



Case Report

Management of Adult Subglottic Foreign Body: A Case Report

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Abstract

Objectives: To describe a rare case of delayed diagnosis of a subglottic foreign body (FB) in an adult, resulting in subglottic stenosis, and to evaluate the effectiveness of Suspension Microlaryngoscopy (SML) as a minimally invasive technique for its management. **Case presentation:** An adult patient presented with persistent respiratory symptoms and was ultimately diagnosed with a retained subglottic FB after a delayed clinical course. The FB was managed using endotracheal intubation and SML, which allowed precise visualization and extraction. Associated granulation tissue and mucosal overgrowth were treated with targeted resection and controlled cauterization. **Discussion:** The delayed presentation and nonspecific clinical manifestations posed significant diagnostic challenges, contributing to the persistence of the FB and the development of subglottic stenosis. SML provided excellent exposure of the subglottic region, enabling safe FB removal while minimizing trauma to surrounding tissues. Postoperative follow-up demonstrated complete symptom resolution and restoration of airway patency without complications. **Conclusions:** Subglottic FB impaction is an exceptionally rare condition in adults and may be overlooked because of its nonspecific presentation, leading to delayed diagnosis and airway complications. This case highlights the importance of maintaining a high index of suspicion for retained airway FBs in patients with persistent respiratory symptoms or unexplained subglottic stenosis. SML represents a safe and effective therapeutic option, offering precise visualization, atraumatic FB extraction, and successful management of associated granulation tissue, with favorable clinical outcomes.

Keywords: foreign body; subglottic; suspension microlaryngoscopy

1. Introduction

Subglottic foreign body (FB) impaction leading to subglottic stenosis is a well-documented occurrence in young children, particularly those with a history of aspiration [1]. In contrast, this presentation is exceptionally rare in adults, with only a few cases reported in the literature [2,3]. Adult airway FB aspiration is typically associated with predisposing factors such as neurological disorders, impaired swallowing mechanisms, altered consciousness, trauma, alcohol or sedative use, and dental or medical procedures. However, FB aspiration may also occur in otherwise healthy individuals and remain unrecognized for prolonged periods [4,5].

The diagnosis of subglottic FBs in adults can be particularly challenging because symptoms are often nonspecific and may mimic more common respiratory or laryngeal conditions, including chronic cough, dyspnea, wheezing, asthma, recurrent respiratory infections, or subglottic stenosis. Furthermore, a history of aspiration is frequently absent or overlooked, contributing to delayed diagnosis and the development of secondary



Academic Editors: Yu Sun and
Agnieszka Szczepiek

Received: 7 May 2026

Revised: 30 July 2026

Accepted: 30 July 2026

Published: 3 August 2026

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complications such as granulation tissue formation, chronic inflammation, and airway narrowing [2–5]. These diagnostic pitfalls underscore the importance of maintaining a high index of suspicion in patients presenting with persistent or unexplained upper airway symptoms. In this report, we present a rare instance of a FB lodged in the subglottic region that manifested as subglottic stenosis after a delayed clinical presentation. This case highlights the diagnostic challenges associated with retained airway FBs in adults and emphasizes the importance of thorough endoscopic evaluation when the etiology of airway obstruction remains unclear. The case was successfully managed using endotracheal intubation in combination with Suspension Microlaryngoscopy (SML). The SML approach has proven to be an invaluable tool in managing subglottic FBs, offering a precise and minimally invasive method for both visualization and extraction. SML provides excellent exposure of the subglottic space and allows careful removal of the FB while minimizing trauma to surrounding tissues. In cases where granulation tissue or mucosal overgrowth complicates the procedure, this technique facilitates targeted resection and controlled cauterization, ensuring a safe and effective outcome. This case report was written according to CARE guidelines. The CARE checklist is in the Supplementary Materials (Supplementary File S1).

