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Silent But Obstructive: Tracheal Polyp Mimicking Common Respiratory Disease

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Abstract

Central airway obstruction is a potentially life-threatening condition that may arise from malignant or benign pathologies. Benign tracheal tumors are exceptionally uncommon, constituting less than 2% of airway lesions, with fibroepithelial polyps representing one of the rarest variants. Their clinical manifestations are often nonspecific and may be mistaken for common respiratory disorders, contributing to delayed diagnosis. This report presents a rare case of a benign tracheal polyp presenting as central airway obstruction in an adult smoker and highlights the importance of early diagnostic evaluation. Case: A 41-year-old male smoker presented with progressive dyspnea, productive cough, chest discomfort, weight loss, and intermittent fever. Physical examination revealed mild rhonchi without wheezing or stridor. Arterial blood gas showed respiratory acidosis (pH 7.32; pCO_2 50 mmHg). Chest X-ray revealed only bronchitic changes, but computed tomography identified an intraluminal mass at the T1–T2 level. Bronchoscopy revealed a nearly occlusive, pedunculated tracheal lesion. The patient was scheduled for bronchoscopic biopsy and debulking. Histopathological examination revealed a benign mesenchymal tumor with prominent thick-walled blood vessels, consistent with a glomus tumor. No malignant cells were identified. Bronchoscopic debulking successfully restored airway patency. This case underscores the importance of considering rare benign tracheal lesions in adult smokers who present with persistent respiratory symptoms refractory to standard management. Early cross-sectional imaging and bronchoscopic evaluation are essential for establishing a definitive diagnosis. Bronchoscopic intervention offers a safe and effective minimally invasive approach for restoring airway patency in patients with fibroepithelial tracheal polyps, thereby preventing critical airway compromise

INTRODUCTION

Central airway obstruction (CAO) is defined as the narrowing of the major airways, including the subglottic space, trachea, right and left main bronchi, and the intermediate bronchus (1). The clinical manifestations of CAO vary depending on the location and severity of the obstruction, with common symptoms including chronic cough, dyspnea, wheezing, stridor, and hemoptysis. In more severe cases, acute respiratory failure may occur, particularly when the obstructing lesion is hemorrhagic, edematous, or secondarily infected (Ikpeama & Bailes, 2012; Villgran et al., 2022). Most symptoms are nonspecific and are often misdiagnosed as common respiratory diseases, such as asthma or chronic bronchitis,

contributing to delayed recognition (Diab et al., 2018; Kavanagh et al., 2019; Kubiak et al., 2024; MacNeil et al., 2016).

The etiologies of CAO range from benign to malignant, with malignant causes being more common and typically associated with a poorer prognosis (Hattab et al., 2024; Harris et al., 2018; Nguyen-Hai et al., 2023). Benign tracheal tumors are exceedingly rare, comprising less than 2% of all airway lesions, and usually exhibit slow growth (Girvin et al., 2023; Madariaga & Gaissert, 2018). Hamartomas and squamous cell papillomas are among the most frequently reported benign tracheal tumors (1,2). Fibroepithelial tracheal polyps are particularly rare, especially when they enlarge sufficiently to cause significant airway obstruction (3). Although the exact incidence remains unknown due to limited case reports, these polyps are believed to be associated with chronic inflammation, trauma, or long-term mucosal irritation, such as in active smokers. Their pathogenesis is thought to involve persistent mucosal irritation that promotes epithelial hyperplasia and submucosal fibrovascular proliferation, ultimately forming a polypoid lesion.

Several previous studies have highlighted the clinical challenges in diagnosing CAO due to its nonspecific presentation. A study by Ernst et al. (2004) reported that delayed diagnosis of central airway obstruction is common, often resulting from initial misclassification as asthma or chronic obstructive pulmonary disease. Similarly, Dutau et al. (2012) emphasized the importance of bronchoscopic evaluation as the gold standard for identifying rare benign airway lesions, including tracheal polyps. Furthermore, case reports by Kim et al. (2018) demonstrated that fibroepithelial polyps, although benign, can cause life-threatening airway obstruction when not detected early, underscoring the need for timely intervention and accurate diagnosis.

