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Case Report

Flat sticker as a mobile airway foreign body: A case report and review of the literature ☆☆☆★

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ABSTRACT

Diagnosis of an airway foreign body in the setting of an unwitnessed aspiration event remains a challenge for physicians in the emergency setting. We describe a case of a 2-year-old male who presented to the emergency department with atypical symptoms resulting from ingestion and aspiration of a large, flat sticker. The airway foreign body remained in place for over 24 hours despite obtaining appropriate airway imaging, and the object was later removed without complication via rigid bronchoscopy in the operating room. Further review of this case and the current literature highlighted multiple lessons. Initial evaluations should combine a rigorous history and physical with strict guidelines on usage of multiple imaging modalities (eg, plain radiographs and CT). Imaging should be obtained with the patient devoid of all obstructive materials in multiple positions (eg, upright, supine, lateral) in order to maximize the physician's ability to positively diagnose airway foreign bodies prior to definitive treatment with rigid bronchoscopy.

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Abbreviations: AP, anterior-posterior; CT, computed tomography; AFB, airway foreign body.

☆ Consent statement: Patient's guardian provided formal written consent for the release of images, case findings, and personal details which remains in the possession of Children's of Alabama; however, all images and information of patient in this case report are anonymous and individual is incapable of being identified as described in Elsevier "Requirement for consent" section under subsection "Non-identifiable images".

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Introduction

Airway foreign body (AFB) remains a common pediatric problem encountered in the emergency department with a spectrum of presentations, including rapid respiratory compromise, anoxia, and death. Radiographic studies can be critical diagnostic tools and guide decision-making about operative intervention, especially when the presentation is untraditional. Despite multiple advances in imaging modalities, however, rigid bronchoscopy remains the gold standard for diagnosis following a convincing history and physical exam. We describe a case of a 2-year-old male with an atypical presentation of an airway foreign body that went unrecognized for over 24 hours despite appropriate airway radiographs being obtained.

Case report

A 2-year-old Caucasian male had been evaluated at an outside hospital for an approximately 1-hour history of refusal to swallow, mild secretions, and brief episodes of oropharyngeal bleeding. These symptoms began after the patient was noted to be eating a piece of pizza prior to a suspected choking event. At the outside facility, he displayed continued coughing and odynophagia and was diagnosed with likely esophageal foreign body after a supine AP/lateral neck X-ray failed to note any discernable radiopaque foreign body. A pulse oximetry monitor, which had been placed on arrival, did not demonstrate any concerning oxygen desaturations, and the patient was stable and comfortable from an airway standpoint. The patient was transferred to a tertiary dedicated children's hospital for further evaluation.

Upon arrival, the patient was noted to be in little to no distress although he continued to display aversion to swallowing. He endorsed mild chest pain but did not display any symptoms concerning for impending respiratory decompensation. The patient was unable to tolerate any medications or liquids by mouth by the time of his arrival. His medical history was unremarkable, and there was no family history of asthma. He was not taking any home medications.

On physical exam, patient was noted to intermittently clutch his chest and throat while coughing. His lungs were noted to be clear to auscultation and his oropharynx did not show any signs of trauma, bleeding, or foreign body. The remainder of his head and neck exam was benign, and his mother noted improved secretion tolerance by the time the exam was completed. Chest and neck radiographs were obtained in the upright position and again did not display any foreign object, air trapping, or other upper or lower airway pathology suggestive of airway foreign body; however, there was concern for an abnormally large mediastinal silhouette. This was felt to be concerning for possible mass, and further evaluation via a computed tomography (CT) scan of the chest with contrast was recommended. Given that the child was quite stable and without evidence of respiratory distress and no concerning findings on imaging, as well as predominant symptoms of odynophagia and dysphagia, a diagnosis



Fig. 1 – Sagittal CT chest with contrast demonstrating a thin, sheet-like radiopaque foreign body extending from the hypopharynx and overlying the arytenoids and aryepiglottic folds. White arrow indicates the foreign body.

was made of suspected esophageal “foreign body” from impaction of pizza crust. A plan was formulated to take the patient to the operating room to perform esophagoscopy and removal of esophageal foreign body, as well as possible direct laryngoscopy and bronchoscopy to assess the airway if indicated. A CT chest was performed prior to the surgery to determine if a suspected mediastinal mass was indeed present and would require biopsy at the same time. The CT chest was performed with the patient in the supine position, and revealed a thin, radiopaque, foreign body in the hypopharynx overlying the epiglottis and aryepiglottic folds (Fig. 1). The mediastinum was normal in appearance with an age appropriate thymus noted. Given this finding, the decision was made to take the patient to the operating room for direct laryngoscopy, bronchoscopy, and esophagoscopy with removal or airway foreign body.

