

Upper Airway Disease Presenting as Refractory Asthma

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Citation

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Abstract

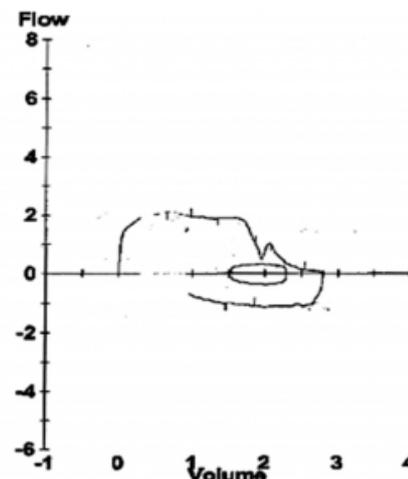
We present a case of tracheal web masquerading as refractory asthma. Flow-volume loop was consistent with fixed airway obstruction. CT scan of neck and bronchoscopy revealed the tracheal web. The patient was treated with tracheal dilatation and tracheostomy.

CASE REPORT

A 62 year old Caucasian female presented to pulmonary clinic with increasing dyspnea on exertion over past year. She reports intermittent wheezing, mild cough, and occasional nocturnal symptoms. She was diagnosed with asthma at another institution and treated with inhaled bronchodilator and corticosteroid treatment with no subjective response. The patient was referred to pulmonary clinic for evaluation and treatment of refractory asthma. Physical examination revealed normal vital signs and oxygen saturation of 96% on room air. Lung auscultation revealed mild bilateral wheezing. Cardiac, abdominal, and neurological examinations were unremarkable. She was a nonsmoker. The patient was treated with Lansoprazole for gastroesophageal reflux disease and had total abdominal hysterectomy done 13 years ago. A chest radiograph and echocardiogram were normal. Pulmonary function testing and flow-loop (Figure1) are shown below.

Figure 1

Figure 1: Flow-volume loop showing fixed airway obstruction



Forced expiratory volume in one second (FEV1)	1.89 L	78% predicted
Forced Vital Capacity (FVC)	2.81 L	94% predicted
FEV1/FVC ratio	67%	
Total Lung Capacity (TLC)	4.26 L	87% Predicted
Residual Volume (RV)	1.43 L	77% Predicted
Diffusion Capacity (DLCO)	12.3 ml/mmHg/min	57% Predicted
Maximum volunteer ventilation (MVV)	29 L/min	29% Predicted

The flow-loop is consistent with fixed airway obstruction. Computed tomography (CT) scan of neck revealed a web-like lesion just below the vocal cords (figure2, arrow) and subsequent bronchoscopy confirmed a membranous subglottic stenosis (figure3, white arrows). The patient underwent tracheostomy and tracheal dilatation.

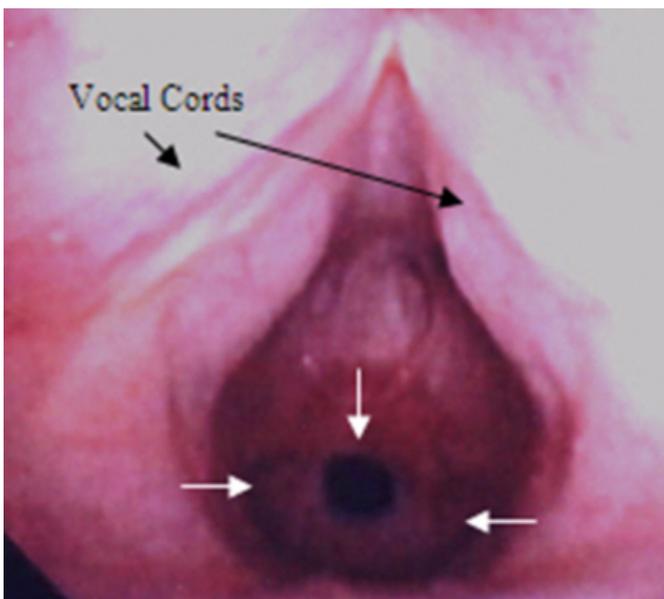
Figure 2

Figure 2: CT scan of neck showing web-like subglottic stenosis (arrow)



Figure 3

Figure 3: Picture of larynx showing vocal cords and subglottic stenosis (white arrows)



DISCUSSION

Tracheal stenosis can be congenital or acquired. Congenital tracheal stenoses include fibrous strictures, webs, cartilaginous deformities, and stenoses associated with vascular rings ¹. Congenital double aortic arch anomaly masquerading as asthma for thirty years has been described ². The most common causes of acquired tracheal stenosis are secondary to tracheal injury following a prolonged intubation ³, other traumatic injuries (surgery, blunt trauma), and inhalational injuries ⁴. Damage to subglottic mucosa due to endotracheal tube may result in ulceration, formation of granulation tissue and subsequently fibrosis and stenosis ³. Incidence of laryngotracheal stenosis secondary to intubation ranges from 1% to 20% in different series ³. Tracheal tumors including tracheal hamartoma ⁵, neurilemmoma ⁶, tracheal lipoma ⁷, glomus tumor of trachea ⁸, and primary tracheal papillomatosis ⁹, can also present with upper airway obstruction mimicking bronchial asthma. Systemic diseases like amyloidosis and relapsing polychondritis with tracheobronchial involvement are rare conditions that may present with wheezing masquerading as bronchial asthma ^{10, 11}. Tracheobronchopathia osteochondroplastica is a rare disease with incidence of 0.002-0.003% in autopsy series. This condition is characterized by presence of bone or cartilage in the mucosa of trachea and bronchi causing an irregular narrowing of trachea or central bronchi ¹².

