

Successful management of acquired left bronchial stenosis caused by massive atelectasis

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Abstract

Acquired bronchial stenosis is rare in children, usually caused by infection or traumatic granuloma due to chronic intubation. A case of severe acquired left bronchial stenosis successfully treated by conservative management for gastroesophageal reflux and atelectasis is reported. A male infant born at 24 weeks' gestation, weighing 461 g, presented with massive atelectasis of the left lower lobe and severe left bronchial stenosis, based on chest computed tomography performed for the evaluation of respiratory failure at the age of 8 months. He responded well to the placement of a duodenal tube for gastroesophageal reflux and chest physiotherapy, reducing the symptoms of atelectasis and successfully managing the left bronchial stenosis. Acquired bronchial stenosis could be caused by bronchial shift due to atelectasis, and it can be cured by conservative management. In cases of acquired bronchial stenosis with massive atelectasis, it is important to consider atelectasis as a potential cause of the acquired bronchial stenosis.

Keywords

Acquired bronchial stenosis, atelectasis, infant

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Introduction

Acquired bronchial stenosis in children is a rare condition usually caused by infection or traumatic granuloma due to chronic intubation.^{1–5} A case of acquired left bronchial stenosis caused by left posterior bronchial shift because of massive atelectasis in the left lower lobe, which was successfully treated by conservative management of atelectasis and gastroesophageal reflux, is presented.

Case

A male infant born at 24 weeks' gestation, weighing 461 g, needed mechanical ventilation and surfactant administration for respiratory distress syndrome (RDS). After successful extubation on Day 53, he required prolonged use of nasal continuous positive airway pressure (NCPAP) for the respiratory failure because of the chronic lung disease, until he reached the age of 5 months. At age of 7 months, his respiratory condition worsened in association with wheezing. His chest X-ray showed atelectasis of the left lung and mediastinal shift toward the left. At 8 months of age, chest computed tomography showed a left bronchial shift toward the

left posterior and a left bronchial stenosis because of compression by the descending aorta and massive atelectasis in the left lower lobe (Figure 1). Bronchofiberscopy showed severe left bronchial stenosis and a pulsation of the posterior bronchial wall, possibly due to the descending aorta (Figure 2). Upper gastrointestinal examination performed to examine the cause of the massive atelectasis showed severe gastroesophageal reflux. He did not present with signs or laboratory findings of infection. In addition, he did not present with hypotonia or any characteristics of chromosomal abnormalities which resulted to hypotonia as a cause of massive atelectasis. Therefore, it was considered that the gastroesophageal reflux caused chronic aspiration, which, in turn, caused atelectasis. Atelectasis caused the mediastinal shift and a left bronchial shift toward the left posterior. These events caused the left bronchial compression by the

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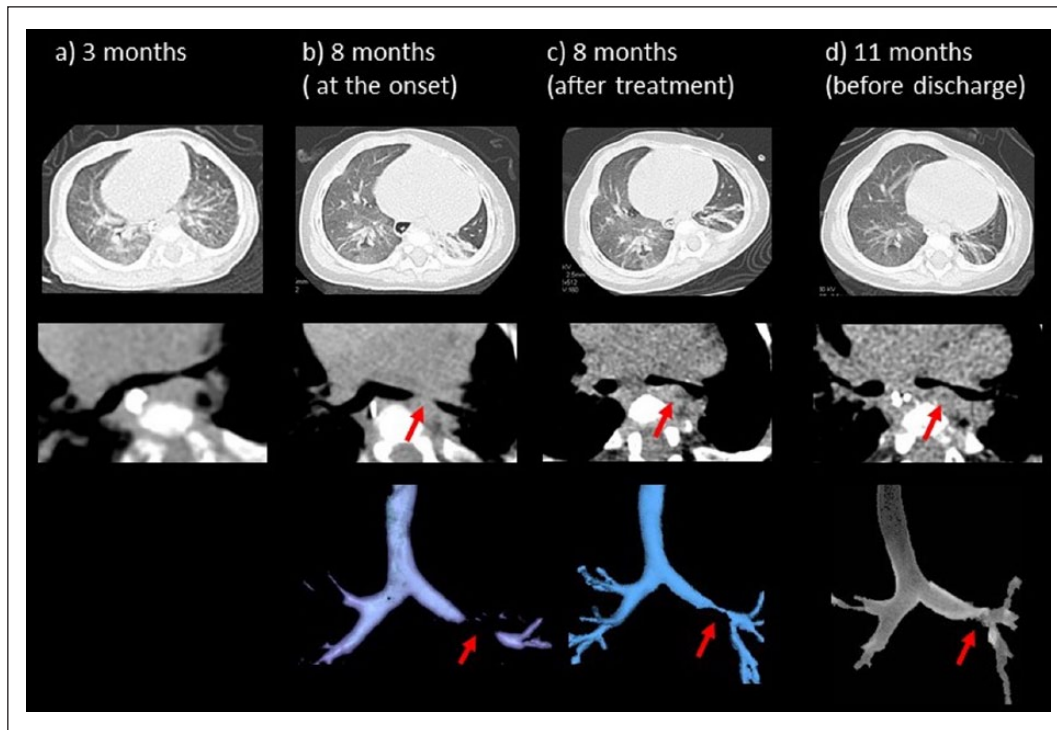


Figure 1. Chest computed tomography findings. The upper row is the axial plane (lung window). The middle row is the axial plane (mediastinal window). The lower row is the three-dimensional reconstruction of the tracheal tree. (a) At 3 months (before onset). Both lungs are equally ventilated. Bronchial stenosis is not seen. (b) At 8 months (at onset). The left lung is collapsed because of the atelectasis. The left bronchus is shifted toward the left posterior. The left bronchial stenosis is due to compression by the descending aorta (arrows). (c) At 8 months (after treatment). Atelectasis in the left lung is corrected; the left bronchial stenosis is ameliorated (arrows). (d) At 11 months (before discharge). The left bronchial stenosis has been successfully managed, while the patient's condition has shown further improvement (arrows).