In the standard fashion of the institutional protocol, the patient was bag-masked by the anesthesiology team, upon induction, then given to the otolaryngology to perform direct laryngoscopy and rigid bronchoscopy, and intubation if needed. During direct laryngoscopy, a large (2.5 cm × 2.5 cm) plastic Paw Patrol sticker (Fig. 2) was noted to be lodged in the posterior oropharynx spanning from the posterior nasopharynx to above the epiglottis. As the child inhaled and exhaled, the sticker was observed to intermittently alternate between flipping over the supraglottis in “lid-like” fashion, to being pushed out of the supraglottis and against the posterior hypopharyngeal and oropharyngeal mucosa. Once removed, further examination showed an area of mild erosion and mucous pooling in the right pyriform sinus, which was likely where the sticker had remained lodged for some time. No other abnormalities were noted within the oropharynx, supraglottis,



Fig. 2 – Plastic 3D Paw Patrol sticker following extraction from the posterior oropharynx/hypopharynx of a 2-year-old child. (A). This image demonstrates the 3D contour of the sticker, which mimics the contour of the foreign body as seen on neck radiographs prior to CT scan. (B). This image demonstrates the size of the sticker (2.5cm x 2.5cm) which again correlates to the prior radiologic imaging.

trachea, lower airway, or esophagus after completion of the aforementioned procedures. The parents of the patient noted that the sticker had come from a large booklet of other age-appropriate stickers in their home and had been labeled with standard precautions warning against ingestion. No further swallowing or respiratory issues were noted after the operation, and the patient was discharged on a regular diet the same day.

Careful retrospective review of the outside facility's supine neck radiographs and our facility's upright radiographs indeed demonstrated very subtle evidence to confirm the presence of the faintly radiopaque hypopharyngeal foreign body (Fig. 3). In fact, when comparing the 2 radiographs of the patient in different positions, the foreign body was visualized in the aforementioned alternating positions as noted on direct laryngoscopy. Several factors, including clothing and wires included in the field of the outside radiographs, added artifacts to the images that made the foreign body's presence difficult to detect on the initial radiograph.

Discussion

Airway foreign body (AFB) is defined as the inhalation of objects, generally classified as organic (eg, fruit, seeds) or inorganic (eg, toys, coins) into the respiratory tract, possibly resulting in suffocation or asphyxia [1]. AFB in pediatric patients aged 1-3 years old is a common reason for emergency department presentation [2]. Patients who have aspirated an object typically present symptomatically, with coughing,

gagging, stridor, or cyanosis. Clinical symptoms are often accompanied by history of witnessed ingestion or choking episode. If symptoms are mild and the ingestion not witnessed, patients may develop long-term complications of unrecognized AFB, including pneumonia, abscess, and atelectasis [3]. Correctly identifying those patients suffering from AFB is paramount to the successful treatment of patients. Failing to do so may lead to serious complications, including death. The gold standard in diagnosing and removing an airway foreign body is rigid bronchoscopy [4,5,6].

While bronchoscopy is both diagnostic and therapeutic, providing an unparalleled visualization of the patient's airway and the ability to remove the offending object, it is an invasive procedure that must be performed under general anesthesia. It is also associated with complications such as injury to vocal cords or airway mucosa, bronchospasm, laryngospasm, and even death [7]. Due to the desire of parents and physicians to avoid subjecting children to increased risk, chest radiography is an important diagnostic tool utilized in children suspected of AFB [8]. Chest X-rays are the most common first-line imaging technique and have both high sensitivity and specificity [9,10]. Some aspirated objects, such as coins and batteries, appear radiopaque on X-ray, making their identification relatively straightforward. More commonly, objects such as nuts, seeds, and plastic, are radiolucent and more difficult to definitively identify. Statistically, chest radiographs show a false negative result in up to 30% of patients, which is not necessarily surprising in the context that almost 90% of airway foreign bodies are radiolucent [11]. In these cases, signs of hyperinflation and air trapping may be used to suggest or confirm the diagnosis [3].

