Abstracts presented at the Eastern Pulmonary Conference, September 21–24, 2023, Palm Beach, Florida

The effectiveness of artificial intelligence versus technician interpretations of home sleep apnea tests

Colton Hawco, M.D., Tristan Pasek, M.D., Amrita Bonthu, B.A., Kaylee Sarna, M.S., Anas Hadeh, M.D.

Introduction: Obstructive sleep apnea (OSA) affects around 22% of the global population, with many having moderate or severe disease. Home sleep apnea testing (HSAT) has become the most common method of diagnosing OSA, replacing in-lab polysomnography. Polysmith software by Nikon Kohden allows for the automatic scoring of respiratory events. This study aimed to assess the reliability of this technology.

Methods: We compared the 2 methods of scoring; technician scoring (gold standard) and the software scoring for apneas, hypopneas, and respiratory event index (REI).

Results: We analyzed 120 patients across four severity groups (primary snoring, mild OSA, moderate OSA, and severe OSA) with 30 patients in each group. The correlation between the REI calculated by the software and technicians proved strong overall ($r = 0.96$, $p < 0.001$). The mild OSA group had a moderate correlation ($r = 0.45$, $p = 0.0129$), while the primary snoring, moderate and severe OSA groups showed strong correlations within their respective groups ($r = 0.69$, $p < 0.001$; $r = 0.56$, $p = 0.012$; $r = 0.71$, $p < 0.001$). Hypopneic incidents were over-reported by the software (median difference of 19, IQR 45, $p =< 0.001$), while apneic episodes were under-reported (median difference of –16.5, IQR 37.5, $p =< 0.001$). However, the cumulative median difference in REI between software and technician was 0.5, with an IQR of 4.1, which was statistically significant, however, clinically insignificant.

Conclusion: The Polysmith software has demonstrated its ability to reliably analyze home sleep apnea tests across various severities of OSA at a comparable level of accuracy to that of a sleep technician. These findings suggest that artificial intelligence has the potential to be integrated into clinical practice, providing an opportunity to expedite, enhance, and automate patient care.

Correlation with IgG4 serum positivity and development of IgG4 related lung disease

M. Gonzalez, S. Mahapatra, C. Railwah, J. Mehta

Introduction: IgG4-related disease (IgG4-RD) is a systemic fibroinflammatory process characterized by substantial infiltration of plasma cells with IgG4 in target organs, regardless of plasma IgG4 level. IgG4-related lung disease (IgG4-RLD) implies a series of clinical, radiologic, and histopathological characteristics that affect the lung. It is known that related lung disease overlaps with the development of other IgG4-related diseases. However, it is unclear whether IgG4 serum levels predispose to IgG4-RLD. Our hypothesis was that there is a co-relation with IgG4 serum levels and development of respiratory-related disease.

Methods: IRB approval was obtained under exempt protocol with study number FLA 22-020. Following that, e-research was approached for data extraction. Data were analyzed and extrapolated in secured RedCap under CCF.org. Univariate analysis was used to compare the patient characteristics and outcome (IgG4-RLD) between the patients with IGG4 < 135 and ≥135. IgG4-RLD was confirmed when there was pulmonary biopsy consistent with IgG4-RLD in the setting of compatible clinical symptoms and radiographic findings. Chi-square test or Fisher's exact test were performed for categorical variables, and Wilcoxon rank sum test was conducted for continuous variables. Multivariate logistic regression analysis with backward elimination was used to assess the association between outcome (IgG4-RLD) and IgG4 (≥135 versus <135).

Results: After inclusion and exclusion criteria from the sample of 7186, 326 were identified to have raw IgG4 values with confirmed IgG4-RLD. Age was significantly unbalanced ($p = 0.0392$) between the patients with IgG4 < 135 and IgG4 ≥ 135. All other baseline characteristics were not significantly different. Multivariate logistic regression analysis with backward elimination method revealed that IgG4 was significantly related with IgG4-RLD. Even after adjusting for age, patients with IgG4 ≥ 135 were more likely to have IgG4-RLD compared with patients with IgG4 < 135 (OR (95% CI) = 4.00 (1.29–12.42), $p = 0.0165$); 88.4% of those patients did not have pulmonary function tests (PFTs). Of those patients who did have PFTs, 80% had no obstructive or restrictive pattern on their PFTs. There was no predominant pattern observed in the remaining patients.

Discussion: IgG4-RLD has been noted to have several patterns of pulmonary involvement involving the interstitium, mediastinum, airways, and pleura. The degree of variability makes diagnosis challenging. Our study showed IgG4 serum levels correlated with likelihood of IgG4-RLD. Patients with IgG4 > 135 were more likely to experience IgG4-RLD as compared to patients without IgG4 < 135. Thus far studies lack standardized diagnostic approach for IgG4-RLD. Our study shows a diagnostic value in using a IgG4 cutoff of ≥ 135.

The efficacy and safety of benralizumab in patients with moderate-to-very-severe eosinophilic COPD: Design of the RESOLUTE study

Gerard Criner, M.D., Dave Singh, M.D., Christopher Brightling, M.B.B.S., Ying Fan, Ph.D., Stefan Ivanov, M.D., Gabriela Luporini Saraiva, M.D., Christopher McCrae, Ph.D., Ioannis Psallidas, M.D., Vivian H. Shih, Dr.P.H., Anna Sokolnicka, Ph.D., Maria Jison, M.D.

Introduction: GALATHEA and TERRANOVA, two phase 3 studies, evaluated benralizumab treatment for patients with moderate–to–very-severe COPD and a history of exacerbations. *Post hoc* analyses showed a subpopulation of patients might respond to treatment with benralizumab 100 mg.

Methods: RESOLUTE (NCT04053634), a 56-week, phase 3, randomized, double-blind, placebo controlled study, will evaluate the efficacy and safety of benralizumab treatment in COPD patients. Eligible patients must have a history of ≥2 moderate and/or severe COPD exacerbations in the previous year despite receiving triple (ICS, LABA, LAMA) therapy, a screening blood eosinophil count of ≥300 cells/μL, and historical blood eosinophil counts of ≥150 cells/μL within the previous year. Approximately 400 sites in 30 countries will participate. Randomization is stratified by country and number of exacerbations in the previous year (2 or ≥3). The 2-exacerbation stratum was capped; patients with ≥ 3 exacerbations in the previous year correspond to ≥70% of the study population. Patients will receive benralizumab 100 mg every 4 weeks for the first 3 doses and every 8 weeks thereafter. The primary end point is the annualized rate of moderate or severe COPD exacerbations over the first 56 weeks of the treatment period: requiring systemic corticosteroids, and/or antibiotics, and/or inpatient hospitalization or death due to COPD. Secondary end points include an annualized rate of severe COPD exacerbations, leading to hospitalization/death, time to first COPD exacerbation, lung function (FEV_1), respiratory health-related quality of life (St. George's Respiratory Questionnaire), COPD health status (COPD Assessment Tool), COPD symptoms (Evaluating Respiratory Symptoms in COPD), and all-cause/respiratory-related mortality. Safety and tolerability will be evaluated by adverse events. Additional exploratory analyses on blood biomarkers will evaluate the role of eosinophilic inflammation in COPD pathogenesis.

Results: Study is ongoing.

Conclusion: This study will evaluate the efficacy and safety of benralizumab in COPD patients with critical unmet needs.

Funded by AstraZeneca (Södertälje, Sweden).

Lung function response to albuterol-budesonide versus albuterol when used repetitively over a week in adults with mild-to-moderate asthma: Results from the DENALI study

Reynold A. Panettieri, Jr., M.D., Bradley E. Chipps, M.D., Richard Beasley, D.Sc., Elliot Israel, M.D., Frank C. Albers, M.D., Christy Cappelletti, Pharm.D., Lynn Dunsire, M.Sc., Ileen Gilbert, M.D., Frank Trudo, M.D., M.B.A., Alberto Papi, M.D.

Introduction: DENALI (NCT03847896) showed albuterol-budesonide used four-times daily (QID) significantly improved lung function over 12 weeks versus its mono-components. As albuterol-budesonide is a rescue therapy, examining its effects versus albuterol over shorter time periods is important because patients may temporarily require frequent dosing for increasing symptoms surrounding an exacerbation.

Methods: This *post hoc* DENALI analysis evaluated lung function responses to QID albuterol-budesonide 180/160 μg (FDA-approved dose), albuterol 180 μg, and placebo, in patients ≥ 18 years (FDA-approved population). Least squares mean (LSM) differences between treatments in change from baseline (day 1, predose) in forced expiratory volume in 1 second area under the curve 0–6 hours (FEV_1 $AUC_{0\text{-}6h}$), day 1, and week 1 were estimated by using a repeated measures model.

Results: On day 1, the LSM change from baseline in FEV_1 $AUC_{0\text{-}6h}$ was greater with albuterol-budesonide (235 mL, n = 193) and albuterol (209 mL, n = 190) than placebo (108 mL, n = 192) (LSM difference [95% CI]: 127 [82–172] mL, and 101 [56–146] mL, respectively; both $p < 0.001$); the comparison between albuterol-budesonide and albuterol (LSM difference [95% CI]: 26.1 [−18.8–71.1] mL) was statistically non-significant. At week 1, improvement in FEV_1 $AUC_{0\text{-}6h}$ from day 1 baseline was greater with albuterol-budesonide than albuterol or placebo (LSM difference [95% CI]: 88 [29–148] mL, $p = 0.004$, and 129 [69–188], $p < 0.001$, respectively); for albuterol, there was no appreciable difference versus placebo (LSM difference [95% CI]: 40 [−19–100] mL, $p = 0.184$).

Conclusion: Albuterol-budesonide and albuterol resulted in similar improvements in FEV_1 $AUC_{0\text{-}6h}$ upon initiating treatment. However, following repeated use over a week, FEV_1 $AUC_{0\text{-}6h}$ improvement from day 1 baseline was greater with albuterol-budesonide than albuterol, while for albuterol, it was markedly reduced and not different from placebo. These effects may be particularly important during the time surrounding an exacerbation when rescue bronchodilator use temporarily increases in response to rising inflammation and symptoms and decreasing lung function.

Funded by Bond Avillion 2 Development LP. Alexander Jones of inScience Communications, Springer Healthcare, UK, provided medical writing support, which was funded by AstraZeneca.

Efficacy of as-needed use of albuterol-budesonide in adults with moderate-to-severe asthma who are adherent to maintenance therapy: Analysis of MANDALA

Alberto Papi, M.D., Richard Beasley, D.Sc., Bradley E. Chipps, M.D., Elliot Israel, M.D., Reynold A. Panettieri, Jr., M.D., Frank C. Albers, M.D., Lynn Dunsire, M.Sc., Ileen Gilbert, M.D., Frank Trudo, M.D., M.B.A., Christy Cappelletti, Pharm.D.

