

# Recurrent respiratory papillomatosis with lung involvement

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## ABSTRACT

The case of a 27-year-old male with recurrent respiratory papillomatosis including lung involvement is presented. Laryngotracheal papillomatosis with lung involvement is a rare entity associated with human papillomavirus infection. Computed tomography (CT) was essential in guiding diagnostic and therapeutic approaches. Knowledge about the findings of this disease is needed for correct diagnosis, since findings are nonspecific. Lesions may show malignant transformation; regular follow-up with CT is essential.

*Key words:* • computed tomography • lung • infection

**R**ecurrent respiratory papillomatosis (also known as laryngotracheal papillomatosis) is a rare entity associated with human papillomavirus (HPV). This disease is characterized by multiple papillomas seen in upper airways, usually on the vocal cords. Downward extension of lesions to trachea, main bronchi, and lungs is rare. Tracheal involvement has been reported to occur in 5% of cases, and fewer than 1% of cases show lung involvement (1). We present a case with laryngeal papillomatosis involving the trachea and lungs.

## Case report

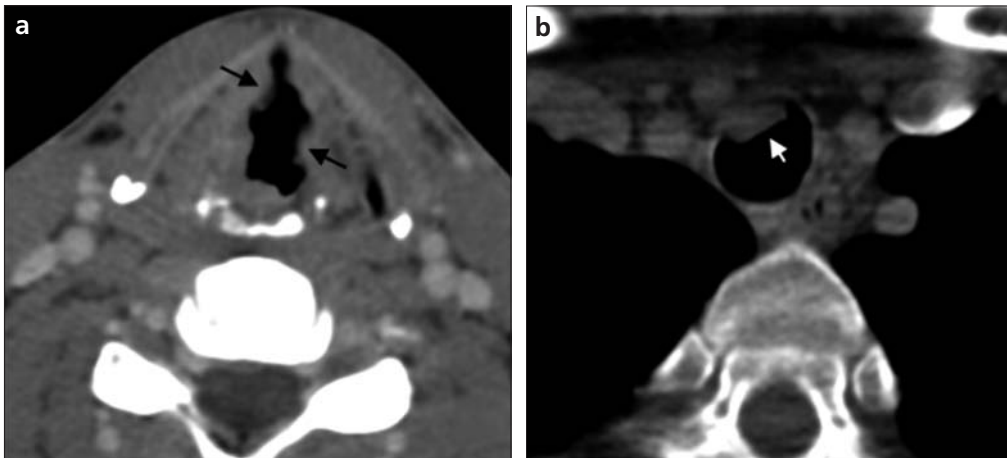
A 27-year-old man was admitted to the hospital with dyspnea, cough, and chest pain. He had recurrent episodes of stridor, beginning at 6 years of age. He had been diagnosed with laryngotracheal papillomatosis and had undergone several endoscopic procedures, but he had not been seen in medical consultation for years. On physical examination, he was noted to have decreased breath sounds over the middle zone of right lung. His complete blood count and blood biochemistry findings were normal. Microscopic examination of sputum revealed no acid-fast bacilli or fungus. Indirect laryngoscopy findings revealed irregular vocal cords containing papillomas. The width of rima glottis was 1–2 mm. Laryngeal computed tomography (CT) and chest CT were performed, with additional high-resolution CT images. CT examination revealed mucosal nodules protruding to the lumen of the trachea compatible with papillomas. Similar lesions were also observed on vocal cords (Fig. 1). Chest CT revealed air-containing cavities with thick, irregular walls in the right upper lobe and the superior segment of the lower lobe. Multiple nodules were also observed in both lungs (Figs. 2, 3). The patient underwent surgery, and papillomas were excised in order to maintain opening of rima glottis. Histologic examination of excised papillomas revealed benign squamous cell papillomas. Following laryngeal surgery, fiberoptic bronchoscopy was performed. While passing airways, a papilloma on the anterior wall of trachea was detected. However, because manipulations of lesions in this location are reported to spread disease toward the lungs, no intervention was performed. Bronchoalveolar lavage was performed, and no atypical cells were detected in cytologic examination of lavage material. The patient has been in follow-up, under interferon treatment.

## Discussion

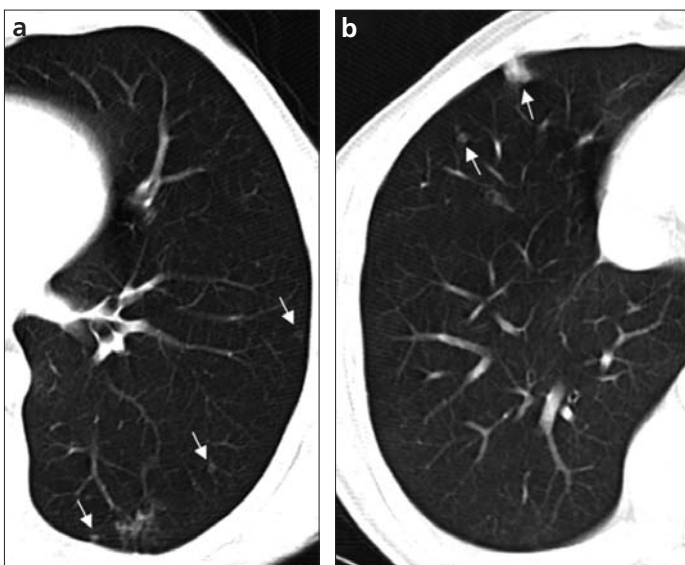
Recurrent respiratory papillomatosis is a chronic disease characterized by mucosal papillomas, which are ingrowths of squamous cell lined fibrovascular core in the lumen of central airways (1). It is the most common benign recurrent neoplasm of the larynx (2).

