

Tracheocele: a rare life-threatening condition in pediatric surgery – A case report

Enrica Antonelli

enri.antonelli@gmail.com

Santobono Children's Hospital

Marianna Squame

Santobono Children's Hospital

Daniela Delle Donne

Santobono Children's Hospital

Luigia D'Amato

Santobono Children's Hospital

Ugo de Luca

Santobono Children's Hospital

Case Report

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Abstract

Introduction

Tracheocele is a rare condition characterized by herniation of the tracheal mucosa through a defect in the posterior wall. Pediatric cases are extremely uncommon, and clear management guidelines are lacking.

Case presentation

We report the case of a previously healthy 5-year-old girl who developed acute respiratory distress immediately after a Sistrunk procedure performed under general anesthesia. Postoperative imaging revealed bilateral pneumothorax, pneumomediastinum, and extensive subcutaneous emphysema. Further evaluation with computed tomography and tracheoscopy demonstrated a large posterior tracheocele with a microperforation.

Intervention and outcome

The patient was promptly managed with airway stabilization, chest drainage, and supportive care, followed by a conservative therapeutic approach. Clinical and radiological conditions progressively improved, and follow-up tracheoscopy showed spontaneous reduction of the tracheocele.

Conclusion

This case highlights the importance of early recognition of tracheocele-related complications and suggests that conservative management can be effective in selected pediatric patients.

Introduction

Tracheocele is a rare pathological condition defined as herniation of the tracheal mucosa through a defect in the posterior membranous wall of the trachea. It may be congenital or acquired and is infrequently reported in pediatric populations.^{1, 2} Due to its rarity, the condition remains poorly characterized, and no standardized diagnostic or therapeutic guidelines are currently available.^{3,4,5,6,7}

Most tracheoceles are asymptomatic and are often discovered incidentally; however, in some cases they may present with nonspecific respiratory symptoms or lead to severe complications, particularly in the context of airway manipulation.⁸

We present a rare case of previously undiagnosed tracheocele in a child, which became clinically evident following endotracheal intubation and resulted in life-threatening postoperative complications. This case

underscores the importance of considering this entity in the differential diagnosis of acute postoperative respiratory distress.

Case presentation

A 5-year-old girl was admitted to our Day Surgery Department for elective excision of a thyroglossal duct cyst. Her medical history was unremarkable, with no prior respiratory diseases, congenital anomalies, or previous surgical interventions. The patient was asymptomatic, and preoperative evaluation did not reveal any abnormalities.

The patient underwent a Sistrunk procedure under general anesthesia with endotracheal intubation. In the immediate postoperative period, she developed acute respiratory distress associated with extensive subcutaneous emphysema involving the neck and upper thorax. Chest X-ray revealed bilateral pneumothorax, more pronounced on the right side (Fig. 1A-B).

The patient was promptly reintubated, and a chest tube was inserted on the right side, while decompression of the left hemithorax was achieved using a 16G angiocath. Multiple needle punctures were performed in the cervical region to reduce subcutaneous emphysema. These interventions led to rapid clinical improvement and re-expansion of the lungs, as confirmed by repeat chest X-ray (Fig 2).

The patient was subsequently transferred to the pediatric intensive care unit for further management.

A computed tomography (CT) scan of the chest demonstrated massive pneumomediastinum, bilateral pneumothorax, diffuse subcutaneous emphysema, and areas of pulmonary atelectasis (Fig. 3A-B-C).

Flexible tracheoscopy revealed a large tracheocele arising from the posterior wall of the trachea, measuring approximately 3 cm in length and extending from 2 cm below the glottis to 1.5 cm above the carina. A small perforation was identified at the base of the lesion. (Fig. 4)

During hospitalization, the patient was closely monitored and treated with broad-spectrum antibiotics. Serial imaging and clinical evaluations showed progressive improvement. She was successfully extubated on postoperative day 8 and transferred to the surgical ward. Given the favorable clinical course and absence of persistent symptoms, a conservative management strategy was adopted. The patient was discharged on postoperative day 18 in good clinical condition (Fig. 5A-B).

At one-month follow-up, repeat tracheoscopy demonstrated a marked spontaneous reduction of the tracheocele, which appeared as a small residual pouch. The patient remained asymptomatic, and no further endoscopic evaluations were deemed necessary.

Discussion

Tracheocele was first described by Rokytansky in 1846 as a diverticulum of tracheal wall ^{4,6,7}.

