



Case Report

Upper Airway Obstruction Diagnosis and Treatment: A Case Report

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Abstract

Tumors of the trachea and bronchi are uncommon and can occur in the form of benign or low- and high-grade malignant tumors. Some of those tumors showed early symptoms and some late. Most of these tumors once early diagnosed can show good outcomes. We presented the case of intrathoracic upper airway obstruction caused by trachea mass diagnosed by PFT, spirometry, and managed and treated by Electrocautery through flexible bronchoscopy. The outcome showed magnificent improvement all over clinical misleading to roll out the tumor in the first place.

Keywords: *Tracheobronchial tumor, Spirometry, Electrocautery, Bronchoscopy.*

Abbreviations:

PFT – Pulmonary Function Test,

ETT – Endotracheal Tube,

SOB – Shortness of breath,

BA – Bronchial Asthma,

CXR – Chest X-ray,

ICU – Intensive care unit.



Introduction

Tumors of the trachea and bronchi are uncommon and can occur in the form of benign or low- and high-grade malignant tumors. Delays in diagnosis of these tumors commonly occur due to the signs and symptoms caused by these tumors are nonspecific and chest radiographs are often considered unremarkable. Therefore, spirometry, radiological techniques like CT scans, and better access to flexible bronchoscopy are the key tools to diagnose tracheal mass. (1)

Spirometry is the pulmonary function test performed to indicate many situations. Spirometry is often performed as a screening procedure, and it may be the first test to indicate the presence of pulmonary disease. Extra thoracic or intrathoracic airway obstruction is frequently diagnosed using the flow-volume loop. (2)

Bronchoscopy is the mainstay to approaching endobronchial lesions under direct vision. Bronchoscopy used a direct visualization of the upper and lower respiratory tract for the diagnosis and management of a spectrum of inflammatory, infectious, and malignant diseases of the chest.

Electrocautery used high-frequency electric current to cause heating which leads to coagulation or tissue vaporization. In one large retrospective series of electrocautery for airway obstruction, luminal improvement was achieved in 78% of patients with a 6.8% complication rate. Electrocautery provided equally effective and constant palliation in patients with airway obstruction as that provided by neodymium-doped: yttrium-aluminum-garnet (Nd: YAG) laser therapy. Thus, electrocautery is a more accessible modality worldwide. (3)

A variety of tools exist to apply electrocautery, via either rigid or flexible bronchoscopy. For the flexible bronchoscope, electrocautery snares, knives, blunt probes, and hot forceps are available. Electrocautery should be avoided in pure extrinsic airway compression. In patients with pacemakers or automatic implantable cardioverter/defibrillators (AICDs), due to the potential for dysrhythmias or device malfunction, caution is recommended, and the device should be turned off whenever possible and clinically indicated. Complications are rare, estimated between 2–5%, and include hemorrhage, endobronchial ignition, electric shock to the operator, and airway perforation. Loss of efficacy can occur with bleeding due to the diffusion of the current across a larger surface area. The FiO₂ must be below 40% to avoid an airway fire. (6)

Case Presentation

38 years old male patient presented to a private hospital with a chief complaint of shortness of breath SOB and hemoptysis. For a six-year patient suffering and decreased in daily activity and quality of life due to shortness of breath. The patient visited many hospitals seeking treatment for his complaint, diagnosis, and recommendation. Until he was admitted to a private hospital where he was diagnosed with a bronchial mass based on the spirometry and chest CT scan.

The patient was diagnosed before that admission as a bronchial asthma BA for 6 years and was on asthma medication for that period with no improvement. A spirometry test (figure 3) done in the same hospital and the result showed no reversible airway disease and no improvement post-bronchodilator with variable intrathoracic upper airway obstruction Moreover, CT chest (figure 1) and CXR (figure 2) showed a lobulated soft tissue mass in the mid trachea causing narrowing of its lumen.

