

Missed bronchial web in a 4-years old boy with foreign body aspiration: a case report

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Abstract

Congenital bronchial webs are extremely rare and usually remain undiagnosed due to non-specific symptoms. Herein, we reported a 4-years-old case of the bronchial web who was initially undiagnosed upon bronchoscopy following foreign-body aspiration and afterward misdiagnosed as childhood asthma through his consistent cough and exertional dyspnea for several months.

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Abstract: Congenital bronchial webs are extremely rare in incidence and usually remained undiagnosed due to non-specific symptoms. Herein, we reported a 4-years-old case of bronchial web who was initially undiagnosed upon bronchoscopy following foreign-body aspiration and afterward misdiagnosed as childhood asthma through his consistent cough and exertional dyspnea for several months.

Keywords: congenital tracheal stenosis, bronchial stenosis, chest 3d-ct; virtual bronchoscopy, bronchoscopy.

Introduction: Bronchial stenosis could be either acquired following trauma, infection, inflammation, and autoimmune condition or congenital due to bronchial webs though scarce in incidence [1]. Congenital bronchial webs are often undiagnosed during infancy and misdiagnosed later as they are not presented with specific manifestations. Bronchial webs could sometimes mimic asthma or foreign-body aspiration presentations. Patients mainly complain shortness of breath, especially during exertion, persistent cough, wheezing, or even infection[2]. The true incidence of the bronchial web is not precisely known as they may go unrecognized throughout the life. It is estimated that 1 in 10,000 births could be afflicted with bronchial webs[3]. Lung computed tomography (CT) scan could be helpful for screening of airway anomalies. Moreover, bronchoscopy is both diagnostic and a therapeutic option. Herein, we described a 4-year-old boy with a right bronchial web who had been primary diagnosed as case of foreign body aspiration and afterward treated approaching childhood-asthma.

Case-report : A 4-year-old boy with anamneses of seasonal allergy which was predominant in the spring and occasional cough without other comorbidities was referred to emergency department in Shiraz following sudden cough and dyspnea. The patient underwent bronchoscopy due to foreign body aspiration suspicious. A little plastic toy was extracted along through the bronchoscopy. Although Bronchoscopy revealed that the trachea and bronchi of the left lung was normal, the severe inflammation was reported in the right bronchus possibly due to foreign body irritation. In order not to healing the cough and other symptom, the patient referred several doctors suggested to be treated as childhood-asthma, but the symptoms did not have a remarkably improved. After five months of persistent in symptoms, especially cough and exertional dyspnea, the patient was referred to our institution for more evaluation. His physical examination was

unremarkable without audible wheezing or stridor. Results of a routine hematological panel and the chest x-ray upon-admission was interpreted as normal(**Figure.1**) . The chest CT-scan showed a partial obstruction in the main right bronchus (**Figure.2**) . To more evaluation, pulmonary 3-dimensional constructed CT-scan was conducted which revealed a narrowing structure at the third-thoracic (T3) vertebrae bone level without any mass, adenopathy, or vascular sling formation in mediastinum(**Figure.3**) . The patient underwent bronchoscopy and a string-like, pallor structure stretching across the main right bronchial lumen obstructed the mainstream of lumen with just a 2 mm opening was revealed (**Figure.4**) . No additional anomalies of the trachea, carina, vocal cords, or other organs were found. The lesion was partially removed using knife during the bronchoscopy procedure. Removal of the lesion by knife, which was easily broken, revealed a fibrous string without bronchial glands or cartilage diagnosed as a “bronchial web” (**Figure.4**) . The patients’ symptoms improved remarkably following the procedure. The second and third follow up bronchoscopy was performed for accomplishment of both bronchial web removal and to confirm that no additional microscopic changes was constructed. Of note, during the second bronchoscopy the granulation tissue was taken. On follow-up in the clinic, the patient’s dyspnea had resolved; he had no limitations in his daily activity or exercise.