Nowadays is well known that there are several conditions that affect the normal tracheal shape and that tracheocele and tracheal diverticula are different entities ^{7,9,10}.

Tracheal diverticula arise from malformed supernumerary branches of the trachea, with an anatomically, histologically and citologically complete tracheal structure, usually arising as multiple sacs smaller than 2 cm with narrow inlets ^{10,11,11}; on the contrary, tracheocele consist in the mucosus membran herniation through a defect of tracheal wall, usually a single sac larger than 2 cm, with a wide opening and it is lined only with respiratory epithelium without cartilage, glands or muscle ^{6,7,10,11,12,13}.

Tracheocele usually affects the posterior membranous trachea and occurs at the junction of the cartilaginous and membranous portion. As described by several authors, the right side is more frequently affected because of the positional support of the left posterolateral esophagus ^{2,3,5,6,13}.

According to the etiopathogenesis, tracheocele may be differentiated in congenital and acquired. Congenital tracheocele is described as the result of embrionic tracheal wall defect, it is usually associated with small opening and it may be associated with other laringo-thracheo-esophageal anomalies and can remains silent until adulthood ^{4,6,7,10}.

Acquired tracheocele, usually located at the junction between the extrathoracic and intrathoracic parts of the trachea, is descrided as mucosal herniation through a weak area of posterior tracheal wall secondary to increased intraluminal pressure (caused by prolonged endotracheal intubation, trauma, tracheo-esophageal surgery, recurrent bronchopulmonary diseases) ^{5,6,10,11,11,13}.

Although most tracheoceles are asymptomatic and found incidentally ^{3,6}, patients may present with a variety of nonspecific symptoms, dependig on the size and the site of tracheocele³, including chronic cough, dysphagia, dyspnea, laryngeal stridor, recurrent respiratory infections, apnea and neck pain^{2,3,4,5,6,13}. In some cases, tracheocele may complicate endotracheal intubation and ventilation during general anesthesia and it may present as pneumomediastinum in case of perforation^{3,4,5,6,13}.

Among diagnostic investigations, high resolution CT is the gold standard technique to diagnose this condition providing information about presence, tracheal communication, site and size of the lesion^{3,4,5,11}. Tracheoscopy is an essential tool to confirm the diagnosis¹⁰. Barium swallow contrast study is useful to make differential diagnosisi of this disorder (laringoceles, pharyngocele,Zenker's diverticulum)^{3,11}. Hystologic exam is the only way of carrying out a definitive diagnosis of acquired or congenital tracheocele.

Due to the rarity of tracheocele, there aren't guidelines about its mangement and the treatment choise depend on general conditions, age, symptoms and tracheocele features (site and size)^{3,11}.

Treatment options includes conservative medical management with antibiotics, mucolytic agents, broncodilatators and physioterapy and surgical management realized by endoscopic

cauterization/brushing or by open lateral cervical approach^{3,5}. Medical management is the treatment of choice in asymptomatic and elderly patients while surgical intervention is reserved to symptomatic patients and in case of medical treatment failure^{5,13}.

The case we have presented could be considered as a congenital tracheocele depending on its features, absence of previous symptomatology, absence of tracheo-oesophageal malformations or surgery, even if the only certain diagnostic tool remains histology.

Conclusions

Tracheocele is a rare entity; however, it should be considered in the differential diagnosis, particularly in the presence of respiratory symptoms in patients with known tracheolaryngeal malformations, a history of tracheoesophageal surgery, or postoperative pneumomediastinum following endotracheal intubation.

In the case presented, a preoperative diagnosis was not possible; nevertheless, this rare condition should be taken into account in the differential diagnosis of postoperative pneumomediastinum or pneumothorax, especially after endotracheal intubation.

Prompt recognition of the defect, together with appropriate management of complications—such as reintubation distal to the tracheocele, pneumothorax drainage, and needle decompression of subcutaneous emphysema—can be life-saving.

Accurate diagnosis of tracheocele is essential to reduce the risk of complications during future intubations. CT and tracheoscopy are the diagnostic modalities of choice and may support histological evaluation in distinguishing between congenital and acquired forms.

In the absence of established guidelines, treatment should be individualized based on the patient's general condition, age, clinical presentation, and the anatomical characteristics of the tracheocele.