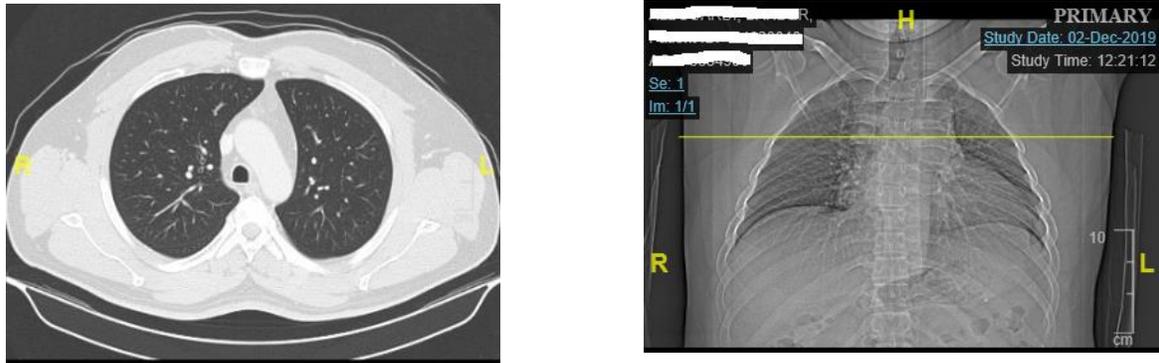


Figure 1: Chest CT scan before the bronchoscopy procedure which shows a lobulated soft tissue mass in the mid trachea causing narrowing of its lumen as described above Incomplete study with no definite other intrathoracic lesions.

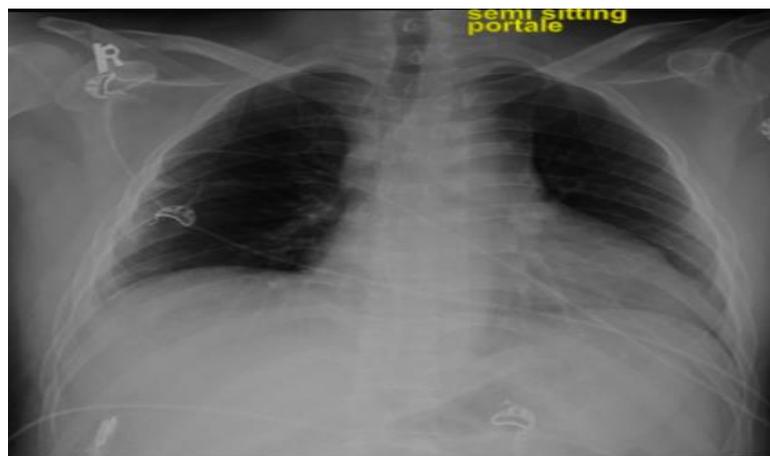
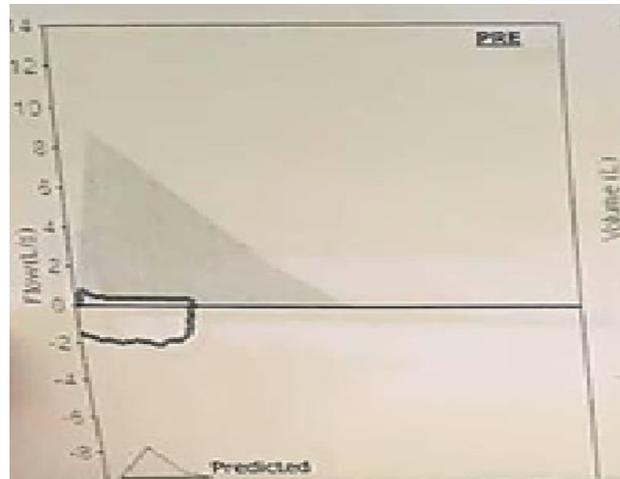


Figure 2: X-ray showed narrowing on the end of trachea near to carina.



