

Giant inflammatory myofibroblastic tumor of the hypopharynx: an unusual cause of acute upper airway obstruction in a 6-year-old child

Liu Yang, Wen Li 

To cite: Yang L, Li W. Giant inflammatory myofibroblastic tumor of the hypopharynx: an unusual cause of acute upper airway obstruction in a 6-year-old child. *World Jnl Ped Surg* 2022;5:e000342. doi:10.1136/wjps-2021-000342

Received 26 September 2021
Accepted 19 January 2022

Acute upper airway obstruction (UAO) in children is a common disease in the emergency department. It is life-threatening and usually caused by laryngospasm or laryngeal edema owing to infection, allergy, or a foreign body.¹ In addition, pediatric UAO can also be the result of laryngopharyngeal space-occupying lesions, such as laryngeal papilloma, lymphangioma, hemangioma, or cyst. Malignancy is uncommon.

Inflammatory myofibroblastic tumor (IMT) is a mesenchymal tumor consisting of differentiated spindle fibroblast cells with plasma cells and/or lymphocytes infiltration. The most common sites of IMT are the lungs, gastrointestinal tract, urogenital tract, abdominal cavity, viscera, central nervous system, upper respiratory tract, and soft tissue. IMT in the head and neck region accounts for only 14%–18% of extrapulmonary lesions, of which the orbit and nasal sinus are common locations.^{2–4} According to the reported cases of laryngeal IMT (fewer than 50 cases), it is usually confined to the glottic region. A lesion with supraglottic and hypopharyngeal involvement is extremely rare and only five cases have been reported in the hypopharynx to date. These cases occurred in adults, including only one female patient.^{5–9} We describe an extremely rare case of giant IMT in the hypopharynx of a female child with respiratory distress as the initial symptom.

A 6-year-old girl was referred to the emergency department of our hospital with progressive dyspnea, stridor, cyanosis, and dysphonia. Hoarseness was not obvious, but a change in her voice and snoring had been present for 4 months. Acute upper respiratory infection, anaphylaxis, and airway foreign body were excluded following detailed post-admission medical inquiries. Compared with children of the same age, she showed stunted growth. Oxygen therapy did not completely

relieve her dyspnea, and transient loss of consciousness was observed; therefore, tentative intubation was conducted but failed. A huge lump blocking the glottis was found during attempted intubation; thus, an emergency tracheotomy was performed. Subsequent laryngoscopy showed an exophytic tumor located in the right piriform sinus partially covering the laryngeal entrance (figure 1A). Contrast-enhanced CT revealed a 30 mm×20 mm×20 mm mass with evident homogeneous enhancement occluding the entrance to the larynx (figure 1B). Routine laboratory tests showed no abnormalities suggestive of infection or immune disorders. The preliminary diagnosis was malignancy of the hypopharynx. The patient underwent surgical exploration and an ill-defined tumor was found occupying the right piriform sinus and esophageal inlet. The cricoarytenoid joint was also involved. The tumor and the involved larynx were excised with the help of frozen sections to determine the safe margin (figure 1C). Ipsilateral enlarged cervical lymph nodes were also observed. The patient's postoperative recovery was uneventful.

Macroscopically, the tumor was granular and fragile, covered by incomplete mucosa, with a white to tan gross appearance (figure 1D). Microscopically, spindle cell proliferation and inflammatory cell infiltration were observed in the tumor, while reactive hyperplasia in the lymph nodes was noted (figure 2A,B). Immunohistochemically, the spindle cells were positive for smooth muscle actin, myosin-specific actin (figure 2C,D), and transducin-like enhancer of split 1 (weakly positive), and negative for anaplastic lymphoma kinase (ALK), epithelial membrane antigen, desmin, H-caldesmon, myogenin, P63, CD34, S-100, and Epstein-Barr virus-encoded RNA in situ hybridization. The proliferation marker protein Ki-67 (ki-67) index was 5%.



