

Hypersensitivity Pneumonitis: A Clinical Case with Rapid Resolution on Imaging

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INTRODUCTION

Hypersensitivity pneumonitis is a rare interstitial disorder characterized by an immune reaction of the lung parenchyma, usually to a sensitized allergen. Pneumonitis is a common cause of respiratory decline among those with comorbid conditions such as chronic obstructive pulmonary disease and congestive heart failure. The use of corticosteroids in patients with pneumonitis is well documented, but their role in the treatment is not clearly understood. The primary objective of this study was to observe and describe clinical improvement of a patient with pneumonitis after a short course of corticosteroids while in the hospital.

CASE PRESENTATION

Patient is a 58-year-old female who presents with a three-day history of progressive shortness of breath, nonproductive cough, dyspnea on exertion, orthopnea, and weight gain. Past medical history includes polymyalgia rheumatica, hypothyroidism, osteoporosis, current hormone replacement therapy, and current smoker with a 70-pack-year smoking history. Family history is significant for lung cancer.

Given the patient's previous history, initial concerns were for COPD exacerbation, congestive heart failure, bronchiectasis, interstitial lung disease, and community-acquired pneumonia. On admission, the patient presented with SpO₂ of 86% on 3 L nasal cannula and subsequently was diagnosed with respiratory failure with hypoxia. Patient was started on 4-5 L nasal cannula. Due to desaturation the patient required adjustment 10 L high flow nasal cannula. Blood gas on admission showed pH 7.418, PCO₂ 37.8, PO₂ 62, bicarb 24. CBC showed leukocytosis. D-dimer 1.68, ESR 90, CRP 20, LDH 960, and BNP of 1456. Blood cultures on admission showed no growth at 120 hours. CXR on admission showed diffuse densities throughout both lungs. CTA pulmonary showed no evidence of acute pulmonary emboli, but ground glass opacities were present. The patient was started on Lasix, IV Solu-Medrol, Cefepime, and Vancomycin.

On day two, the chest x-ray revealed mild improvement of aeration, small effusions with no pneumothorax. Antibiotics were discontinued on day two and steroids were increased on day three. The patient's deteriorating respiratory status improved, with resolution of symptoms within five days. Repeat CXR on day six showed low lung volumes with a mild pulmonary edema pattern. Repeat CTPA conducted on day six showed nearly resolved pneumonia with improving adenopathy. Repeat BNP was 173. The patient was discharged on oral prednisone taper. Since then, the patient has been doing well with outpatient follow up and remains off oxygen.

RESULTS & DISCUSSION

Hypersensitivity pneumonitis (HP), also known as extrinsic allergic alveolitis (EAA), is a syndrome that affects the lung parenchyma as well as the alveolar interstitium. (5) This area becomes inflamed in response to a previously sensitized organic antigen after prolonged exposure. This antigen is usually a naturally occurring material such as mold, bird droppings, chemicals, etc. Depending on the material causing the reaction as well as the length of time of exposure HP may be categorized as acute, subacute, or chronic. However, the lack of widely accepted diagnostic criteria makes it difficult to properly diagnose a patient with HP.

The common symptoms in hypersensitivity pneumonitis include coughing, dyspnea, fever and malaise may also be seen. Classic features on imaging include ground-glass opacities, areas of decreased attenuation and vascularity, and small centrilobular nodules. (3) A common presentation of acute HP is exacerbation of the symptoms when returning to the area of exposure, and an improvement in symptoms once the patient leaves the area of exposure. Chronic HP, in contrast, can develop over months to years, presenting with episodes of wheezing and low-grade fevers. In severe cases, chronic HP can cause anorexia, weight loss, dyspnea, and mucopurulent sputum. As such, it is important to be aware of the signs and symptoms of this disease early in its course, as untreated HP has the potential to lead to overwhelming outcomes.