Patient perspective

The patient's parents reported satisfaction with the care received and expressed relief regarding the favorable outcome after a potentially life-threatening complication.

Declarations

Ethical approval

Ethical approval was not required for this case report in accordance with institutional policies.

Consent to Participate

Consent was obtained from the patient's parents for participation and publication of this case report and accompanying images.

Consent for Publication

Written informed consent was obtained from the patient's parents for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Conflict of Interest

None declared.

Authors' contributions

E.A. and U.dL were the surgeons in the operating room and wrote the main manuscript text

D.DD and L.DA were the on call anesthesiologist

M.S. carried out the first peer review for this journal

All authors reviewed the manuscript.

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Author Contribution

E.A. and U.dL were the surgeons in the operating room and wrote the main manuscript text D.DD and L.DA were the on call anesthesiologist M.S. carried out the first peer review for this journal All authors reviewed the manuscript.

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Data availability

Not applicable. Written informed consent was obtained from the patient's parents for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

References

1. Razak A, Patil PH, Sahota JS, Subramanian S. Giant tracheocele. *J Thorac Cardiovasc Surg*. 2010;139(3):e27-e28
2. Madana J, Yolmo D, Saxena SK, Gopalakrishnan S. Giant tracheocele with multiple congenital anomalies. *Ear Nose Throat J*. 2012;91(5):E13-E15
3. Kallel S, Chaabouni MA, Thabet W, Mnejja M, Ben Mahfoudh K, Charfeddine I. Tracheocele: A Rare Entity. *Iran J Otorhinolaryngol*. 2022;34(123):191–194
4. Gakosso LGC, Coulibaly M, Zouita I, Basraoui D, Jalal H. A Congenital Tracheocele Revealed by Difficulty Breathing in an Infant [full article]. *Open J Case Rep*. 2023; 4: 171. Available at: <http://www.arraypublishers.com/images/photo/63f788738765b.pdf>
5. Berlucchi M, Pedruzzi B, Padoan R, Nassif N, Stefini S. Endoscopic treatment of tracheocele in pediatric patients. *Am J Otolaryngol*. 2010;31(4):272–275
6. Molinaro F, Loglisci M, Cocca S, Monciatti G, Pellegrino C, Di Maggio G, et al. Giant acquired tracheocele in a syndromic child: Case report and review of the literature [full article]. *Curr Pediatr Res* 2017; 21 (3): 455–459. Available at: <https://usiena-air.unisi.it/bitstream/11365/1033029/1/giant-acquired-tracheocele-in-a-syndromic-child-case-report-and-reviewof-the-literature.pdf>
7. Briganti V, Tavormina P, Testa A, Oriolo L. Giant tracheocele following primary tracheostomy closure in a 3 year old child. *Interact Cardiovasc Thorac Surg*. 2004;3(2):411–412
8. Khamash O, Nawaz S, Mendonca R, Khan E. Tracheocele: A Rare Airway Condition With Significant Anesthesia Implications and the Importance of Preoperative Diagnosis. *Cureus*. 2025;17(7):e88326. doi: 10.7759/cureus.88326. PMID: 40837910; PMCID: PMC12360918.
9. Scholl PD. Adult tracheocele. *Otolaryngol Head Neck Surg*. 1994;111(4):519–521
10. Nerurkar N, Patil P, Tampi S, Yadav K, Jain S. Tracheocele—a case report. *Laryngoscope*. 2011;121(8):1735–1737
11. Soto-Hurtado EJ, Peñuela-Ruiz L, Rivera-Sánchez I, Torres-Jiménez J. Tracheal diverticulum: a review of the literature. *Lung*. 2006;184(6):303–307
12. Endo S, Saito N, Hasegawa T, Sato Y, Sohara Y. Tracheocele: surgical and thoracoscopic findings. *Ann Thorac Surg*. 2005;79(2):686–687
13. Porubsky EA, Gourin CG. Surgical treatment of acquired tracheocele. *Ear Nose Throat J*. 2006;85(6):386–387

