Published in final edited form as:

Ann Thorac Surg. 2014 February ; 97(2): e37–e39. doi:10.1016/j.athoracsur.2013.10.090.

Pneumomediastinum after percutaneous endoscopic gastrostomy tube placement: report of two cases

Kenan W Yount, MD, MBA¹, Melissa A Mallory, MD², Kristin C Turza, MD², Eric R Griffiths, MD¹, Christine L Lau, MD, MBA¹, and Robert G Sawyer, MD²

¹Division of Thoracic and Cardiovascular Surgery, University of Virginia Health System, PO Box 800679, Charlottesville, VA 22908

²Department of Surgery, University of Virginia Health System, PO Box 800679, Charlottesville, VA 22908

Abstract

The incidence of esophageal perforation or confounding mechanisms of pneumomediastinum specifically introduced by the addition of percutaneous endoscopic gastrostomy (PEG) tube insertion to esophagogastroduodenoscopy (EGD) have not been described, and pneumomediastinum in the absence of esophageal perforation after PEG has not been reported. Typically, pneumomediastinum is an ominous finding although benign causes exist. We present two cases of post-PEG pneumomediastinum not correlated with esophageal perforation on follow-up imaging. When pneumomediastinum is detected after PEG, appropriate studies should be undertaken to confirm its etiology and determine treatment plans. Further investigation may be warranted to ascertain the true incidence, causes, and clinical significance of post-PEG pneumomediastinum.

Keywords

Esophageal Injury/Perforation; Endoscopy/Endoscopic procedures; Computed Tomography; CAT Scan; Mediastinum

INTRODUCTION

Percutaneous endoscopic gastrostomy (PEG) tube placement has become the most common method for establishing enteral access at many hospitals. As the frequency of PEG has increased, thoracic surgeons have become more involved in their placement and in the management of their complications, especially esophageal perforation.

The majority of procedural risks are minor, including wound infection, leakage, and superficial bleeding. Major complications include esophageal perforation, hemorrhage, and intra-colonic placement.[1]

© 2013 The Society of Thoracic Surgeons. Published by Elsevier Inc. All rights reserved.

Corresponding Author: Kenan W Yount, MD, MBA, Division of TCV Surgery, University of Virginia, PO Box 800679, Charlottesville, VA 22908, Telephone: 434-982-0332 Fax: 434-982-3885 kenan@virginia.edu.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Pneumoperitoneum is a common post-procedural finding thought to be caused by the leakage of insufflated air through the needle puncture site of the gastric wall. Usually, it has no clinical significance and raises alarm only if there is suspicion for a ruptured viscus.[2]

Pneumomediastinum in the absence of esophageal perforation after PEG placement has not been reported. Typically, pneumomediastinum is an ominous finding with potentially devastating consequences, although benign causes have been described.[3,4] Most cases can be attributed to blunt or penetrating trauma, rupture of a hollow viscus, or infection by gas-forming organisms.[3,4] The incidence and significance of post-PEG pneumomediastinum in the absence of esophageal perforation are currently unknown. We present two patients found to have pneumomediastinum incidentally after PEG placement without evidence of esophageal perforation.

CASE REPORT

PATIENT #1

A 44 year-old female with progressive solid food dysphagia and substernal chest pain was found to have recurrence of a mixed adenocarcinoma and small cell lung cancer causing extrinsic esophageal compression. Four days after initiating chest radiotherapy, the decision was made to place a PEG tube for nutritional support.

Esophagogastroduodenoscopy (EGD) was first attempted with a standard gastroscope; esophagitis and intraluminal narrowing were encountered 30 cm from the incisors, prompting a second attempt with a narrower nasoenteric scope, which easily passed into the stomach. Thereafter, the PEG tube was placed in the standard fashion and no mucosal defects were appreciated during scope withdrawal. Twenty minutes after the procedure, the patient experienced an episode of oxygen desaturation, which corrected with intravenous naloxone administration. A chest radiograph during the event revealed pneumoperitoneum and pneumomediastinum (Figure 1). Her pre-existing substernal chest pain remained at baseline. Given the patient's risk factors, however, a computed tomography (CT) scan was obtained, which confirmed the presence of pneumomediastinum but showed no esophageal tear or mediastinal fluid collection. Broad-spectrum, intravenous antibiotic therapy was initiated, and a follow-up water-soluble esophagram (Figure 2) did not reveal an esophageal leak. The primary team subsequently restarted the patient on a liquid diet and discontinued antibiotic therapy, which had lasted less than 24 hours. The patient was discharged to home nine days later with no further complications.

PATIENT #2

A 27 year-old male was found to have new-onset dysphagia after resection of a right jugular foramen schwannoma complicated by hydrocephalus requiring placement of a ventriculoperitoneal (VP) shunt. After continued swallow evaluations demonstrated oropharyngeal aspiration, the decision was made to place a PEG tube.