2. Case Presentation

A 48-year-old Italian male presented to the emergency department with progressive dyspnea, biphasic stridor, and a four-day history of mild hoarseness. In the emergency room, the patient was treated with racemic epinephrine aerosol, steroids, and oxygen therapy, leading to immediate improvement of dyspnea, although hoarseness persisted. Oxygen was delivered via a face mask with gentle, positive pressure, maintaining an oxygen saturation of 96%, as measured by pulse oximetry. Biphasic stridor remained evident on mild exertion but was not associated with either intercostal/subcostal recession or the use of accessory muscles for respiration. The patient had a history of narcotic substance use (cannabis and cocaine) but no other significant health issues. Lab investigations showed leukocytosis ($18.29 \times 10^3/\mu\text{L}$) and a high neutrophil percentage (93.1%). Cocaine use was confirmed through blood tests. Fiberoptic laryngeal examination showed granulation tissue in both nasal passages, nasal septum perforation, and subglottic granulation tissue and a visible portion of a foreign body partially obstructing the tracheal lumen [Figure 1]. The findings included laryngeal hyperemia and normal vocal fold motility. The subglottic airway was reduced by approximately 40 percent. The patient was admitted for further treatment, including oxygen therapy, injectable antibiotics, corticosteroids, and a computed tomography (CT) scan of the neck and thorax. The neck CT revealed: “a linear structure located immediately below the true vocal cord plane, dividing the tracheal lumen into anterior and posterior sections, extending approximately 22 mm craniocaudally and 15 mm laterally, suggestive of a FB or mucosal bridge.” [Figures 2–4].

A preoperative evaluation was completed, and monitoring for pulse oximetry, arterial blood pressure, and EtCO₂ was established. An emergency airway cart was prepared, including a Cook’s airway catheter, laryngeal masks of various sizes, a track light, a fiberoptic flexible bronchoscope, and equipment for needle cricothyroidotomy, percutaneous tracheostomy, and surgical tracheostomy. Intubation of the trachea was performed using a 6 mm endotracheal tube carefully positioned past the FB and surrounding tissue.

A Kleinsasser laryngoscope was carefully introduced under general anesthesia and positioned to optimize exposure of the laryngeal inlet. Proper alignment was achieved by adjusting head extension and anterior external laryngeal pressure when necessary, in order to obtain a stable and centered view of the subglottic region. Once an adequate exposure was obtained, the laryngoscope was suspended to allow bimanual microscopic work.

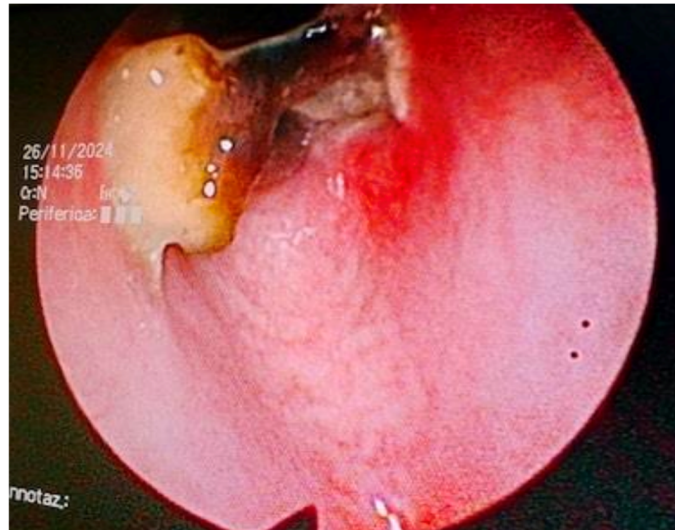


Figure 1. Subglottic granulation tissue and a portion of a foreign body visualized during laryngoscopy, highlighting the presence of both inflammatory response and retained foreign material.