Figures

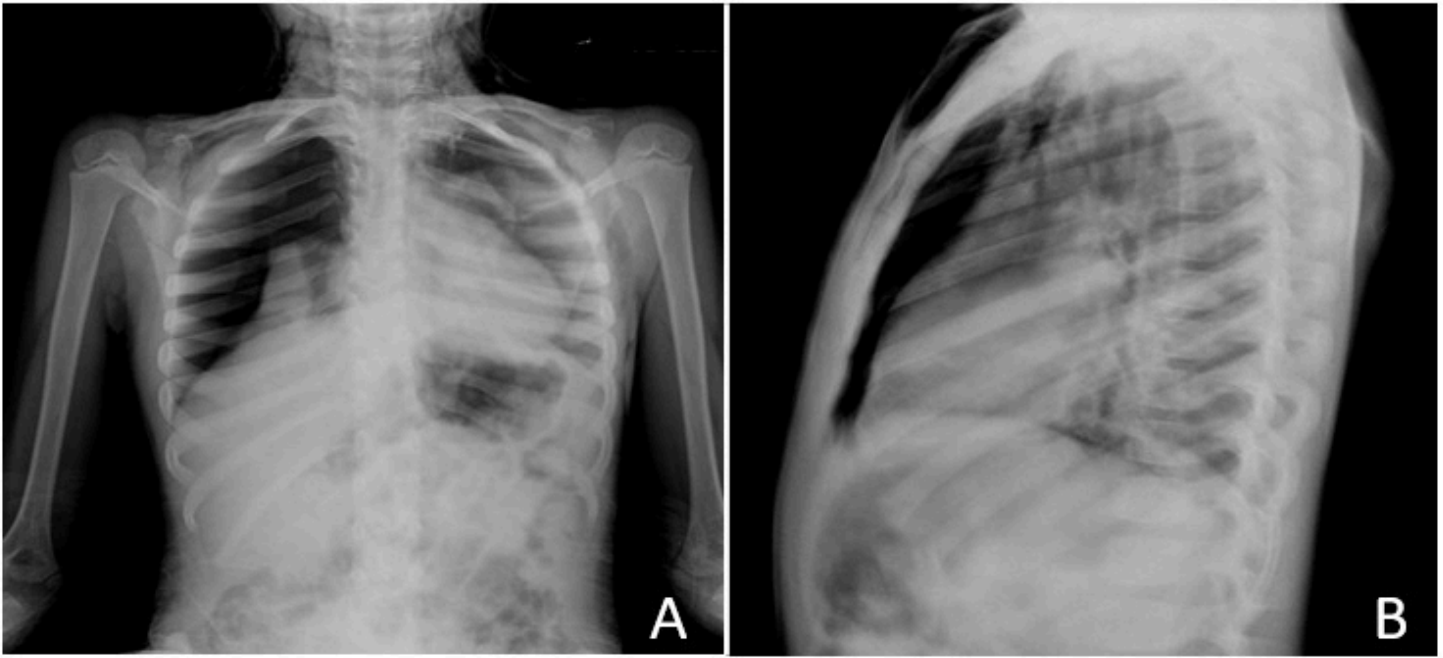


Figure 1

Post operative chest X-ray revealing bilateral pneumothorax, more pronounced on the right side and subcutaneous emphysema



Figure 2

Chest X-ray following treatment of the pneumothorax and the subcutaneous emphysema, showing improvement