Transillumination and endoscopic visualization during needle placement were appropriate, and the PEG tube was inserted without difficulty. No mucosal defects were noted during scope withdrawal. The following day, the patient complained of vague chest pain and had a progressive supplemental oxygen requirement. A CT scan demonstrated interval development of a pneumonia, likely aspiration-related, as well as the presence of pneumomediastinum (Figure 3). A follow-up water-soluble esophagram, however, showed no evidence of esophageal leak. Sputum cultures were positive for *E. coli*, further increasing suspicion for aspiration pneumonia, and the patient was successfully treated with intravenous antibiotics for seven days. He was discharged to a rehabilitation facility eight days after PEG placement without further complications.

COMMENT

We report two cases of post-PEG pneumomediastinum discovered incidentally on chest radiography, confirmed by CT, but not correlated with identifiable esophageal perforation based on additional CT findings or follow-up esophagrams.

Pneumomediastinum after EGD is most concerning for esophageal perforation, especially if clinical suspicion is high. Esophageal perforation after diagnostic EGD occurs in 0.3% cases, with an increasing incidence when combined with therapeutic maneuvers; however, the incidence of perforation or confounding mechanisms of pneumomediastinum specifically introduced by the addition of PEG tube placement to EGD are not reported in the literature.[5]

Air may enter the mediastinum from the esophagus, lung, trachea, neck, abdomen, or retroperitoneal space to produce pneumomediastinum. Pneumomediastinum is a rare complication of intra-abdominal laparoscopic procedures due to passage of carbon dioxide through the hiatus as the result of congenital anomalies, weak points, defects, or tears.[6] It is thought to be associated with high intra-peritoneal pressures and increased case length.

High intraluminal pressures due to excessive insufflation may occur during PEG tube placement, but case length and intra-peritoneal pressure are unlikely to be significant factors. In the first case, pneumomediastinum could have occurred from several mechanisms. Esophageal microperforation is possible given the patient's radiotherapy, esophagitis, and invasive cancer. Metastatic fistulization is also possible. In the second case, recent instrumentation with a VP shunt may have created a tract into the mediastinum, though this seems unlikely. In either case, the stomach could have been backwalled with air tracking retroperitoneally, but there was no difficulty with needle placement or evidence of retroperitoneal air on imaging.

Regardless of cause, a prompt work-up is appropriate in all cases of post-PEG pneumomediastinum given the morbidity of delayed diagnosis of esophageal perforation. Contrast CT has a reported sensitivity of 90% with worrisome findings including mediastinal contrast, fluid collection, or visible perforation. A contrast esophagram, which has a reported false negative rate of 10%, is additionally indicated. The combination of both contrast CT scan and esophagram, however, has a higher sensitivity.[7]

These are the first two reports of pneumomediastinum found incidentally post-PEG placement with no evidence of significant sequelae or esophageal perforation. Further investigation may be warranted to ascertain the true incidence and causes of post-PEG pneumomediastinum. Such investigation will also help determine whether post-PEG pneumomediastinum is associated with clinically significant respiratory compromise or whether management with empiric antibiotic therapy to prevent mediastinitis is needed.

Acknowledgments

ACKNOWLEDGEMENTS/DISCLOSURES

Amanda Beer, MD (Department of Radiology, University of Virginia) assisted with radiographic interpretation.

References

1. Larson DE, Burton DD, Schroeder KW, DiMagno EP. Percutaneous endoscopic gastrostomy. Indications, success, complications, and mortality in 314 consecutive patients. *Gastroenterology*. 1987; 93(1):48. [PubMed: 3108063]

2. Wiesen AJ, Sideridis K, Fernandes A, et al. True incidence and clinical significance of pneumoperitoneum after PEG placement: a prospective study. *Gastrointest Endosc.* 2006; 64(6): 886. [PubMed: 17140892]
3. Newcomb AE, Clarke CP. Spontaneous pneumomediastinum: a benign curiosity or a significant problem? *Chest.* 2005; 128:3298–302. [PubMed: 16304275]
4. Caceres M, Ali SZ, Braud R, Weiman D, Garrett HE. Spontaneous Pneumomediastinum: A Comparative Study and Review of the Literature. *Ann Thorac Surg.* 2008; 86:962–966. [PubMed: 18721592]
5. Chirica M, Champault A, Dray X, et al. Esophageal perforations. *J Visc Surg.* 2010; 147(3):e117. [PubMed: 20833121]
6. Cunningham AJ. Laparoscopic surgery--anesthetic implications. *Surg Endosc.* 1994; 8(11):1272–84. [PubMed: 7831596]
7. Brinster CJ, Singhal S, Lee L, Marshall MB, Kaiser LR, Kucharczuk JC. Evolving options in the management of esophageal perforation. *Ann Thorac Surg.* 2004 Apr; 77(4):1475–83. [PubMed: 15063302]

Figure 1. Chest radiograph PA (A) and lateral (B) showing pneumoperitoneum (black arrows), with air superior to the liver and inferior to the diaphragm, and a pneumomediastinum (white arrows).

Figure 2. Esophagram revealing extrinsic compression (black arrows) of the esophagus and no visible leak as demonstrated by a lack of contrast extravasation. Further images in the series (not shown) confirmed the absence of a delayed leak and real-time imaging revealed fixed compression.

Figure 3.
CT scan showing pneumomediastinum with air surrounding the aorta and trachea (white arrows).