This case demonstrates the rapid resolution of hypersensitivity pneumonitis in response to steroids. Although hypersensitivity pneumonitis is typically associated with microbial agents, animal proteins and droppings, or chemical exposure, the immune mediated response is often obscured by smoking and can often be missed on presentation. This patient's rapid response and recovery to steroids and lack of response to antibiotics and diuretics quickly narrowed down the differential to exclude congestive heart failure, COPD exacerbation, and pneumonia. While the presence of the ground-glass opacities is a common, nonspecific imaging finding on CT in a variety of pulmonary diseases including cardiogenic pulmonary edema, extra cardiac causes including hypersensitivity like reaction, eosinophilic pneumonias, and atypical infectious processes such as pneumocystis pneumonia the clinical course supports the diagnosis of hypersensitivity pneumonitis.

The gold standard treatment remains antigen avoidance with follow up imaging to evaluate for improvement. Imaging with high-resolution CT scan has been shown to be successful in imaging hypersensitivity pneumonitis. Total avoidance, however, can prove to be quite difficult as the antigen in question may be present in the job or a home. (2) As a result, corticosteroids (typically prednisone) 40mg or 60mg over four weeks are indicated for acute flare ups. Unfortunately, chronic HS unresponsive to corticosteroids can lead to a pulmonary fibrosis, at which time a lung transplant can be considered. (4)

The patient's rapid recovery on steroids for presumed interstitial lung disease related to hypersensitivity reaction from her smoking history presents a unique presentation and approach to treatment. Cigarette smoking can affect the physical examination findings, erythrocyte sedimentation rate, and spirometry, making it difficult to rely on these testing modalities. The entire clinical course with radiological evidence is the most appropriate method of diagnosis (1).