Discussion: A bronchial web is formed by a thin layer of membranous tissue containing small holes that cause the bronchial lumen to narrow leading to partial airway obstruction. The etiology of the lesion is unknown. If such webs result in complete obstruction, they will be fatal unless treated at birth. The literature about which published this topic revealed that most of bronchial cases were congenital by nature and similar to our finding, anatomical occurrence was mostly in the right bronchial site [2-4]. Most of these cases went initially unrecognized due to the nonspecific symptoms. Similarly, our patient who initially had an episode of foreign body aspiration, had been treated as asthma for frequent months due to persistent cough and dyspnea. We believe that appearance of clinical symptoms just after the foreign body aspiration was due to inflammation reaction to foreign body at the bronchial web site, which led to exacerbate the partial lumen narrowing. In other meaning, the worsening of his symptoms, probably was associated with the progression of the size of the stenosis. Our case demonstrated the need for bronchoscopy evaluation due to persistent symptom not ameliorating by previous treatment. Diagnostic bronchoscopy is essential for diagnosis of congenital bronchial web and also for acquired cases. Meanwhile, in recent years, tendencies to spiral pulmonary 3D-CT scan and reconstructed virtual bronchoscopy navigation as diagnostic option has been increased[5]. By this imaging, the internal layer of the airway’s lumen and also neighboring structures of external lumen such as fistula could be inspected[6]. By evaluation of the primary chest x-ray in our patient, it was not plausible suspecting bronchial narrowing (**Figure.1**) ; however, the findings of bronchial stenosis were remarkably evident in the pulmonary 3D-CT-scan. Moreover, as the internal aspect of bronchial lumen images were constructed by virtual bronchoscopy using the pulmonary CT-scan images, the findings suggested a web shaped stenosis in right bronchus. The virtual bronchoscopy is less effective for the dynamic imaging inspection or evaluation of mucosal formations by the colorful tonnage compared to bronchoscopy; meanwhile the virtual bronchoscopy advantage is that bronchial lumen does not get invaded directly by the bronchoscope instrument; hence the possible injury to high-risk lesions is prevented. Therefore, if a fixed and predominant stenotic structure is doubted at a level where bronchoscopy is hard to utilized, primary assessment using 3D pulmonary CT-scan and virtual bronchoscopy could be helpful[5, 7]. Finally, the interventional lesion removal using knife during two stages of flexible bronchoscopy with one week interval has not been previously reported for improvement of these lesions. Due to completely remission of clinical symptoms and no procedure related side-effects, this technique is found to be a safe and effective way to treat the airway obstruction following bronchial web.

Conclusion : Herein, we described a mis-diagnosed case of child with prolonged cough and dyspnea who was ultimately diagnosed as bronchial web after evaluation via pulmonary 3D-CT scan and treated by interventional bronchoscopy. Bronchial stenosis due to web structures should be considered in prolonged asthma-like symptoms, and assessment based on using 3D pulmonary CT-scan, virtual bronchoscopy, and following bronchoscopy as ultimate diagnostic and treatment option could be advantageous.

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Patient consent statement: Written informed consent has been acquired from patient parents to publish this study according to the journal's patient consent policy. Moreover, the authors all declare that patients' confidentiality has been respected.

Data Availability Statement: The data supporting the findings of the study such as electronical medical reports and full video of bronchoscopy procedures are available on request from the corresponding author.

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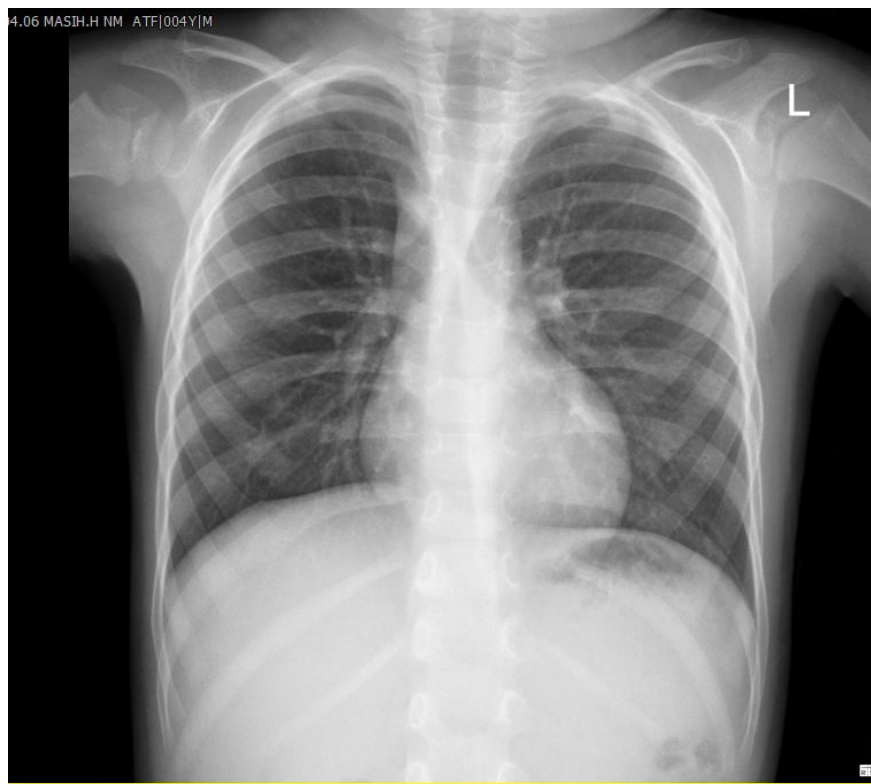