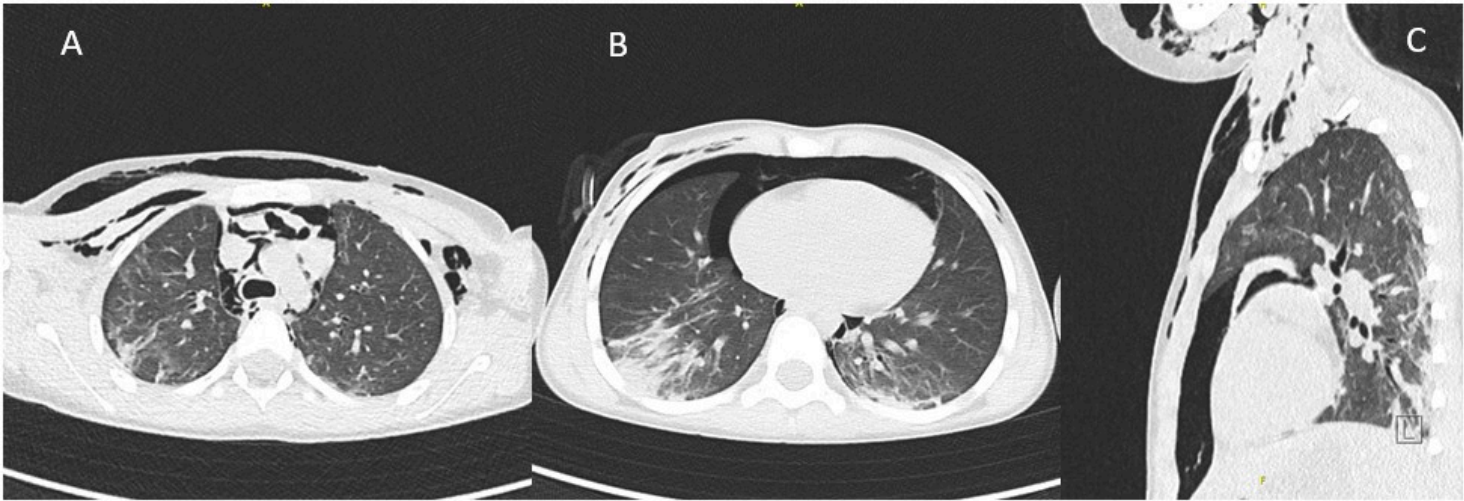


Figure 3

CT scans revealing bilateral pneumothorax, pneumomediastinum and subcutaneous emphysema



Figure 4

Tracheoscopy: tracheocele arising from the posterior wall of the trachea

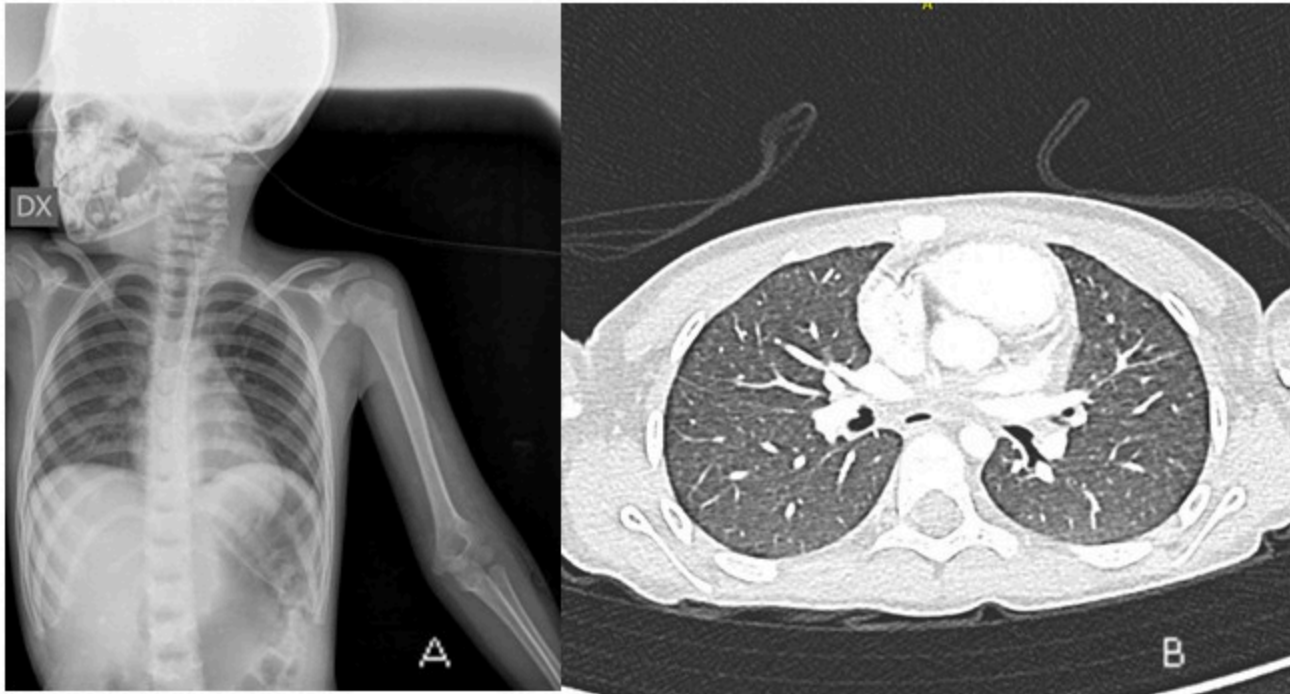


Figure 5

Chest X-ray (A) and CT scan (B), at patient discharge, demonstrating complete resolution of the pneumothorax, pneumomediastinum and subcutaneous emphysema