

A Recurrent Pediatric Tracheal Inflammatory Myofibroblastic Tumor Initially Misdiagnosed as Asthma with Subsequent Granulation Tissue Formation

Lamin Makalo

lmakalo@utg.edu.gm

University of the Gambia

M. Jaiteh

Edward Francis Small Teaching Hospital

A. Manneh

Edward Francis Small Teaching Hospital

R. Komma

Edward Francis Small Teaching Hospital

M. Y Sesay

Edward Francis Small Teaching Hospital

F. I Tambajang

Edward Francis Small Teaching Hospital

O. Leigh

University of the Gambia

H. Ebel

Kindernierenzentrum

Research Article

Keywords: inflammatory myofibroblastic tumor, tracheal granuloma, pediatric airway obstruction, malnutrition, recurrence, bronchoscopy

Posted Date: April 22nd, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-9456021/v1>

License:   This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Additional Declarations: The authors declare no competing interests.

Abstract

Background: Inflammatory myofibroblastic tumor (IMT) is a rare, intermediate-grade neoplasm of the airway that can present with nonspecific respiratory symptoms, often mimicking asthma. In resource-limited settings, delayed diagnosis may increase morbidity, particularly in children with underlying nutritional deficits.

Case Presentation: We report the case of a 3-year-6-month-old female with a history of twin gestation, low birth weight (2.14 kg), and severe acute malnutrition (SAM) at 11 months. She presented with recurrent episodes of cough, wheeze, and respiratory distress over the past year, with poor response to bronchodilator therapy. On examination, she was tachypneic with inspiratory stridor, and her weight was 11 kg—below the 3rd percentile for age according to WHO growth standards. Airway imaging and endoscopic evaluation revealed a tracheal mass. Initial histopathological and immunohistochemical findings confirmed an inflammatory myofibroblastic tumor. The patient underwent multiple surgical excisions for recurrent airway obstruction. However, following the third surgical removal, histopathological examination demonstrated fibrovascular granulation tissue rather than recurrent IMT, indicating a reactive post-surgical process. Nutritional rehabilitation was initiated to address her underweight status and support recovery.

Conclusion: This case highlights the diagnostic challenge of distinguishing recurrent IMT from post-surgical granulation tissue in children with persistent airway obstruction. It underscores the importance of histopathological confirmation, early airway evaluation in treatment-refractory respiratory symptoms, and the role of nutritional optimization in improving clinical outcomes.

Introduction

Inflammatory myofibroblastic tumor (IMT) is a rare mesenchymal neoplasm characterized by spindle-shaped myofibroblastic cells accompanied by an inflammatory infiltrate. It most commonly affects the lungs, liver, and soft tissues of children and young adults [1]. Airway involvement, particularly within the trachea, is uncommon but clinically significant, as it may present with nonspecific respiratory symptoms such as cough, wheeze, or stridor, often mimicking asthma or recurrent respiratory infections [2–4].

Due to its rarity and nonspecific presentation, IMT is frequently misdiagnosed or diagnosed late, resulting in repeated ineffective treatments and increased morbidity. We report a case of recurrent tracheal IMT in a toddler with a background of early-life malnutrition, initially managed as asthma, with subsequent evolution to post-surgical granulation tissue—highlighting the diagnostic and therapeutic challenges in low-resource settings.

Case Presentation

A 3-year-6-month-old female presented with a 2-day history of low-grade fever, cough, and increased respiratory rate. There was no history of cyanosis or choking episodes. She had recurrent episodes of

similar symptoms over the past year, frequently treated as asthma with salbutamol nebulization and corticosteroids, with poor clinical response.