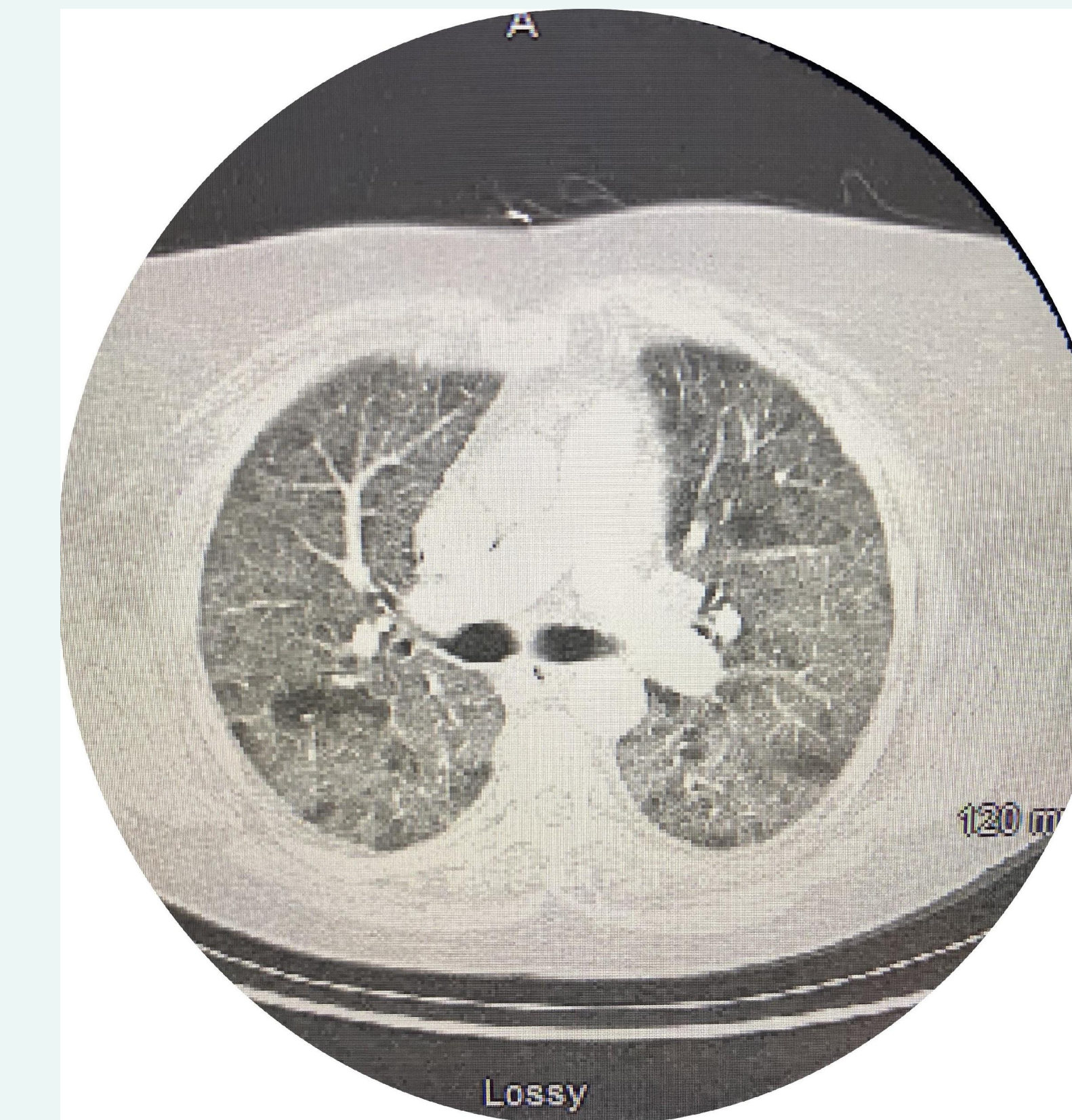


Figure 1

HRCT Day 1 showed patient with ground-glass opacities bilaterally along with centrilobular nodules and air trapping.

