Chronic Eosinophilic Pneumonia and Allergic Bronchopulmonary Aspergillosis: Two eosinophilic lung diseases in one patient.

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Agenda

• Index case presentation.

• Eosinophilic Lung Diseases.
  o Chronic eosinophilic pneumonia.
    • Presentation.
    • Diagnostic studies.
    • Imaging.
    • Differential diagnosis.
      o Churg-Strauss Syndrome.
      o Bronchiolitis obliterans organizing pneumonia.
      o Simple pulmonary eosinophilia (Loeffler syndrome).

• Patient additional work-up.

• Allergic bronchopulmonary aspergillosis.

• Case analysis.

• Conclusions.

• References.

• Acknowledgements.
Index patient presentation.
Our patient: History of present illness

- 40 year old female reports for consultation with cough, weight loss, abnormal CXR, and sputum growing AFB.

- She c/o worsening chronic cough; clear sputum, Some DOE. She has sustained an 15 pounds weight loss over the past year. Denies hemoptysis.
Our patient: Review of systems

- Prominent malaise; fatigue; more than 30 pounds weight loss over past several years.
- Denies SOB at rest; no stridor, intermittent wheeze.
- Denies fevers, chills, or sweats.
- Denies chest pain, chest pressure, or palpitations.
- No abdominal pain; no NVD
Our patient: Past medical history

- Abnormal CXR in India 2005: biapical scarring.
- Not clear if previous history of asthma.
- BCG vaccination.
- No medications.
- No Known drug allergies.
- No recent epidemiologic exposures.
Our patient: Physical examination

- General: Cachectic, no acute distress.


- Lungs: diffuse rhonchi; diffuse coarse rales.

- Cardiac, abdominal, neurologic, extremities and skin were within normal limits.
Our patient: Initial Work-up

- WBC was 9.1 with 57 segs, 21 lymphs, and 13.8 eos.
- ESR: 30.
- AFB culture negative one month before consultation.
- Recently Negative PPD
- Of course !!!! CXR.
- HIV, Hept B, Hept C and liver function tests were within normal.
Our patient: Pleural thickening, consoloditation and reticulonodular pattern on Initial PA CXR

- Bilateral zones of pleural thickening and consolidation, predominant in the periphery.

Furthermore a diffuse reticulonodular pattern is present.
Our patient: parenchimal densities Initial CXR lateral

- Diffuse parenchimal densities more accentuated in upper lobes.
What is the differential diagnosis of a patient with history of general and chronic respiratory symptoms, marked peripheral eosinophilia and diffuse findings on CXR?
Eosinophilic Lung Diseases
Eosinophilic Lung Diseases

Unknown etiology
- Acute Eosinophilic pneumonia.
- Chronic Eosinophilic pneumonia.
- Simple pulmonary eosinophilia.
- Idiopathic Hipereosinophilic Syndrome.

Known etiology
- Allergic Bronchopulmonary Aspergillosis.
- Parasitic Infections.
- Drug Reactions.

Vasculitis
- Churg-Strauss Syndrome.
- Allergic Angiitis.
Chronic Eosinophilic Pneumonia (CEP)
CEP: Presentation

- Insidious onset and progressive.
- General manifestations:
  - Asthenia, weight loss, nocturnal sweat or fever could be frequent.
- Pulmonary signs:
  - Dyspnea, cough, wheezing could be present.
- Physical examination: Hypoxemia, tachycardia, rales and wheezes.
- Twice more frequent in women.
- 1/3 previous history of asthma.
CEP: Diagnostic studies

Laboratory findings

- Market peripheral eosinophilia.
- ESR and CRP usually elevated.
- IgE levels elevated in 50% of the cases.
- Bronchoalveolar lavage (BAL): Always high percentage of eosinophils.
- Restrictive pattern or obstructive on lung function tests could be found.
Companion patient #1: Upper lobes consolidation on CXR

Areas of **air space consolidation**. Which are predominant in the upper lobes.

Migratory pulmonary infiltrates, zones of consolidation distributed peripherally.