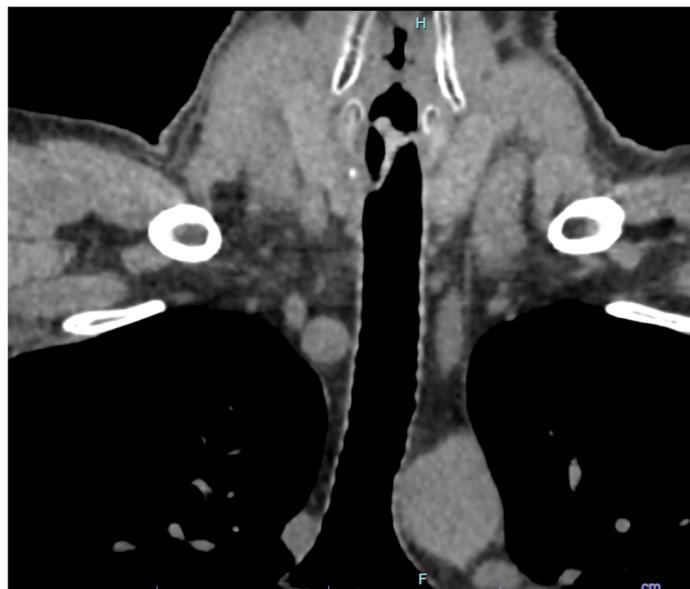


Figure 2. Coronal CT scan showing a foreign body located in the subglottic region.



Figure 3. Sagittal CT scan showing a foreign body located in the subglottic region.



Figure 4. Axial CT scan showing a foreign body located in the subglottic region.

Under suspension microlaryngoscopy and microscopic magnification, systematic inspection of the larynx and subglottic area was performed. The use of gentle external laryngeal counter-pressure facilitated further optimization of the subglottic view, allowing progressive advancement of the visual axis.

This revealed a fragment of an acrylic denture plate coated with mucin and surrounded by significant granulation tissue, lodged in the subglottic space and partially adherent to the cricoid cartilage [Figure 5]. Visualization was facilitated by careful suctioning of secretions and intermittent removal of obstructing inflammatory tissue to maintain a clear operative field.



Figure 5. Denture fragment found in the subglottic region.

The foreign body was carefully mobilized and extracted using Jackson grasping forceps under direct microscopic control. Particular attention was paid to avoiding mucosal trauma during dislodgement due to firm adherence of the surrounding granulation tissue.

Subsequently, granulation tissue was gently removed or partially cauterized using microlaryngeal bipolar forceps, taking care to preserve adjacent healthy mucosa. Small tissue fragments were sent for histopathological examination, which confirmed inflammatory changes.

During the procedure, minor mucosal abrasions were observed but no significant complications occurred. Given the airway manipulation and local mucosal edema, the patient was electively kept intubated and monitored overnight in the Intensive Care Unit

to prevent postoperative respiratory compromise. Extubation was performed the following day, and the patient was transferred to the ENT ward. Vital signs remained stable, and there were no signs of respiratory distress. The patient was discharged three days after surgery with prescriptions for antibiotics, steroids, and a proton pump inhibitor. At the two-week follow-up, the patient reported significant improvement in hoarseness, and laryngoscopy findings confirmed reduced inflammation. Leukocytosis had also resolved. The patient later recalled losing a denture fragment about a month earlier, which he had been unable to locate.