Introduction: Albuterol-budesonide 180/160 μg inhaler received FDA approval (January 2023) for as-needed treatment or prevention of bronchoconstriction and to reduce exacerbation risk in patients ≥ 18 years with asthma. In the MANDALA study (NCT03769090), as-needed albuterol-budesonide 180/160 μg reduced severe exacerbation risk by 28% versus albuterol in patients ≥ 18 years with moderate-to-severe asthma on inhaled corticosteroid (ICS) based maintenance therapy. Real-world data indicate that, even patients with high maintenance adherence are at risk for severe asthma exacerbations. We assessed the effects of albuterol-budesonide 180/160 μg on severe exacerbation risk in adults adherent to maintenance therapy in MANDALA.

Methods: Adults (≥18 years) randomized to as-needed albuterol-budesonide 180/160 μg (FDA-approved dose) or albuterol 180 μg for ≥24 weeks were evaluated. Adherence was calculated as percentage of days patients reported taking maintenance therapy (eDiary entries). A *post hoc* analysis of time-to-first severe exacerbation was performed that followed up patients until their average maintenance adherence over a 3-week period fell below 70%. Patients were included if their mean adherence to maintenance in the 10 days before randomization was ≥ 70%. All data before randomized treatment discontinuation, change in maintenance therapy, or fall in 3-weekly maintenance therapy < 70% were included.

Results: 856 of 979 patients randomized to albuterol-budesonide 180/160 μg and 835/980 to albuterol had ≥ 70% mean adherence to maintenance therapy in the 10 days before randomization and were included in this analysis. Among those with continued adherence, the risk of a severe exacerbation was reduced by 24% with albuterol-budesonide 180/160 μg versus albuterol (HR 0.76; 95% CI 0.60–0.96; $p = 0.019$).

Conclusion: As-needed albuterol-budesonide resulted in a clinically meaningful reduction in severe exacerbation risk in adults who continued to be adherent to maintenance therapy post-randomization versus albuterol. This suggests that, even for patients receiving consistent ICS maintenance therapy, the opportunity exists to prevent an asthma exacerbation by treating worsening symptoms by using as-needed albuterol and budesonide concomitantly.

Funded by Bond Avillion 2 Development LP. Helen Brereton of inScience Communications, Springer Healthcare, UK, provided medical writing support, which was funded by AstraZeneca.

Efficacy of a respiratory syncytial virus (RSV) prefusion F protein vaccine (RSVPreF3 OA) in older adults with co-existing cardiorespiratory conditions

Alberto Papi, M.D., Robert G. Feldman, M.D., Raffaele Antonelli-Incalzi, M.D., Katie Steenackers, M.D., Dong-Gun Lee, M.D., Michael G. Ison, M.D., Laurence Fissette, Marie-Pierre David, Céline Maréchal, Ph.D., Marie Van der Wielen, M.D., Lusine Kostanyan, M.D., Veronica Hulstrøm, M.D., for the AReSVi-006 Study group

Introduction: RSV can cause severe respiratory disease in older adults with cardiorespiratory conditions. In an ongoing phase 3 placebo controlled study (NCT04886596), the vaccine efficacy (VE) of RSVPreF3 OA during the first RSV season was 82.6% against RSV-related lower respiratory tract disease (RSV-LRTD) and 71.7% against RSV-related acute respiratory illness (RSV-ARI) in ≥ 60-year-olds. We present VE in participants with co-existing cardiorespiratory conditions of interest associated with a higher risk of severe RSV disease outcomes.

Methods: Adults ≥60 years were randomized 1:1 and received 1 dose of RSVPreF3 OA or placebo. VE against first RSV-LRTD and RSV-ARI episodes was assessed in subgroups of specific interest.

Results: Of the 12,467 RSVPreF3 OA and 12,499 placebo recipients, 20.0% and 19.4%, respectively, had ≥ 1 cardiorespiratory condition of interest. Incidence rates of RSV-LRTD and RSV-ARI were higher in placebo recipients with ≥ 1 cardiorespiratory condition of interest versus those with no medical conditions of interest. VE was 92.1% (RSV-LRTD) and 88.1% (RSV-ARI).

Conclusion: RSVPreF3 OA is efficacious against RSV-LRTD and RSV-ARI in ≥ 60-year-olds with cardiorespiratory conditions of interest, a population who may benefit the most from protection against RSV.

Funded by GlaxoSmithKline Biologicals SA.

Estimating the effect of nintedanib on forced vital capacity in children and adolescents with fibrosing interstitial lung disease: extrapolation using a Bayesian borrowing approach

Toby M. Maher, Robin Deterding, Lisa R. Young, Martina Gahlemann, Christian Stock

Introduction: In the InPedILD trial in children and adolescents with fibrosing ILD, changes in FVC over 24 weeks favored nintedanib over placebo, but the trial was not powered for this end point. In a prespecified Bayesian analysis, we incorporated data from adults to estimate the effect of nintedanib on FVC in children and adolescents.

Methods: The InPedILD trial enrolled children or adolescents aged 6–17 years with clinically significant fibrosing ILD. Subjects received nintedanib (n = 26) or placebo (n = 13). Data from 6 trials of nintedanib in adults (N = 2570) were represented as a meta-analytic predictive (MAP) before distribution in a dynamic Bayesian borrowing framework. Expert opinion on the relevance (weight) of the data from adults to children and adolescents was obtained in a formal expert elicitation exercise. The previous distribution was updated with the data from the InPedILD trial to calculate the posterior distribution of the estimated treatment effect.

Results: In a meta-analysis, the effect of nintedanib versus placebo on change in FVC % predicted at week 24 in adults with fibrosing ILDs was 1.65 (95% confidence interval, 1.15-2.14). Expert elicitation yielded a mean previous weight on adult data of 0.56. In the InPedILD trial, the nintedanib versus placebo difference in adjusted mean change in FVC % predicted at week 24 based on a mixed model for repeated measures was 1.21 (95% confidence interval, −3.40 to 5.81). Combined data analyzed within the Bayesian framework led to a median difference in adjusted change in FVC % predicted at week 24 in children and adolescents treated with nintedanib versus placebo of 1.63 (95% confidence interval, −0.69 to 3.40). The probability of nintedanib being effective in children and adolescents was estimated to be 95.5%.

Conclusion: A Bayesian borrowing approach suggested a benefit of nintedanib in children and adolescents with fibrosing ILDs similar to that observed in adults.

Funded by The InPedILD trial was supported by Boehringer Ingelheim.

Meta-analysis of effect of nintedanib on mortality in subjects with idiopathic pulmonary fibrosis (IPF) and other forms of progressive pulmonary fibrosis (PPF)

Wim A. Wuyts, Toby M. Maher, Marlies S. Wijsenbeek, Wibke Stansen, Luca Richeldi

Introduction: In individual placebo controlled trials in subjects with idiopathic pulmonary fibrosis (IPF) and other forms of progressive pulmonary fibrosis (PPF), treatment with nintedanib was associated with numerical reductions in mortality. We assessed the effect of nintedanib on the risk of mortality across trials in subjects with IPF and PPF.

Methods: Meta-analyses of the effect of nintedanib versus placebo on time to death and time to first acute exacerbation of ILD or death were performed by using data from randomized placebo controlled trials in subjects with IPF (TOMORROW, INPULSIS-1 and -2, a phase IIIb trial [NCT01979952]) and other forms of PPF (INBUILD). The TOMORROW and INPULSIS trials had a placebo controlled period of 52 weeks. The phase IIIb trial had a placebo controlled period of ≥6 months. The INBUILD trial had a placebo controlled period of ≥52 weeks. The heterogeneity of the effect of nintedanib across trials was assessed by using the I^2 statistic, τ^2, and Q test p value.

Results: In the combined analysis of data from 5 clinical trials involving 2007 patients, nintedanib reduced the risk of death (HR 0.72 [95% CI, 0.53-0.97]) and the risk of acute exacerbation of ILD or death (HR 0.62 [95% CI, 0.48-0.81]) compared with placebo. The results were consistent across the trials ($I^2 = 0\%$, $\tau^2 = 0$, $p = 0.71$ for the analysis of time to death and $I^2 = 0\%$, $\tau^2 = 0$, $p = 0.64$ for the analysis of time to acute exacerbation of ILD or death).

Conclusion: Nintedanib had consistent effects on reducing the risk of mortality and of acute exacerbation of ILD or mortality across clinical trials conducted in subjects with IPF and other forms of PPF.

Funded by The TOMORROW, INPULSIS, Phase IIIb [NCT01979952] and INBUILD trials were supported by Boehringer Ingelheim.

Characteristics of patients with progressive fibrosing interstitial lung diseases (ILDs) in the ILD-PRO Registry

L. Jason Lobo, Peide Li, Murali Ramaswamy, Srihari Veeraraghavan, Scott M Palmer

Introduction: The ILD-PRO Registry is a multicenter U.S. registry of patients with progressive fibrosing ILDs other than idiopathic pulmonary fibrosis (IPF). We assessed the demographic and clinical characteristics of patients enrolled into the ILD-PRO Registry.

Methods: Patients enrolled in the ILD-PRO Registry had a non-IPF ILD diagnosed or confirmed at the enrolling center, reticular abnormality and traction bronchiectasis on HRCT and met criteria for ILD progression within the previous 24 months. Descriptive statistics were calculated based on the number of patients with available data.

Results: Of the first 491 patients enrolled, the majority were white (75.4%) and female (60.6%); 47.4% had history of smoking. Documented ILDs were connective tissue disease-associated ILDs (47.2%), hypersensitivity pneumonitis (17.5%), idiopathic non-specific interstitial pneumonia (9.1%), interstitial pneumonia with autoimmune features (8.9%), unclassifiable ILD (7.6%), and other ILDs (9.7%). Median (Q1, Q3) time from ILD diagnosis to enrollment was 2.0 (1.0, 4.1) years. About half (51.3%) of patients had experienced a relative decline in FVC % predicted ≥ 10% within the previous 24 months. At enrollment, median (Q1, Q3) FVC was 62.2 (49.4, 72.4) % predicted and DLco was 39.2 (30.2, 49.2) % predicted. The most common comorbidities were gastroesophageal reflux disease (61.1%) and sleep apnea (29.6%). Overall, 64.5% of patients were receiving immunosuppressive or cytotoxic therapy, 53.2% oral steroids, 19.8% nintedanib, and 3.6% pirfenidone.