The peripheral distribution of abnormalities results in the typical finding of “Photographic negative of pulmonary edema.”
Companion patient #4: subpleural consolidation and pleural effusion on Chest CT

Other common findings are subpleural areas of consolidation in both lungs.

Right pleural effusion is also seen, but is observed in less than 10%.

Companion patient #5: ground glass opacities on Chest CT

Bilateral asymmetrical areas of **Ground glass opacities** in peripheral distribution.

C – axial chest CT. Lung window

Differential diagnosis

- Focus on clinical and radiologic findings, and additional work up, the differential diagnosis includes:
  - Churg-Strauss Syndrome (CSS).
  - Bronchiolitis obliterans organizing pneumonia (BOOP).
  - Simple pulmonary eosinophilia (SPE).

All of these diseases have eosinophilia as a remarkable finding.
Churg-Strauss syndrome (CSS)
Churg-Strauss Syndrome:

- Clinically:
  - Extrapulmonary involvement: Neurological, paranasal sinus, cardiac and skin.
  - Previous history of asthma.

- Perinuclear - Anti-neutrophil cytoplasmic antibodies (P-ANCA) is found positive in 48-73% of patients.
CSS: Bilateral opacities and enlarged heart size on CXR

- Bilateral **opacities in both lower lobes** and **enlarged heart size** which was proved to be pericardial effusion on CT.

CSS: consolidation, ground glass opacities, pleural and pericardial effusions on Chest CT

- Characteristics of eosinophilic lung involvement are Lung consolidation in the right lung and Ground glass opacities in the left side.
- Bilateral Pleural effusions and pericardial effusion. Subsequent to cardiomyopathy.

Mason: Murray and Nadel's Textbook of Respiratory Medicine, 5th ed.
CSS: Multiple centrilobular nodules, bronchial wall thickening and ground glass opacities on Chest CT

Other common findings are [multiple centrilobular nodules, bronchial wall thickening]. Also some areas of diffuse ground glass opacities are present.

C – axial chest CT. Lung window

Bronchiolitis obliterans organizing pneumonia (BOOP)
BOOP: Presentation and laboratory

- Histological diagnosis of organizing pneumonia of unknown etiology.

- Clinical:
  - Short history of cough, dyspnea, fever, malaise and weight loss.

- Excellent response to corticosteroid treatment, but relapses are common.
BOOP: Relapsing consolidations

Adam. Grainger & Allison's Diagnostic Radiology A Textbook of Medical Imaging. 5th edition

**Multifocal consolidation in upper and mid zones**, the relapse is present after stopping the treatment, a suggestive characteristic of this condition.
**BOOP: consolidation and ground glass opacities on Chest CT**

- **areas of consolidation** in both upper lobes, with associated **ground-glass opacification**.

C – axial chest CT. Lung window
BOOP: consolidation and ground glass opacities affecting both lungs.

- These consolidations and ground-glass opacification. Could be present in all lobes.

C – axial chest CT. Lung window

Adam. Grainger & Allison's Diagnostic Radiology A Textbook of Medical Imaging. 5th edition
Simple pulmonary eosinophilia (Loeffler Syndrome)
Simple pulmonary eosinophilia: Presentation

• It is due to the passage of some parasites, especially nematodes, through the lung.

• Could be asymptomatic or just general symptoms.

• The most common causes are: Ascaris lumbricoides, Strongiloides stercoralis and Toxocara canis.
Simple pulmonary eosinophilia: Migratory opacities.

- Migratory opacities with peripheral distribution.

Sharma Girish. Loeffler syndrome. Medscape reference
Simple pulmonary eosinophilia: Ground glass opacities on chest CT

- Mixed bilateral areas of consolidation and ground glass opacities. Usually these changes resolve spontaneously within one month.

SPE: Other findings on CT

- This lesion could be a common finding in patient with Loeffler syndrome, and can be concerning about malignancy, however in this case it disappear completely at follow-up.