She was a product of a twin pregnancy, delivered at 38 weeks’ gestation via spontaneous vaginal delivery, with a birth weight of 2.14 kg. At 11 months of age, she was admitted to Kanifing General Hospital for severe acute malnutrition (SAM). From the age of 2 years and 6 months, she underwent multiple surgical interventions for airway obstruction. At ages 2 years 6 months, 3 years, and 3 years 10 months, tracheal masses were removed via rigid bronchoscopy. Persistent recurrence prompted further histopathological and immunohistochemical evaluation.

At presentation, her weight was 11 kg, which is below the 3rd percentile for age according to WHO growth standards, indicating underweight status. She was commenced on structured nutritional rehabilitation. On examination, she was tachypneic with inspiratory stridor and reduced air entry bilaterally, without wheeze.

Histopathological Findings

The first specimen analyzed at Edward Francis Small Teaching Hospital consisted of firm grey-white tissue. Microscopy showed nodular proliferation of polygonal to spindle-shaped cells arranged in fascicles, with bland nuclei and no atypia or mitotic activity. Benign glandular elements were also noted, consistent with benign myofibroblastic proliferation.

A second histopathological review with immunohistochemistry at Cheikh Anta Diop University demonstrated diffuse positivity for smooth muscle actin (AML), focal positivity for S100 protein, and CD34 positivity limited to vascular endothelial cells. Desmin, myogenin, beta-catenin, and STAT6 were negative. The Ki-67 proliferation index was approximately 5%. These findings confirmed the diagnosis of inflammatory myofibroblastic tumor.

Following the third surgical excision via rigid bronchoscopy, histopathological examination revealed dark brown tissue fragments measuring approximately 1 cm. Microscopy demonstrated ulcerated polypoid tissue composed of fibrovascular stroma with proliferating capillary-sized vessels, spindle cells, and areas of hemorrhage—features consistent with granulation tissue formation rather than recurrent IMT.

Table 1.

Radiological Findings

Chest radiography (PA view) revealed bilateral lung hyperinflation with flattened diaphragms and increased lucency, consistent with air trapping. Narrowing of the upper tracheal air column suggested partial upper airway obstruction. No focal consolidation or mediastinal shift was observed.**Figure 1.**

Computed tomography of the neck and chest demonstrated a well-defined intraluminal soft-tissue mass within the proximal trachea, causing significant luminal narrowing. The lesion originated from the

tracheal wall without evidence of extraluminal extension or invasion of adjacent mediastinal structures. Distal airways were patent, and no significant lymphadenopathy was identified. **Figure 2a and 2b**

Discussion

Inflammatory myofibroblastic tumor is a rare, intermediate-grade neoplasm that predominantly affects children and young adults and may mimic common airway diseases such as asthma [5–7]. Tracheal involvement is particularly challenging due to its nonspecific presentation and the high likelihood of misdiagnosis, especially in resource-limited settings [8,9].

In this case, repeated treatment for presumed asthma without improvement delayed definitive diagnosis. Subsequent imaging and bronchoscopy revealed a tracheal mass, confirmed histologically as IMT. Despite its benign histological appearance, IMT carries a risk of local recurrence and airway obstruction [1,10,11].

The patient experienced two confirmed recurrences before the third histopathological evaluation demonstrated granulation tissue rather than tumor recurrence. This distinction is clinically significant, as post-surgical granulation tissue may closely mimic recurrent tumor both clinically and radiologically, potentially leading to overtreatment if not accurately identified [1,12].

Her history of twin gestation, low birth weight, and severe acute malnutrition likely contributed to impaired immune function and delayed tissue repair [13,14]. At presentation, her weight remained below the 3rd percentile, reinforcing the role of chronic undernutrition in disease progression and recovery. Nutritional rehabilitation was therefore a critical component of her management, supporting immune function and postoperative healing.

From a physiological perspective, the degree of airway compromise can be explained by Poiseuille's law, which states that airway resistance is inversely proportional to the fourth power of the radius ($R \propto 1/r^4$) [15]. Even minor reductions in tracheal diameter result in a dramatic increase in airflow resistance, explaining the patient's severe symptoms and radiological evidence of hyperinflation.