Conclusion: Patients enrolled into the ILD-PRO Registry had a variety of ILD diagnoses and marked impairment in lung function. The majority of patients were taking immunosuppressive therapy.

Funded by The IPF-PRO/ILD-PRO Registry is supported by Boehringer Ingelheim Pharmaceuticals, Inc. and run in collaboration with the Duke Clinical Research Institute and enrolling centers.

Design of trials of BI 1015550 in idiopathic pulmonary fibrosis and progressive pulmonary fibrosis

Toby M. Maher, Shervin Assassi, Arata Azuma, Donald Zoz, Fernando J. Martinez

Introduction: Progressive pulmonary fibrosis (PPF) is associated with poor outcomes. BI 1015550 is a preferential phosphodiesterase 4B (PDE4B) inhibitor in clinical development as a potential treatment for idiopathic pulmonary fibrosis (IPF) and other forms of PPF. Non-clinical studies have shown that BI 1015550 has antifibrotic and anti-inflammatory effects. In a phase II trial in patients with IPF, BI 1015550 prevented decline in lung function over 12 weeks. The phase III FIBRONEER-IPF and FIBRONEER-ILD trials are investigating the effects of BI 1015550 in subjects with IPF and other forms of PPF, respectively.

Methods: FIBRONEER-IPF (NCT05321069) and FIBRONEER-ILD (NCT05321082) are randomized, double-blind, placebo controlled trials. In FIBRONEER-IPF, subjects with IPF will be randomized to receive BI 1015550 9 mg, BI 1015550 18 mg, or placebo twice daily (bid) for at least 52 weeks, stratified by use of approved therapy for IPF (pirfenidone/nintedanib versus neither). In FIBRONEER-ILD, subjects with PPF other than IPF will be randomized to receive BI 1015550 9 mg, BI 1015550 18 mg, or placebo bid for at least 52 weeks, stratified by the pattern seen on a high-resolution computed tomography (HRCT) scan of the lungs (usual interstitial pneumonia-like pattern versus other fibrotic patterns) and by use of background nintedanib therapy (yes/no).

Results: The primary end point in both the FIBRONEER-IPF and FIBRONEER-ILD trials is the absolute change from baseline in FVC (mL) at week 52. The key secondary end point is the time to first acute exacerbation, hospitalization with a respiratory cause, or death. Data on adverse events will also be collected.

Conclusion: The results of these trials will illuminate the efficacy and safety of BI 1015550 in patients with IPF and other forms of PPF.

Funded by The FIBRONEER-IPF and FIBRONEER-ILD trials are supported by Boehringer Ingelheim.

A popping cough: A case of spontaneous pneumothorax after 1 month coughing spell with history of interstitial lung disease

Alfonso Manotas, M.D., Czarina Teano, M.D., Francini Alcocer Guzman, M.D., Livasky Concepcion, M.D.

Introduction: A secondary spontaneous pneumothorax is a rare occurrence. It is seen in 2 per 100,000 of cases in women typically age greater than 60. This is valuable differential diagnosis to keep in mind when evaluating a patient with underlying lung disease who presents with chronic shortness of breath.

Case description: A 55-year-old female with a history of interstitial lung disease, SLE, MDD, former smoker (20 pack year), presenting to the ED for abnormal CXR ordered by the pulmonologist outpatient office. The office reviewed CXR and noted there was a pneumothorax. She was sent in urgently to the ED for further evaluation and CT chest scan. The CXR was done by a pulmonologist because she was having a cough for 1 month and was on a course of Levaquin and prednisone. Right-sided chest tube was placed in the ED. Labs were notable for a low α-1 antitrypsin level. Cardiothoracic surgery consulted for possible intervention but recommended medical management with chest tube, no surgical intervention indicated. The chest tube was monitored daily with seal checks and repeated imaging done. She passed her six-minute walk test status post chest tube removal. She was discharged on a course of atovaquone and prednisone for close follow up with the pulmonologist.

Discussion: Secondary spontaneous pneumothorax in the setting of ILD has been reported in ~20% of cases. The recurrence rate is extremely high in the first 30 days, reaching ~30%. There is still scarce data about the prognosis of patients with ILD after a spontaneous pneumothorax.

Recurrent pneumothoraces and lung cancer: Positive or negative?

C. Tejera Quesada, P. Adderley, J. Baek, T. Smith, R. Beaty

Abstract: Pneumothorax as the initial presentation of primary lung neoplasms is uncommon, with an incidence of only 0.03–0.05%. However, recurrent pneumothorax after successful re-expansion should raise concern for co-existent lung pathology, particularly lung neoplasms in high-risk populations. We herein report a case of lung cancer, presenting as a recurrent pneumothorax.

Case: A 62-year-old man with a medical history of chronic obstructive pulmonary disease presented with recurrent symptomatic right-sided pneumothorax over a six-week course. The patient denied any history of trauma, surgical procedures, or malignancy. Upon evaluation, he was found to be hypoxic, in moderate respiratory distress. Pulmonary examination was significant for hyperresonance and decreased breath sounds over the right lung field. Chest computed tomography revealed a large right-sided pneumothorax with an associated 4-cm bullae over the right apex, for which a 28-Fr thoracostomy tube was placed. Given the history of recurrent pneumothorax without any other lung pathology, video-assisted thoracoscopic surgery bullectomy with pleurodesis was performed. The pathology report showed findings consistent

with stage 2 non–small cell lung carcinoma (pT2aN0M0). The patient underwent a right upper lobe lobectomy with an uneventful postoperative course.

Discussion: Simultaneous presentation of a pneumothorax and primary lung neoplasms is a rare finding. Multiple theories have been proposed regarding the association of concurrent pneumothorax in lung neoplasm, but exact pathophysiology remains unclear. One of the theories hypothesizes that the increased production of tumor necrosis factor in primary lung neoplasm weakens the visceral pleura, raising the risk of bullae rupture, particularly in patients older than 40 years old exposed to oncogenic substances, such as tobacco. The prognosis of lung cancer seems to be unrelated to the presence of pneumothorax. Literature emphasizes that patients with recurrent pneumothorax after successful re-expansion, particularly those who possess a higher risk of developing lung neoplasms, should have a more comprehensive workup. Having a low threshold of suspicion for lung neoplasm in patients with recurrent pneumothorax may aid in early detection.

Invasive group B *Streptococcus* from a necrotic leiomyoma causing embolic stroke and endocarditis

Czarina Teano, M.D., Kevin Gopala Rao, M.D., Sinay Ceballos, M.D., Danay Herrera, DO

Introduction: group B *Streptococcus* (GBS) infections are most commonly observed in neonates and pregnant women. However, the incidence of GBS infections in non-pregnant women continues to increase, comprising ~75% of invasive GBS disease. We present an unusual case of a large necrotic leiomyoma, resulting in GBS bacteremia presenting as an ischemic stroke.

Case Description: A 51-year-old female with abnormal uterine bleeding presented with dizziness, nausea, and vomiting. Stroke alert was activated upon arrival, which revealed a left-sided facial droop and left hemiparesis. The CTA of head and neck revealed an acute vertebral artery occlusion. Vital signs are notable for fever of 100.4°F. Laboratory findings are significant for hemoglobin of $10 \times$ g/dL and platelet 46×10^9/L. Blood cultures resulted in GBS. A pelvic US revealed a large uterine mass measuring 15 cm × 13 cm × 11 cm. Persistent bacteremia prompted a transesophageal echocardiogram (TEE), which revealed a small vegetation on her mitral valve. She subsequently underwent a full hysterectomy. Her bacteremia resolved, and she continued treatment with ceftriaxone for 4 weeks.

Conclusion: Invasive GBS disease is associated with high mortality and morbidity rates. Prompt recognition of possible sites of infection and achieving source control is crucial. In addition, prompt exclusion of valvular vegetation(s) with a TEE, is key in tailoring length of treatment and avoiding recurrence.

A case of bronchopleural fistula status post VA-ECMO

Giselle Perez, M.D., Muhammad Rehan, M.D., Amal Benchakroun, M.D., and Vijay Srinivasan, M.D.

Background: Veno-arterial extracorporeal membrane oxygenation (VA-ECMO) has been shown to improve outcomes in complications after pulmonary procedures, such as bronchopleural fistulas (BPF). The following case, however, BPF is noted status post VA-ECMO in a patient who suffered a cardiac arrest.

Case: A 56-year-old male with a history of cocaine abuse, required emergent intubation with mechanical ventilation and VA-ECMO placement *via* open femorofemoral peripheral cannulation after multiple cardiac arrests. Left heart catheterization was performed, showing an ejection fraction of 10–15% and diffuse coronary spasm that was treated with intracoronary nitroglycerin with marked improvement and no fixed stenosis. Noted worsening oxygenation and secretions requiring flexible bronchoscopies showing airway hemorrhage and copious mucus plugging with sputum cultures growing multidrug resistant organisms. Due to unsuccessful attempts at extubation, cuffed tracheostomy was placed. VA-ECMO decannulation was successful on day 15. Three days later, left main ulceration and large right hydropneumothorax, multiloculated posterior pleural effusion, and almost complete collapse of the right lung was noted. He then had a cardiac arrest, bedside lung POCUS showed empyema and complex fluid collections. ROSC was subsequently achieved after chest tube placement. Right video-assisted thoracoscopic surgery noted BPF and total lung decortication, parietal pleurectomy, and middle lobe resection was done. Three chest tubes were placed and subsequently removed after 4 days. The patient was discharged to a long-term acute care hospital on intravenous antibiotics.

Discussion: A meta-analysis, in 2013, of more than 100 patients receiving ECMO reported the most common complications: renal failure, bacterial pneumonia, bleeding, and sepsis. Pulmonary effects due to systemic inflammatory response have been reviewed along with pulmonary congestion and hypoxia. It is hypothesized that such a state of persistent inflammation and fibrosis may result in long-term dysfunction. There, however, are limited data on BPF status post VA-ECMO.

When things start going wrong think herpes: A rare case of herpes pneumonitis

Jodi Perry, D.O., Muhammad Rehan, M.D., Sunil Bali, M.D.

Introduction: Herpes syncytial virus (HSV) pneumonia is a known, yet rare complication in immunocompromised individuals and should be suspected when having difficulty weaning off mechanical ventilation. It has generally been described in patients receiving chemotherapy; however, no cases have been reported of patients on methotrexate for rheumatoid arthritis. Although cases of disseminated HSV have been reported in these individuals, an association with severe acute respiratory distress syndrome (ARDS) after a bacterial pneumonia complicated by HSV pneumonitis has not. We present a case of a middle-aged woman who developed severe ARDS secondary to HSV pneumonitis complicated by refractory hypoxemia requiring veno-venous extracorporeal membrane oxygenation (VV-ECMO).

