

Incidental Discovery of a Hyperdense Esophageal Foreign Body in a Patient with an Unknown Origin of Pneumomediastinum: A Case Report

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Abstract

Background: Esophageal perforations can lead to air entering the mediastinum, resulting in pneumomediastinum and potentially life-threatening complications. Prompt identification and management of foreign bodies are critical in such cases.

Case Presentation: This case presents the incidental discovery of a hyperdense foreign body in the middle two-thirds of a patient's esophagus, identified on computed tomography (CT) imaging following a prior diagnosis of pneumomediastinum of unknown origin. The foreign body's potential involvement in the pneumomediastinum presented diagnostic and management challenges for the medical team, as the patient had no prior history of ingesting a foreign object. Further investigation into the patient's dietary habits, coupled with the CT findings, ultimately revealed that the hyperdense object was bubble gum.

Conclusion: The hyperdense appearance of bubble gum on X-ray and CT scans resembles bone, making it difficult to distinguish without a detailed patient history. Although no causal relationship between the foreign body and the pneumomediastinum was identified, this case underscores the significance of meticulous imaging evaluation and the necessity of considering both prevalent and uncommon etiologies during the diagnostic process.

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

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Introduction

The removal of a foreign body from the esophagus is a critical and time-sensitive procedure. As time elapses beyond 24 hours, the probability of a successful extraction diminishes, while the likelihood of complications, including esophageal perforation, peritonitis, and sepsis, rises. (3). Air may enter the mediastinum through a perforation resulting in pneumomediastinum. Therefore, prompt identification of the foreign body is essential to prevent adverse side effects and reduce the risk of mortality (4). Potential causes of pneumomediastinum include spontaneous rupture (i.e., rupture of a

pulmonary bulla, which is more common in smokers), or secondary causes induced by surgery, penetrating trauma, coughing, esophageal lesions or Boerhaave syndrome (2). High impact sports and occupations requiring heavy lifting also play a significant role (5). Patients may present with chest pain, dyspnea, voice changes, and subcutaneous emphysema. This case study highlights the diagnostic challenges of differentiating similar foreign bodies with distinct treatment protocols.

Case Presentation

A 36-year-old male with a history of heavy manual labor and smoking presented to the emergency outpatient clinic with acute onset of retrosternal chest pain that began at work. A 12-lead electrocardiogram (ECG) and blood work ruled out cardiovascular pathologies. A chest X-ray revealed pneumomediastinum, with no signs of pneumothorax. Additionally, subcutaneous emphysema was also palpated in the subclavicular area. A chest CT was performed, which confirmed pneumomediastinum of unknown origin. No identifiable cause for the pneumomediastinum was evident from the patient's history obtained in the emergency department. The patient was then transported to the tertiary medical center's Department of Surgery for further evaluation and observation.

In the Department of Surgery, a repeat chest X-ray was conducted, which again revealed pneumomediastinum with emphysema in the cervical and upper thoracic soft tissue areas. Given the patient's history of heavy lifting during work, a swallow test using a water-soluble contrast agent (Gastrografin) was performed to rule out a potential esophageal perforation. The test demonstrated no signs of esophageal leakage. Consequently, the etiology of the pneumomediastinum remained undetermined. Due to the unresolved nature of the pneumomediastinum, the surgical team referred the patient to the Ear, Nose, and Throat (ENT) Department for consultation and endoscopic examination to exclude the presence of foreign bodies in the esophagus.

The patient was transported to our ENT Department, where the on-call otolaryngologist performed an examination. During the examination, a detailed patient history was once again taken, which did not reveal any evidence that the patient has ingested anything capable of causing damage to the esophagus. Endoscopic examination of the oropharynx, hypopharynx and larynx were also normal, with no signs of mucosal injury, stagnation of the saliva, signs of hypersalivation, or difficulty swallowing.

The on-call ENT specialist reviewed the chest CT scan, provided by the emergency department where the CT scan was performed, and identified a hyperdense area in the middle two-thirds of the esophagus, resembling the presence of a possible foreign body, as shown in Figure 1.

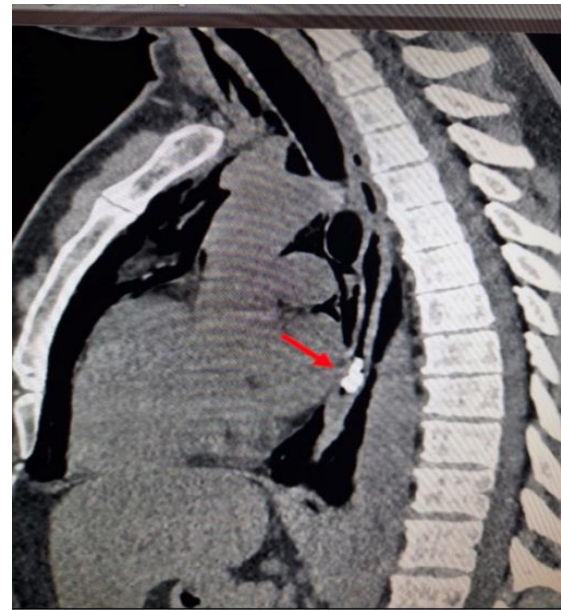


Figure 1: A lateral aspect of one of our CT scans denoting a hyperdense object at the distal end of the esophagus.