Clinically, this case underscores the importance of considering structural airway lesions in children with persistent or atypical respiratory symptoms unresponsive to standard therapy. Early imaging and endoscopic evaluation are essential for accurate diagnosis. Strengthening pediatric ENT services, including access to bronchoscopy and histopathological expertise, is crucial in low-resource settings. While complete surgical excision remains the cornerstone of treatment, recurrence may occur, and targeted therapies such as ALK inhibitors may be considered in selected cases [6,7,16–18].

Conclusion

This case highlights the diagnostic challenges of tracheal IMT presenting as refractory asthma in a young child and emphasizes the importance of early histopathological evaluation. It also demonstrates

the critical need to distinguish true tumor recurrence from post-surgical granulation tissue. Nutritional status should be considered an important modifying factor in disease progression and recovery. Long-term follow-up is essential for early detection of recurrence and optimization of clinical outcomes.

Declarations

Ethical Approval and Consent to Participate

Ethical approval for this study was obtained from the Research Ethics Committee of the Edward Francis Small Teaching Hospital (EFSTH), Banjul, The Gambia. Informed consent and consent to publish were obtained from the patient's parents. The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki (2013 revision). All patient data were anonymized prior to analysis, and strict confidentiality was maintained throughout the research process.

Clinical Trial Registration

Clinical trial number: Not applicable.

Conflict of Interest

The authors declare no conflict of interest.

Funding Statement

This study was self-funded.

Data Availability Statement

The data supporting the findings of this study are sourced from the medical records department of Edward Francis Small Teaching Hospital, Banjul, The Gambia. Due to ethical and confidentiality constraints, access to these data is restricted. However, data may be made available upon reasonable request to the corresponding author, subject to approval by the hospital's ethics committee

Author Contribution;

1. L. Makalo; Conceptualisation, Data Collection, Reviewing, Editing and Supervision
2. M. Jaiteh; Data Analysis, Data Visualisation
3. Aminata Manneh; Data Collection, Manuscript preparation
4. Rita Koroma; Data Collection and Manuscript Preparations
5. Mariama Y Sesay; Data Collection and Manuscript Preparation
6. Fatima Ibrahim Tambajang; Data Collection and Manuscript Preparation