Case Presentation: A 55-year-old woman with a history of rheumatoid arthritis on methotrexate and steroids, obesity, hypertension, presented with angioedema found to have a lower lobe pneumonia. Further testing revealed legionella pneumonia and she was treated with appropriate antibiotics. Her clinical course was complicated by progressive respiratory failure, requiring mechanical ventilation. Despite being on broad spectrum antibiotics, she developed refractory hypoxemia secondary to ARDS, requiring VV-ECMO. Bronchoscopy revealed endobronchial ulcerations, and cultures were positive for HSV-1. Lumbar puncture was positive for HSV-2 in cerebrospinal fluid. She was treated with high-dose Acyclovir and showed significant clinical improvement.

Conclusion: In patients with worsening respiratory failure despite being on broad-spectrum antibiotics, viral pneumonitis and pneumonia, particularly HSV, should be considered. Bronchoscopy can be a useful tool in visualizing ulcerations caused by HSV and obtaining samples for testing. In patients with refractory hypoxemia despite appropriate antimicrobial therapy, a bronchoscopy should be performed to assess for the presence of ulcers. If findings remain suspicious for HSV, treatment with high-dose antivirals is recommended while we await culture results because early detection and treatment can have positive clinical outcomes.

A case of coxsackie B & influenza A coinfection leading to acute fulminant myocarditis presenting as cardiogenic shock

Lesley-Ann McCook, M.D., Giselle Perez, M.D., Andrew Fischer, M.D.

Fulminant myocarditis is an uncommon clinical entity characterized by sudden and severe diffuse cardiac inflammation, leading to acute heart failure and often more fatal sequalae. We present a case of coxsackie B and influenza A coinfection, leading to acute fulminant myocarditis and cardiogenic shock. We present a case of 56-year-old female, with a medical history of well-controlled hypertension, who presented for a 2-day history of generalized weakness, malaise, anorexia, and intractable nausea and vomiting. Of note, she works as a kindergarten teacher, and reports many of her students having similar symptoms. She sought medical attention after developing exertional dyspnea and orthopnea, which worsened throughout the day before presentation. She denied chest pain, leg swelling, palpitations, dizziness, or syncope. On initial assessment, she was observed to be somnolent with cold clammy skin, and NIBP readings were unattainable. Physical examination further revealed acute hypoxic respiratory distress with an oxygen saturation of 88% on 5-L supplemental oxygen *via* nasal canula. Fine crackles were auscultated in the mid to lower zones bilaterally. ECG revealed sinus tachycardia with nonspecific ST and T wave changes. Echocardiogram demonstrated a globally hypokinetic left ventricle with an ejection fraction in the 10% range. Chest x-ray confirmed infiltrates to the mid to lower zones bilaterally. Blood investigations values were notable for a lactic acidosis of 9 mmol/L and troponin of 4.5 ng/mL, which shortly up trended to 9.6 ng/mL. She was admitted to the ICU for further management of cardiogenic shock. Cardiac catheterization revealed very mild nonobstructive coronary artery disease in a right-dominant system, moderately reduced Fick cardiac output, and index of 2.1 L/minute and 1.3 L/minute/m^2, respectively, with a PCWP 20 mm Hg. An intra-aortic balloon pump was successfully inserted. Cardiac MRI revealed nonhypertrophied LV with EF of 39% with global hypokinesis, small intramyocardial area of LGE inferior base consistent with myocarditis. Serology confirmed influenza A and coxsackie B co-infection, and she was then assessed as having acute viral fulminant myocarditis. She was treated with Olseltamivir, colchicine, ASA, and a statin. IABP was successfully weaned 4 days after. GDMT was commenced. The patient was discharged and continued to be

followed up in the heart failure clinic. Fulminant myocarditis (FM) is the most severe form of acute myocarditis and often can result in sudden cardiac death. The current treatment for fulminant myocarditis with cardiogenic shock is primarily supportive but requires a full extent of hemodynamic support along with anti-viral treatment. Coxsackie B virus myocarditis is a well-known entity, on the other hand, influenza myocarditis is a rare condition and the complications are even rarer. This case aims to bring attention to the impact of possible co-infection in patients with influenza and coxsackie B viral infections. In this case, we describe a female in her early fifties who presented with abrupt onset exertional shortness of breath and orthopnea after 2 days of history viral symptoms. After the discovery of her new onset left ventricular dysfunction, she underwent cardiac catheterization, which ruled out ischemic cardiomyopathy. The diagnosis of viral myocarditis was made based on her clinical presentation, imaging, and a positive coxsackievirus and influenza immunoassay. Prompt investigation and management prevented a fatal outcome.

A diagnostic dilemma of a case of GPA misdiagnosed as community-acquired pneumonia, over and over again

Lewjain Sakr, M.D., Colton Hawco, M.D., Lucas Goldenberg, M.D., David Pendlebury, M.D., Aastha Poddar, M.D., Ashequlla Qudratulla, M.D., Allen Lavina, M.D.

Introduction: Granulomatosis with polyangiitis (GPA) is a C-ANCA positive necrotizing granulomatous vasculitis. We present a rare case of a GPA that was initially misdiagnosed as cryptogenic pneumonia. We highlight the importance of clinical presentation, labs, and kidney biopsy in the diagnosis of GPA.

Case Presentation: A 45-year-old female with a medical history of type 1 diabetes mellitus, hypothyroidism, nasal polyps, and otitis media went to the hospital with shortness of breath and cough after a nasal polyp procedure complicated by suspected pneumonia. She received antibiotic therapy with no improvement in her symptoms. She returned to the hospital with worsening symptoms and underwent bronchoscopy and lung biopsy, which showed patchy airway-centered organizing pneumonia with concern for chronic infectious process. Bronchial cultures were negative for any microbes. She received another course of antibiotics. Two week later, she had worsening of her symptoms. Computed tomography of the chest suggested diffuse multifocal airspace disease. Urine analysis was positive for hematuria. Her bronchial cultures remain negative. Laboratory studies showed positive antineutrophil cytoplasmic antibodies (C-ANCA), elevated proteinase-3 antibody, and low myeloperoxidase antibody. She was then started on pulse dose steroids for presumed C-ANCA vasculitis. A renal biopsy was pursued and confirmed pauci-immune glomerulonephritis with 18/23 with necrotic and crescentic glomeruli. Therapy with rituximab was then started, and the patient continued on treatment.

Discussion: According to the American College of Rheumatology, a diagnosis of GPA can be made with 88.2% sensitivity and 92.0% specificity when 2 of the 4 criteria are met. Criteria for diagnosis of GPA include the following: (a) nasal or oral inflammation, (b) respiratory radiographic abnormalities consistent with respiratory tissue destruction (*e.g.*, nodules, infiltrates, and cavities), (c) microhematuria or red blood cell casts on urinary sediment analysis, and (d) granulomatous inflammation on biopsy for pathology. GPA can have a negative lung biopsy, making it a challenging diagnosis. We present a case clinically suggestive of GPA with a negative lung biopsy result. Initially diagnosed with community-acquired pneumonia, the patient's symptoms persisted and worsened despite multiple courses of antibiotics. Eventually she developed kidney dysfunction and was diagnosed with GPA.

Conclusion: This case highlights the importance of early diagnosis based on the clinical picture of the patient. It also suggests that tissue biopsies can be misleading, resulting in delay of the appropriate treatment. Early diagnosis and treatment of GPA were shown to have favorable outcomes.

Adenovirus-associated acute respiratory distress syndrome requiring mechanical ventilation

L. Goldenberg, M.D., L. Sakr, M.D., C. Hawco, M.D., D. Pendlebury, M.D., A. Poddar, M.D.

Introduction: Adenovirus-associated acute respiratory distress syndrome (ARDS) requiring mechanical intubation is extremely rare. Previous studies have mainly described influenza viruses as a cause of ARDS. Adenovirus-related ARDS cases and mortality rate are increasing. We present a rare case of a patient with rapidly progressing adenovirus-associated ARDS requiring mechanical ventilation. We aim to shed light on this common virus as a cause of ARDS to promote early diagnosis and implement prompt treatment.

Case Presentation: A 46-year-old male with a history of kidney disease from focal segmental glomerulosclerosis on immunosuppression who presented to the hospital with a cough. The patient's clinical course was complicated by progressive ARDS requiring intubation and mechanical ventilation within days as well as shock. He was empirically treated for presumed community-acquired pneumonia with antibiotics. The patient was subsequently found to be adenovirus positive by a polymerase-chain reaction test. He was subsequently treated with cidofovir. The patient then developed acute on chronic kidney failure, requiring hemodialysis. The patient's course gradually improved following ARDS management, including prone position ventilation. Patient underwent successful tracheostomy placement and was slowly weaned off mechanical ventilation.

Discussion: There are very few studies on patients with adenovirus-associated ARDS who required mechanical ventilation. A recent study showed that, in all patients with ARDS, virus-related ARDS accounted for 32.87%. Among these infections, adenovirus-related ARDS accounted for 9.79% of all infections. It is estimated, however, that cases of adenovirus-associated ARDS are increasing with an increase in morbidity and mortality. Given the scarcity of the data on adenovirus-related ARDS, no consensus has been achieved regarding treatment of severe ARDS from adenovirus. Immunocompromised states increase the risk for viral reactivation and infection as seen in our patient. Currently there are no specific drugs that are approved for the treatment of adenovirus infection. Our treatment strategy involved ARDS management, including ventilator support and prone position ventilation, as well as antiviral treatment with cidofovir. Cidofovir is a monophosphate nucleotide analog that inhibits the viral DNA replication with some potential therapeutic effects against adenovirus.

Conclusion: Adenovirus infection is usually self-limited in immunocompetent patients; however, can cause marked morbidity and mortality when progressed to ARDS. Due to the paucity in the literature regarding management of adenovirus-related ARDS, no consensus has been achieved regarding treatment plans. Further research needs to be conducted to investigate treatment options to better manage patients with adenovirus-related ARDS.

Doxycycline alert! A rare case of respiratory failure following chemical pleurodesis

Muhammad Rehan, M.D., Jodi Perry, D.O., Patton Adderley, M.D., Claudia Tejera Quesada, M.D., Vijay Srinivasan, M.D.

Introduction: Pleurodesis is a therapeutic procedure used to obliterate the space between the visceral and parietal pleura. It is an effective treatment option for patients with recurrent pleural effusions or pneumothoraces. A literature review revealed limited instances of serious adverse effects after doxycycline pleurodesis, with postprocedure fever being a commonly documented complication. We report a case of acute on chronic respiratory failure after doxycycline pleurodesis.