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| Parameters | LLN | Pred | Best | %Pred | Z-score | PRE # 1 | PRE # 2 | PRE # 3 | POST | %Pred | %Chg |
|------------|-------|------|------|-------|---------|---------|---------|---------|------|-------|------|
| FVC | L | 3.41 | 4.41 | 1.89* | 43 | -4.13 | 1.89 | | | * | |
| FEV1 | L | 2.82 | 3.66 | 0.55* | 15 | -6.10 | 0.55 | | | * | |
| FEV1/VC | % | 68.2 | 80.0 | | | | | | | * | |
| FEV1/FVC | % | 68.2 | 80.0 | 29.1* | 36 | -7.10 | 29.1 | | | * | |
| PEF | L/s | 6.88 | 8.87 | 0.83* | 9 | -6.64 | 0.83 | | | * | |
| FEF2575 | L/s | 2.57 | 4.28 | 0.48 | 11 | -3.65 | 0.48 | | | | |
| FEV3 | L | 3.24 | 4.19 | 1.40 | 33 | -4.57 | 1.40 | | | | |
| ELA | Years | | 40 | 147 | 368 | | 147 | | | | |
| FET | s | | 6.00 | 4.67 | 78 | | 4.67 | | | | |
| FEF25 | L/s | 4.84 | 7.65 | 0.43 | 6 | -4.22 | 0.43 | | | | |
| FEF50 | L/s | 2.68 | 4.85 | 0.40 | 8 | -3.37 | 0.40 | | | | |
| FEF75 | L/s | 0.77 | 2.06 | 0.40 | 19 | -2.12 | 0.40 | | | | |
| EVol | mL | | | | | | | | | | |
| FIVC | L | 3.41 | 4.41 | 2.41 | 55 | -3.28 | 2.41 | | | | |
| FIV1 | L | 2.82 | 3.66 | 2.02 | 55 | -3.21 | 2.02 | | | | |
| FIV1/FIVC | % | 68.2 | 80.0 | 83.8 | 105 | 0.53 | 83.8 | | | | |
| PIF | L/s | 6.88 | 8.87 | 2.08 | 23 | -5.61 | 2.08 | | | | |

Figure 3: Flow volume loop showed intrathoracic Upper airway obstruction.

The patient was admitted to ICU in the same hospital and bronchoscopy was performed under general anesthesia with ETT size 8 mm. A fungating tumor sitting 1.5 cm from the carina was found and almost obstructed the airway by 90% and easy to bleed. The patient was then referred to King Fahad Medical City (KFMC) as a case of tracheal mass for further management.

Rigid and flexible Bronchoscopy procedure (Figure 4) done under general anesthesia using Electrocautery to remove the tumor. Biopsy samples sent to the pathology for examination Cytokeratin 7, CD 117, and p63 all are positive and synaptophysin, TTF-1, Napsimn-A, and CK 20 all are negative. Spirometry (figure 6) and CXR (figure 7) done after the bronchoscopy procedure by two weeks, the parameters have some improvement, the clinical picture for the patient is much better and the patient able to walk normally without feeling SOB.

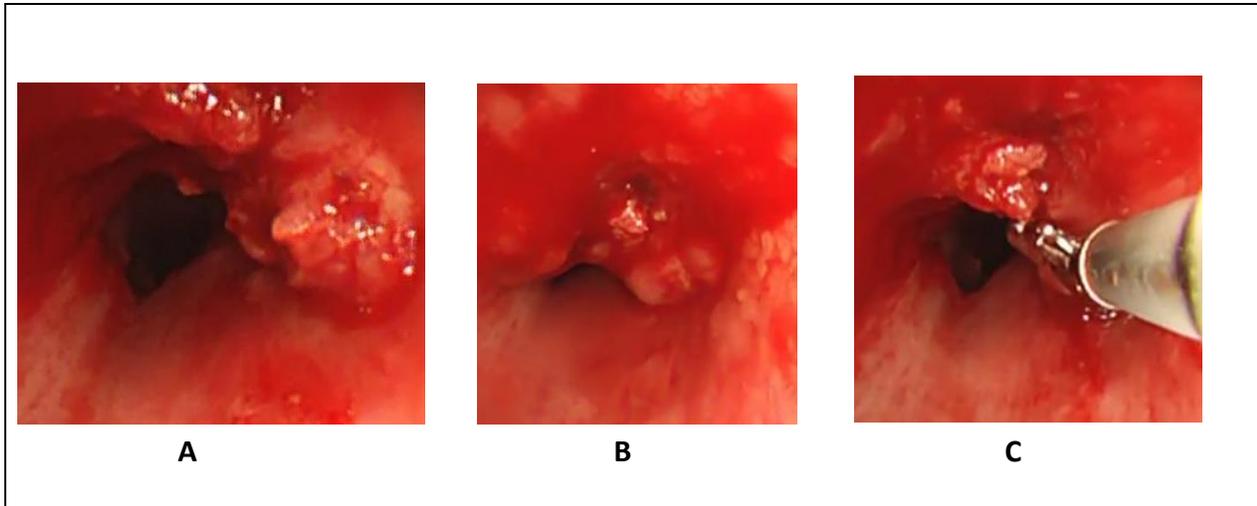


Figure 4: A & B showed a tumor above the carina, and C showed the snare cutting and removing the tumor.