7. Ousman Leigh; Histological analysis, Reviewing and Editing
8. Henrike Ebel; Radiological analysis

References

1. Choi JH. Inflammatory Myofibroblastic Tumor: An Updated Review. *Cancers (Basel)*. 2025;17(8):1327. Published 2025 Apr 15. doi:10.3390/cancers17081327
2. Coffin CM, Watterson J, Priest JR, Dehner LP. Extrapulmonary inflammatory myofibroblastic tumor (inflammatory pseudotumor): a clinicopathologic and immunohistochemical study of 84 cases. *Am J Surg Pathol*. 1995;19(8):859–872.
3. Karnak I, Senocak ME, Ciftci AO, et al. Inflammatory myofibroblastic tumor in children: diagnosis and treatment. *J Pediatr Surg*. 2001;36(6):908–912.
4. Fernández AG, Ayestarán NZ, Miguélez SH. Tracheal Inflammatory Myofibroblastic Tumour ALK+ as Cause of Dyspnea in a 10 Years Old Child. *Indian J Otolaryngol Head Neck Surg*. 2023;75(3):2511-2514. doi:10.1007/s12070-023-03775-5
5. Leivaditis V, Baltagianni M, Liolis E, et al. Inflammatory myofibroblastic tumor of the lung: a comprehensive narrative review of clinical and therapeutic insights. *Kardiochir Torakochirurgia Pol*. 2025;22(1):32-43. doi:10.5114/kitp.2025.148514
6. Amro, Alhareth M. MDa; Almassri, Tabarak MDb; Albandak, Maram MDa; Elqadi, Mohammad MDb; Bannoura, Sami MDc; Asafrah, Anas A. MDd; Abu Asbeh, Yousef MDd,*.
- Successful management of an unusual case of pediatric inflammatory myofibroblastic tumor: a case report and literature review. *Annals of Medicine & Surgery* 87(1):p 407-412, January 2025. | DOI: 10.1097/MS9.0000000000002870
7. Lopez-Nunez O, John I, Panasiti RN, et al. Infantile inflammatory myofibroblastic tumors: clinicopathological and molecular characterization of 12 cases. *Mod Pathol*. 2020;33(4):576-590. doi:10.1038/s41379-019-0406-6
8. Siddiqui NUR, Rehman AU, Sultan A, Abbas A, Siddiqui MIU, Abbas Q. Tracheal stenosis misdiagnosed as asthma: a case report. *J Med Case Rep*. 2024;18(1):588. Published 2024 Nov 30. doi:10.1186/s13256-024-04915-3
9. O Cathain E, Gaffey MM. Upper Airway Obstruction. [Updated 2022 Oct 17]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK564399/>
10. Parekh P, Wagh A. A Rare Endobronchial Tumor in a Pediatric Patient. *Diagnostics*. 2024; 14(20):2254. <https://doi.org/10.3390/diagnostics14202254>
11. Poombal F, Mansoor I, Abdellatif RM, Shaker N. Anaplastic lymphoma kinase1 positive inflammatory myofibroblastic tumor of the urinary bladder: A rare mesenchymal neoplasm with diagnostic and therapeutic implications. *SAGE Open Med Case Rep*. 2024;12:2050313X241308992. Published 2024 Dec 19. doi:10.1177/2050313X241308992

12. Savvidou OD, Sakellariou VI, Papakonstantinou O, Skarpidi E, Papagelopoulos PJ. Inflammatory myofibroblastic tumor of the thigh: presentation of a rare case and review of the literature. *Case Rep Orthop*. 2015;2015:814241. doi:10.1155/2015/814241
13. Fernández-Guarino M, Naharro-Rodriguez J, Bacci S. Disturbances in the Skin Homeostasis: Wound Healing, an Undefined Process. *Cosmetics*. 2024; 11(3):90. <https://doi.org/10.3390/cosmetics11030090>
14. Saunders J, Smith T. Malnutrition: causes and consequences. *Clin Med (Lond)*. 2010;10(6):624-627. doi:10.7861/clinmedicine.10-6-624
15. Campbell M, Sapra A. Physiology, Airflow Resistance. [Updated 2023 Apr 24]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK554401>
16. Lawrence B, Perez-Atayde A, Hibbard MK, et al. TPM3–ALK and TPM4–ALK oncogenic fusion genes in inflammatory myofibroblastic tumors. *Am J Pathol*. 2000;157(2):377–384.
17. Butrynski JE, D’Adamo DR, Hornick JL, et al. Crizotinib in ALK-rearranged inflammatory myofibroblastic tumor. *N Engl J Med*. 2010;363(18):1727–1733.
18. Nagumo Y, Maejima A, Toyoshima Y, et al. Neoadjuvant crizotinib in ALK-rearranged inflammatory myofibroblastic tumor of the urinary bladder: A case report. *Int J Surg Case Rep*. 2018;48:1-4. doi:10.1016/j.ijscr.2018.04.027

Tables

Table 1: Differential Diagnosis of Persistent Upper Airway Obstruction in a Toddler