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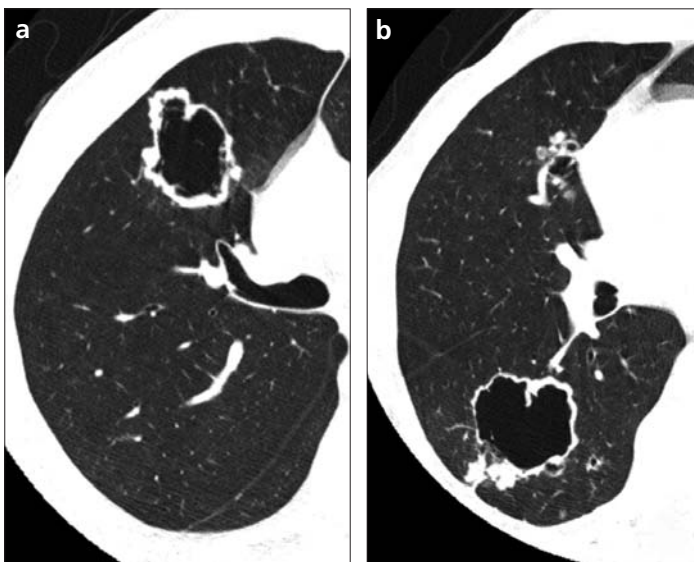
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**Figure 1.** a, b. Axial CT images (a, b) from the levels of larynx (a) and trachea (b). Multiple papillomas protruding into the airway lumen (arrows) are shown.



**Figure 2.** a, b. Axial CT images (a, b) show multiple nodules (arrows) in both lungs.



**Figure 3.** a, b. High-resolution CT images (a, b) show air-filled cavities with thick irregular walls in right upper lobe (a) and superior segment of right lower lobe (b).

Papillomatosis is associated with HPV, a deoxyribonucleic acid papovavirus with a specific affinity for squamous epithelial cells. The virus has several antigenic subtypes. HPV types 6 and 11, in particular, have been associated with the disease (3, 4). The association between the virus and the characteristic lesions of this disease was proven with electron microscopic studies and DNA analysis (5, 6). Microbiologic studies revealed antigenic similarity to genital papillomavirus, suggesting that the infection is transmitted during labor (vertical transmission) (5, 7). HPV type 11 is found to cause more severe disease (7, 8). Longstanding disease may cause dysplasia, leading to malignant transformation to squamous cell cancer. There are case reports noting malignant transformation of pulmonary papillomatosis lesions. HPV DNA has been isolated from malignant tissue specimens (4–6, 9). Enlargement of a previously found lesion and mediastinal lymphadenopathy should raise the suspicion of malignancy. The possibility of malignant transformation of papillomas makes regular follow-up using CT important (4).

CT is the standard imaging modality. The characteristic radiologic finding of the lung involvement is nodules scattered throughout the lungs. Nodules may enlarge, become air-filled cysts, and may form large cavities with thick or thin walls (10). Confirmatory diagnosis is made by direct laryngoscopy or fiberoptic bronchoscopy. These interventional procedures allow direct visualization of the airways for therapeutic approaches and for biopsy

sampling for tissue diagnosis and viral typing (7).

Involvement of lower airways and lungs is rare. Lung lesions occur in fewer than 1% of patients. There are several theories for explaining downward spread of lesions: contiguous extension of papillomas, diffuse viral contamination of airways, and downward dissemination by small particles resulting from interventional procedures such as tracheotomy, laryngoscopy, or bronchoscopy (1, 6, 9). Histopathologically, lung nodules are squamous cell proliferations. As the nodule grows, the blood supply to the center of the nodule is lost, and central necrosis occurs. Communication with an airway results in cavitation. Other hypotheses for cavitation include obstruction of the bronchus by papillomas, followed by formation of pneumatoceles or subsegmental emphysema (1, 6).

The disease is usually diagnosed before 5 years of age. However, the diagnosis of laryngotracheal papillomatosis may be challenging. Patients are often misdiagnosed with croup or asthma, and treatments are targeted to these entities. These patients do not respond to treatment and may later be admitted to the emergency department with severe respiratory problems caused by airway obstruction (11). Performing laryngeal CT should be considered in children with stridor who are nonre-

sponsive to treatment for croup and asthma, particularly if there is a known history of maternal anogenital warts.

Laryngeal CT detected the laryngeal papillomas in the presented case. In addition, a papilloma in the trachea which could not be detected by laryngoscopy was detected by CT of the larynx and thorax. This finding helped provide guidance while passing a fiberoptic bronchoscope through the trachea. Chest CT also provided information to identify the lung zone where bronchoalveolar lavage should be performed.

In conclusion, lung involvement is rare in recurrent respiratory papillomatosis. Because the radiologic manifestations of nodules and cavities are nonspecific, knowledge of radiologic manifestations of lung involvement is essential for diagnosing this disease. Follow-up studies are mandatory, since malignant transformation is possible. CT has a major role in work-up of this disease.

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