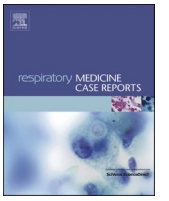
Respiratory Medicine Case Reports 37 (2022) 101634

Contents lists available at ScienceDirect

Respiratory Medicine Case Reports

journal homepage: www.elsevier.com/locate/rmcr



Case report

Bronchoesophageal fistula: An unusual manifestation of lung cancer

Chelsea Smith [a], Mark Bannon [a], Adrita Ashraf [a], Prashant Kaushik [b], Creticus Marak [c,*]

[a] Department of Internal Medicine, House Staff, Northeastern Eastern Health System, Tahlequah, OK, USA
[b] Department of Medicine, Rheumatology, Oklahoma State University, Tahlequah, OK, USA
[c] Department of Medicine, Pulmonary and Critical Care, Oklahoma State University, Tahlequah, OK, USA

ARTICLE INFO

Keywords:
Bronchoesophageal
Fistula
Lung cancer
Aspiration
Stent
Chemotherapy

ABSTRACT

Bronchoesophageal fistula (BEF) is a rare condition caused by a fistulous connection between the bronchus and the esophagus. BEF can be acquired or congenital; congenital BEFs are rarely encountered in adults. Acquired BEF can be due to either a benign or a malignant process. Acquired BEF due to primary lung cancer is a life-threatening and usually a terminal complication. Unlike tracheoesophageal fistula, this condition is much rarer. Patients usually present with symptoms related to recurrent aspiration. Barium esophagogram is the initial diagnostic modality of choice. Treatment is primarily palliative. We are presenting a case of a bronchoesophageal fistula caused by non-small cell lung cancer that was successfully treated with concurrent chemoradiation therapy.

1. Case presentation

A 65-year old male smoker (50 pack-years) with a history of chronic bronchitis, HIV infection (on Genvoya, diagnosed more than 20 years ago, recent CD4 count of 244 with no prior opportunistic infections), hypertension, paroxysmal atrial fibrillation, and diastolic heart failure. He presented with intermittent fevers, worsening dyspnea, cough productive of purulent sputum, and generalized weakness. Physical examination revealed a thin, pale male who appeared older than his stated age, in mild respiratory distress. His BP was 102/60, HR 102/min, RR 30/min, Temp 38C, and spo2 was 92% on ambient air at rest. Auscultation revealed bilateral expiratory wheezes and a coarse crepitation at the right lung base. His white blood cell count was 14,000 with a left shift, and his lactate was 3.2. X-ray chest revealed a consolidative opacity in the right lower lobe [Fig. 1]. He was hospitalized with a diagnosis of community-acquired pneumonia with sepsis and started on intravenous Ceftriaxone and intravenous Azithromycin. While in the hospital, he developed atrial fibrillation with a rapid ventricular response; synchronized cardioversion was attempted but unsuccessful. He was then started on IV Heparin and IV Esmolol, but he developed hemoptysis. His respiratory status worsened with increasing oxygen requirement, necessitating broadening the antibiotic coverage with intravenous Vancomycin and Piperacillin/Tazobactam. He was evaluated by a pulmonologist, and based on his recommendations, IV heparin was immediately discontinued, and a stat CT chest was obtained that revealed a large, irregular, thick-walled cavitary lesion in the right lower lobe with a fistulous tract connecting the lung cavity to the distal third of the esophagus [Fig. 1]. His sputum was negative for AFB but grew Enterobacter cloacae and Pseudomonas; his antibiotic was accordingly switched to IV Meropenem based on sensitivity results.