Other benign causes of CAO include post-intubation or post-tracheostomy tracheal stenosis (reported in 1–21% of patients with prolonged intubation), idiopathic subglottic stenosis, systemic inflammatory diseases, infectious processes such as tuberculosis or fungal disease, other benign tumors (e.g., hemangiomas, neuromas, lipomas), extrinsic compression from mediastinal masses or lymphadenopathy, and tracheobronchomalacia (1).

Given these varied etiologies, this case highlights the importance of maintaining clinical awareness of rare causes of airway obstruction in adult patients, particularly those with a smoking history and persistent respiratory symptoms that do not improve with standard therapy (Oberg et al., 2018; Daneshvar et al., 2019; Milojevic et al., 2021). The purpose of this case report is to promote early recognition, enhance clinical vigilance, and contribute to the optimal management of tracheal polyp–induced airway obstruction. The benefit of this study is to provide additional clinical insight for healthcare professionals in identifying rare causes of airway obstruction and to support more accurate and timely management, thereby reducing the risk of misdiagnosis and complications.

RESEARCH METHOD

A 41-year-old male presented with a primary complaint of shortness of breath and productive cough that had persisted since September 26th, 2025. The cough was occasionally severe and associated with chest pain radiating to the back. He also reported decreased appetite, disturbed sleep, and unintentional weight loss over the past month. There was no history of night sweats, and the patient experienced intermittent fever, although the exact

temperature was not recorded. He is a current smoker with no significant previous medical history.

Physical examination revealed an alert and fully conscious patient (GCS E4V5M6). Vital signs on admission were as follows: heart rate 83 beats per minute, blood pressure 91/63 mmHg, body temperature 36.2°C, respiratory rate 22 breaths per minute, and oxygen saturation (SpO_2) 98% on room air. Pulmonary auscultation demonstrated vesicular breath sounds (+++/+++), mild rhonchi (+/+++), and no wheezing. Other systemic examinations were within normal limits.

Laboratory findings on October 22nd, 2025, revealed a white blood cell count of 9.75 $\times 10^3/\mu L$, hemoglobin 14.2 g/dL, hematocrit 43.6%, and platelet count 214 $\times 10^3/\mu L$. Liver enzymes were within normal limits (SGPT 11 U/L, SGOT 7 U/L). Coagulation profile showed PPT 9.6 seconds and APTT 23.0 seconds (low). Renal function tests on October 23rd, 2025, showed urea 17 mg/dL and creatinine 1.0 mg/dL.

Arterial blood gas (ABG) analysis demonstrated pH 7.32 (low), pCO_2 50 mmHg (high), pO_2 89 mmHg, HCO_3^- 26 mmol/L, and SO_2 96%, indicating a respiratory acidosis with partial metabolic compensation. Electrocardiogram (ECG) showed sinus rhythm with a heart rate of 84 beats per minute.

Impulse oscillometry performed on 24 October 2025 demonstrated abnormal lung mechanics characterized by elevated R5Hz (0.62, 223%), indicating increased total airway resistance, predominantly involving the small airways. The markedly reduced X5Hz (-0.13; –1355%) reflects impaired reactance and increased peripheral elastance, consistent with dysfunction of the distal airways. The VT value (0.43, 107%) remains within normal limits, suggesting preserved global tidal ventilation. Overall, the pattern is consistent with small airway obstruction, supporting the clinical impression of peripheral airway involvement and correlating with the patient's respiratory symptoms.

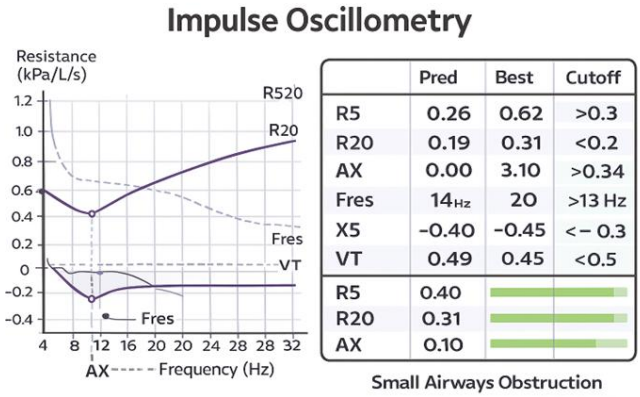

Figure 1. Impulse Oscillometry show small airway obstruction

Source: Documented from author's case series

Spirometry performed on 24 October 2025 results demonstrate a mixed obstructive–restrictive ventilatory pattern. The flow–volume loop shows a marked reduction in the *Peak Expiratory Flow (PEF)* and *Forced Expiratory Flow at 50% of FVC (FEF_{50})*, indicating impaired expiratory airflow consistent with airway obstruction. The expiratory limb exhibits

a characteristic concave "scooped-out" appearance, further supporting the presence of obstructive physiology.