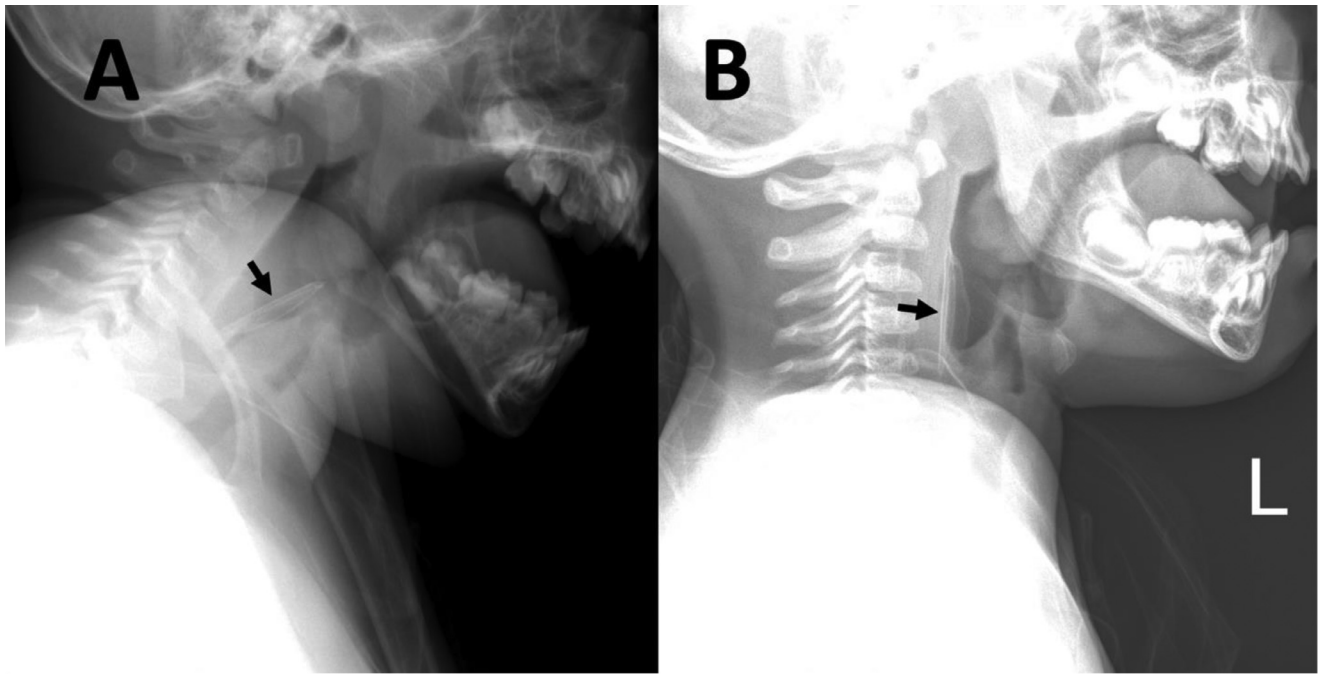


Fig. 3 – Lateral neck radiographs which demonstrate the airway foreign body in both positions visualized at the time of direct laryngoscopy. (A). Lateral neck radiograph obtained at an outside hospital. Black arrows point to a linear opacity extending from the region of the hypopharynx posteriorly and overlying the epiglottis anteriorly. The view is obscured due to improper patient positioning which obscures the object. The object was not identified on Radiology read at that time. (B). Lateral neck radiograph obtained at the Children's Hospital of Alabama. A linear opacification can be seen lying in a vertical orientation along the posterior pharyngeal wall. The measurements correlate to the size of the extracted foreign body.

Chest X-ray alone in the setting of a suspected AFB has a sensitivity ranging from 60% to 80% and specificity of approximately 70% [9,10]. Because frontal radiographs are often unrevealing in the setting of radiolucent objects, neck and lateral decubitus views are also commonly obtained to increase the overall sensitivity of the study [12,13]. By utilizing additional radiographic imaging, physicians are able to increase their ability to correctly diagnose or rule out the possibility of an AFB, particularly in the case of aspirated objects that are initially undetectable.

CT imaging has also been suggested as an effective method of diagnosing foreign bodies. Hong et al in a series of 51 patients recently showed that spiral CT scans had a reported test sensitivity of 100% and a specificity of 66.7% [14]. The gold standard for diagnosis and treatment of airway foreign bodies remains bronchoscopy, but physicians and parents wish to mitigate the incidence of invasive procedures in the setting of false positive imaging studies. How then can clinicians minimize the risk of either a false positive or more importantly a false negative? Our patient's case highlights that utilizing multiple imaging views with proper preparation and technique could have increased both the radiologist and surgeon's ability to correctly diagnose and treat an airway foreign body.

Of significant importance, the patient had 2 apparently normal airway radiographs. Each was taken at a different facility and in different positions (upright vs supine). It was only due to concern for a mediastinal mass that CT imaging was obtained, which revealed a possible foreign body in the hy-

popharynx. Retrospective analysis by the radiologist and surgical team showed that not only was a foreign body likely present, but that it had changed positions from each radiographic imaging study to the next pending the patient's position. These radiographs were further complicated by poor preparation and technique given the multiple artifacts created by stray intravenous lines and retained clothing. This highlights the key clinical point from our experience: Utilizing additional imaging with proper technique and the patient in multiple positions will increase the physician's ability to detect foreign bodies within the airway. This in turn will lead to more judicious use of bronchoscopy in order to confirm and treat foreign bodies.

Authors' contributions

Wineski- primary author, corresponding author, literature review, case report data acquisition, manuscript writing, manuscript editing, manuscript formatting, manuscript submission.

Panico- 2nd author, figure design, manuscript writing, manuscript editing.

Bailey- 2nd author, literature review, manuscript writing.

Grayson- faculty mentor, manuscript editing.

Wiatrak- faculty mentor, attending otolaryngology surgeon, manuscript editing.

Cardenas- faculty mentor, attending radiologist, manuscript design, content contribution, manuscript editing, figure editing.

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