Case Presentation: A 62-year-old man with a history of remote COVID-19 pneumonia transferred to our facility due to worsening respiratory failure requiring mechanical ventilation. His hospital course was complicated by recurrent transudative left-sided pleural effusions requiring chest tube placement. After prolonged intubation, the patient underwent a tracheostomy for chronic respiratory failure but was successfully weaned off of the ventilator and decannulated by the second week of hospitalization. He was gradually transitioned to high-flow nasal cannula. Notably, the left chest drain had persistently significant output. The decision was made to proceed with chemical pleurodesis with doxycycline. At 24 hours after the procedure, the patient developed respiratory distress with worsening hypoxia. He was started on non-invasive mechanical ventilation, systemic steroids, and bronchodilators. He was eventually transitioned back to a nasal cannula after 5 days of treatment. Repeated imaging revealed resolution of pulmonary infiltrates.

Discussion: There are very limited reports of serious adverse effects after doxycycline pleurodesis, and there is only one case report of acute respiratory failure. Our patient seems to have suffered a doxycycline-induced bronchospastic lung injury. He had a favorable response to systemic steroids and bronchodilator therapy. We hope that this case sheds light on this rare complication of chemical pleurodesis by using doxycycline so that clinicians can ensure that patients receiving this therapy are in a setting where they can be closely monitored and intervened on appropriately.

A case of chronic eosinophilic pneumonia

Roshan Shah, Seth Gottlieb

Introduction: Chronic eosinophilic pneumonia is an idiopathic rare disorder that occurs ~2.5% of interstitial lung disease. Eosinophilia and bilateral peripheral lung

opacities are important clues for the diagnosis. Surgical biopsy is rarely needed to finalize the diagnosis as in our case.

Case Summary: The patient is 33-year-old female with a history of allergies presented with unresolving pneumonia despite two courses of antibiotics. She denies any weight loss, history of similar symptoms or other chronic lung conditions. She had breast implantation surgery ~10 years before in her home country. Her brother has asthma. She drinks socially and denies smoking. Her initial laboratory results showed white blood cells $13.41 \times 10^3/\mu L$ (segmented neutrophils 34%, eosinophils 35%). Cultures were negative bacterial, fungal, and acid-fast bacilli. Serologic workup was negative for aspergillus, strongyloides, lupus, RA, coccidiomycosis, histoplasma. ANA was mildly elevated at 1:80. The initial CT chest showed bilateral peripheral opacities in upper and lower lobes. Surgical lung biopsy showed chronic eosinophilic pneumonia. The patient's symptoms improved with steroids, and she was discharged on steroids taper.

Discussion: CEP is an idiopathic disorder characterized by pulmonary infiltrates with eosinophils. Clinical presentations, imaging findings of peripheral or pleural base opacities, peripheral eosinophilia, and lung biopsy showed eosinophilic infiltrates in the lungs are important in making a diagnosis of CEP after exclusion of infections, drug-induced eosinophilia, rheumatologic disorder, and malignancy. Systemic steroids are the choice of treatment for CEP. The duration of therapy is not known although most patient response with a few months of steroids. In some cases, patients may need treatment for several years, like in our patient.

More than we bargained for: Severe leg pain secondary to type A aortic dissection

Shany Quevedo, M.D., Yoel Tajes Leiva, M.D., Vincent DeGregory, D.O., Michele Iguina, M.D., Dionne Morgan, M.D.

Acute aortic dissection is a rare but life-threatening diagnosis with reported occurrence of three cases per 100,000 per year and an estimated mortality of 25% to 30%. Aortic dissection, classified by type A (involving the aortic arch) or type B (involving the descending aorta), classically presents with acute-onset, severe, tearing chest pain, oftentimes with radiation to the back; however, atypical presentations can occur. Here, we present a case of a 67-year-old female with isolated excruciating right lower extremity pain who was found to have an extensive type A aortic dissection. A 67-year-old female without a significant medical history presented to the hospital with severe right lower extremity pain that began abruptly while driving. The pain was associated with complete loss of motor and sensory function of the right limb and ascended proximally to her abdomen and back. On admission, she was hemodynamically stable; a physical exam revealed an absent right-sided pedal pulse. Computed tomography angiography (CTA) revealed type A aortic dissection extending to the right external iliac artery and left coronary artery with superior mesenteric artery occlusion, resulting in bilateral kidney infarction and suspected bowel ischemia. She was taken emergently for aortic dissection repair and femoral-femoral bypass for restoration of blood flow to her limb. The hospital course was complicated by acute renal failure requiring temporary dialysis, right hemispheric ischemia after the dissection advanced into the right common carotid artery, and new-onset atrial fibrillation with sinus pauses requiring permanent pacemaker placement. Despite the many challenges faced, the patient made a full recovery and was discharged to an acute inpatient rehab facility. Acute aortic dissection is associated with significant morbidity and mortality. Despite surgical advancements, specifically for type A aortic dissections, mortality remains greater than 25% of cases. Moreover, variability in clinical presentation can delay a timely diagnosis. This case illustrates the challenges of recognizing sudden-onset leg pain as a manifestation of aortic dissection without obvious clinical signs or contributory medical history. Early recognition is critical in these patients due to the decrease in morbidity and mortality associated with immediate surgical intervention.

A case of internal jugular vein and sigmoid sinus thrombosis in the post-partum period

Sinay Ceballos, M.D., Michael Vempala, M.D., Czarina Teano, M.D., Mauricio Danckers, M.D.

Introduction: During the third trimester of pregnancy and the postpartum period, there is an increased risk for thrombosis due to the hormonal environment and other pregnancy-related changes considered to act as prothrombotic factors. Cerebral venous thrombosis is more common in women and can manifest as a persistent headache with or without visual disturbances or neurologic deficit.

Case description: A 33-year-old female with history of type 1 diabetes mellitus and recent delivery due to preeclampsia 3 weeks before presentation who consulted due to headache for 1 week. The patient was hemodynamically stable with a non-focal neurologic exam. Initial labs showed a normal PT/INR with a shortened PTT. Head CTA showed no opacification of the left sigmoid sinus (LSS) and left internal jugular vein (LIJ), consistent with a LIJ thrombosis extending to the sigmoid sinus. The patient was admitted to the intensive care unit and started on anticoagulation. Subsequent MRV reported absent vascular flow within the LIJ vein. The results were discussed with neurology and considered to be a result of a prompt initiation of anticoagulation. The patient was discharged without neurologic deficit, on Apixaban for 6 months. Thrombophilia workup completed as an outpatient revealed no other risk factors.

Discussion: Headache is one of the most common reported symptoms in the emergency department, with an extensive differential diagnosis. There is an increased risk for thrombosis during pregnancy and puerperium, possibly due to a hypercoagulable state. Central sinus thromboses occur more commonly in women compared with men with a 3:1 ratio, with headache being the most frequently reported symptom. A high level of suspicion is required, particularly in patients with transient risk factors.

Circuitous circulation: A presentation of pulmonary hypertension in association with partial anomalous pulmonary venous return

Veronica Williams, D.O., Franck Rahaghi, M.D.

Introduction: Partial anomalous pulmonary venous return (PAPVR) results from the persistence of embryonic anastomotic plexus between the pulmonary vein and systemic venous plexus, a condition first described in 1739. PAPVR remains a rare diagnosis, mainly noted in case reports or from autopsy data, with an incidence estimated to be 0.7% of the population. It most commonly occurs with other cardiac abnormalities, such as ASD. Here, we present a case of an elderly male with PAH secondary to PAPVR, prompting cardiologists and pulmonologists to have increased awareness of this entity and options for management.

Presentation of Case: A 76-year-old Vietnam veteran with history of OSA on CPAP, Parsonage-Turner syndrome, previous tobacco use, and remote endocarditis presented with increased exertional dyspnea of one year's duration. Pulmonary function testing revealed moderate obstructive defect and normal DLCO. A CT angiogram showed no embolism or significant parenchymal disease but had findings of enlarged pulmonary artery and suspected right heart strain. An electrocardiogram demonstrated new RBBB. Echocardiogram showed severely dilated right ventricle but preserved left ventricular ejection fraction of 55%, mild aortic and tricuspid valvulopathy, and RVSP of 44 mm Hg. Subsequent TEE showed mild delayed right to left shunting system with pulmonary shunting. A VQ scan was unremarkable. Right heart catheterization was performed, showing high mixed venous O_2 with prominent step-up in the right atrium (oxygen saturation 86% and 83% in superior vena cava and right atrium, respectively, with IVC saturation of 68%), elevated right-sided pressures, normal PCWP, mildly decreased cardiac output, and a PVR of 4 WU. An autoimmune workup was negative. Cardiac MRI demonstrated partial anomalous pulmonary venous return of the left upper pulmonary veins into the innominate vein and superior vena cava. The patient was referred to cardiothoracic surgery for evaluation given persistent but overall unchanged symptoms. Medications were not adjusted in view of his minimally elevated PVR, stable risk stratification, and anatomic cause for pathophysiology, and he was maintained on macitentan and sildenafil with mild improvement.

Conclusion: PAPVR has been implicated as a rare etiology of PAH, but this situation may often be overlooked within the initial workup. Recognition of this anomaly remains crucial, as detection helps ascertain possible surgical intervention for PAH before progression of disease results in significant right ventricular dysfunction.

Prerenal acute kidney injury as adjunctive treatment of SIADH in newly diagnosed small-cell lung cancer

Vincent DeGregory, D.O., Shany Quevedo, M.D., Sheyla Gonzalez, M.D., Michael Lemont, M.D.

Paraneoplastic syndromes are found in many types of malignancies; however, they are most often associated with lung cancer. The syndrome of inappropriate antidiuretic hormone (SIADH) has been reported in ~10% of patients with small cell lung cancer. SIADH manifests as euvolemic hypoosmolar hyponatremia defined by low serum osmolality concurrent with inappropriately high urine osmolality in the absence of heart failure, cirrhosis, adrenal insufficiency, hypothyroidism, diuretic treatment, or volume depletion. Early presentation of paraneoplastic syndromes may precede the diagnosis of disease; however, syndromes may occur later in disease or be a sign of recurrence. Acute or persistent hyponatremia is associated with morbidity and mortality because it can often delay chemotherapeutic treatment. In a

study of 61 patients who received two or more cycles of chemotherapy, patients who failed to fully regain normal serum sodium levels had poorer survival compared with patients with appropriate correction. We present a case of an 80-year-old male with recently diagnosed small cell lung cancer who presented to the hospital with reports of generalized weakness, memory loss, and gait instability for several days. The sodium value was found to be 110 on arrival, with urine sodium and osmolality consistent with inappropriate ADH secretion. Initially, he had received hypertonic saline with adequate correction of sodium. Additional agents were required to achieve the electrolyte goal, including urea, salt tablets, intravenous furosemide, and fluid restriction less than 800 mL per day. A goal sodium value of 130 was achieved but not without compromised renal function. Limited data exist related to the treatment of persistent hyponatremia in SIADH with induction of a prerenal state. Thus, this patient may require relative volume depletion and as-needed use of vasopressin receptor antagonist therapy to maintain optimal sodium values, which may further complicate treatment of his malignancy. Further studies are needed to evaluate the risks and benefits of volume depletion to achieve long-term sodium goals in the syndrome of inappropriate antidiuretic hormone.