* Corresponding author.
E-mail address: creticus@hotmail.com (C. Marak).

https://doi.org/10.1016/j.rmcr.2022.101634
Received 2 March 2022; Accepted 10 March 2022
Available online 21 March 2022
2213-0071/© 2022 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

Esophagogastroduodenoscopy confirmed a small fistula in the distal third of the esophagus [Fig. 2]. Flexible bronchoscopy revealed a destructive cavitary lesion in the right lower lobe that resembled a limestone cave. Individual segmental bronchi in the right lower lobe could not be identified clearly due to the widespread tissue destruction [Fig. 3]. Bubbles could be seen in one of the bronchi, which we believe is the bronchus connected to the esophagus. Biopsy of the cavitary lesion revealed fibrotic lung parenchyma infiltrated by irregular nests and cords of malignant cells with high mitotic activity, Napsin negative, weakly TTF1 positive, and stained strongly positive for p63, p40, and CK5/6; consistent with squamous cell carcinoma [Fig. 4]. Immunostaining for EGFR was negative, and PD-L1 expression was only 1%. Staging with CT PET showed a large hypermetabolic mass in the right lower lobe invading the mediastinum with hypermetabolic ipsilateral mediastinal lymph nodes and a left hilar lymph node [Fig. 1]. He was made NPO, and a PEG tube was placed for enteral nutrition. After staging workup was completed, he received a stage IIIc NSCLC/squamous cell carcinoma diagnosis. He was started on a combination of Carboplatin and Paclitaxel and radiation therapy. Six months later, his repeat imaging showed resolution of the fistula with a residual but non PET avid mass in the right lower lobe [Fig. 5]. He tolerated the chemoradiation therapy and is currently on Durvalumab consolidation therapy. His symptoms have resolved; he is tolerating regular food and gaining weight.

2. Introduction

Bronchoesophageal fistula is a rare clinical entity, and the incidence in adults is unknown. Acquired BEFs in adults is usually due to esophageal and lung cancers. By the time the diagnosis is made, the underlying cancer is usually advanced. Treatment is mostly palliative and depends on the location of the fistula, the severity of the symptoms, the associated complications, and the performance status of the patients.

3. Discussion

Esophagorespiratory fistula (ERF) refers to the existence of an abnormal connection between the esophagus and the lungs and includes tracheoesophageal (TEF) and bronchoesophageal (BEF) fistulas. TEF is more common than BEF; information on ERF is derived chiefly from the existing literature on TEFs. BEFs are rare; the available literature is supported primarily by periodic case reports and small observational studies. Most reported cases of BEF involved the main bronchi and not the distal airway like in this case.

BEFs in adults are almost always acquired with both malignant and nonmalignant etiologies. Reported nonmalignant causes include blunt and penetrating traumas, endoscopic interventions like dilatation and sclerotherapy, esophageal penetration injuries with foreign bodies (stab or gunshot wounds, broncholiths), caustic ingestion, vasculitis, and esophageal diverticulum [1–5]. Infectious causes like tuberculosis, histoplasmosis, candidiasis, mucormycosis, syphilis, and lung abscesses have been reported to cause BEF [1–5]. Endotracheal or tracheostomy tubes have been reported to cause TEF but not BEF due to obvious reasons. Esophageal cancer is the most common malignancy to cause BEF, with up to 5–10% of patients with esophageal cancer developing this complication. Lung cancers (usually squamous cell carcinoma) and mediastinal lymphomas rarely develop this complication [6–13]. There is an interesting case report of treatment with Bevacizumab resulting in BEF [13].

Diagnosis is often delayed because of the condition's rarity and the non-specificity of the symptoms. The diagnosis of BEF/TEF should be entertained in patients with predisposing conditions who develop coughing spells with oral intake (Ono's sign), recurrent purulent bronchitis or pneumonia, unexplained weight loss, and respiratory failure. Patients with esophageal and lung cancers can

