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CASE REPORT

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Importance of thorough examination in foreign body exposure: An impressive case of asphyxiation with foam sealant

Eileen Chang[1] | **Ian Chang**[2]

[1]Department of Medicine, Redmond Regional Medical Center, Rome, GA, USA

[2]Division of Rheumatology, Department of Medicine, University of California Irvine, Irvine, CA, USA

Correspondence
Eileen Chang, Department of Medicine, Redmond Regional Medical Center, 501 Redmond Rd, Rome, GA 30165, USA.
Email: changei1@msu.edu

Abstract

Foreign body exposure requires a systematic exploration. There are no specific guidelines regarding cancer screening with prior toxin exposure. More research about the pathophysiology and management may further our knowledge and improve morbidity.

KEYWORDS

aerodigestive trace, aspiration, foreign body exposure, toxic ingestion

1 | INTRODUCTION

Cases of concomitant foreign body aspiration and ingestion have been reported, majority occurring in children. We present a case of suicide attempt with foam sealant in an adult. Prompt diagnosis and protection of airway, with follow-up exploration of other possible locations is important in preventing morbidity and mortality.

Foreign bodies that enter the aerodigestive tract can track down to the respiratory or digestive tract. Either aspiration or ingestion of foreign bodies constitutes an emergency, which should instigate prompt intervention to decrease morbidity and mortality. It has been reported that 92.5% of foreign bodies that enter the oral cavity end up in the gastrointestinal tract and the other 7.5% end up in the tracheobronchial tree.[1] In normal swallowing physiology, the soft palate meets the posterior nasopharyngeal wall to seal off the nasopharyngeal inlet. The larynx and hyoid are pulled upwards and forward allowing oral content to pass over the larynx without aspiration. The larynx serves a protective role by having three different levels for air passage including the epiglottis and aryepiglottic folds, false vocal cords, and true vocal cords. However, when this mechanism fails, aspiration is likely to occur. It has been reported that more than 85% of foreign body ingestions occur in the pediatric population, majority in children under the age of three. This is because of incomplete mastication with incisors due to lack of molars. Inability to protect airway is more common in the following populations: elderly, inebriated, individuals with altered state of consciousness, and mentally handicapped. Other risk factors include psychiatric illness, head trauma, stroke, dementia, and other neurologic disorders.

Aspiration can occur anywhere in the tracheobronchial tree, but the right bronchus is the most common site due to the anatomic location. Symptoms of laryngotracheal obstruction include cough, dyspnea, stridor, and respiratory distress (with or without cyanosis). Bronchial disruption is associated with decreased air entry, cough, and wheezing. However, foreign bodies that pass through the vocal cords without obstructing the upper airway can remain asymptomatic. If the foreign body remains in the respiratory tract for a prolonged period of time, this can lead to complications such as vocal cord paralysis, atelectasis, bronchiectasis, pneumothorax, postobstructive pneumonia, pulmonary hemorrhage, abscess, and death.[2] Similarly, ingestion of foreign bodies may be asymptomatic and pass through the digestive tract uneventfully. Most common symptoms of obstruction are dysphagia and odynophagia. Other symptoms include cough, chest pain,

nausea, vomiting, abdominal pain or distension, and hematemesis. Moreover, objects that cause perforation may be fatal.

The accessibility and common use of household items pose a risk for accidents and misuse to occur. We present a case of a female adult who attempts suicide through asphyxiation with foam sealant.

2 | CASE REPORT

A 57-year-old Caucasian female with extensive psychiatric history and past suicide attempts, presents following yet another suicide attempt by injection of foam insulation into her oropharynx and nasopharynx. Patient had been feeling depressed since the death of her spouse one week ago. An altercation with her mother for whom she is the caretaker prompted this serious action.

Upon initial evaluation, patient was spontaneously breathing and phonating. The otolaryngologist emergently cleared the foreign material in the oropharynx. But the material solidified in her bronchus resulting in respiratory failure necessitating intubation with mechanical ventilation. The left mainstem bronchus distally was filled with hardened foam insulation. There was a foam cast located in the posterior and apical subsegmental bronchi of the right upper lobe. The cardiothoracic surgeon was consulted for further management of the remaining sealant material. The surgeon was able to perform a flexible bronchoscopy to assess the anatomy and a rigid bronchoscopy to extract the foam sealant cast from the bronchial tree (Figure 1). Patient tolerated the procedure well and was successfully extubated the following day. She was oxygenating well on nasal cannula 2-3 L/min. Chest radiograph demonstrated good interval clearing of patchy airspace disease within the left lung and minimal atelectasis.