The hyperdense focus was suspected to be bone due to its high attenuation, with a measured density of $568 \pm .23$ (HU). The identification of a suspected foreign body in the esophagus, which could be a possible explanation as to why the patient had pneumomediastinum, caused diagnostic uncertainty since the patient consistently denied swallowing bones, tooth, or any other material that could have caused this condition. As the patient's symptoms were gradually resolving and there was no indication for urgent esophagoscopy, an upright abdominal X-ray (anteroposterior and lateral views) was ordered to look for signs that the focus had been forwarded distally from the esophagus to the gastrointestinal (GI) tract. On the upright abdominal X-ray, multiple hyperdense foci were recognized throughout the intestines, as marked in Figure 2. This confirmed that the foreign body was soft

enough to break into fragments and move from its original location in the middle two-thirds of

the esophagus to the GI tract, following the normal digestive route.



Figure 2: An Abdominal X-Ray: AP erect, lateral erect views depicting the hyperdense foci scattered along the GI tract.

At this point, the nature of the mysterious object, with the possibility of swallowing that neither leads to choking nor recollection, was vast enough to include bubble gum. The definitive diagnosis was made when the patient confessed to habitual gum swallowing, which also occurred at the time of the CT scan. A follow-up chest X-ray was then ordered, which showed the pneumomediastinum had resolved. No more subcutaneous emphysema was palpable in the subclavicular area, and the patient was discharged home.

The bubble gum was identified as an accidental finding that necessitated only observational management, as there was no evidence of life-threatening obstruction. Consequently, the patient was discharged home.

Discussion

The clinical presentation of esophageal foreign bodies and related pathologies depends on the location, type, and underlying cause of the obstruction. While some cases resolve spontaneously, others require urgent medical attention (2). These patients may present with the onset of chest pain and shortness of breath

(5). Foreign bodies can have different compositions requiring different treatment and management strategies. For instance, rigid objects require rigid esophagoscopy, whereas softer materials are more appropriately managed by flexible endoscope gastroscopy. The removal of a bony foreign body from the esophagus typically requires esophagoscopy using a rigid instrument, which carries several risks, including complications from anesthesia (either general or local), as well as potential injury to the teeth, pharynx, or esophagus (7). However, these risks can be minimized or avoided through a thorough patient examination and careful history taking before the procedure. Foreign bodies should be removed from the esophagus within one day (2). Delayed care significantly decreases the chances of successful removal, which increases the risk of perforation, which could lead to pneumomediastinum, mediastinitis, and sepsis (3). The unique aspect of this case is the delayed identification of the swallowed foreign body, specifically, bubble gum. Though widely consumed around the world, bubble gum is not

considered edible; therefore, its occurrence is rarely documented in literature. Many consumers ingest this hard-to-digest substance, which may cause it to get lodged in numerous areas along the esophagus and the GI tract.

Bubble gum appears hyperdense on CT imaging due to its high bicarbonate content (50% of its total weight) (1). Its unique composition allows it to present hyperdense on CT or X-ray imaging with a high level of attenuation (1). Hyperdense foci like bubble gum can therefore be mistaken for hemorrhage, calcification, or bone (1); each of which requires a different treatment and management plan.

The characteristic features of bubble gum on CT imaging include its ovoid shape, hyperdensity, and the presence of small air pockets, which can help physicians identify foreign objects and reduce the risk of misdiagnosis (6). Imaging was the most important diagnostic test we performed to help us sort out the nature of the foreign body. The upright abdominal X-Ray (anterior-posterior and lateral views) and the diluted contrast agent from the swallow probe clearly showed multiple hyperdense patchy structures in the small and large intestines.

The patient was diagnosed with having swallowed bubble gum based on three main factors: (i) an absent history of swallowing a bone; (ii) the patient's confession to habitual gum swallowing; and (iii) the confirmation of the diagnosis through imaging.

Considering the patient's condition, symptoms, and ENT status, it was not considered necessary to perform an esophagoscopy. The chewing gum was an incidental finding that only required observational management since no life-threatening obstruction was present.

To our knowledge, this is the first reported case in which a piece of bubble gum was identified in the esophagus, leading to diagnostic and management challenges due to its incidental discovery in a patient already diagnosed with pneumomediastinum of unknown origin. This

case is particularly unique as the bubble gum was in transit to the stomach at the time the chest X-ray was performed.

Conclusion

Ultimately, while the hyperdense esophageal object was initially a source of diagnostic concern, it was determined to be unrelated to the pneumomediastinum. This case underscores the value of cautious interpretation of imaging findings and the role of incidental discoveries in clinical decision making.

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Conflicts of Interest

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