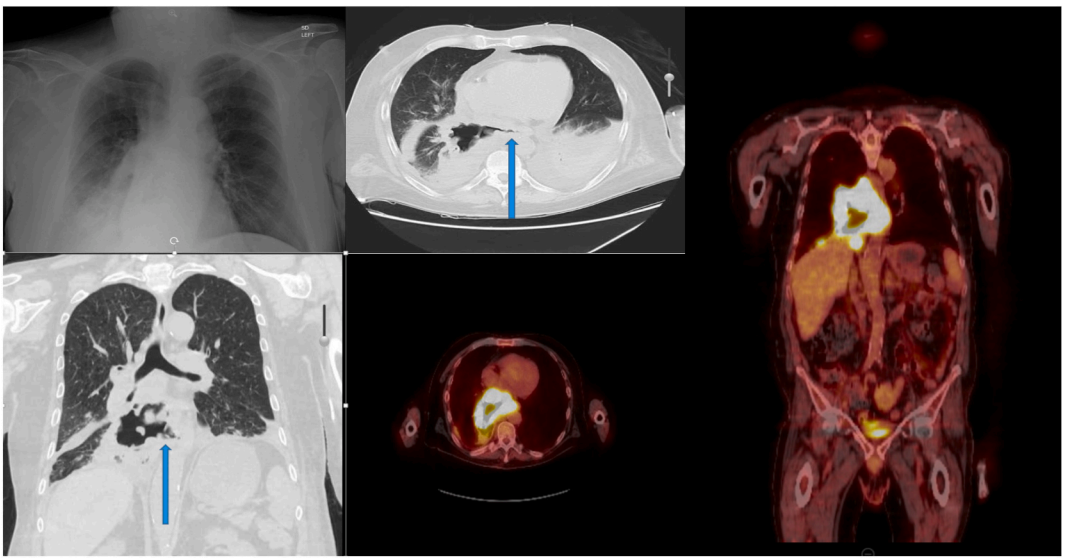


Fig. 1. X-ray showed a consolidative opacity in the right lower lobe. Axial and coronal CT sections displaying the fistula (blue arrows). CT PET with a highly avid lesion in the right lower lobe with extension into the mediastinum. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

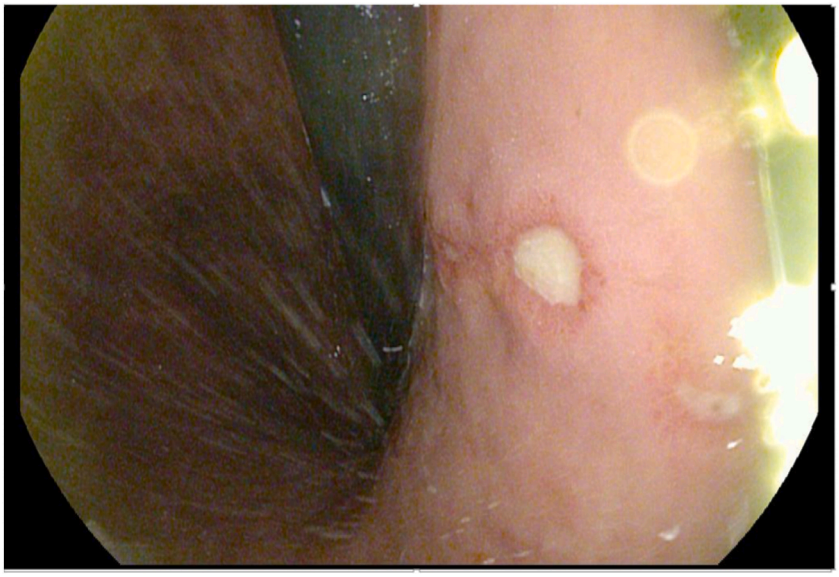


Fig. 2. Esophageal end of the fistula in the distal third, the white circular lesion.