Lung transplant patient with postCOVID organizing pneumonia

Aamer Mahmood, M.D., and Courtney Shappley, M.D.

Introduction: Organizing pneumonia (OP) can be caused by viral infections and may lead to persistent radiologic infiltrates and respiratory symptoms. We present a case of COVID pneumonia in a lung transplant patient with development of secondary OP.

Case Description: A 51-year-old gentleman with medical history of idiopathic pulmonary fibrosis requiring bilateral lung transplant, bilateral bronchial stenosis, requiring stents presented with progressively worsening dry cough, fever, and chills. He denied any chest pain, shortness of breath, orthopnea, nocturnal dyspnea, loss of taste. His admission vital signs showed tachycardia in the 120 s/minute and hypoxemia with saturation 89% requiring 2 L oxygen. Laboratory investigations were remarkable for BUN/creatinine 24/1.80, CRP 134.8 and ferritin 2755. He tested positive for COVID-19. A chest x-ray showed increased left-sided interstitial markings, patent bronchial stents, and left pleural thickening. Dexamethasone, remdesivir, and therapeutic dose Enoxaparin were initiated. Empiric vancomycin and piperacillin/Tazobactam were started, which were then tapered to Levofloxacin. The patient had improvement in symptoms and was able to be weaned to room air with adequate saturations. He was discharged on day 4 of admission with four days of antibiotics. He had recurrent hypoxemia prompting readmission during which a CT scan showed bilateral multifocal consolidates with air bronchograms. He was discharged with another 7 days of levofloxacin and home oxygen. The patient returned to the lung transplant clinic with lethargy, persistent dyspnea since discharge, particularly during conversation, and hypoxemia requiring supplemental oxygen. A CT of the chest was done 3 weeks after initial admission, which revealed improving multifocal, patchy ground-glass and consolidative opacities bilaterally, with a small left pleural effusion. He was started on prednisone due to concern for OP with symptomatic resolution and improvement in oxygenation status back to room air.

Discussion: OP can occur in response to pulmonary injury/infection. Characterized by filling of alveoli and bronchioles with plugs of connective tissue. OP radiographically presents as peripheral bilateral lower lobe consolidation or peribronchovascular consolidation extending to lower lobe subpleural regions. Treatment involves corticosteroids and treatment of underlying disorder. Secondary OP has a higher mortality rate compared with cryptogenic OP.

Conclusion: OP should be considered as a differential diagnosis in patients with COVID pneumonia with persistent radiographic findings and respiratory symptoms that may necessitate use of steroids.

Novel method for ground-glass opacity and subs centimeter lung nodule markings

Adolfo Alvarez, D.O., Cynthia Espinosa, D.O., Fernando Safdie, M.D., Hasnain Bawaadam, M.D.

Introduction: The use of low-dose CT screenings has resulted in an increasing number of incidental pulmonary nodules being detected. Pure ground-glass opacities and small lung nodules represent, in many opportunities, clinical stage IA lung cancers. Surgical resection remains the gold standard therapy. We report a novel and effective technique for accurate intraoperative localization of sub centimeter lung nodules facilitating sublobar anatomic resections.

Case Presentation: We report the case of a 70-year-old female with a medical history of hypertension, hypothyroidism, hyperlipidemia, and a meningioma who was referred for a lung nodule. Low-dose CT in October 2022 showed a 9×8 millimeter nodule in the left lower lobe. A follow-up PET-CT in November 2022 confirmed the nodule with avidity and an SUV of 2.9. The patient underwent robotic-assisted navigation bronchoscopy by using the ion endoluminal system with intraoperative cone beam CT 3D reconstruction in December 2022, confirming the presence of a typical carcinoid tumor. Subsequently, an ICG-soaked coil was deployed within the target lesion and the patient was discharged home the same day. Twenty-two days later, the patient underwent a successful left lower lobe superior segmentectomy (S6) with intraoperative indocyanine green fluorescence visualization and localization without postoperative complications.

Discussion: Accurate nodule localization is crucial in surgical resection to prevent the unnecessary excision of healthy lung tissue. In this case, we used a fiducial coil soaked with ICG, which has optimal ICG dye adherence due to its platinum and spaced synthetic fibers. The bright green dye luminescence enables surgeons to precisely localize the lesion.

Conclusion: ICG embedded fiducial markers allow for real-time, intraoperative localization of early stage lung cancer facilitating lung sparing surgical resections. This method has the potential to improve our ability to perform successful local therapeutic interventions in the near future warranting further research and consideration for widespread use.

Severe sepsis with multiorgan involvement: Military tuberculosis on chest imaging unravels the case.

Amal Benchakroun, M.D., Nulma Carguill, M.D., Giselle Perez, M.D., Juzer Ali Asgar, M.D., Muhammad Rehan, M.D.

Introduction: Mycobacterium tuberculosis (MTB) infection remains relatively uncommon in the United States with an incidence of 2.5 case per 100,000 persons, one of the lowest incidence rates in the world. Disseminated tuberculosis is rare and a potentially fatal complication of TB infection that can lead to multiorgan failure. We present a case of disseminated TB with lymphogenous spread leading to scrofula, innumerable lung nodules, and abdominal abscess.

Case Presentation: A 26-year-old transgender female presented to the emergency department with a three-week history of abdominal pain associated with fever, nausea, vomiting, and diarrhea. The patient was febrile, tachycardic, hypotensive, tachypneic, and hypoxic. On examination, the patient appeared cachectic, with a right neck mass and diffuse abdominal pain. Laboratory evaluation revealed microcytic anemia, lymphopenia, lactic acidosis, elevated LFTs, elevated INR, AKI, and multiple electrolyte abnormalities. CT imaging of the neck, chest, abdomen, and pelvis showed extensive lymphadenopathy, with large necrotizing cervical lymph node measuring 6×3 cm. Innumerable small nodules in the lungs with the largest measuring 0.9×0.6 cm. In the abdomen, multiple lesions were present along the mesentery and retroperitoneum with largest measuring 4.1×2.7 cm. Empiric treatment with intravenous (IV) fluids and IV antibiotics were initiated. The lung findings raised concern for miliary TB and scrofula, which prompted further workup of the immunocompromised state and lymph node biopsy. HIV testing was positive with a CD4 count of 22. The pathology report revealed acid-fast bacilli, which later confirmed MTB. The RIPE regimen was initiated in conjunction with corticosteroids for 10 days before starting antiretroviral therapy.

Discussion: Although the MTB incidence is low in the United States, the number of cases vary significantly by states, with Florida reporting the fourth highest cases in year 2022. Extrapulmonary presentation of TB is often missed due to nonspecific symptoms. While our patient's CT chest findings reports were not classic imaging of TB, the addition of the neck mass and history of recent travel to an endemic country prompted further evaluation. This influenced our medical management, including early isolation precaution, delaying antiretroviral therapy due to concern for immune reconstitution inflammatory syndrome, and pending biopsy results for MTB. It is also important to note that rapid extrapulmonary PCR testing can be performed but is not FDA approved and cultures can take 1 month for results.

Mycobacterium abscessus infection in an HIV patient with chronic lung disease

Cynthia Espinosa, D.O., Laura Mendez Morente, M.D., Adolfo Alvarez, D.O., Daniel Acosta, D.O., Jason Kovacevic, M.D.

Introduction: *Mycobacterium abscessus,* a prevalent drug-resistant and rapidly growing mycobacteria (RGM), presents considerable diagnostic challenges for

medical practitioners. Notably, among its subspecies, *Mycobacterium abscessus* subsp. massiliense (Mycma) is more frequently observed in patients with chronic obstructive lung disease (COPD) but remains relatively infrequent in immunocompetent individuals. This case report underscores the multifaceted complexities involved in identifying RGM Mycma in an active smoker with documented well-controlled HIV.

Case Presentation: A 69-year-old male with a history of COPD and well-controlled HIV (CD4 540, 3 months prior), presented with a two-month history of dyspnea on exertion (DOE). Initially prescribed a short steroid course with bronchodilators with moderate symptom relief. A 6-minute walk test revealed adequate exercise capacity; however, pulmonary function tests revealed a newly diminished DLCO of 44%. Computed tomography of the chest demonstrated emphysema, sub-pleural reticulations with interstitial thickening, prompting suspicions of combined pulmonary fibrosis and emphysema. During the ensuing 8 months missed appointments, symptoms persisted, prompting several hospital visits requiring oral corticosteroids. A subsequent bronchoscopy with bronchoalveolar lavage yielded an elevated cell count with 70% lymphocytes, >50% monocytes, and reactive pneumocytes with pigment-laden macrophages. While initial cytology yielded negative results, on day 7 of Mycma was isolated from BAL specimens. The patient was hospitalized and found to have severe pancytopenia with a CD4 count of 50.

Discussion: The risk of RGM infections in HIV-positive individuals is believed to correlate with the degree of immunosuppression, underscoring the importance of verifying CD4 counts in such patients. This case depicts the diagnostic challenges posed by Mycma lung infections, particularly among patients with chronic lung diseases and compromised immune systems. The observed delay in obtaining a definitive diagnosis underscores the limitations of the current RGM diagnostic schema. Hence, collective efforts are required to refine this diagnostic framework and improve patient outcomes.

An unlikely case of cavitary lung lesion in immunocompetent patient: Psuedomonal cavitary lesion in a patient with new onset hemoptysis

David Pendlebury, M.D., Colton Hawco, M.D., Lewjain Sakr, M.D.

Introduction: Cavitary lung lesions are generally associated with malignancy, infectious etiology, or inflammatory disorders. Within the differential of cavitary lesions lies infectious etiology. We will discuss a case of an immunocompetent patient with cavitary lung lesion due to pseudomonas.

