphoma is considered to be a consequence of long-term exposure to a variety of antigenic stimuli-including smoking, inflammatory disorders, or autoimmune diseases <sup>6</sup> [2-4]. BALT lymphoma tend to remain localized until late in the natural course. The histological progression from a low-grade BALT lymphoma to a high-grade lymphoma is rare, and they show a good prognosis. Many patients with this disease are asymptomatic. Symptomatic patients evidence some nonspecific pulmonary symptoms, such as cough, dyspnea, and chest pain. It is easy to misdiagnose and miss diagnoses. [5, 6]

The diagnosis of BALT lymphoma should be based on comprehensive analysis *via* chest X-ray, CT, MRI and other imaging, a bone marrow biopsy, bronchoscopy, and PET/CT. Imaging is characterized by irregular tracheal or bronchial wall thickening and luminal stenosis, with or without accompanying atelectasis. Microscopic examination of the trachea is performed to diagnose the disease under larger values, mainly for nodules or mucosa hypertrophy.

<sup>1</sup> Because the incidence and prevalence of this disease are rare, it is difficult for large randomized clinical trials to provide an “evidence-based” approach. <sup>1</sup> There is no consensus for the treatment of BALT lymphoma. Surgery, single agent therapy, combination chemotherapy, radiation treatment, and the watchful waiting approach have all been used in single or very small series of cases <sup>1</sup> [7-10]. Some scholars believe that localized disease could be resected, especially for diagnostic and therapeutic purposes. <sup>1</sup> RT may play a role in the case of small localized lesions. If symptomatic, BALT lymphoma should be treated with combination chemotherapy or chemoimmunotherapy. For all other cases (asymptomatic/nonsurgical candidates), watchful waiting or single agent chemotherapy could be considered [11, 12]. RT has been combined with surgery, chemotherapy, and immunotherapy applications and has been used as a salvage therapy after chemotherapy failure. Using RT alone is rare, but most patients with RT show positive responses. <sup>2</sup> RT may be a reasonable alternative to surgical treatment, when resection of a localized tumour is not possible or appropriate [13]. However, the fields and doses of RT are rarely detailed in the literature (Table1).

Takeshi Kawaguchi *et al* described a patient treated by RT with a total dose of 50 Gy, resulting in a complete response of the tumor [14]. In a case report by Hashemi SM *et al*, a total dose of 30 Gy was administered, also resulting in a complete response of the tumor [13]. In a report by Theodore Girinsky, M.D. [21], 10 patients were treated using small radiation doses (2\*2 Gy) delivered exclusively to tumor sites. The median follow-up was 56 mo. All patients are now alive with no local progression. The five-year progression-free survival rate was 87.5% (6 CR, 4 PR).

In our case, referring to the biological characteristics of MALT lymphoma and the radiation dose of digestive tract MALT lymphoma, a total dose of 30.6 Gy/17 f was given. There were no obvious symptoms, radioactive lung, or heart injury during and after RT. Until the time of follow-up, there were no signs of recurrence. RT was effective and safe for patients with BALT lymphoma. It also retained the normal physiological structure and improved quality of life. Annual CTVB showed no signs of recurrence. Long-term efficacy still requires further follow-up.

BALT lymphoma can manifest as solitary intraluminal nodules, a diffuse wall thickening, and several tiny nodular protrusions in CT scans. Chest CT alone is not usually sufficient to determine the scope of the lesions. A bronchoscope is important in diagnosis and therapy. In our case, the patient received CTVB before RT, at the end of RT, and 1.5 mo after RT to determine the scope of the lesions and evaluate the effect. Annual CTVB was used for annual reviews. CTVB is a CT-based imaging technique that allows for a noninvasive intraluminal evaluation of the tracheobronchial tree. It can accurately show the lumen and the diameter of the trachea, the left and right main stem bronchi, and the bronchial tree down to the fourth order of bronchial orifices and branches (Figure 4D). The morphology of the carinas can be evaluated accurately, and the images look very similar to those recorded with fiberoptic bronchoscopy (FB) [15]. In contrast to FB, CTVB is noninvasive and repeatable. It can show the outside of the cavity of infringement and indicate its relationship with surrounding structures. It can also show the bronchial lumen across the narrow or blocked bronchial segment and can be used to observe the lumen, which FB cannot achieve. In this case, CTVB was applied



for diagnosis, treatment, and follow-up and provided abundant information regarding the above-mentioned characteristics. It can be used in subsequent follow-up and in other cases.

### **CONCLUSION**

BALT lymphoma is an uncommon disease and shows good prognosis. The treatment of BALT lymphoma is controversial. In recent years, less invasive diagnostic and therapeutic approaches have been emerging. Radiotherapy was effective and safe in our case. The use of CTVB could provide a noninvasive, repeatable, and accurate method in diagnosis and follow-up.

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