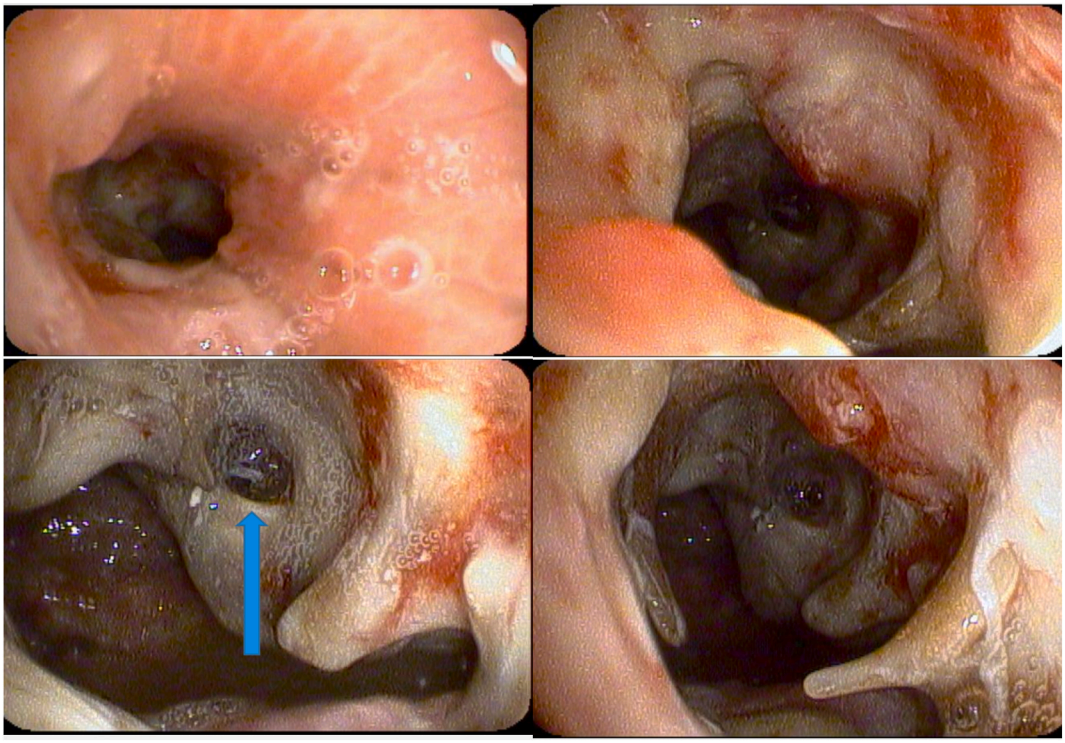


Fig. 3. A destructive cavitary lesion in the right lower lobe. Bubbles (blue arrow) can be seen in one of the bronchi, likely the bronchial end of the fistula. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

present with dysphagia and hemoptysis, respectively [1–9].

The initial diagnostic modality of choice is barium esophagography, demonstrating contrast displacement into the lungs. This test is diagnostic in over 65% of the cases [1]. Gastrografin studies should be avoided due to concerns for the development of pulmonary edema, pneumonitis, respiratory failure, and death. Contrast-enhanced CT with three-dimensional reconstruction is a suitable option for patients who cannot swallow. CTs also have the added advantage of providing more information on the abnormalities of the surrounding structures. Endoscopy (esophagogastroduodenoscopy and bronchoscopy) is probably the most helpful test and can help

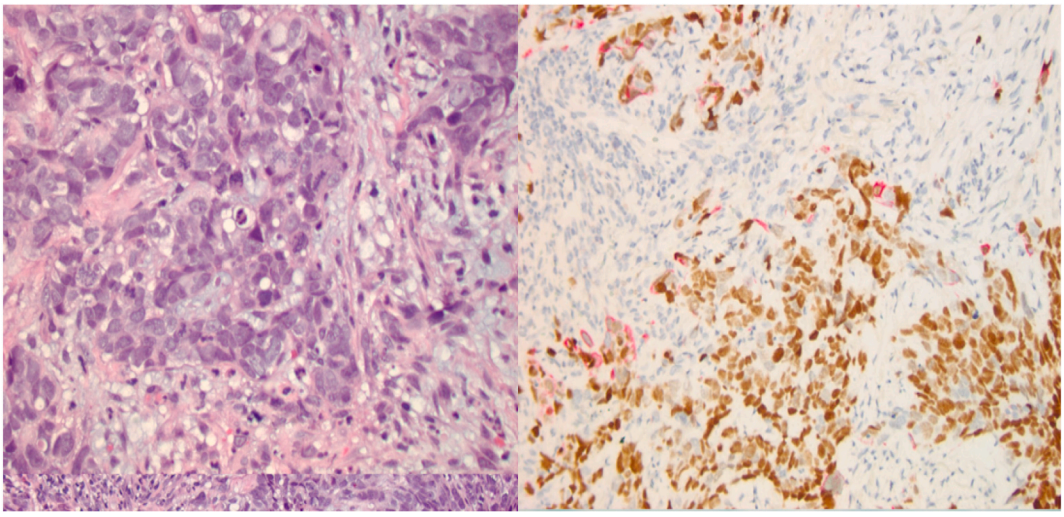


Fig. 4. Malignant cells with a high mitotic activity with positive stains for p40 (brown nuclear stain) and CK5/6 (pink cytoplasmic stain). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