Case Presentation: An 85-year-old female presented with 1-day history of hemoptysis. No history of lung disease, never smoked, 30 lb unintentional weight loss. Vital signs stable. Initial lab studies significant for WBC 17. A chest x-ray showed a large right-sided cavitary lesion in the right lower lobe (RLL), subsequent CT scan showed a large 8.3 × 8.1 cm cavitary mass within the RLL along with mediastinal lymphadenopathy, new compared with previous imaging 2 months prior. Started on empiric vancomycin and zosyn for concern for infection. CT imaging also showed chronic RLL pulmonary embolism. Pulmonary consulted for bronchoscopy. Gram stain and culture growing pseudomonas, pathology negative for malignancy, AFB negative, QuantiFERON gold screen negative, respiratory viral panel negative. Infectious disease consulted; patient discharged with a 3-week course of zosyn. A repeated CT chest 1 month later showed decrease in size of the lung lesion.

Discussion: *Pseudomonas* is a common gram-negative rod, risk factors for infection more prevalent in immunocompromised patients. Pathophysiology of pseudomonal cavitary lesion thought to be due to parenchymal necrosis, driven by the inflammatory response. This case highlights the importance of diagnostic imaging and bronchoscopy in cavitary lesion management.

Conclusion: Pseudomonas has been found to be a cause of cavitary lung lesions. Literature shows psuedomonal cavitary lesions to be more common in immunocompromised individuals. It is important to rule out common causes of cavitary lesions. When working up cavitary lesions, bacterial infections should be considered, specifically pseudomonas, regardless of immune status.

Rarely encountered and highly fatal: A case of *Mycobacterium xenopi* with resulting hemoptysis

Hadeer Sinawe, M.D., Seema Qayum, M.D.

Introduction: *Mycobacterium xenopi* is a non-tubercular mycobacterium (NTM) that is rarely encountered and carries a high mortality rate. We present a case of *M. xenopi* NTM complicated by low-volume hemoptysis after treatment intolerance.

Description: A 52-year-old M with PMH of GERD and tobacco use who presented to our clinic for cavitary lung lesions found during evaluation of a lung nodule. History includes unintentional 15 lb weight loss and dyspnea. CT chest revealed 2.2 × 2.0 cm LUL cavitation, 2.0 × 1.7 cm superior segment RLL peripheral nodule with consolidation, and scattered solid/cystic lesions. AFB stain and mycobacterium PCR were negative for tuberculosis. Bronchoscopy showed evidence of mycobacterial disease; fungal cultures were negative. RLL biopsy culture and 16 s sequencing were positive for *M. xenopi*. The patient was initiated on standard therapy but discontinued treatment due to medication intolerance. The patient subsequently developed low-volume hemoptysis.

Discussion: *M. xenopi* is a slow-growing scotochromogenic species of *Mycobacterium* first isolated on the African clawed frog in 1959, and first thought to be pathogenic in 1965. *M. xenopi* accounts for ~0.3% of all clinical mycobacterial isolates and has been cultured in water taps, hospital water reservoirs, and other environmental sources. Symptomatology mirrors that of *M. kansasii*. Although 500 cases have been reported, only 70 cases have demonstrated true disease with some estimates showing a 69.1% mortality rate. The optimal treatment regimen includes a prolonged course of clarithromycin/azithromycin, ethambutol, and rifampin. Furthermore, this case is rare due to its low pathogenicity in patients who are immunocompetent without a history of concomitant pulmonary disease, as seen in this patient.

Discussion: *M. xenopi* is a rarely reported cause of NTM disorders, indistinguishable clinically from *M. kansasii*, with high mortality rates despite treatment. Prompt identification is crucial for earlier intervention, treatment, and surveillance for improved clinical outcomes.

Breathless mystery unveiled: Vanishing lung syndrome in an HIV-positive patient

Jose Carlos Fernandez, M.D., Shivaan Oomrigar, M.D., Elvis Caraballo, M.D., Cristoffer Rivera, M.D., Daniel Zapata, M.D.

This is the case of a 51-year-old man with advanced human immunodeficiency virus (HIV) infection who developed vanishing lung syndrome (VLS). The patient's medical history revealed non-compliance with antiretroviral therapy, leading to a severely compromised immune system. He presented with generalized weakness and respiratory distress. Labs were remarkable for CD4 cell count of 0.01, CD8 of 68, and HIV viral load of 127,000. Imaging revealed diffuse emphysematous changes with giant bullous formation, and bronchoscopy confirmed the presence of *Candida albicans*. The patient's condition rapidly deteriorated, requiring intubation for respiratory support and chest tube placement after one of the giant bulla spontaneously burst. As a result, the patient suffered anoxic brain injury. Despite aggressive management, his condition worsened until he expired. This case highlights the importance of early diagnosis, prompt intervention, and adherence to antiretroviral therapy in HIV-infected individuals. The patient's prolonged non-adherence to antiretroviral therapy, and compromised immune system played a crucial role in the progression of his illness. Opportunistic infections, such as *Candida albicans*, further complicated his condition, resulting in respiratory distress. The development of vanishing lung syndrome, associated with respiratory complications and neurologic sequelae, underscores the need for comprehensive management strategies and close monitoring in HIV-infected individuals. Clinicians should remain vigilant in recognizing and managing complications in HIV-infected patients to optimize outcomes. Timely diagnosis, antiretroviral therapy initiation, and treatment adherence are critical in preventing the progression of HIV infection and reducing the risk of developing severe complications, like VLS. This case serves as a reminder of the devastating consequences of advanced HIV infection and the importance of a multidisciplinary approach involving infectious disease specialists, pulmonologists, and neurologists to provide comprehensive care for these patients. Future research should focus on improving patient education and developing strategies to enhance medication adherence in HIV-infected individuals, ultimately improving their long-term prognosis.

Unilateral ventilator induced lung injury

Kaila Schultz, M.D., Ali Hani Al-Tarbsheh, M.D., Nydia Martinez, M.D.

Introduction: Ventilator-induced lung injury (VILI) is an acute lung injury caused by positive pressure from mechanical ventilation. Such damage might resemble tissue injury in acute respiratory distress syndrome (ARDS) and is associated with increased mortality. High-end inspiratory lung volume is the primary mechanism causing ventilator-induced lung injury, which affects both lungs in most cases. Unilateral or single ventilator-induced lung injury has not been extensively described. We report a case of ventilator-induced lung injury in a contralateral uninjured lung, despite a lung-protective ventilation strategy.

Case Description: A 75-year-old male presents for a robotic-assisted transbronchial biopsy of a recently diagnosed right hilar mass. Upon patient arrival at the outpatient bronchoscopy suite, the patient had mild-to-moderate volume hemoptysis. The procedure was postponed due to ongoing hemoptysis, and he was admitted to the intensive care unit for airway monitoring. Physical exam and laboratory test results were unremarkable, besides diminished breath sounds on his right side. In the medical ICU, his hemoptysis progressively worsened. Elective intubation, followed by diagnostic bronchoscopy, revealed blood filling the right main bronchus up to the level of the main carina. The left lung survey was unremarkable. Under direct visualization, a 9-French endobronchial blocker was inserted into the right main bronchus. Interventional radiology performed urgent embolization of his right bronchial artery. Hemostasis of his right hilar mass was achieved. For the next 48 hours, lung-protective ventilation continued without complication. The patient was extubated to nasal cannula but remained hypoxemic. An investigative CT of the chest revealed new ground-glass opacities throughout his left lung. His previously injured right lung was unremarkable. Ventilator-induced lung injury to the contralateral left lung occurred. Steroids and diuretics were started, and he was ultimately discharged home with oxygen supplementation.

Discussion: Different ventilator-induced lung injury (VILI) types have been described, with baro and volume trauma being the most common. The increased need for mechanical ventilation during the COVID-19 pandemic highlighted different strategies to prevent and manage VILI, which may exacerbate preexisting lung injuries or induce injury in a healthy lung. Clinical management centers on ventilatory mechanics of lung-protective ventilation and optimizing positive end-expiratory pressure to prevent repetitive alveoli damage. Adjunct measures, such as prone positioning and ECMO, are typically reserved for cases of severe ARDS. The role of corticosteroids in attenuating VILI-associated inflammatory response remains controversial. Radiological similarities to common lung pathologies may delay diagnosis. Early identification and management of VILI is critical, with high clinical suspicion of VILI is paramount.

Altered mental status due to cerebral malaria

Monica Cabrera, D.O., Adolfo Alvarez, D.O., Seth Gottlieb, M.D.

Introduction: Malaria is one of the most prevalent parasitic infections worldwide. Clinical manifestations include cyclical fever and flu-like illness. Cerebral malaria is a potential severe complication in patients with *Plasmodium falciparum*. The CDC describes cerebral malaria as severe malaria causing neurologic deficits, including abnormal behavior, impairment of consciousness, seizures, coma, or other neurologic abnormalities. We present a case of a young woman with cerebral malaria.

Case Presentation: A 35-year-old female visiting the United States from Equatorial Guinea, presented to the hospital due to altered mental status, preceded by 5 days of headache, fatigue, nausea, vomiting, and cyclical fevers occurring every 48 hours. On arrival to the hospital, the patient was lethargic and unable to respond to questions. She was febrile with a temperature of 104.4°F, hypotensive, tachycardic, and tachypneic. Laboratory findings were significant for pancytopenia with evidence of hemolysis. A blood smear showed evidence of gametocytes and intra-erythrocyte inclusions consistent with *Plasmodium falciparum* infection with 3–6% parasitemia. A CT scan of the head was unremarkable. The patient was admitted to the intensive care unit and was initiated on intravenous (IV) clindamycin and oral atovaquone, and later transitioned to IV artesunate. The patient exhibited a favorable response to treatment with resolution of symptoms, improvement in blood counts, and a reduction in parasitemia to less than 2%. The patient was ultimately discharged in good condition on oral quinidine and clindamycin therapy.

Discussion: Cerebral malaria is a potentially fatal complication of malarial infection. The clinical manifestations may include altered mental status or behavior. It can be difficult to diagnose as there are no specific clinical manifestations that differentiate it from other causes of altered mental status.

Conclusion: Physicians should be cognizant of the neurologic manifestations of cerebral malaria and consider it as a potential etiology for altered mental status in patients who are from or recently visited a malaria endemic region.

A rare case demonstrating the development of acute bilateral pulmonary emboli shortly after the diagnosis of chronic pulmonary aspergillosis

Peter Harrill, M.D., Mariel Duchow, M.D., Levy Amar, M.D., Armando Rodriguez Lopez, M.D.

Background: Although there have been case reports and discussions regarding *in situ* pulmonary artery thrombosis (PAT) in the setting of invasive pulmonary aspergillosis (IPA), there has been less discussion on the risks of pulmonary embolism (PE) with chronic pulmonary aspergillosis (CPA).