Additionally, the inspiratory limb shows a decreased *Forced Inspiratory Flow at 50% (FIF_{50})*, suggesting involvement of the upper airway, likely due to a fixed mechanical obstruction. The FEF_{50}/FIF_{50} ratio approaching 1, together with the reduced FIF_{50}, raises suspicion for a central or intratracheal lesion causing flow limitation during both inspiration and expiration. The forced vital capacity (FVC) is also reduced, indicating a concomitant restrictive component, possibly secondary to chronic airflow limitation or reduced lung expansion caused by persistent intraluminal obstruction. Overall, these spirometric findings are consistent with a mixed obstructive and restrictive ventilatory disorder, exhibiting flow-volume characteristics commonly associated with tracheal polyps or other intraluminal tracheal masses producing fixed upper airway obstruction.

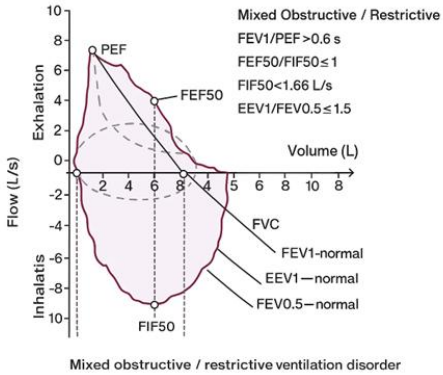

Figure 2. Spirometry show mixed obstructive and restrictive ventilatory disorder.
Source: Documented from author's case series

Radiologic examinations included a chest X-ray (October 1st, 2025) which revealed bronchitic changes. An MSCT of the neck without contrast (October 21st, 2025) demonstrated a heterogeneous-density intraluminal lesion at the level of T1–T2, suggestive of a tracheal mass or mucous plug, accompanied by multiple bilateral cervical, submandibular, and submental lymphadenopathies, as well as nasal septum deviation.

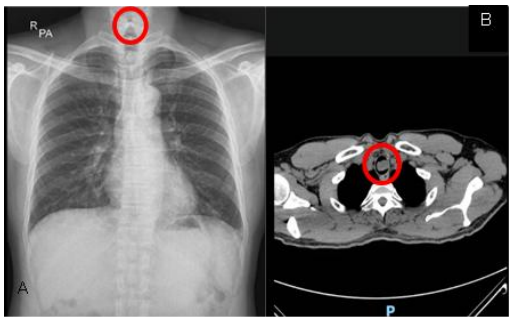

Figure 3. a. Chest X-ray imaged revealed bronchitic changes. b. CT scan Thorax imaged showed suggestive of a tracheal mass or mucous plug, accompanied by multiple bilateral cervical, submandibular, and submental lymphadenopathies, as well as nasal septum deviation.
Source: Documented from author's case series

Bronchoscopic evaluation confirmed the presence of a central airway obstruction caused by an intraluminal tracheal mass.

Figure 4. A. Showed mass on Trakea Proximal. B and C. Shows Bronchoscopic imade with presence of a central airway obstruction caused by an intraluminal tracheal mass.
Source: Documented from author's case series

The patient underwent a tracheal washing procedure for the clinical diagnosis of an intraluminal tracheal tumor. A liquid-based cytology examination was performed. The specimen was received in a plastic container containing approximately 15 cc of reddish fluid. The sample was processed for cytological evaluation and stained using Diff-Quik and Papanicolaou methods.

Microscopic examination revealed a smear composed of mature squamous cells along with aggregates of inflammatory cells, predominantly lymphocytes, accompanied by a small number of neutrophils and macrophages. The background consisted of amorphous material. No malignant cells or specific pathological processes were identified in this specimen. In conclusion, no malignant cells and no specific pathological features were observed. Another microscopic examination revealed two fragments of tissue. One fragment consisted solely of stratified mature squamous epithelial cells without accompanying stroma. The second fragment demonstrated a proliferation of neoplastic mesenchymal cells with increased cellularity.

