



## Case Report

# Bronchoscopy: The Last Hope When Radiology Fails to Illuminate, A Case of Subglottic Stricture

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### Abstract

**Background:** Subglottic stricture is a rare cause of upper airway obstruction in adults and is often misdiagnosed as asthma or chronic obstructive pulmonary disease due to nonspecific symptoms and normal routine imaging.

**Case Presentation:** A 55-year-old female presented with progressive shortness of breath and wheezing for three months. Routine blood investigations, chest radiography, and contrast-enhanced computed tomography of the thorax were unremarkable. Spirometry revealed flattened inspiratory and expiratory limbs on the flow–volume loop, suggestive of fixed airway obstruction, with a reduced FEV<sub>1</sub>/FVC ratio and preserved forced vital capacity. Flexible bronchoscopy subsequently demonstrated a subglottic stricture, confirming the diagnosis.

**Conclusion:** This case emphasizes the importance of recognizing spirometric patterns of fixed airway obstruction and the role of bronchoscopy in diagnosing subglottic stricture when routine imaging is normal. Early identification allows appropriate management and improved outcomes.

**Keywords:** Subglottic stenosis, Bronchoscopy, Spirometry.

## INTRODUCTION

Subglottic stricture (subglottic stenosis) is a cause of airway obstruction that occurs due to narrowing of the airway between the inferior margin of the vocal cords and the lower border of the cricoid cartilage, most commonly acquired following endotracheal intubation or tracheostomy, though it may also be congenital, inflammatory, autoimmune, post-infectious, or idiopathic. The pathogenesis involves mucosal injury leading to inflammation, granulation tissue formation, fibrosis, and cicatricial scarring, resulting in fixed airway narrowing. Patients typically present with progressive exertional dyspnea, biphasic stridor, cough, and wheeze, and are often misdiagnosed as having asthma or COPD<sup>1</sup>. Diagnosis is established by laryngoscopy or bronchoscopy as well illustrated in this case report, supported by CT imaging to define length and severity, and spirometry showing a fixed upper airway obstruction pattern with flattening of both inspiratory and expiratory limbs of the flow–volume loop. Management depends on nature and severity of the

condition and includes medical therapy and observation, endoscopic interventions such as balloon dilatation, stenting or laser incision, and definitive surgical approaches like laryngotracheal reconstruction (LTR) with anterior, posterior or combined costal cartilage grafts or cricotracheal resection<sup>2</sup>. Cricotracheal resection offers durable long-term airway patency with excellent functional outcomes in patients with idiopathic subglottic stenosis, establishing surgery as the gold-standard treatment for appropriately selected cases.<sup>3</sup> Tracheostomy is usually reserved for critical airway compromise.

## CASE REPORT

A 55-year-old female presented to us with a history of shortness of breath and audible wheeze, which progressed over a period of 3 months. Clinical examination revealed rhonchi

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with no other added sounds. All routine blood investigations were performed and came out to be normal. A chest X-ray was done and it showed no significant abnormalities. A spirometry was performed as a part of the initial evaluation and it showed flattened inspiratory as well as expiratory curves (Figure 1), suggestive of fixed airway obstruction. The FEV1/FVC ratio was below the lower limit of normal (LLN) with preserved forced vital capacity (FVC) and reduced forced expiratory volume in 1 second (FEV1), suggestive of obstructive pathology (Figure 2).

Following the spirometry, a contrast computed tomography (CT) scan of the thorax was performed, but it came out to be unremarkable. Despite normal vital signs and imaging, her symptoms persisted. To further evaluate the cause of this presentation, flexible bronchoscopy was planned. On fiberoptic bronchoscopy, a subglottic stricture was revealed (Figure 3), which was determined to be the cause for her respiratory symptoms. The patient was referred to an interventional pulmonologist for argon laser dilatation of the stricture. The patient got rapid relief of her symptoms after the endoscopic procedure, but she did not turn-up for follow-up visit.



Figure 3: Bronchoscopic view showing subglottic stenosis.

