

CASE REPORT

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# Chronic congestion with oral feeds in the presence of subglottic stenosis: a case report

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## Abstract

**Background** Subglottic stenosis is the narrowing of the airway below the vocal folds. It can present as a congenital or acquired condition. The primary clinical presentation is often noted as noisy breathing, also known as stridor. Diagnosis in the infant pediatric population poses challenges due to age-related factors and symptom variability. This case report highlights a pediatric patient whose predominant symptom was congestion during oral feeds.

**Case presentation** A 3-month-old pre-term male, intubated following an episode of ventricular fibrillation with underlying viral infection, presented with prolonged, persistent congestion with oral feeds. Given persistent congestion, the differential diagnosis included aspiration, recovery from a viral illness, reflux, and an anatomical stricture. A videofluoroscopic swallow study was completed and ruled out oropharyngeal dysphagia from the differential. Despite this exclusion and the patient's eventual recovery from his viral illness, congestion with oral feeds continued to worsen. A fiberoptic endoscopic evaluation was completed and revealed Grade 2 subglottic stenosis. The patient required immediate intervention via balloon dilation in the operating room.

**Conclusions** Acquired subglottic stenosis is often a consequence of intubation. Symptoms are variable and can be difficult to diagnose in pediatric patients. Timely intervention is essential to prevent life-threatening conditions.

**Keywords** Acquired subglottic stenosis, Pediatric, Congestion, Feeding, Case report

## Background

Subglottic stenosis can affect individuals across all age groups, presenting either at birth as congenital, or following trauma or airway manipulation, referred to as acquired (Jefferson et al. 2016; McCormick 2022). Acquired subglottic stenosis is more common than

congenital and is frequently associated with prolonged intubation (Arianpour et al. 2019; Carta et al. 2022; Dorris et al. 2021; Gould and Young 1992; Jefferson et al. 2016; Percul et al. 2023; Pinzas et al. 2023). It is reported that it occurs in 0.63% of neonates intubated for more than 48 h (Lin et al. 2013). The clinical presentation in infants with acquired subglottic stenosis is often noted with biphasic stridor and symptoms of respiratory distress (Jefferson et al. 2016). Diagnosis in pediatric patients can pose challenges given the delayed symptom presentation over weeks, and clinical symptoms can overlap with other diagnoses. This case report will aim to share another clinical symptom seen in pediatric patients that should be considered clinically to help with the diagnosis.

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### Case presentation

A 3-month-old male, born pre-term at 35 weeks gestation, was brought to the emergency department due to ventricular fibrillation. He required immediate defibrillation and cardiopulmonary resuscitation (CPR) and was eventually intubated for respiratory support. Further clinical assessment revealed that the patient also had a viral illness. He was admitted to the cardiac intensive care unit for ongoing monitoring and extubated to room air six days later.

After extubation, speech-language pathology assessed the patient's feeding and swallowing ability, and recommendations were made for small oral trials with supplemental enteral nutrition due to feeding-related congestion, concerning for aspiration. Prior to this admission, the patient did not have any history of feeding concerns. The patient continued to show upper airway congestion two weeks after the assessment, which prompted further investigation, including a videofluoroscopic swallow study (VFSS). The results of the VFSS did not show any penetration or aspiration events, but the patient continued to present with an immediate onset of chest congestion, accompanied by upper airway congestion and audible breathing, with oral feeds. Otolaryngology (ENT) was consulted, and an endoscopy was completed, which found no structural abnormalities at the time. The patient was then cleared to resume full oral feeds. However, one week later, the patient presented with worsening upper airway congestion and highlighted the need for continued evaluation to uncover the cause of these challenges. A fiberoptic endoscopic evaluation (FEES) was ordered in collaboration with ENT for further assessment.

During the FEES assessment, immediate visualization by the ENT revealed subglottic stenosis, leading to an urgent direct laryngoscopy and bronchoscopy (DLB) (Fig. 1). The results of the DLB indicated Grade 2 subglottic stenosis, necessitating immediate balloon dilation. The patient was discharged on nasogastric (NG) feeds with small-volume oral feeds due to the heightened risk of aspiration with the newly identified diagnosis. Monthly DLB and balloon dilations showed improvement in the trachea, as evidenced by endoscopic images of the trachea (Fig. 2).

Although the initial considerations for the patient's symptoms included continued viral recovery, reflux, and an anatomical stricture, these possibilities were subsequently dismissed. The patient tested negative on the viral panel completed four weeks after admission, yet continued to experience congestion during feeding. Additionally, both the caregivers report and the patient's medical history revealed no congestion during feeding or reflux concerns before admission. Finally, VFSS and

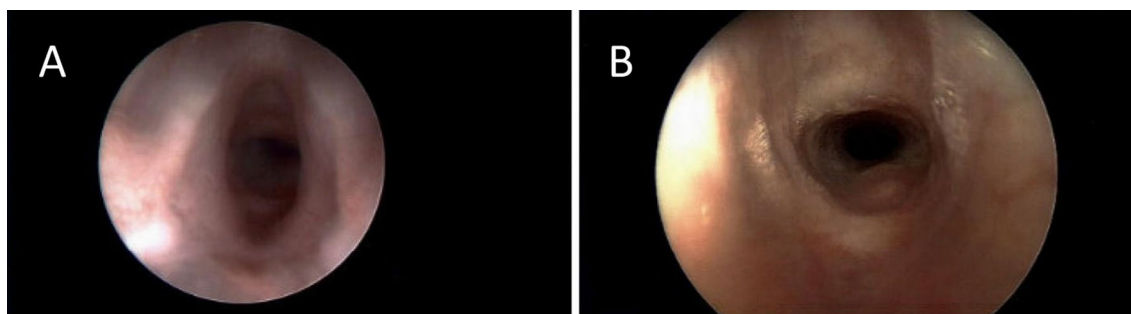


**Fig. 1** Fiberoptic endoscopic evaluation of patient airway four weeks after intubation

initial endoscopic findings showed no evidence of anatomical strictures.