© Author(s) (or their employer(s)) 2022. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

Department of Otolaryngology
Head and Neck Surgery, West
China Hospital of Medicine,
Chengdu, Sichuan, China

Correspondence to

Dr Wen Li; church.ent.wc@163.com

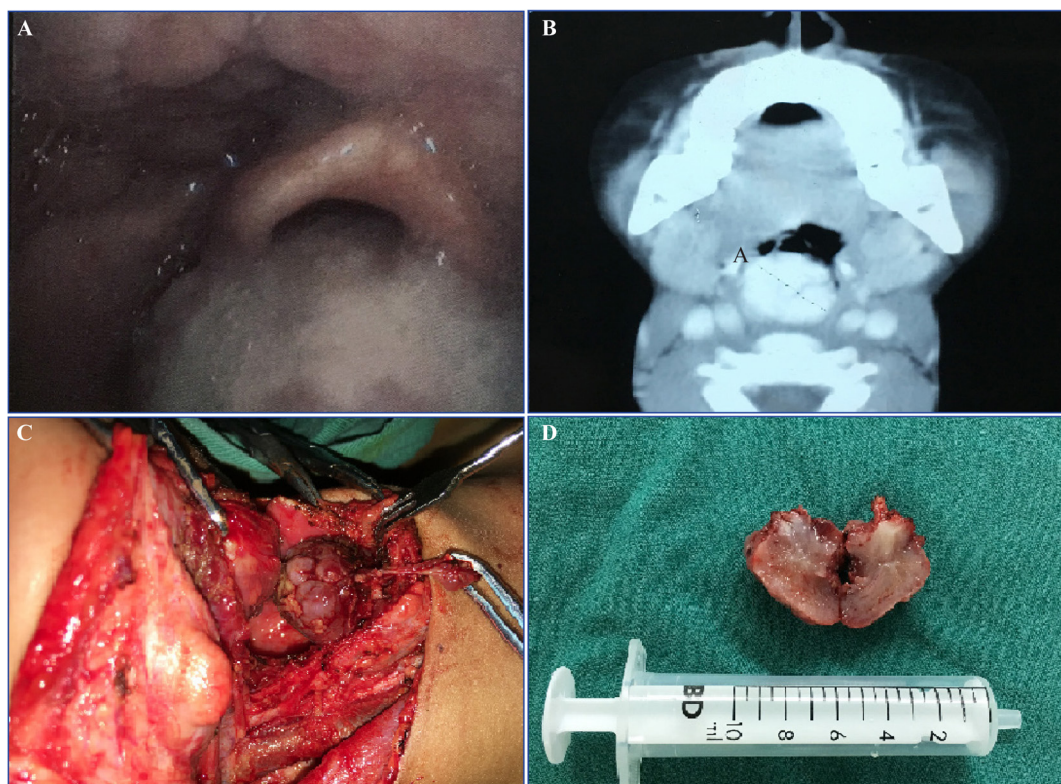


Figure 1 Laryngoscope, operative field and contrast-enhanced CT. (A) Endoscopic view demonstrated a mass obstructing the laryngeal entrance. (B) CT revealed a giant tumor occluding the pharynx at the same level in A. (C) The tumor was exposed through a suprahyoid transcervical incision. (D) Cross-section of the tumor revealed a white to tan appearance.

A hypopharyngeal IMT was finally diagnosed. Three months after surgery, decannulation was achieved. She was able to communicate in a hoarse voice after decannulation. There was no evidence of recurrence during the 4-year follow-up period and the quality of the voice gradually improved.