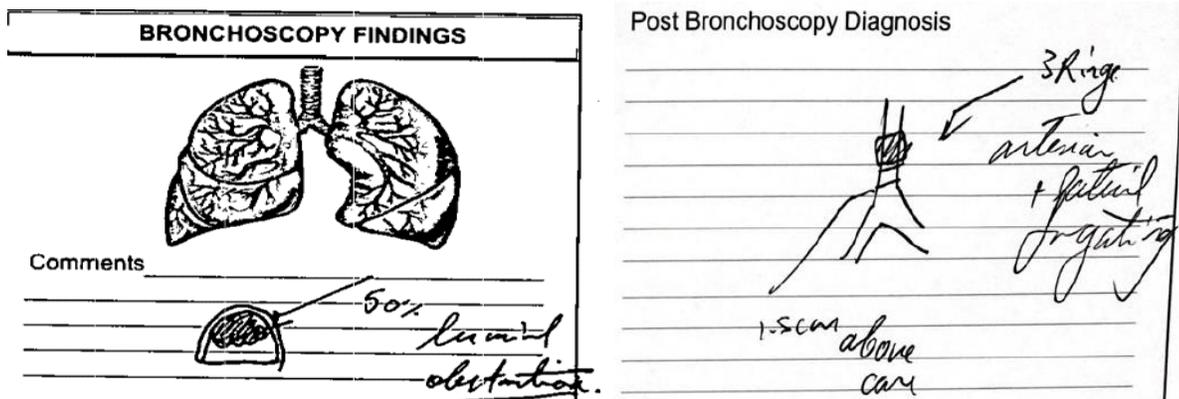
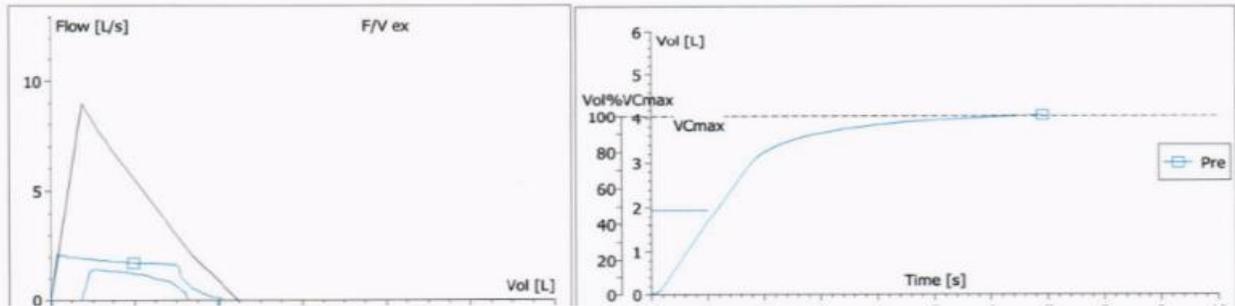


Figure 5: Post bronchoscopy procedure finding.

| SPIROMETRY | Unite | Pred | Pre | %Pre/Pred |
|-------------|-------|-------|-------|-----------|
| FVC | L | 4.46 | 4.06 | 91 |
| FEV1 | L | 3.72 | 1.93 | 51.9 |
| FEV1%VC Max | % | 80.37 | 47.55 | 59.2 |
| MMEDF 75/25 | L/s | 4.36 | 1.71 | 39.1 |
| PEF | L/s | 8.95 | 2.13 | 23.7 |
| PIF | L/s | | 4.92 | |



INTERPRETATION

Spirometry shows reduced FEV1, normal FVC, and reduced FEV1/FVC ratio suggesting obstructive pattern. The degree of reduction in FVC suggests moderate obstructive ventilatory defect. Flow-volume loops are significant for finding consistent with fixed intrathoracic airway obstruction.