Differential Diagnosis	Key Clinical Features	Relevance to This Case / Reason for Exclusion or Confirmation
Asthma / Reactive Airway Disease	Episodic wheeze, reversible airway obstruction, responds to bronchodilators	Initially suspected; poor and inconsistent response to salbutamol and presence of stridor made this unlikely
Recurrent Respiratory Papillomatosis	Progressive hoarseness, stridor, multiple papillomatous lesions in airway	Considered due to recurrent airway obstruction; histopathology did not support papilloma
Post-intubation / Post-surgical Granulation Tissue	Occurs after airway trauma or surgery; may present as obstructing mass	Confirmed in the third histopathology as fibrovascular granulation tissue following repeated resections
Tracheal Stenosis	Fixed airway narrowing, often congenital or post-intubation; no discrete mass	Imaging and bronchoscopy revealed a localized intraluminal mass, not diffuse narrowing
Foreign Body Aspiration	Sudden onset cough, choking episode, localized findings	No history of choking and chronic, recurrent course made this unlikely
Benign Airway Tumors (e.g., IMT, hemangioma, fibroma)	Progressive airway obstruction; may recur depending on tumor type	Initial and subsequent biopsies confirmed IMT, explaining recurrent obstruction
Malignant Airway Tumors	Rapid progression, systemic symptoms, invasive features	Histopathology showed benign lesion with no malignant features
Congenital Airway Anomalies (e.g., tracheomalacia)	Symptoms from infancy, dynamic airway collapse	Late onset and presence of discrete mass excluded congenital anomaly