Case: A 59-year-old male with history of hypertension and chronic obstructive pulmonary disease who recently had been diagnosed with chronic cavitary pulmonary aspergillosis after the identification of a cavitating lesion in his left upper lobe on computed tomography (CT). A subsequent bronchoscopy and bronchoalveolar lavage revealed 4/4 samples growing fungal elements that were consistent with aspergillosis. Blood and sputum cultures remained negative. He was discharged on voriconazole. Approximately two weeks later, he presented to the emergency department (ED) with acute onset of dyspnea. A CT scan with contrast remonstrated the cavitary lesion in addition to pulmonary emboli in the proximal branches of the left upper and lower lobe pulmonary arteries as well as the right lower lobe pulmonary artery. The patient was admitted, and an intravenous heparin infusion was initiated. As part of the thromboembolic workup, a transthoracic echocardiogram as well as bilateral lower extremity doppler ultrasounds were ordered and were unremarkable. He rapidly improved clinically and was transitioned to oral apixaban before discharge; however, the patient ended up stopping that therapy on his own after one month. He was able to continue his voriconazole. A CTA performed over six months later confirmed resolution of the previously identified pulmonary emboli.

Discussion/Conclusion: There is limited evidence available currently to establish firm guidelines for anticoagulation strategies in individuals diagnosed with acute PEs who have underlying CPA. Further research is recommended to establish stronger guidelines for these clinical scenarios, as most of the focus thus far has been centered on In-Situ PATs in IPA.

Unlikely friends: Coinfection of a malignant cavitary lesion with *Aspergillus* and *Actinomyces*

Ross Huff, D.O., Arunima Jose, M.D., Abraham Bell, D.O., Jordan Taillon, M.D.

Introduction: Pulmonary aspergillosis is a rare fungal infection most frequently seen in immunosuppression or severe structural lung disease. Actinomyces is a slow-growing anaerobic bacterium that classically causes maxillofacial infections and is often seen in immunocompromised individuals. In rarer instances, it causes pulmonary infections with a similar presentation to fungal infections. Co-infection of the two is almost unheard of and likely occurs only in unique situations where the perfect environment is available for them to communally thrive.

Case Report: A 58-year-old male with a medical history of stage IIIa right upper lobe non-small cell lung cancer undergoing chemotherapy and radiation therapy, chronic obstructive lung disease, and active nicotine dependence was evaluated in the pulmonary office for worsening shortness of breath and fatigue. A recent CT of the chest redemonstrated his right upper lobe malignancy with new findings of a cavitary lung lesion extending off the mass. He was referred for bronchoscopy with transbronchial biopsy to evaluate for additional pathology, which revealed co-infection with *Aspergillus niger* and *Actinomyces odontolyticus*. He was initiated on voriconazole and ampicillin-sulbactam and evaluated by thoracic surgery for potential lobe resection. Medical management was opted for over surgical due to his ongoing infectious process and recent chemoradiation. However, the patient continued to deteriorate despite medical management, leading to hospitalization where sputum cultures additionally grew *Klebsiella* and *Pseudomonas stutzeri*. The patient was eventually transferred to a tertiary center for right upper lobectomy with amphotericin pleural instillation, resulting in postoperative improvement and reinitiation of his immunotherapy.

Discussion: Pulmonary malignancies place patients at an increased risk for many uncommon infections that typically require prompt identification and treatment. It can often be hard to distinguish between the progression of malignancy versus infectious process and routine labs are often non-diagnostic. This case highlights the role of early bronchoscopy with lavage and biopsy in rapid diagnosis leading to earlier treatment.

Alveoli in the red zone: Fentanyl induced diffuse alveolar hemorrhage

Shivaan C. Oomrigar, M.D., Jose Carlos Fernandez, M.D., Eduardo Marino Urbino, M.D., Alfredo Toll, M.D., Ernesto Perez Colome, M.D., Michael Ashley, M.D., Enny Cancio, M.D., Diego Bonilla, M.D.

Introduction: Diffuse alveolar hemorrhage (DAH) is an uncommon, life-threatening condition of opioid intoxication. Common causes include autoimmune conditions and vasculitis; however, it has seldom been described as an adverse effect of fentanyl intoxication.

Case: A 19-year-old female, with a medical history of illicit drug and substance abuse, presented to our institution after a fentanyl overdose. After receiving Narcan,

she endorsed generalized weakness, hemoptysis, and acute dyspnea at rest and on exertion. She was tachycardic, hypoxic, requiring non-rebreather mask, and a pulmonary exam noted bilateral decreased breath sounds and diffuse bibasilar crackles. Initial CXR revealed bilateral interstitial opacities, therefore, she was started on antimicrobial therapy. However, she acutely decompensated with increasing respiratory distress and continued hemoptysis, and was urgently transferred to the ICU. A chest CT was significant for multifocal airspace disease with a centrilobular pattern, extending bilaterally to the periphery, representing acute diffuse alveolar damage. The patient was started on high-dose steroids, nebulizers, and broad antimicrobial coverage, and continued with supplemental oxygenation with interval improvement.

Discussion: The rate of fentanyl abuse is rapidly increasing. Opioid-induced diffuse alveolar hemorrhage is an uncommon adverse effect of acute intoxication that has been sparingly reported in the literature. After extensive literature review, the incidence rate of fentanyl-induced DAH is currently unknown. However, DAH carries an in-hospital mortality rate of 20% to 100% once diagnosed. Mechanistically, fentanyl causes an extreme form of acute lung injury by inducing severe endothelial dysfunction leading to global alveolar hemorrhage, hemoptysis, and non-cardiogenic pulmonary edema. Up to one third of presenting patients do not have hemoptysis. CT findings of nonspecific, mixed consolidation, and ground-glass opacities are typical in the acute DAH phase. Interlobular septal thickening develops in the subacute phase, as macrophages migrate to the pulmonary lymphatics to clear blood products. As these findings are so non-specific (*e.g.*, multifocal pneumonia, pulmonary edema), it is paramount to keep a high level of suspicion for diffuse alveolar hemorrhage with a presentation of hemoptysis, as in our patient.

Rare case of primary adenoid cystic carcinoma of the lung with bilateral kidney and liver metastasis

Talwinder Nagi, M.D., Rannah Dabiri, Yousra Gheit, Touqir Zahra, M.D., Sachin Sule M.D.

Introduction: Adenoid cystic carcinoma (ACC) is a rare epithelial tumor found in the salivary glands. Primary ACC in the lung makes up only 0.04–0.2% of all primary lung tumors. In addition, metastasis of the ACC to the liver and bilateral kidneys is not common frequently documented.

Case Presentation: A 51-year-old male presented due to dyspnea, weight loss, and cough. He was treated with albuterol outpatient for possible asthma. A chest x-ray showed complete opacification of the right hemithorax with mediastinal shift to the right. CT showed an ill-defined hypoattenuation within the right upper lobe ascending into the right mainstem bronchus measuring 6.1 × 5.3 cm, a lesion in the liver measuring 5.2 × 3.8 cm, and multiple bilateral renal hypodensities. Bronchoscopy with biopsy revealed ACC of the lung, and a liver biopsy confirmed ACC and metastasis. He began radiation followed by four rounds of cyclophosphamide, adriamycin, and cisplatin (CAP) chemotherapy.

Discussion: Metastasis of ACC originating in the lung is rare and has a poor prognosis. Due to the indolent nature of ACC and the lack of effective treatment options, watchful waiting is typically recommended in asymptomatic individuals. Surgical resection is the mainstay of treatment in primary ACC of the lung if the tumor is resectable. Treatment for advanced disease is still under debate. Current chemotherapy includes CAP as well as 5-fluorouracil and cisplatin. Overall effectiveness and tolerability of these regimens is unclear. A phase II clinical trial looking at 22 individuals with advanced salivary gland carcinomas, of whom, 12 had ACC, showed an adjuvant CAP response rate of 27%.

Chronic pulmonary silicone embolism resulting in interstitial lung disease

S. Khan, M.D., M. Gonzalez, M.D., A. Lavina, M.D., J. Rivera, M.D., S. Gillenwater, M.D.

Introduction: Silicone has been used in cosmetic procedures since the early 1960s. Due to its nature as an inert liquid polymer, it is prone to leakage, becoming a chronic stimulus to the immune system. Although rare, pulmonary disease related to silicone has been reported in the past, including immunologic response to silicone as a causative agent of interstitial lung diseases (ILD). We present a case of silicone cosmetic injections causing chronic pulmonary silicone emboli resulting in ILD.

Case Report: A 40-year-old woman never-smoker presented to the emergency department (ED) with cough and progressive dyspnea on exertion. She had multiple admissions for similar symptoms at different hospitals over the past year, treated with steroids and nebulizers but was lost to follow up. Review of systems was otherwise negative. She denied exposure to toxins, animals, or mold. She reported multiple illicit silicone injections to the hips, thighs, and buttocks from the early 1990s to mid 2000s. In the ED, she was tachycardic and hypoxic on room air. Labs were unremarkable. Computed tomography (CT) of the chest was notable for reticulonodular opacities predominantly involving the lung bases without evidence of pulmonary emboli. The patient subsequently underwent a bronchoscopy with transbronchial biopsy. Cytology and fluid analysis were unremarkable. The CD/CD8 ratio was normal. Pathology showed spheroid silicone particles in lung interstitium and small blood vessels with resulting chronic inflammation and fibrosis of lower lung lobes, indicating interstitial lung disease likely due to silicone emboli. She was started on oral steroid therapy with improvement of acute symptoms. She was discharged with referral for possible lung transplantation.

Discussion: Silicone emboli resulting in pulmonary disease is rare but has been described previously in the literature. Interestingly, the majority of these cases are involving illicit silicone injections by non-medical professionals, with patients acutely presenting with fever and respiratory failure within hours following injection. A more recent novel case reported the diagnosis of chronic lung disease many years after placement of silicone breast implants, termed chronic silicone embolism syndrome. Our patient presented similarly with chronic dyspnea on exertion and chest imaging showing reticulonodular opacities. Subsequent biopsy corroborated the diagnosis with evidence of silicone particles in lung interstitium. The patient had no other risk factors for ILD and last injected silicone a decade before the current presentation. Although the pathophysiology is not completely understood, chronic leakage of silicone particles over many years into the pulmonary vasculature is thought to induce histiocyte reactions resulting in chronic inflammation and fibrosis.

Conclusion: A history of silicone augmentation has been linked with the development of ILD. Treatment modalities include supportive management and immune suppressive therapy with steroids and consideration of lung transplantation. Physicians must consider all aspects of relevant social history in evaluation of patients presenting with chronic dyspnea or ILD.