Acute UAO usually manifests as dyspnea and stridor and is more likely to occur in pediatric patients. In this condition, intrinsic and extrinsic etiologies should be differentiated so that immediate effective treatment can be given to the patient. Anaphylaxis, airway foreign body, acute epiglottitis, and laryngotracheitis should be considered initially.¹ In addition, upper airway space-occupying benign lesions, such as laryngeal papilloma, hemangioma, lymphangioma, and retropharyngeal abscess, should also be considered. Although malignancy is uncommon, it can also be fatal if undiagnosed. A detailed medical history and careful physical examinations are important for diagnosis. Imaging and endoscopic examinations should be carried out as soon as possible if conditions permit. Early identification of airway stability or lability is vital in the management of children with acute UAO.¹⁰ Pediatric tracheotomy should be carried out as an elective procedure in extreme emergent situations, such as in patients with progressive aggravation of hypoxia after routine oxygen therapy, hormone therapy, and intubation have been performed. In the present case, the tumor occluded the laryngeal entrance and made routine oxygen intake impossible.

IMT was previously named inflammatory pseudotumor, plasma cell granuloma, pseudosarcomatous inflammatory lesion, and so on. It is now recognized as a real tumor with uncertain behavior and etiology. Recurrence and metastasis of IMT have been reported in several isolated cases, and clonal cytogenetic aberrations have also been detected.⁴⁹ IMT is very rare in the upper aerodigestive tract, and the larynx is the most common site.⁴ Hoarseness is the most common symptom in most reported laryngeal IMTs with glottic involvement, while acute UAO is extremely rare except in subglottic locations. In pharyngeal IMTs, dysphagia and globus sensation may be relevant mild symptoms. Unlike adults, IMT is very rare in children, especially in the head and neck region. Because pediatric IMTs usually mimic malignancy, such as sarcoma or lymphoma, surgery is the main therapeutic approach to cure the disease or to achieve a final diagnosis.¹¹

The differential diagnosis of IMT should include spindle cell tumors with inflammation, such as IgG4-related diseases (IgG4-RD), inflammatory myomatous polyps (IFPs), inflammatory leiomyomas, etc. Approximately 16% of IgG4-RD cases may present as an inflammatory pseudotumor and these cases are usually accompanied by elevated levels of IgG4 in serum and tissues.⁷ Corticosteroid therapy is usually effective in these cases. IFP is characterized by eosinophil infiltration and immunohistochemistry shows CD34 positivity, which can differentiate it from IMT. Leiomyomas with lymphocytic infiltration are most easily confused with