### Discussion

Acquired subglottic stenosis resulting from intubation may not exhibit clinical symptoms until weeks or months later, making it an often-overlooked area. If left untreated, acquired subglottic stenosis can result in respiratory distress and progressive airway obstruction. Recent literature has shown that acquired subglottic stenosis occurs in more than 90% of cases, with prolonged endotracheal intubation being the primary etiological factor, underscoring the importance of careful monitoring (Carta et al. 2022; Fiz et al. 2019; Pinzas et al. 2023). Dorris and colleagues (2021) further emphasize that subglottic stenosis may manifest as a late complication, with its clinical presentation delayed by weeks to months following initial intubation. Various challenges and risk factors contribute to its development, including the size of the endotracheal tube, respiratory infections within 14 days of intubation, and a higher prevalence in pre-term infants with low birth weight (Arianpour et al. 2019; Contencin et al. 1993; Dorris et al. 2021; McCormick 2022; Pinzas et al. 2023). In our case, the patient had both risk factors, having an upper respiratory infection prior to admission and a history of prematurity with a gestational age of 35 weeks. Additionally, poor wound healing responses after intubation have been shown to lead to fibrotic scarring due to restricted blood supply. The constant movement of the larynx during head movement and swallowing further complicates this process (Arianpour et al. 2019; Gould and Young 1992; McCormick



**Fig. 2** Direct laryngoscopy and bronchoscopy endoscopic images four weeks after initial balloon dilation of acquired subglottic stenosis (A). Endoscopic images after fourth balloon dilation completed 12 weeks after initial diagnosis (B)

2022; Pinzas et al. 2023). The healing and recovery process occurs in phases, with the final phase, remodeling, lasting from weeks to years. In this case report, the second endoscopic assessment completed four weeks post-intubation using the FEES revealed subglottic stenosis, providing immediate visualization during the ongoing healing and recovery process.

Furthermore, the symptoms of aspiration and acquired subglottic stenosis share similarities, which can often result in misdiagnosis. While VFSSs are crucial for assessing aspiration concerns, our case presented with persistent congestion during feeding despite no airway invasion events on the assessment completed two weeks after the onset of respiratory symptoms. The subsequent FEES, conducted four weeks post-intubation during continued healing, led to the diagnosis of Grade 2 subglottic stenosis. Although endoscopy is the gold standard for subglottic evaluation, it poses challenges in the pediatric population, including limited participation and premature assessment of the upper airway before full healing. Therefore, endoscopy is often only utilized if the patient presents with clinical concerns warranting further assessment. The treatment approach for subglottic stenosis varies based on its severity, including esophageal balloon dilation or laryngotracheoplasty (Maresh et al. 2014; McCormick 2022). The least invasive approach is balloon dilation, for which timing and frequency of intervention are patient specific. More recent studies have shown a shift toward endoscopic intervention due to the reduced risks of complications, faster recovery, avoidance of repeated intubation, decreased sedation needs, and avoidance of external incisions (McCormick 2022).

## Conclusions

This case highlights the presence of acquired subglottic stenosis as a consequence of pediatric intubation, emphasizing the need for ongoing vigilance and follow-up by the interdisciplinary team in pediatric cases of prolonged intubation. It is essential to recognize that symptoms may

not become apparent for weeks, underscoring the need for ongoing monitoring. It may be beneficial for clinicians to monitor congestion with oral feeds to help support identifying this diagnosis. Additionally, the utilization of FEES can be a supplemental tool in the identification of subglottic stenosis in the setting of persistent congestion. Timely identification and intervention play a pivotal role in influencing positive patient outcomes in patients with acquired subglottic stenosis.

## Abbreviations

VFSS	Videofluoroscopic swallow study
FEES	Fiberoptic endoscopic evaluation
DLB	Direct laryngoscopy and bronchoscopy

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Not applicable.

## Author contributions

NHM was the primary speech-language pathologist treating the patient. NHM completed the videofluoroscopic swallow study (VFSS) on the patient and later completed a fiberoptic endoscopic evaluation with SG. SG is the ENT who performed a direct laryngoscopy bronchoscopy followed by a balloon dilation on the patient. JAN is the cardiologist who was the primary MD in the patient's case, given the underlying cardiac diagnosis. KH assisted NHM in VFSS interpretation. All authors read and approved the final manuscript.

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## Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

## Declarations

### Ethics approval and consent to participate

All required measures were undertaken to preserve the information's confidentiality. All procedures performed in studies involving human participants were in accordance with the ethical standards of Children's Healthcare of Atlanta.

### Consent for publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

### Competing interests

The authors declare that they have no competing interests.

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