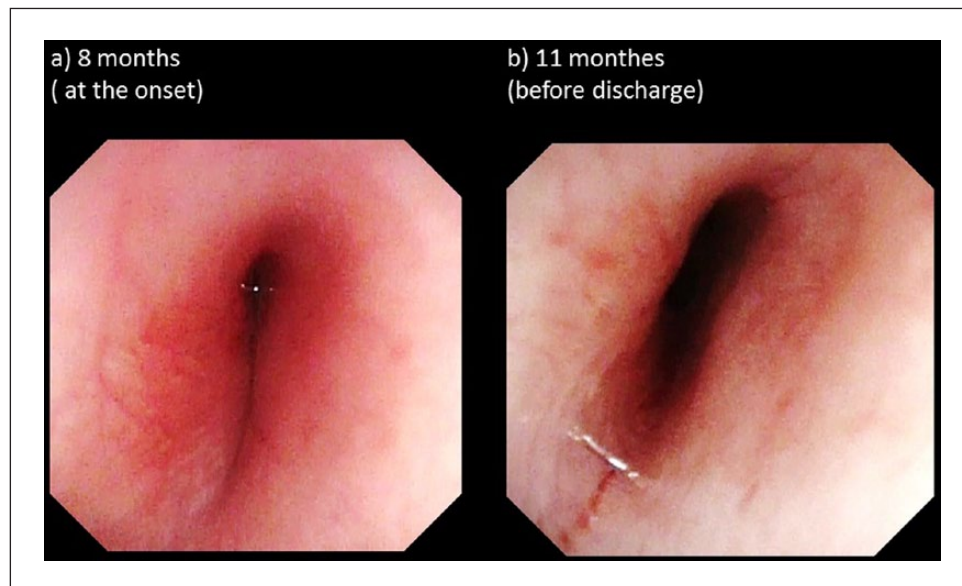


Figure 2. Bronchofiberscopy findings: (a) At 8 months (at onset). Severe left bronchial stenosis and pulsation of the posterior bronchial wall that might be caused by the descending aorta are shown. (b) At 11 months (before discharge). Amelioration of the left bronchial stenosis is shown.

descending aorta. A duodenal tube was placed for the gastroesophageal reflux, and chest physiotherapy including postural drainage in concert with percussion was performed for the atelectasis. Two weeks after initiating treatment, chest computed tomography and bronchofiberscopy showed amelioration of the left bronchial stenosis and atelectasis (Figure 1). At 11 months of age, chest computed tomography showed further improvement of the patient's condition in terms of the left bronchial stenosis. There was no recurrence of the atelectasis and the left bronchial stenosis upon and after the use of the duodenal tube.

Discussion

This case has two clinical implications. The first is that acquired bronchial stenosis could be caused by the bronchial shift due to atelectasis. Acquired bronchial stenosis in children is a rare condition usually caused by infection or traumatic granuloma due to chronic intubation.^{1–5} In this case, intubation was not performed at the onset of the bronchial stenosis, there was no granuloma in the bronchial lumen, and there was no evidence of infection. Chest computed tomography showed that there was no lymph node enlargement, which has been reported as a cause of bronchial compression.¹ Comparing the findings on chest computed tomography at the age of 3 months showing no bronchial stenosis to those at 8 months showing bronchial stenosis, there was massive atelectasis dominantly positioned in the left lower lobe, along with left bronchial shift toward the left posterior and left bronchial compression by the descending aorta. These findings indicated that the acquired left bronchial stenosis was caused by atelectasis. This report describes the first case of acquired bronchial stenosis caused by atelectasis in children.

Second, acquired tracheal stenosis caused by bronchial shift due to atelectasis was improved by conservative treatment for atelectasis. Surgical treatment for bronchial stenosis in infants is a highly demanding approach because of the small size of the airway.¹ Intrinsic acquired bronchial stenosis such as granuloma or fibrotic stenosis could be managed with endoscopic dilation or laser resection.^{6–12} However, endoscopic dilation or laser resection was not indicated in this case because the bronchial stenosis was due to compression by the descending aorta. Correcting the condition of atelectasis caused the bronchial stenosis to heal, and surgical treatment of the bronchial stenosis could be avoided.

Acquired bronchial stenosis could be caused by the bronchial shift due to atelectasis, and it could be improved by conservative treatment for atelectasis. In general, atelectasis is often complicated by bronchial stenosis, and atelectasis is considered a result of the bronchial stenosis.¹³ However, cases in which atelectasis itself is the main cause of the bronchial stenosis might be missed in the clinical setting. The fact that acquired bronchial stenosis whose surgical treatment

is a highly demanding procedure could be improved by conservative treatment for the atelectasis has clinical importance.

Conclusion

We must be aware that acquired bronchial stenosis could be caused by massive atelectasis. In cases of acquired bronchial stenosis with massive atelectasis, it is important to consider the possibility of atelectasis as a cause of the acquired bronchial stenosis.

Declaration of conflicting interests

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Ethical approval

Our institution does not require ethical approval for reporting individual cases or case series.

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Informed consent

Written informed consent was obtained from the legally authorized representatives for anonymized patient information to be published in this article.

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