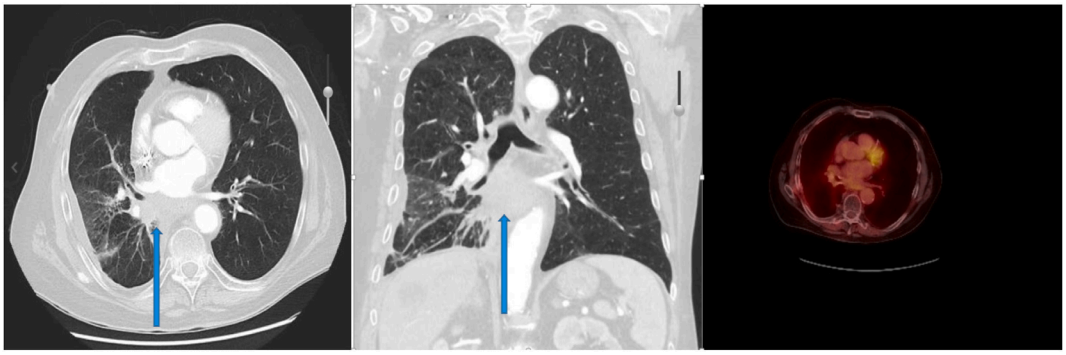


Fig. 5. Repeat imaging showing a residual mass in the right lower lobe (blue arrows) that is PET non-avid with the resolution of the fistula. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

confirm the diagnosis, obtain biopsies, and devise appropriate treatment plans. Oral administration of methylene blue and indocyanine green followed by diagnostic bronchoscopy can sometimes identify small fistulas [16].

For obvious reasons, bronchoesophageal fistulas due to benign causes have a better prognosis than malignant ones. A multidisciplinary approach involving thoracic surgery, interventional pulmonology, gastroenterology, oncology, and nutritionist is required to manage these complex cases. Simultaneous treatment of the fistula and the underlying etiology should be started as soon as possible. It is essential to focus on their nutritional needs and aggressively treat superimposed infections. Supportive care should be offered to these patients, including cessation of oral intake, elevating the head to 45°, anti-reflux medicines, and PEG or J tube for enteral nutrition. Depending on the location of the fistula and the severity of the underlying condition, these patients can be considered for esophageal or bronchial stenting or both [14,15]. Stenting can immediately palliate symptoms and increase the overall quality of life. Metallic stents are preferred over silicon stents for malignant fistulas [17]. However, stenting is an option only for proximal lesions. Our patient was unsuitable for bronchial stenting because of the location, and fortunately, the esophageal lesion was small. Without treatment, the life expectancy of these patients is measured in weeks. Surgical intervention is not an option for these sick and terminal patients. Still, if their performance status is reasonable, palliative chemoradiation therapy can be considered.

Declaration of competing interest

We have no conflicts to declare.

References

[1] P. Hendry, A. Crepeau, D. Beatty, Benign bronchoesophageal fistulas, J. Thorac. Cardiovasc. Surg. 90 (5) (1985 Nov) 789–791. PMID: 4058051.
[2] P.V.S. Narayanan S, K.A.V.U. Majeed, Tuberculosis Presenting as Bronchoesophageal Fistula. ID Cases, vol. 8, 2017 Feb 21, pp. 19–21, https://doi.org/10.1016/j.idcr.2017.02.008. PMID: 28271046; PMCID: PMC5338911.

