

Facing the Unexpected: A Case Report of Difficult Airway Situation

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ABSTRACT:

Background: A difficult airway presents challenges in securing a clear and safe airway, often arising during intubation or ventilation due to anatomical or physiological factors. Effective recognition and management are crucial, involving tools such as video laryngoscopy and surgical interventions, as failure can lead to severe complications.

Case Description: We report a 3-month-old male with congenital right fibular hemimelia and talipes calcaneovalgus, admitted to the pediatric ICU for upper airway obstruction. He exhibited paroxysmal cyanosis and stridor during crying and breastfeeding. On admission, he was cyanotic, in respiratory distress, and experienced a seizure. After stabilization with high-flow oxygen, he developed severe respiratory distress and bradycardia on day three, necessitating intubation. Video laryngoscopy revealed a large cystic mass obstructing the airway, confirmed by MRI as a loculated cystic lesion near the glottis and trachea.

Conclusions: This case underscores the critical role of video laryngoscopy in managing difficult airways in pediatric patients. The enhanced visualization and accessibility provided by this technique improve intubation success and minimize complications, highlighting the need for its integration into clinical practice for similar cases.

Keywords: *Difficult intubation, Upper airway obstruction, Stridor, Cystic mass, Video laryngoscopy.*

Background:

Difficult intubation is a prevalent challenge in airway management, occurring in approximately 1-5% of intubations, with significant implications for patient safety and procedural success [1]. Traditional direct laryngoscopy can be limited by anatomical variations and patient-specific factors, resulting in a failure rate of up to 10% in high-risk scenarios [2]. Video laryngoscopy, which provides enhanced visualization through a video screen, has been shown to improve success rates in difficult intubations. Studies indicate that video laryngoscopy has a success rate of up to 95% in these cases, compared to approximately 85% for direct laryngoscopy [3]. Despite these advantages, the effectiveness of video laryngoscopy can vary depending on clinical circumstances, necessitating ongoing evaluation of its impact on patient outcomes and procedural efficiency [4].

Case Report:

A 3-month-old male patient, known to have right fibular hemimelia and right talipes calcaneovalgus with an

American Society of Anesthesiologists classification II (ASA II), was admitted to the pediatric intensive care unit with upper airway obstruction. He presented with recurrent episodes of paroxysmal cyanosis, accompanied by stridor, primarily triggered by crying and breastfeeding. His perinatal and neonatal histories were unremarkable, aside from the congenital right fibular hemimelia and talipes calcaneovalgus. On arrival, the patient was cyanotic and in respiratory distress, with a respiratory rate of 44 breaths per minute and SpO₂ of 30%. He experienced his first seizure episode in the emergency room, witnessed by the attending physician. A decision was made to admit him to the pediatric intensive care unit for observation and diagnostic evaluation for at least 24 hours. During this period, he remained hemodynamically stable, maintaining oxygen saturation with high-flow nasal cannula, which was later weaned to a simple nasal cannula. His laboratory results, chest X-ray, and cardiology and neurology assessments were all unremarkable. On the third day post-admission, the patient developed severe respiratory distress with bradycardia, prompting a decision to intubate. During intubation, induction was initiated with ketamine and a

muscle relaxant. A video laryngoscopy was performed, revealing a large cystic mass obstructing the airway (Figure 1). An anesthesia consult was obtained, and the airway was secured using a size 3.5 mm endotracheal tube with the assistance of video laryngoscopy and a bougie.



During the procedure, the cystic mass was noted in relation to the epiglottis (Figure 2).

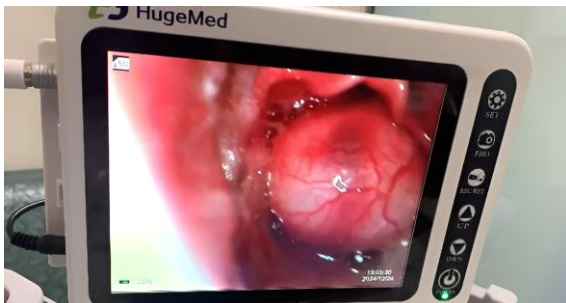


Figure 2. Cystic mass in relation to the epiglottis observed during video laryngoscopy. The image highlights the anatomical location of the cystic mass adjacent to the epiglottis, which was identified during the intubation procedure.

The image highlights the anatomical location of the cystic mass adjacent to the epiglottis, which was identified during the intubation procedure. Following an attempt to secure the airway using a bougie introduced into the glottis, the cystic mass was again visualized (Figure 3).



Figure 3. Cystic mass in relation to the epiglottis and vocal cords following an attempt to secure the airway using a bougie introduced into the glottis. The image captures the positioning of the bougie alongside the

cystic mass, illustrating the challenges encountered during intubation. This finding emphasizes the need for careful airway management and assessment in cases of unexpected anatomical variations.

The image captures the positioning of the bougie alongside the cystic mass, illustrating the challenges encountered during intubation. The airway was successfully secured with a 3.5 mm endotracheal tube (Figure 4).



Figure 4. Secured airway with a 3.5 mm endotracheal tube following the intubation procedure. The image illustrates successful placement of the endotracheal tube, providing access to the airway despite the presence of the cystic mass. This step was crucial in ensuring adequate ventilation and oxygenation during the management of the patient, highlighting the importance of skilled airway intervention in complex cases.