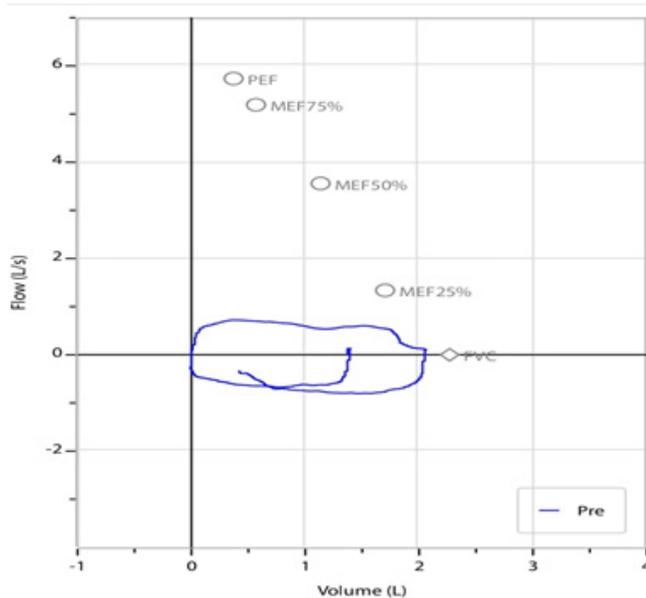


Figure 1: Flow volume loop showing flattened inspiratory & expiratory limbs.

		Meas.	Pred	% Pred	z score	
FVC	L	<b>2.09</b>	2.27	92	-0.42	
FEV1	L	<b>0.73</b>	1.91	38	-3.12	
FEV1/FVC%	%	<b>34.8</b>	78.5	44	-6.71	
FEV1/VCmax%	%	<b>34.8</b>	78.5	44	-6.71	
FEF25-75%	L/s	<b>0.61</b>	2.95	21	-2.76	
PEF	L/s	<b>0.72</b>	5.74	13	-5.57	
FET100%	s	<b>5.2</b>	-	-	-	

Figure 2: Spirometry values for the patient

## DISCUSSION

Subglottic strictures are the narrowing of the airway just below the vocal cords (glottis) in the subglottic region, leading to airway obstruction. They can be congenital which occur due to incomplete canalization of laryngotracheal lumen during development, or may be acquired post intubation or post tracheostomy. They may be associated with certain autoimmune diseases like granulomatosis with polyangiitis and relapsing polychondritis. It can occur due to trauma or injuries, iatrogenic injury following prolonged endotracheal intubation, being the most common cause. Usually, the strictures present with dyspnea and progressively increasing noisy breathing, progressive stridor, and recurrent respiratory infections as we could also appreciate in this case. As they may be missed on routine imaging, the diagnosis is made by direct visualization by either rigid laryngoscopy or bronchoscopy, like in this case. For the imaging, CT with airway reconstruction can also be used.

The management of subglottic strictures depends on the severity of the disease and is multidisciplinary and individualized.<sup>4</sup> Mild disease is treated with medical management like Anti-Reflux treatment and observation while interventions like balloon dilatation, laser therapy or even open surgery are required in cases that are moderate to severe. Cryotherapy is also a safe and effective endoscopic modality for treating glottic and subglottic stenosis, achieving restoration of airway patency with minimal bleeding and without major complications, highlighting its role as a valuable minimally invasive therapeutic option in patients.<sup>5</sup>



Management should be individualized, with endoscopic treatments reserved for short, less severe stenoses and surgical resection with primary anastomosis considered the definitive treatment for long-segment or high-grade disease, highlighting the importance of a multidisciplinary approach.<sup>6</sup> The prognosis of subglottic stricture depends on time of detection. Early detection and prompt management indicate better prognosis. Subglottic stricture, though rare, should be considered in patients with unexplained upper airway obstruction.

## CONCLUSION

In this particular case, the patient's symptoms of progressive shortness of breath and wheezing, initially suggested a condition like COPD or asthma, which could have led to a wrong diagnosis. However, spirometry loop with normal chest imaging prompted bronchoscopy, which identified the stricture. This case underscores the importance of bronchoscopy in diagnosing airway abnormalities, such as subglottic stricture, where routine radiological imaging fails

to provide a clear diagnosis. Bronchoscopy remains crucial when radiological findings fail to reveal the underlying pathology, as was proven in this case.

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