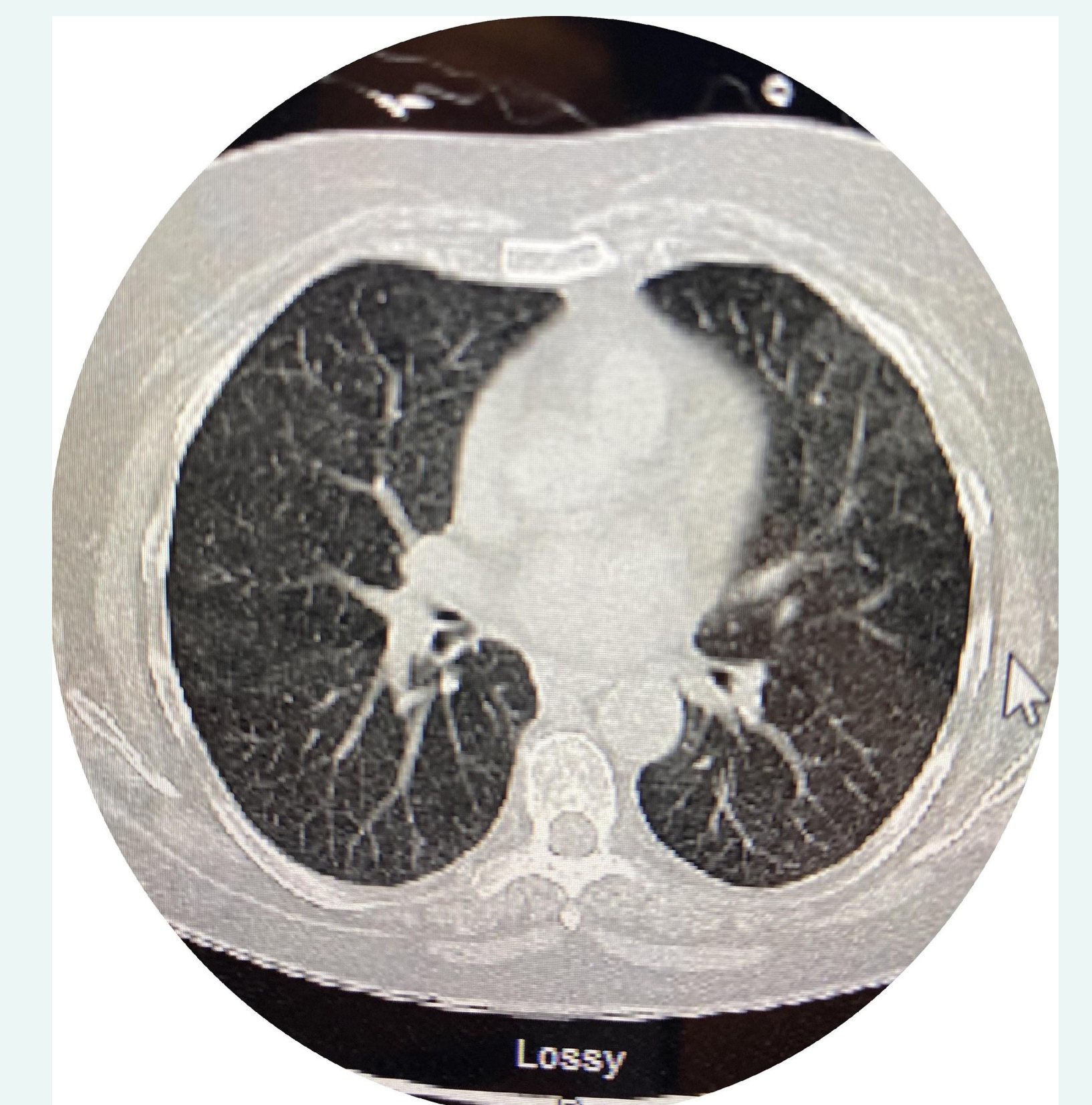


Figure 2

HRCT Day 6 showed essentially resolved HP with improving aeration, low lung volumes, and improved adenopathy.

CONCLUSION

The authors present this case to emphasize the challenging differential diagnosis of hypersensitivity pneumonitis due to the lack of specificity of clinical manifestations and treatment. A multidisciplinary discussion of clinical and radiologic data can play a role in the diagnosis and thus early and effective management of rapid respiratory deterioration. The diagnosis requires attention to exposure history, clinical assessment, and radiographic findings. Clinicians should have a high suspicion for hypersensitivity pneumonitis in chronic smokers.

REFERENCES

- Dangman KH, Storey E, Schenck P, Hodgson MJ. Effects of cigarette smoking on diagnostic tests for work-related hypersensitivity pneumonitis: data from an outbreak of lung disease in metalworkers. *Am J Ind Med.* 2004 May;45(5):455-67. doi: 10.1002/ajim.20001. PMID: 15095428.
- Chandra D, Cherian SV. Hypersensitivity Pneumonitis. [Updated 2021 Jul 15]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK499918/>
- Riario Sforza GG, Marinou A. Hypersensitivity pneumonitis: a complex lung disease. *Clin Mol Allergy.* 2017;15:6. Published 2017 Mar 7. doi:10.1186/s12948-017-0062-7
- Raghu G, Remy et al. Diagnosis of Hypersensitivity Pneumonitis in Adults. An Official ATS/JRS/ALAT Clinical Practice Guideline. *Am J Respir Crit Care Med.* 2020 Aug 1;202(3):e36-e69. doi: 10.1164/rccm.202005-2032ST. Erratum in: *Am J Respir Crit Care Med.* 2021 Jan 1;203(1):150-151. PMID: 32706311; PMCID: PMC7397797.
- Patel AM, Ryu JH, Reed CE. Hypersensitivity pneumonitis: current concepts and future questions. *J Allergy Clin Immunol.* 2001 Nov;108(5):661-70. doi: 10.1067/mai.2001.119570. PMID: 11692086.