[3] T. Go, H. Kobayashi, M. Takata, H. Shirasaki, S. Miyayama, Endoscopic management for broncholithiasis with bronchoesophageal fistula, Ann. Thorac. Surg. 84 (6) (2007 Dec) 2093–2095, https://doi.org/10.1016/j.athoracsur.2007.06.071. PMID: 18036946.
[4] Dafang Chen, Neha Mehta, Brett Lindgren, Killu Keith, Rare complication of bilateral bronchoesophageal fistulas due to invasive mucormycosis after renal transplantation, Chest ume 158 (Issue 4, Supplement) (2020).
[5] Wei Jung Hsia, Killu Keith, Rare presentation of bronchoesophageal fistula from Drano ingestion, Chest ume 158 (Issue 4, Supplement) (2020).
[6] C.Y. Wang, C.H. Chou, H.P. Wang, J.S. Chen, P. Lee, Successful treatment of bronchoesophageal fistula with esophageal and bronchial stenting, J. Formos. Med. Assoc. 110 (4) (2011 Apr) 270–272, https://doi.org/10.1016/S0929-6646(11)60041-7. PMID: 21540011.
[7] J.C. Koval, R.M. Curley, Bronchoesophageal fistula in small cell lung cancer, Chest 98 (2) (1990 Aug) 512–513, https://doi.org/10.1378/chest.98.2.512a. PMID: 2165450.
[8] E.S. Kassis, C.P. Belani, P.F. Ferson, R.J. Keenan, J.D. Luketich, Hodgkin's disease presenting with a bronchoesophageal fistula, Ann. Thorac. Surg. 66 (4) (1998 Oct) 1409–1410, https://doi.org/10.1016/s0003-4975(98)00784-x. PMID: 9800846.
[9] E. Argüder, G. Aykun, A. Karalezli, H.C. Hasanoğlu, Bronchoesophageal fistula, J Bronchol. Interv. Pulmonol. 19 (1) (2012 Jan) 47–49, https://doi.org/10.1097/LBR.0b013e31823fc99e. PMID: 23207263.
[10] J. Fernández Gajardo, H. Gómez Herrero, G. Viteri Ramírez, Long-term acquired bronchoesophageal fistula, English, Spanish, Arch. Bronconeumol. 54 (5) (2018 May) 283, https://doi.org/10.1016/j.arbres.2017.10.009. Epub 2017 Dec 6. PMID: 29221828.
[11] S. Khuwaja, A. Azeem, S. Guttmann, Bronchoesophageal fistula: a rare complication of non-small cell carcinoma (NSCLC) invading the mediastinum, BMJ Case Rep 12 (7) (2019 Jul 15), e230393, https://doi.org/10.1136/bcr-2019-230393. PMID: 31311788; PMCID: PMC6663213.
[12] G. Korpanty, S. Alken, L. Smyth, J. Greene, A. El-Helali, L. Grogan, O.S. Breathnach, Bronchoesophageal fistula in a patient with stage IIIB non-small-cell lung cancer, J. Thorac. Oncol. 7 (10) (2012 Oct) 1622, https://doi.org/10.1097/JTO.0b013e3182606a4c. PMID: 22982662.
[13] J. Schreiber, N. Waldburg, Bronchoesophageal fistula and fatal hemoptysis after bevacizumab-containing chemotherapy without radiation in lung cancer, J. Clin. Oncol. 30 (32) (2012 Nov 10) e324, https://doi.org/10.1200/JCO.2012.42.8169. Epub 2012 Sep 24. PMID: 23008311.
[14] M. Schweigert, Interventionelle Versorgung tracheo-/bronchoösophagealer Fisteln [Interventional treatment of tracheoesophageal/bronchoesophageal fistulas], Chirurg 90 (9) (2019 Sep) 710–721, https://doi.org/10.1007/s00104-019-0988-z. German, PMID: 3124035.
[15] Cheng-Yi Wang, Chien-Hong Chou, Hsiu-Po Wang, Jin-Shing Chen, Peilin Lee, Successful treatment of bronchoesophageal fistula with esophageal and bronchial stenting, J. Formos. Med. Assoc. 110 (Issue 4) (2011).
[16] M. Kanzaki, K. Adachi, K. Takuma, J. Matsumoto, T. Obara, Y. Miyano, S. Sasano, [Esophago-bronchial fistula confirmed with bronchoscopy utilized an indocyanine green], Kyobu Geka 60 (10) (2007 Sep) 910–914. Japanese. PMID: 17877011.
[17] V.K. Holden, D. Ospina-Delgado, A. Chee, M.S. Parikh, M.M. Carreiro, D. Alape Moya, S. Fernandez-Bussy, F.J.F. Herth, A. Majid, Safety and efficacy of the tracheobronchial bonastent: a single-center case series, Respiration 99 (4) (2020) 353–359, https://doi.org/10.1159/000506815. Epub 2020 Apr 7. PMID: 32259817.