These cells appeared spindle-shaped to ovoid, with some arranged around thick-walled blood vessels. The nuclei were relatively monotonous, ranging from oval to elongated, with fine chromatin and inconspicuous nucleoli. The cytoplasm was scant, eosinophilic, and no significant pleomorphism or tumor necrosis was identified. Mitotic figures were minimal, and numerous thick-walled vascular components were observed, arranged consistently among the neoplastic cells. No evidence of epithelial, glandular, or squamous differentiation was seen. Conventional morphological features suggest a benign mesenchymal tumor with prominent thick-walled blood vessels, raising the possibility of a glomus tumor (glomangiomyoma). Differential diagnoses include hemangiopericytoma or solitary fibrous tumor.

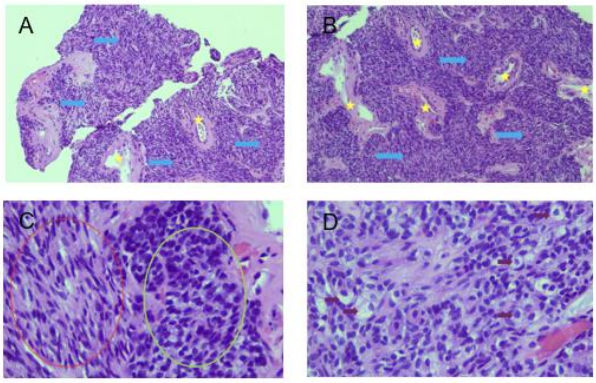

Figure 5. A & B. Neoplastic cells (marked with blue arrow) are densely arranged, forming a solid sheet pattern, and some (marked with yellow star) are observed cuffing/perivascularly encircling thick-walled blood vessels. C. Spindle-shaped cells with elongated nuclei (marked with red circle). Ovoid-shaped cells with round-oval nuclei (marked with green circle). D. Epithelioid-shaped cells (which are larger in size marked with purple arrow).

Source: Documented from author's case series

The clinical diagnosis for this patient was central airway obstruction due to an intraluminal tracheal mass. The differential diagnoses considered included a benign tracheal tumor, a malignant tracheal neoplasm, or a mucous plug.

Initial management focused on maintaining adequate oxygenation, alleviating airway obstruction, and preparing the patient for definitive diagnostic evaluation. The treatment plan included the administration of oxygen therapy via nasal cannula at 2–4 L/min with a target oxygen saturation (SpO_2) above 94%, and nebulized bronchodilator therapy using *Combivent* (a combination of ipratropium bromide and salbutamol) three times daily to improve airway patency. Cough suppression was achieved with *codeine 10 mg once daily* to reduce irritation and discomfort. Further diagnostic steps were planned, including a bronchoscopy-guided biopsy to obtain tissue samples for histopathological confirmation and a contrast-enhanced thoracic CT scan to evaluate the extent, nature, and possible spread of the tracheal lesion.

RESULTS AND DISCUSSION

Central airway obstruction (CAO) refers to the narrowing of the central airways, including the subglottic region, trachea, and main bronchi, which can produce significant airflow limitation once more than 50% of the airway lumen is compromised. This condition may arise from both malignant and benign etiologies, although malignant causes are far more common, particularly in patients with primary lung cancer or metastatic disease from extrathoracic malignancies such as renal cell carcinoma, colorectal carcinoma, and breast cancer. In fact, malignant central airway obstruction (MCAO) has been reported in up to 13% of newly diagnosed lung cancer cases, and airway compromise can result from endoluminal tumor growth, extrinsic compression, or a combination of both. In contrast, benign central airway obstruction (BCAO) is exceedingly rare, representing less than 2% of all airway lesions. Common benign tumors include hamartomas, squamous papillomas, and fibroepithelial polyps, while glomus tumors (glomangiomas) constitute one of the rarest

entities. Because CAO often presents with nonspecific symptoms such as chronic cough, dyspnea, wheezing, or stridor, it can easily be misdiagnosed as common respiratory illnesses like asthma or chronic bronchitis, leading to significant diagnostic delay. This was evident in the present case, where the patient initially exhibited symptoms suggestive of acute bronchitis and did not respond adequately to standard therapy, emphasizing the need to consider CAO in adults with persistent or atypical respiratory complaints (4).