Figures

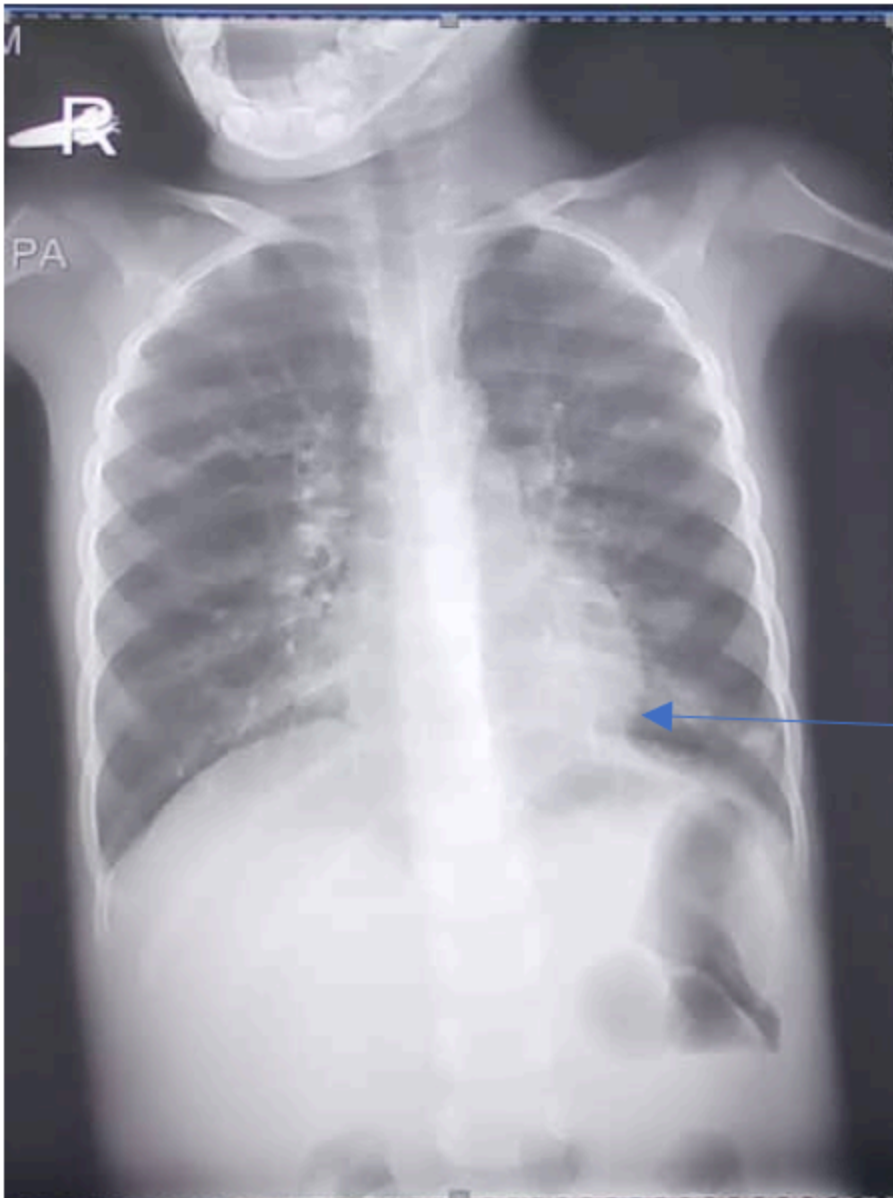


Figure 1

Chest radiograph (PA view) demonstrating bilateral lung hyperinflation with increased pulmonary lucency and flattened diaphragms, consistent with air trapping secondary to upper airway obstruction.

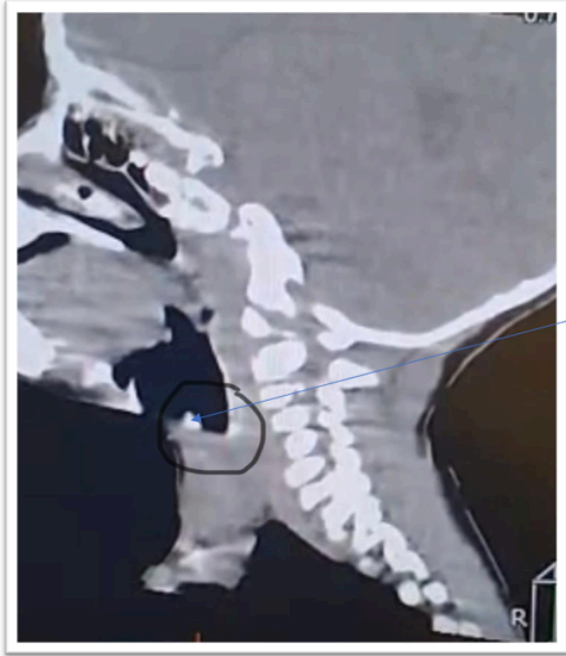


Figure 2a.

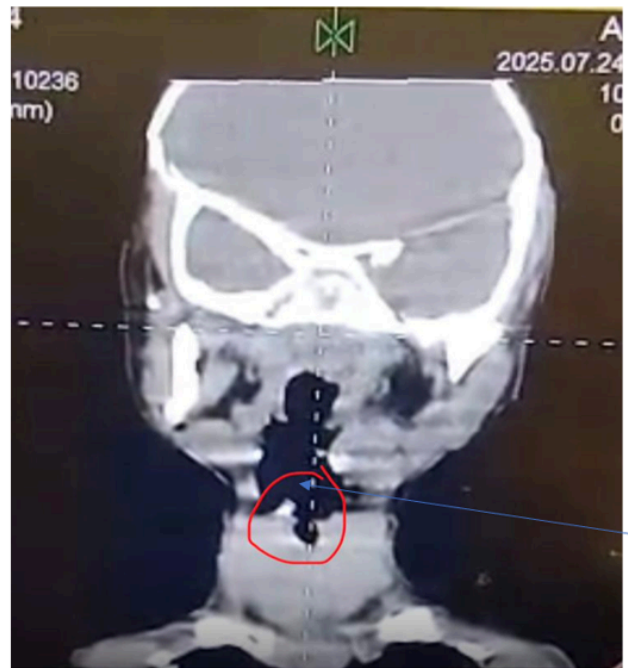


Figure 2b.

Figure 2

- a.** Axial radiologic image demonstrating a tracheal mass (arrow) protruding into the airway lumen, causing significant narrowing.
- b.** Sagittal section illustrating the tracheal mass (arrow) extending into the lumen with associated airway compromise