Figure.1 : normal chest-x-ray upon admssion

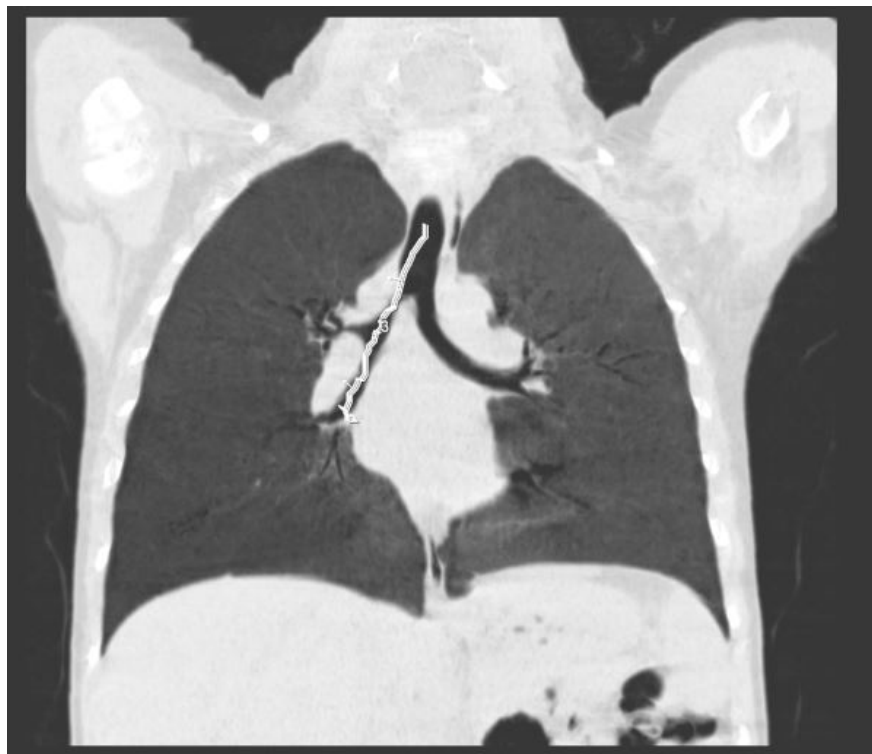


Figure.2: partial obstruction of right main bronchus is remarked in the coronal cut of the chest CT-scan