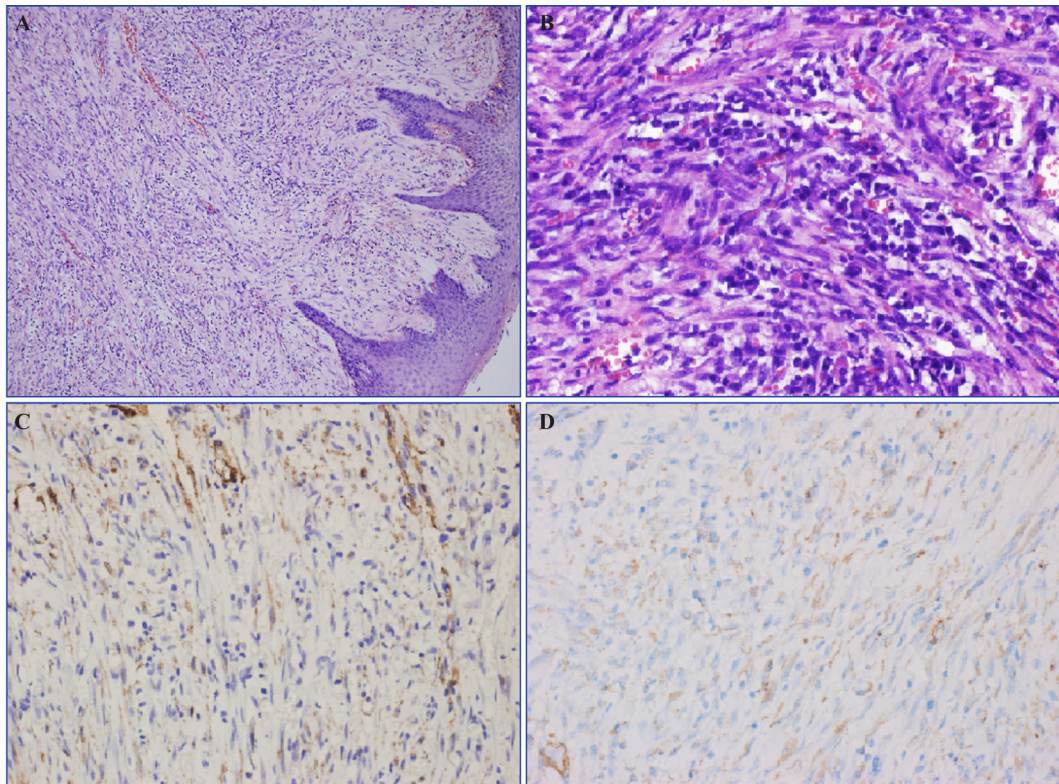


Figure 2 Histological and immunochemical staining. (A) Spindle cells and lymphocytes infiltration under squamous cell hyperplasia of the overlying mucosa (H&E staining, original magnification $\times 50$). (B) Spindle cells and lymphocytes infiltration (H&E staining, original magnification $\times 400$). (C) The tumor cells were positive for MSA (immunohistochemical staining, original magnification $\times 400$). (D) The tumor cells were positive for SMA (immunohistochemical staining, original magnification $\times 400$). MSA, myo-specific actin; SMA, smooth muscle actin.

IMT. The spindle cells in leiomyoma are smooth muscle cells rather than myofibroblast cells. The degeneration of interstitial mucus is not obvious, and inflammatory cells are mainly small lymphocytes, whereas in IMT plasma cells and neutrophils are the main cells.

Hypopharyngeal IMT is extremely rare and only five case reports (four English articles and one Chinese article) were found through a PubMed search (table 1). The five cases

were in one female and four male patients aged 49–74 years (mean 57.8 years). One malignant case was confirmed to harbor the 3a/b variants of the EML4-ALK fusion gene by genetic testing.⁹ The disease course is from 2 months to 2 years. The lesion usually occurred in the posterior wall of the pharynx. Globus sensation was the most common local symptom, followed by progressive dysphagia. Three patients presented with general symptoms, including weight loss and

Table 1 Hypopharyngeal inflammatory myofibroblastic tumors in the literature

Case number	Age (sex)	Clinical presentation	Tumor site	Disease course	Therapy	Follow-up time	Outcome
1 ⁵	64 (M)	Progressive dysphagia and voice change that had been present.	Right side of the hypopharynx.	3 mon	Total resection transorally by direct microlaryngoscopic surgery.	6 mon	Event-free survival.
2 ⁶	40 (M)	Progressive dysphagia, globus sensation, and a weight loss of 5 kg.	Medial aspect of the sinus piriformis.	6 mon	Total resection transorally by direct microlaryngoscopic surgery.	3 y	Event-free survival.
3 ⁷	74 (F)	Weight loss, progressive dysphagia, odynophagia, and globus sensation.	Right posterior wall of the hypopharynx.	No report	Palliative surgical resection.	11 mon	Death due to disease progression.
4 ⁸	49 (M)	Globus sensation.	Left posterior hypopharyngeal wall.	2 years	Total resection transorally by direct microlaryngoscopic surgery.	2 y	Event-free survival.
5 ⁹	69 (M)	Persistent productive cough of brown sputum, globus symptoms, dysphagia, odynophagia, dysphonia, otalgia, and general malaise.	Posterior pharyngeal wall.	2 months	Corticosteroid therapy.	2 y	Survival with tumor.

F, female; M, male.

general malaise. Pharyngeal malignancy was considered in almost all patients prior to pathological results. Three of five patients underwent total resection transorally, and the patient with IgG4 IMT was treated with corticosteroids.⁸ The case of malignant transformation only received palliative surgical resection and subsequently succumbed to disease progression at 11 months postdiagnosis.⁸ From the reviewed literature, we concluded that hypopharyngeal IMTs occur mostly in adults and rarely affect respiratory function, and total resection is the preferred treatment for IMT.