Patient passed a swallow evaluation and was started on a clear liquid diet. Throughout the next few days, diet was advanced but patient reported new onset nausea and epigastric pain. She described the pain as a cramping sensation, worse with oral intake, no radiation, and 4/10 in severity. Abdominal radiograph showed unusual mottled appearance of the gastric air shadow concerning for caustic substance ingestion or possible pneumatosis. No bowel obstruction was identified. Gastroenterology was consulted for further evaluation. CT abdomen and pelvis revealed a large amount of spongifoam material within the stomach extending into the distal esophagus. The gastroenterologist performed an upper endoscopy which showed a large foreign body in the distal esophagus (Figure 2). Attempt to extract the material with a Talon was unsuccessful. The foreign body was pushed into the stomach; no esophageal ulcer or pathology was noted. The large foreign material was found

FIGURE 2 Esophagogastroduodenoscopy showing a large foreign body in the distal esophagus

FIGURE 1 Foam sealant material was extracted from the bronchial tree by bronchoscopy

FIGURE 3 Gastrotomy was performed to evacuate the entire gastric lumen

in the fundus and gastric body. It was rock hard and was not amenable to endoscopic extraction. The pylorus was patent and the visualized gastric mucosa was normal. General surgery was consulted and performed a gastrotomy with evacuation of the foreign material that occupied the entire gastric lumen (Figure 3). She tolerated the procedure well and was medically cleared. Patient was safely discharged to an inpatient psychiatric facility.

3 | DISCUSSION

This is the first case in literature of foam sealant aspiration that entered deeply into both the bronchial tree and upper gastrointestinal tract. There have been prior reports of intentional spray foam insertion into other body orifices such as mouth, nares, and rectum that did not penetrate the supraglottic, glottic or hypopharyngeal regions.[3] Another case reported polyurethane foam entering the nasal cavity and nasopharynx, adhering to the nasal mucosa and sinuses.[4] Although foreign body aspiration and ingestion can be symptomatic requiring obvious emergent retrieval, other times it can go unnoticed for an extended period of time. Physicians must be vigilant in exploring both bronchial and esophageal routes of foreign body introduction. It is imperative to perform comprehensive assessments in these cases.

Different imaging modalities must be considered depending on the suspected material involved. In the case presented above, evaluation of the gastrointestinal tract was performed several days after emergent bronchoscopy. It is important to realize that symptomatology may be unreliable and that thorough examination with different modalities may prevent morbidity, mortality, and reduce healthcare cost.

Toxic ingestions not only cause initial insults, but may also have delayed effects leading to further complications. In this specific case, the major components of the sealant includes: polymeric diphenylmethane diisocyanate, 4,4′-methylene diphenyl diisocyanate, tris (2-chloro-1-methylethyl) phosphate, dimethyl ether, isobutene, and propane. These toxins may predispose an individual to co-morbidities such as frostbite, fetotoxicity, asthma, lung cancer, hepatitis, cirrhosis, gastric cancer, lymphoma, leukemia, and hemangiosarcoma.[5-10] The mechanism for which these toxins causing carcinogenesis is not well understood. However, some proposed mechanisms include DNA mutation and changes to tumor microenvironment.[11] Carcinogens target the tissue and immune system, resulting in angiogenesis and chronic inflammation. With time, this allows neoplastic cells to grow within the tumor microenvironment. And thus, individuals with toxin exposure require regular surveillance to assess for delayed complications and possible malignancy.

Currently, there are no specific guidelines as to when and how often to perform cancer screening in this population. More research about the pathophysiology and management may further our knowledge and hopefully improve morbidity and mortality.

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CONFLICT OF INTEREST

There are no conflicts of interest to declare regarding the publication of this paper.

AUTHOR CONTRIBUTIONS

EC was the major contributor in writing the manuscript. EC and IC analyzed and interpreted the patient data. All authors read, revised and approved the final manuscript.

ETHICAL APPROVAL

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

ORCID

Eileen Chang https://orcid.org/0000-0002-8738-0784
Ian Chang https://orcid.org/0000-0001-6985-0474

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