The image illustrates successful placement of the endotracheal tube, providing access to the airway despite the presence of the cystic mass. This step was crucial in ensuring adequate ventilation and oxygenation during the management of the patient, highlighting the importance of skilled airway intervention in complex cases. An MRI of the neck was performed post-intubation, which revealed an oblong-shaped, loculated cystic lesion involving the glottic and infraglottic areas, extending right para-tracheally to the root of the neck (Figure 5) which was managed later with surgical excision by the ENT team.

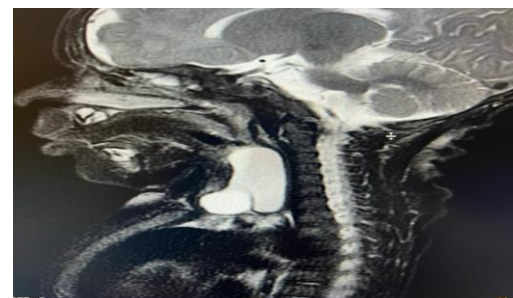


Figure 5. MRI of the neck post-intubation revealing an oblong-shaped, loculated cystic lesion involving

the glottic and infraglottic areas. The imaging shows the extent of the lesion, which extends right para-tracheally to the root of the neck. This finding was critical in further evaluating the airway obstruction and guiding subsequent management strategies.

DISCUSSION:

Glottic and tracheal cysts are rare but significant entities affecting the respiratory tract, with glottic cysts occurring in approximately 1-6% of patients presenting with voice disorders [5]. Glottic cysts, often located in the vocal folds, can lead to voice changes and respiratory difficulties due to their impact on the airway and phonation. In contrast, tracheal cysts, which may occur anywhere along the trachea, can obstruct airflow and present challenges in airway management. Studies have shown that tracheal cysts account for about 4% of all tracheal tumors [6]. Both types of cysts can be congenital or acquired, and their diagnosis typically involves imaging studies such as CT scans or endoscopy. Treatment often necessitates surgical intervention, particularly when cysts cause significant symptoms or complications. Understanding the pathophysiology and clinical implications of these cysts is essential for effective management and improved patient outcomes.

Video laryngoscopy plays a crucial role in diagnosing glottic and tracheal cysts as causes of upper airway obstruction. This advanced imaging technique provides real-time visualization of the laryngeal and tracheal structures, enabling clinicians to assess the size, location, and characteristics of cysts that may obstruct the airway. Studies have shown that video laryngoscopy can significantly enhance diagnostic accuracy compared to traditional laryngoscopy, particularly in cases where cysts are difficult to visualize due to swelling or anatomical variations [7]. Furthermore, this modality facilitates the evaluation of vocal cord function and allows for simultaneous biopsy if indicated, providing a comprehensive approach to patient management. The timely identification of glottic and tracheal cysts through video laryngoscopy is essential, as early intervention can prevent serious complications associated with airway obstruction and optimize treatment outcomes [8]. Additionally, Video laryngoscopy has become an essential tool in the management of difficult intubations, significantly improving visualization of the airway compared to traditional direct laryngoscopy. Studies show that video laryngoscopy can increase first-attempt intubation success rates by up to 93% in difficult cases, compared to approximately 67% with conventional techniques [9]. The enhanced view provided by the camera-equipped blade allows clinicians to navigate anatomical challenges more effectively, reducing the risk

of trauma and improving overall safety [10]. Furthermore, a meta-analysis indicated that video laryngoscopy reduces the incidence of failed intubation by nearly 50% in patients with predicted difficult airways [11]. This technique not only aids in clinical practice but also serves as a valuable educational tool, allowing real-time visualization that can be shared among team members during challenging scenarios [12]. Overall, the integration of video laryngoscopy in difficult intubations enhances both patient outcomes and the efficiency of airway management.

The limitations of this study arise from its reliance on a single case, which restricts the generalizability of the findings. The patient belonged to the pediatric age group, which presents unique challenges, as children may be unable to express symptoms clearly. Furthermore, the emergency nature of the intubation procedure limited the opportunity for a thorough airway assessment prior to intervention. Variations in patient anatomy and clinical scenarios may influence outcomes in different contexts. Additionally, the assessment of airway difficulty is often subjective and can vary among practitioners, potentially leading to differences in management strategies and results. The case report also does not incorporate perspectives from other specialties, such as ENT, which could provide a more comprehensive understanding of airway challenges. Lastly, it primarily addresses immediate management and outcomes, offering limited insight into long-term effects or complications.

CONCLUSION:

In conclusion, glottic and tracheal cysts, while rare, pose significant challenges in respiratory health and airway management. The advancements in diagnostic techniques, particularly video laryngoscopy, have revolutionized the approach to these conditions. By providing enhanced visualization and improving diagnostic accuracy, video laryngoscopy not only aids in the timely identification of cysts but also facilitates safer intubation in difficult cases. As a critical tool in both clinical practice and education, it underscores the importance of early intervention in preventing complications and optimizing patient outcomes. Thus, a thorough understanding of these cysts and the implementation of advanced imaging techniques are essential for effective respiratory care.

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