Figure 6: Flow volume loop showed intrathoracic Upper airway obstruction

Table 1: Complete lab work blood count

| Test Name | Result |
|--------------------|--------|
| WBC | 15.31 |
| RBC | 5.11 |
| HGB | 15.20 |
| HCT | 44.60 |
| MCV | 87.30 |
| MCH | 29.70 |
| MCHC | 34.10 |
| RDW Red Cell | 13.30 |
| Platelet count | 248 |
| MPV | 9.400 |
| NRBC Nucleated RBC | 0.00 |

Table 2: Complete Chemistry lab work

| Test Name | Result |
|--|--------|
| Albumin, plasma | 34.7 |
| Bilirubin Total, plasma | 3.8 |
| Alkaline Phosphatase ALP, plasma | 56 |
| Alanine amino Transferase ALT (SGPT), plasma | 134 |
| Sodium Plasm | 138 |
| Potassium Plasma | 4.3 |
| Chloride Plasma | 106 |
| Creatinine plasma | 97 |
| Urea, plasma | 8.9 |
| Bicarbonate (CO2), plasma | 21.1 |



| | |
|--------------------------|--------|
| Anion Gap | 15.2 |
| Bilirubin Direct, plasma | < 1.80 |

Table 3: Coagulation profile

| Test Name | Result |
|-----------------------|---------|
| Prothrombin Time (PT) | 10.80 S |
| INR | 0.930 |

Discussion

Tracheobronchial tumors (TBTs) are a rare entity that may present with diverse pathological findings and may challenge their diagnosis and management. Malignant tumors are more frequent than benign ones. Although TBT tumors represent only 0.6% of all pulmonary tumors, they are clinically significant. These tumors are often revealed incidentally. (1)

The clinical presentation of an endobronchial tumor primarily depends on its size rather than the pathologic characteristics of the tumor itself. They may be clinically significant, causing airway obstruction and mimicking malignant neoplasms and asthma or chronic obstructive pulmonary disease (COPD). Today, novel radiological techniques and better access to flexible bronchoscopy enable the detection of a larger number of TBT. They tend to have similar clinical presentation as cough, dispend, hemoptysis, or signs of tracheobronchial obstruction. (1)

Our case was unique and left undiagnosed for 6 years. The patient suffered from SOB and hemoptysis and was treated as BA for some time. The spirometry test plays a major role in the initial diagnosis and BA was excluded then X-ray and CT scan confirmed the diagnosis. The patient was stable then admitted to ICU for a Bronchoscopy procedure. The patient was intubated and bronchoscopy procedures were performed. The procedure is done smoothly without major complications. The patient then refers to a specialized center and the tumor was removed by using electrocautery through rigid and Flexible Bronchoscopy.

Conclusion

In this case report, patients get benefits and improve clinically post bronchoscopy especially electrocautery procedures. The patient has an accurate diagnosis for his symptoms using the spirometry test. The bronchial tumor can be evaluated and diagnosed by spirometry and treated by Bronchoscopy using electrocautery procedure.

Acknowledgments

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Conflicts of Interest:

The authors report no conflict of interest



References

1. Stevic R, Milenkovic B. "Tracheobronchial tumors". *Journal of thoracic disease*. 2016 Nov;8(11):3401.
2. Ruppel GL. "Manual of pulmonary function testing" 8. Ed. 2003.
3. Lin CY, Chung FT. "Central airway tumors: interventional bronchoscopy in diagnosis and management". *Journal of thoracic disease*. 2016 Oct;8(10):E1168.
4. Panjwani, A., & Lodha, J. (2019). "Pulmonary function test in upper airway obstruction: a simple yet effective diagnostic test". *The Egyptian Journal of Internal Medicine*, 31(2), 243.
5. Majeed, A., & Sultan, A. (2014). "Severe Presentation of Acute Upper Airway Obstruction–A Case Report". *British Journal of Medical Practitioners*, 7(4), 24-27.
6. Schray, Mark F., et al. "Management of malignant airway obstruction: clinical and dosimetric considerations using an iridium-192 afterloading technique in conjunction with the neodymium-YAG laser." *International Journal of Radiation Oncology* Biology* Physics* 11.2 (1985): 403-409.
7. Rudrappa, Mohan, Laxmi Kokatnur, and Sanket Shah. "Case Report: Upper airway obstruction due to rheumatoid arthritis." *F1000Research* 9.119 (2020): 119.
8. Oberg, Catherine, Erik Folch, and Jose Fernando Santacruz. "Management of malignant airway obstruction." *AME Med J* 3 (2018).
9. Maish, Mary, and Ara A. Vaporciyan. "Chondrosarcoma arising in the trachea: a case report and review of the literature." *Journal of thoracic and cardiovascular surgery* 126.6 (2003): 2077-2080.

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