3. Discussion

FB aspiration predominantly occurs in children, whereas only isolated cases have been documented in adults [4]. FB within the laryngotracheal region is rare and poses life-threatening emergencies when encountered. Subglottic FB in adults is exceedingly rare, and its incidence remains unknown [5]. The aspiration of objects large enough to obstruct the supraglottis or glottis is typically life-threatening and straightforward to diagnose. In contrast, the diagnosis becomes more challenging when the object passes through the glottis and lodges in the subglottis. While airway obstruction of varying severity is usually apparent at presentation, determining the cause can be difficult if the aspiration event is not observed. Our case report confirms what was asserted in the study of Halvorson et al. [6], where patients with significant granulation tissue formation in the subglottis demonstrated the greatest delays in diagnosis. Continued mucosal reaction around the FB, along with granulation tissue formation and inflammatory polyps, can progressively narrow the airway, presenting as stridor, particularly during upper respiratory infections, and voice changes [7]. Protracted episodes of stridor, croup, or hoarseness should raise the possibility of a subglottic foreign body. Several factors can predispose adults to FBs aspiration into the tracheobronchial tree, including neurological disorders, dental or medical procedures, trauma, loss of consciousness, alcohol intoxication, and the use of sedatives [8]. Airway protection against FB relies on the rapid flow of air during a cough, which generates pressure over the object's surface. The presence of small foreign bodies lodged in the subglottic region can be partly attributed to this protective reflex and the unique anatomical structure of the subglottis. After aspiration, the object may enter the trachea or lower respiratory tract. During a cough, a forceful column of air may lift the object, propelling it against the undersurface of the true vocal cords within the area defined by the conus elasticus [9]. Radiological evaluation, including chest X-rays, is invaluable in diagnosis, although X-rays that are performed immediately may yield false negatives. Radiopaque FB bodies are more easily identified, whereas radiolucent ones may be missed, complicating diagnosis [10]. In the literature, various sedation techniques are counted, including conscious sedation with spontaneous ventilation, general anesthesia with a laryngeal mask airway or endotracheal intubation with positive pressure ventilation, or rigid bronchoscopy with jet ventilation [11,12]. Removing an impacted FB often necessitates the resection of surrounding granulation tissue, which can be accomplished using laser techniques or piecemeal removal with forceps [13]. Flexible bronchoscopy has largely replaced rigid bronchoscopy as the first-line approach for evaluating and managing FB aspiration, offering a 90% success rate and a comprehensive airway survey [14,15]. In the case report by Kim et al., the endotracheal tube was used as a conduit for the insertion of a flexible bronchoscope, and grasping forceps were introduced via the side channel of the bronchoscope to remove the FB [16]. However, rigid bronchoscopy remains the standard for pediatric patients due to its ability to maintain ventilation and reduce the risk of airway obstruction [17,18]. Rigid bronchoscopy is also preferred for removing sharp FBs to prevent damage to the vocal cords and for managing complications like significant bleeding. It is recommended for

cases of acute respiratory distress or when flexible bronchoscopy fails, and should always be available as a backup option. In our case, where the presence of granulation tissue was significant, using the SML technique we obtained an excellent exposure of the subglottic region which allowed us to manage the granulation tissue covering the foreign body and the foreign body itself, obtaining an excellent result.

4. Conclusions

FBs lodged in the subglottic area for an extended period are exceedingly rare, particularly in adults. Our case report confirms that a subglottic foreign body is a diagnostic challenge, requiring meticulous attention to detail, and the majority of patients had a delay in diagnosis. The available literature asserts that the vast majority of FBs can be safely extracted using flexible or rigid bronchoscopy, combined with tools such as forceps and retrieval baskets. In cases of subglottic FBs, especially those presenting with granulation tissue or mucosal overgrowth, advanced tools and techniques may be required to ensure safe and complete extraction. In our case report, SML was demonstrated to be particularly well-suited for managing subglottic FB. This approach not only allows for precise visualization of the lesion but also enables the controlled removal of granulation tissue and foreign objects, minimizing damage to surrounding structures. Despite the advancements in techniques and tools, there is a pressing need to expand the body of evidence regarding the management of long-standing subglottic FBs in adults. Accumulating a broader case history through well-documented clinical reports and studies will help validate current observations and refine treatment protocols. Future research should focus on identifying optimal strategies for safe and effective FBs extraction while minimizing complications and preserving airway function.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/ohbm7020029/s1>, Supplementary File S1: CARE Checklist of information to include when writing a case report.

Author Contributions: G.C., D.C., M.L. and G.A.-L.: conceptualization; G.C., D.C. and C.G.: data curation; G.C.: writing—original draft; G.C., M.L., G.D.C., G.L. and D.C.: writing—review and editing. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Written informed consent has been obtained from the patient to publish this paper.

Data Availability Statement: All relevant clinical data are included in the manuscript; no additional datasets are available due to patient confidentiality.

Conflicts of Interest: The authors declare no conflicts of interest.

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