Although there is no consensus on the treatment of IMTs, complete excision is critical for cure and can result in a favorable prognosis in children. Anti-inflammatory treatment, chemotherapy, steroids, or immunomodulators as potential remedial and effective management strategies are recommended for adult patients who may not be able to undergo possible complete excision or in ALK-negative cases with a higher frequency of metastasis and invasiveness.¹²

In conclusion, in this child, the initial symptom of a large IMT was acute UAO. This report highlights the importance of differential diagnosis in a child with acute UAO. Following relief of acute UAO, wide excision of the tumor with safe margins should be carried out.

Correction notice This article has been corrected since it first published online.

Contributors LY contributed to investigation, visualization, original draft writing, review and editing. WL contributed to revising and final approval. Both authors have read and approved the final manuscript.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Parental/guardian consent obtained.

Ethics approval This study involves human participants and was approved by the Ethics Committee of West China Hospital, Sichuan University (ID: 20111108). Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement All data relevant to the study are included in the article or uploaded as supplementary information.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iD

Wen Li <http://orcid.org/0000-0002-1747-9594>

REFERENCES

- 1 Sasidaran K, Bansal A, Singhi S. Acute upper airway obstruction. *Indian J Pediatr* 2011;78:1256–61.
- 2 Coffin CM, Watterson J, Priest JR, et al. Extrapulmonary inflammatory myofibroblastic tumor (inflammatory pseudotumor). A clinicopathologic and immunohistochemical study of 84 cases. *Am J Surg Pathol* 1995;19:859–72.
- 3 Dalton BGA, Thomas PG, Sharp NE, et al. Inflammatory myofibroblastic tumors in children. *J Pediatr Surg* 2016;51:541–4.
- 4 Devaney KO, Lafeir DJ, Triantafyllou A, et al. Inflammatory myofibroblastic tumors of the head and neck: evaluation of clinicopathologic and prognostic features. *Eur Arch Otorhinolaryngol* 2012;269:2461–5.
- 5 Yilmaz M, Ibrahimov M, Aslan M, et al. Hypopharyngeal inflammatory myofibroblastic tumor. *J Craniofac Surg* 2013;24:1055–6.
- 6 Graefe H, Stellmacher F, Sotlar K, et al. Inflammatory pseudotumor of the hypopharynx: clinical diagnosis, immunohistochemical findings and treatment of this rare disease. *In Vivo* 2008;22:817–20.
- 7 Wang P-J, Shen Y, Ke S-X. [A case of inflammatory myofibroblastic tumor in hypopharynx]. *Zhonghua Er Bi Yan Hou Tou Jing Wai Ke Za Zhi* 2008;43:709.
- 8 Khoo JF, Batt M, Stimpson P, et al. Supraglottic immunoglobulin-G4 related plasma cell granuloma: case report and literature review. *Head Neck* 2014;36:E57–9.
- 9 Muscarella LA, Rossi G, Trombetta D, et al. A malignant inflammatory myofibroblastic tumor of the hypopharynx harboring the 3a/b variants of the EML4-ALK fusion gene. *Oncol Lett* 2017;13:593–8.
- 10 Grundfast KM, Insalaco LF, Levi J. The 10 Commandments of management for acute upper airway obstruction in infants and children. *JAMA Otolaryngol Head Neck Surg* 2017;143:539–40.
- 11 Keen M, Cho HT, Savetsky L. Pseudotumor of the larynx--an unusual cause of airway obstruction. *Otolaryngol Head Neck Surg* 1986;94:243–6.
- 12 Mir MH, Dar W, Aejaz Aziz S, et al. Clinico-radiological and pathological characteristics of inflammatory myofibroblastic tumors in children: a retrospective study. *Indian J Med Paediatr Oncol* 2017;38:261–5.