Epidemiologically, glomus tumors (glomangiomas) of the trachea are exceptionally uncommon, with most documented cases occurring in middle-aged men and frequently associated with chronic mucosal irritation, recurrent inflammation, or local trauma. In this case, the patient was a 41-year-old male and an active smoker, fitting well within the reported demographic profile and supporting the hypothesis that long-standing airway irritation may contribute to the formation of such lesions. Clinically, slowly growing intraluminal tumors may produce few or subtle physical findings. In this patient, auscultation revealed only mild rhonchi without wheezing or stridor, and oxygen saturation remained normal. Despite the seemingly benign physical examination, arterial blood gas analysis demonstrated respiratory acidosis with elevated pCO_2, indicating impaired ventilation as a consequence of progressive mechanical obstruction, highlighting the discrepancy that may occur between physical findings and physiological impairment in CAO (5).

Radiologic examinations often fail to identify intraluminal tracheal tumors. Chest radiography commonly appears normal or shows nonspecific findings, as seen in this case, where the chest X-ray demonstrated only bronchitic changes without any visible mass. Computed tomography (CT), however, is more sensitive and is considered essential when CAO is suspected. In this patient, a CT scan revealed a heterogeneous intraluminal mass at the T1–T2 level, providing crucial information regarding the location and extent of the lesion. Bronchoscopy remains the gold standard for diagnosing CAO, as it allows direct visualization of the lesion and facilitates tissue sampling. Bronchoscopic evaluation in this case revealed a round, pedunculated mass occupying nearly the entire tracheal lumen, with a hyperemic, nodular, and friable surface. Although visual characteristics may strongly suggest benignity, histopathologic analysis is necessary to confirm the diagnosis and exclude malignancy, especially given the presence of cervical lymphadenopathy on imaging (6).

From microscopic examination, one of the tissue fragments consisted solely of mature stratified squamous epithelium without stroma. Another tissue fragment showed a proliferation of neoplastic cells with increased cellularity. These cells were spindle-shaped, with some appearing ovoid and slightly epithelioid, arranged densely in solid sheets and partly surrounding thick-walled blood vessels. The nuclei were relatively monotonous, oval to elongated, with fine chromatin and inconspicuous nucleoli. The cytoplasm was scant and pale eosinophilic. No significant nuclear pleomorphism, mitotic activity, or tumor necrosis was identified. The stroma was minimal, with numerous thick-walled vascular components arranged regularly among the neoplastic cells. No epithelial, glandular, or squamous differentiation was observed. These microscopic findings were compatible with glomus tumors. Glomus tumors in airways are extremely rare; they usually occur in the distal part of the respiratory tree, and the majority of these tumors are benign. Typically, these tumors are found in the distal portion of the digits, especially under the fingernails. The main histological characteristic of glomangiomas is that the glomus cell clusters are arranged

around dilated venous vessels. Otherwise, for glomangiomas, there is a gradual transition from glomus cells to elongated, mature smooth muscle cells (7).

The WHO also classified glomus tumors into three categories: benign glomus tumors, glomus tumors of uncertain malignant potential, and malignant glomus tumors, with the majority of reported glomus tumors being benign, and a small proportion being histologically malignant (Sbaraglia et al., 2020). Malignant glomus tumors are characterized by marked nuclear atypia and mitotic activity. Otherwise, uncertain malignant potential tumors do not fulfill the criteria for malignancy but have one or more atypical features other than nuclear polymorphisms. These features include a deep site location and a size greater than 2.0 cm. The initial emergency management was extremely difficult and challenging, considering the respiratory distress combined with massive bleeding (8).

The differential diagnosis for intraluminal tracheal lesions includes benign tumors such as fibroepithelial polyps, hamartomas, papillomas, and hemangiomas; primary malignant tumors such as squamous cell carcinoma or adenoid cystic carcinoma; metastatic endobronchial lesions; and non-neoplastic conditions such as mucous plugs, granulation tissue from prior intubation or tracheostomy, or granulomatous infections (Georgakopoulou et al., 2020; Sasaki et al., 2023; Tauziède-Espariat et al., 2021). In the present case, several features supported a benign etiology, including the patient's younger age, the pedunculated nature and mobility of the lesion, and the absence of gross tracheal wall destruction on bronchoscopy. However, the friable surface and positive bleeding during biopsy warranted careful evaluation, as these features may also be seen in malignant or highly vascular lesions. Thus, definitive diagnosis relies on histopathologic confirmation (9).

