Sling Pulmonary Artery with Bridging Bronchus and Narrowing Airway: A Case Report

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We present a case of a 10-month-old girl baby with pulmonary artery sling and bridging bronchus demonstrated using multidetector computed tomography with a three-dimensional volume-rendering display and minimum intensity projections. To the best of our knowledge, this method has been helpful not only in the diagnosis and surgical planning for this rare abnormality but also in the evaluation of prognosis. After pulmonary artery reimplantation, the patient was well and discharged.

Keywords: pulmonary artery sling, bridging bronchus, multidetector computed tomography, three-dimensional volume-rendering display, minimum intensity projection

Introduction

Pulmonary artery sling (PAS) is a rare congenital anomaly that results when the left pulmonary artery (LPA) arises from the right pulmonary artery (RPA) and constricts the airway. PAS associated with the right upper bronchus arising from the trachea (tracheal bronchus) and stenosis of the bridging bronchus is a more rare and complex condition. The initial clinical presentation of these patients is mostly respiratory distress due to varying degrees of tracheoesophageal compression.1 Multidetector computed tomography (MDCT) is useful to confirm this diagnosis2 and surgery is an effective method to relieve the compression.

Case Report

A 10-month-old girl baby was admitted to our department with stridor lasting for 1 month, repeated dyspnoea for 2 w and fever for 1 w. She was undergoing medical treatment at another hospital, and her temperature was normal. When she was admitted to our hospital, her body temperature was 36.8°C, pulse rate was 144 beats/min, respiratory rate was 36 breaths/min, and blood pressure was 122/81 mmHg. On physical examination, wheezes and rales were auscultated on both lungs, and a continuous murmur was audible during auscultation of the precordial region. A chest radiograph showed patchy shadows in both lungs, and a transthoracic echocardiography showed LPA arising from RPA posterior to the trachea and an atrial septal defect. MDCT was then performed for diagnosis...
Li D, et al. (Fig. 1 and Video 1). 3D volume-rendering display and MinIP imaging revealed the presence of a bridging bronchus and partial bronchial stenosis (Figs. 2A and 2B). The patient was referred for surgery; cardiopulmonary bypass and aortic clamping were performed via median sternotomy under the guidance of a fiberoptic bronchoscope. The LPA, including the narrowing at the anastomosis site, was transected with the main pulmonary artery (MPA). The defect in MPA was closed with direct sutures. LPA was reimplanted into MPA anterior to the trachea, relieving the compression on the left main bronchus. Direct closure of the atrial septal defect was performed. No procedure was performed on the airways because of the acceptable condition on visual inspection. The infant was well and discharged on the 8th day postoperatively. At the 6-month follow-up, the stridor remained resolved without recurrence and computed tomography (CT) showed that the bronchial stenosis had disappeared (Figs. 2C and 2D).

Discussion

The association of PAS with bridging bronchus is very rare and complex. PAS can also be associated with other tracheobronchial abnormalities such as long-segment tracheal stenosis and tracheal bronchus. The latter, in which an aberrant bronchus originates from the trachea above the carina, emerges laterally and at an angle required to supply the right upper lobe, and can be confused with a bridging bronchus. The abnormal bronchus in bridging bronchus emerges more inferiorly, obliquely and below the right main bronchus when present.\textsuperscript{2,3} Traditional radiographic techniques used to diagnose left PAS with bridging bronchus have relied on chest radiography, barium esophagogram, pulmonary angiography, echocardiography, and bronchoscopy.\textsuperscript{2} Currently, the imaging technique best suited for diagnosis and presurgical planning is MDCT, which uses 3D volume-rendering display and MinIP imaging to delineate the pathology and assist in the surgical planning.\textsuperscript{3} As shown by this case, in cases with apparent symptoms, surgical intervention is essential and effective and involves reimplantation of the pulmonary artery and tracheal repair.\textsuperscript{4} Some research has proposed cardiac repair with simultaneous tracheoplasty, whereas others have proposed conservative treatment for the tracheoplasty in PAS.\textsuperscript{5} For congenital bronchial/tracheal stenosis, tracheoplasty has been an effective method. However, with the compression of PAS, it may be more effective to remove PAS. Regarding tracheoplasty, there is no additional evidence in the literature on possible long-term complications such as re-stenosis with scar tissue. Therefore, surgical strategies for bronchial/tracheal stenosis with PAS are still controversial. More studies are required, at least at our centre, to evaluate tracheoplasty for bronchial/tracheal stenosis with PAS.

Conclusion

MDCT is an ideal tool for diagnosis and treatment planning for the rare association of PAS with bridging bronchus and bronchial stenosis. As for treatment, it may
be safer and more effective to proceed with a comprehensive evaluation of both imaging and clinical presentation. Furthermore, follow-up MDCT can help with the assessment of surgical results.

**Disclosure Statement**

The authors declare no conflicts of interest.

**References**