Going back to our patient: Additional work-up
Our patient: Hospital admission

Our patient was admitted to the hospital for in-patient work-up, where she underwent:


• ABG: Hypoxemia.

• Bronchoscopy: Negative for anatomic abnormality.

• Parasites serology: Negative.
Our patient: Diagnostic tests

- Lung biopsy: fibrosis and scarring, increased number of eosinophiles. Involves bronchial walls, changes suggestive of pulmonary hypertension.

- P-ANCA: Negatives.

- Control CBC showed WBC: 10,000 with 19% eosinophils(2000). ESR: 71
Our patient: more diagnostic tests

- Total IgE: 4916.
- Allergens skin testing: Panelevation of enviromental allergens, including Aspergillus.
- Spirometry: Severe restrictive pattern.
Our patient: fibrosis and ground glass opacities on Chest CT

Areas of fibrosis in both upper lobes with subpleural distributions.
Bilateral Ground glass opacities

C – axial chest CT. Lung window
Our patient: fibrosis and loss of volume on chest CT

- **Bilateral peripheral fibrosis**, along with signs of right upper lobe loss of volume.

C – coronal chest CT. Lung window

PACS, BIDMC
Our patient: bronchiectasis, mucus impactation and centrilobular nodules on chest CT

- **Bilateral bronchiectasis radiating from perihilar areas.**
- **Zone of mucus impactation, within bronchiectasis.**
- **Centrilobular nodules.**

C – axial chest CT. Lung window

PACS, BIDMC
Allergic Bronchopulmonary Aspergillosis

A new diagnosis to take into account in our patient.
Patient with previous history of asthma.

There are essential findings for the diagnosis:
- Skin test reactivity to Aspergillus sp.
- Total IgE level more than 1000 U/L.
- IgE or IgG against Aspergillus sp. in the blood.
- Peripheral blood eosinophilia.

Symptoms are general and there are no specific clinical findings other than these of asthma.
Companion patient #6: opacities and dilated bronchi on CXR

- **Opacities in both upper lung zones** and round opacity in left lower lung zone. Also **dilated bronchi in right side** are present.

Companion patient #7: Mucus plugging and bronchiectasis on Chest CT

Bilateral zones of mucous plugging.

C – axial chest CT. Lung window

Tubular and cystic bronchiectasis
These findings are almost pathognomonic of Allergic Bronchopulmonary Aspergillosis in patients with previous history of asthma, elevated eosinophil count and high serum IgE.
Patient analysis
The diagnosis of Chronic eosinophilic pneumonia and Allergic Bronchopulmonary Aspergillosis was made based on the following:

- **Clinical findings:**
  - Long history of respiratory and general symptoms.
  - Non clear PMH positive for asthma.

- **Laboratory:**
  - Peripheral eosinophilia greater than 1.000 /uL.
  - Persistent elevated ESR.
  - IgE level higher than 1.000 U/L.
  - Severe restrictive pattern on lung function test.
  - BAL and biopsy: Market eosinophilia and inflammatory changes.
  - Exclusion of other possible causes: Infection, vasculitis.
Summary of imaging findings

- **Chest X-ray:**
  - Parenchimal densities more accentuated in upper lobes.
  - Generalized linear opacities.
  - Peripheral pleural thickening.

- **Chest CT:**
  - Areas of peripheral fibrosis and bilateral ground glass opacities predominant in upper lobes.
  - Bilateral bronchiectasis and mucous impactation.
  - Centrilobular nodules.
After the diagnosis was made, the therapy was optimized and patient has been doing well with symptoms last years; however his findings on pulmonary imaging have not improved much, because the patient is in the fibrotic phase of the disease, which is irreversible.
Conclusions
Conclusions

• There are a big number of conditions that can cause peripheral eosinophilia along with pulmonary symptoms, in these cases extended work-up will be necessary in order to make a right diagnosis and provide correct treatment.

• Different modalities of imaging, such as chest X-ray and CT, play an important role in the diagnosis of these diseases.

• The approach bases on radiologic and clinical findings usually is enough and invasive procedures, as biopsies could be avoided.
References

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