CAO poses risks of significant complications, including hemorrhage, sudden complete airway obstruction, and hypercapnic respiratory failure. In this patient, the biopsy was complicated by active bleeding, reflecting substantial vascularity. Combined with the observed respiratory acidosis, these findings justified prompt airway intervention. Management of tracheal tumors depends on their pathology, location, extent, and the patient's clinical condition. Surgical resection with segmental tracheal excision and primary end-to-end anastomosis is considered definitive but carries considerable morbidity, especially in tumors involving extensive tracheal segments. For benign and localized lesions, bronchoscopic interventions offer a minimally invasive alternative with excellent outcomes (Freitas et al., 2021; Bashour & Lazarus, 2022; Rui & Lian, 2024). Thus, the multidisciplinary team opted for bronchoscopic debulking and recanalization in this case. The pedunculated morphology made the lesion suitable for endoscopic removal, and the controlled operative environment provided opportunities for hemostasis using modalities such as argon plasma coagulation (APC) or electrocautery (10).

The difference between spirometry results and endoscopic findings may arise from variations in patient cooperation during tests. Moreover, functional spirometry outcomes can differ between patients with the same anatomical degree of obstruction due to variations in intra-luminal airway pressure and lung capacities (Filauro et al., 2020). Some studies have found correlations between plethysmography parameters and rigid bronchoscopy results in cases with post-intubation tracheal stenosis. The forced oscillation test measures the severity of tracheal stenosis (flow dependence of resistance), which is not disturbed by the presence of concomitant peripheral obstructions. In addition, some studies linked reactance at 5 Hz to

tracheal stenosis, noting a decrease in reactance with increasing tracheal stenosis severity, although no significant correlation was established between resistance and stenosis severity. While these assessments provide valuable information, they do not specify the exact location, morphology, or typology of airway stenosis, necessitating further imaging for complete evaluation. The assessment of CAO comprises spirometry, bronchoscopy, and CT. Some studies have shown that pulmonary function measurements are useful for the diagnosis of CAO. Furthermore, forced FV curves can not only detect large airway obstruction but also differentiate between fixed and variable CAO (11).

Interventional bronchoscopy for CAO includes mechanical extraction, cryotherapy, laser ablation, electrocautery, and APC. Rigid bronchoscopy is often preferred when there is a high risk of bleeding or near-complete obstruction, as it provides superior airway control, allows ventilation, and enables more effective tumor debulking. Flexible bronchoscopy may be used for smaller or more distal lesions or as an adjunct to rigid bronchoscopy. In this patient, endoscopic debulking was deemed appropriate given the localized nature of the mass, the potential for rapid symptom relief, and lower procedural morbidity compared to open surgical resection (12).

Post-procedural care involves close monitoring for airway edema, re-bleeding, or recurrence. The histopathologic examination of the excised tissue is essential to confirm benignity and determine whether further intervention or oncologic evaluation is needed. For benign fibroepithelial polyps, recurrence is uncommon but possible, especially if underlying irritative factors such as smoking are not addressed. Regular surveillance through follow-up bronchoscopy and imaging is recommended, typically at 4 to 6 weeks post-procedure and then every 3–6 months. In cases where histopathology reveals malignancy or if suspicious lymphadenopathy persists, additional imaging such as contrast-enhanced CT or PET-CT and referral to thoracic oncology would be warranted (13–15).

CONCLUSION

Central airway obstruction (CAO) caused by a benign tracheal lesion, such as a fibroepithelial polyp, can resemble common respiratory diseases and lead to delayed diagnosis and inappropriate initial treatment. Rare benign airway tumors should still be considered in adults especially smokers who experience persistent symptoms that do not improve with standard therapy. Physical examination and chest X-ray may appear normal despite significant obstruction, making early advanced imaging and bronchoscopy essential when CAO is suspected. Bronchoscopy remains the most accurate diagnostic method, as it allows direct visualization and biopsy.

Although surgery is commonly used for tracheal tumors, minimally invasive bronchoscopic procedures may be safer and still effective in selected patients. In this case, endoscopic tumor debulking successfully relieved the obstruction without the need for extensive surgery. Overall, greater awareness of uncommon CAO causes is crucial for early diagnosis and proper management, ultimately improving outcomes for patients with benign tracheal polyps.

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