Idiopathic laryngotracheal stenosis (ILTS) is a rare inflammatory disease that results in stenosis of upper trachea. This condition occurs almost exclusively in women. Patients present with dyspnea and stridor ¹³.

The clinical presentation of tracheal obstruction depends on the degree of lumen reduction and growth rate of the stenosis. Chronic upper airway obstruction can have an insidious presentation. Dyspnea without hypoxemia or hypercapnia is the usual presenting symptom. Patients with 50% to 60% reduction in tracheal lumen present with persistent cough, progressive dyspnea on exertion, and recurrent pneumonias. As the degree of stenosis increases, resting dyspnea and stridor may be detected. Patients with tracheal stenosis are commonly misdiagnosed with asthma or chronic obstructive lung disease. When tracheal stenosis is severe (airway diameter less than 5 mm), alveolar hypoventilation and exertional hypoxemia can be seen ^{15, 3, 11}.

Miller and Hyatt described the physiologic characteristics of obstructing lesions of the larynx and trachea. They found that maximum volunteer ventilation (MVV) and peak

expiratory flow rate (PEFR) are the most sensitive measurements to detect mild to moderate upper airway obstruction and forced expiratory volume in 1 second (FEV1) is the least sensitive. They also demonstrated that contour of the flow-volume loop becomes abnormal earlier than other spirometric measurements ¹⁴. Fixed airway obstructions produce constant degree of airflow limitation during inspiration and expiration resulting in flattening of both the inspiratory and expiratory portion of the flow-volume loop ¹¹. Helical CT scan of neck with multiplanar reconstructions is 91% accurate in detecting central airway stenosis. Thin-section axial CT scan and conventional tomography also can be used for diagnosis of tracheal stenosis. Direct visualization of central airways with bronchoscopy can confirm the diagnosis ¹⁵.

Rigid bronchoscopy with Nd: YAG laser, electrocautery, cryotherapy, mechanical dilation, and stent placement are different interventional modalities useful in management of patients with tracheal stenosis. Tracheostomy and tracheal reconstructive surgery are also indicated in selected patients ³.

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References

1. Legasto AC, Haller JO, Giusti RJ. Tracheal web. *Pediatr*

Radiol. 2004; 34:256-258.

2. Stoica SC, Lockowandt U, Coulden R, et al. Double aortic arch masquerading as asthma for thirty years. *Respiration.* 2002; 69:92-95.

3. Sue RD, Susanto I. Long-term complications of artificial airways. *Clin Chest Med.* 2003; 24:457-471.

4. Rubin AE, Wang KP, Liu MC. Tracheobronchial stenosis from acid aspiration presenting as asthma. *Chest.* 2003; 123:643-646.

5. Nadrous HF, Allen MS, Wylam ME. Rare tracheal chondroid hamartoma masquerading as asthma in a 14-year-old girl. *Ann Allergy Asthma Immunol.* 2004; 92:576-579.

6. Lin YC, Lin MC, Chen TC, et al. Tracheal neurilemmoma mimicking bronchial asthma- a dilemma of difficult diagnosis: Case report. *Changcheng Yi Xue Za Zhi.* 1999; 22:525-529.

7. Morton SE, Byrd RP jr, Fields CL, et al. Tracheal lipoma: A rarer intrathoracic neoplasm. *South Med J.* 2000; 93:497-500.

8. Nadrous HF, Allen MS, Bartholmai BJ, et al. Glomus tumor of the trachea: Value of multidetector computed tomographic virtual bronchoscopy. *Mayo Clin Proc.* 2004; 79:237-240.

9. Valentino J, Brame CB, Studtmann KE, et al. Primary tracheal papillomatosis presenting as reactive airway disease. *Otolaryngol Head Neck Surg.* 2002; 126:79-80.

10. Sharma SK, Ahluwalia G, Ahluwalia A, et al. Tracheobronchial amyloidosis masquerading as bronchial asthma. *Indian J Chest Dis Allied Sci.* 2004; 46:117-119.

11. Sundar KM, Kanner RE. Pulmonary-Function Testing in Diagnosing Upper-Airway Obstruction Oct/Nov 2000.

12. Los H, Schramel NH, van der Harten JJ, et al. An unusual cause of recurrent fever. *Eur Respir J.* 1997; 10:504-507.

13. Ashiku SK. Idiopathic laryngotracheal stenosis. *Chest Surg Clin N Am.* 2003; 13:257-269.

14. Miller RD, Hyatt RE. Obstructing lesions of the larynx and trachea: Clinical and physiologic characteristics. *Mayo Clin Proc.* 1969; 44:145-161.

15. Quint LE, Whyte RI, Kazerooni EA, et al. Stenosis of the central airways: Evaluation by using helical CT with multiplanar reconstructions. *Radiology.* 1995; 194:871-877.

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