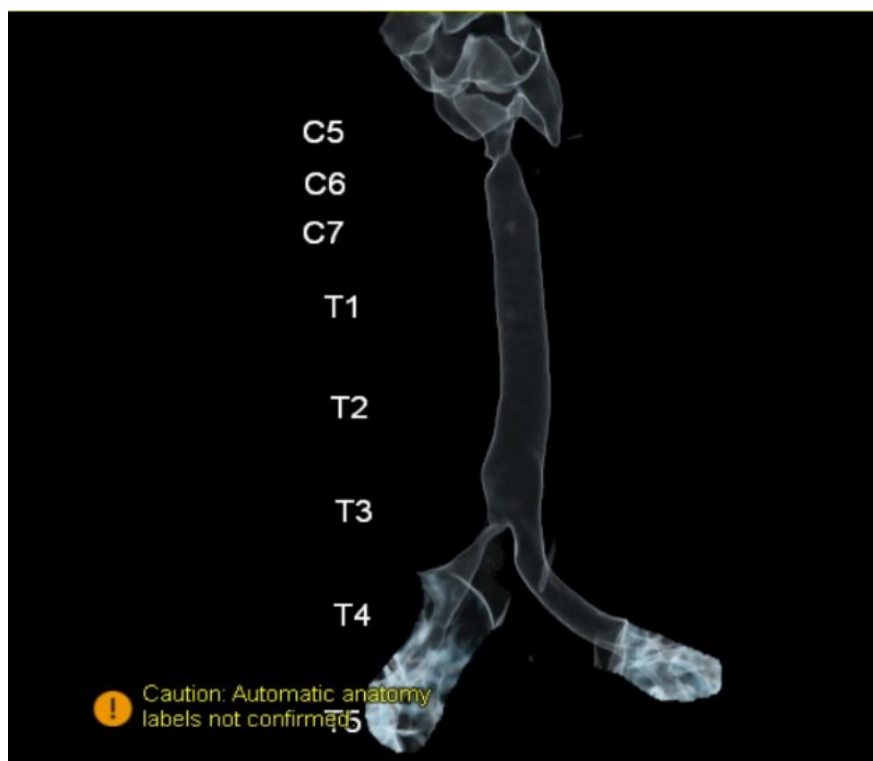


Figure.3: partial narrowing of right main bronchus at the levels of third-thoracic in the 3-dimentional chest CT-scan (virtual bronchoscopy)



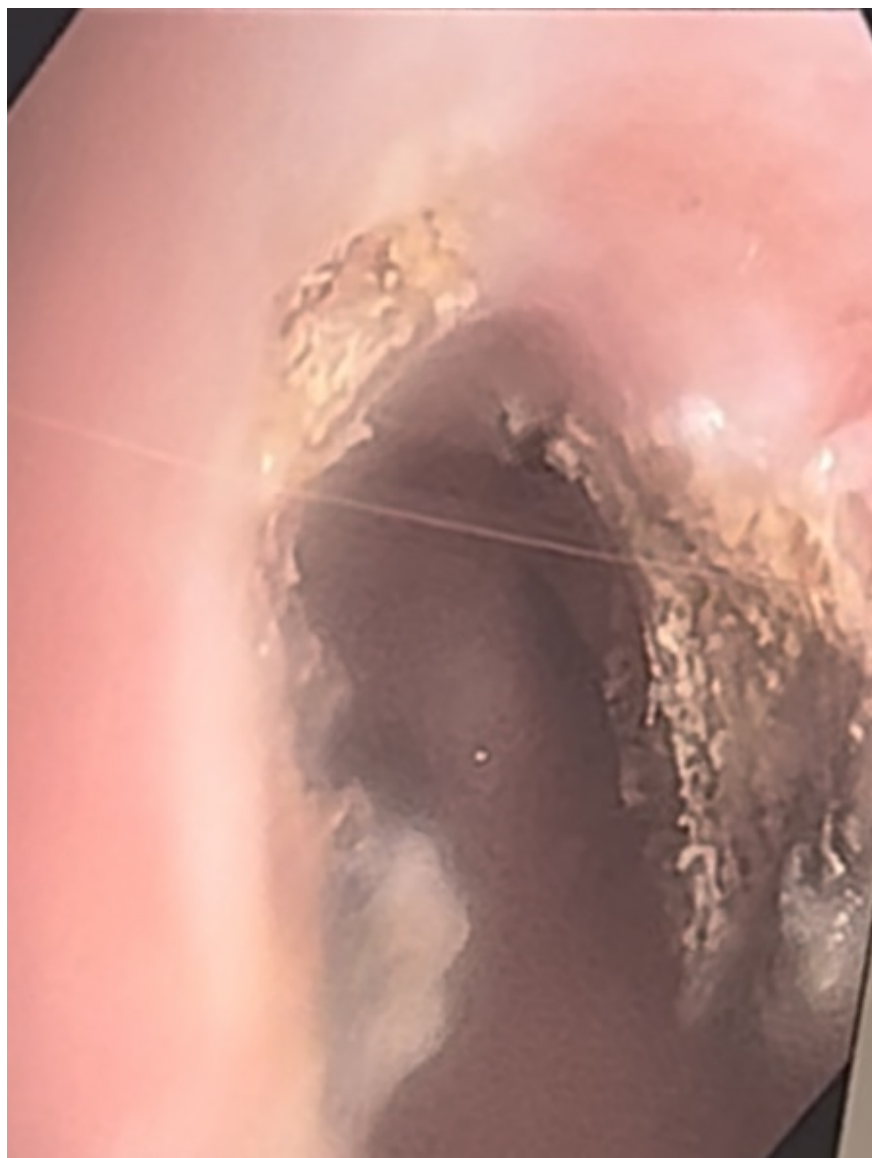


Figure.4: Bronchoscopy in a case of bronchial web in right main bronchus. A: partial stenosis before procedure, B: after removal of the web.

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