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Diagnostic Approach To Eosinophilic Lung Disease In A Young Male Patient

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Abstract:
Eosinophilic lung diseases are a varied group of disorders that, apart from the presence of eosinophils, often have little in common clinically. Chronic eosinophilic pneumonia (CEP) is thought to represent 1-3% of interstitial lung diseases and is characterized by significant eosinophilia in both tissue and peripheral blood. We present the case of a 21-year-old patient, non-smoking and with no history of atopy. He came in with progressively worsening, insidious respiratory symptoms, reporting cough and dyspnea. The diagnosis of chronic eosinophilic pneumonia was considered based on characteristic imaging, blood eosinophilia and broncho alveolar lavage (BAL) results. The progress under corticosteroid therapy was favorable. After just one week, the patient reported clinical improvement, normalization of blood eosinophil levels, and radiological clearance.

Key Word: *Hyper eosinophilia, idiopathic chronic eosinophilic pneumonia, diffuse infiltrative lung disease*

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I. Introduction:

Eosinophilic lung diseases are a varied group of disorders that, apart from the presence of eosinophils, often have little in common clinically. They are characterized by pulmonary opacities accompanied by tissue or peripheral eosinophilia. Some of these conditions can be severe, leading to significant hypoxia and respiratory failure. Eosinophilic pneumonias can have an undetermined cause like idiopathic chronic eosinophilic pneumonia or an identifiable cause: infectious origin (parasitic or fungal), toxic, or drug-induced.

Idiopathic eosinophilic pneumonias are rare conditions that can manifest in either acute or chronic forms. Chronic eosinophilic pneumonia (CEP) is thought to represent 1-3% of interstitial lung diseases and is characterized by significant eosinophilia in both tissue and peripheral blood (1) . CEP typically occurs in patients in their 30s or 40s, though some cases have been reported in children. Women are affected approximately twice as often as men (2)

We present the case of a 21-year-old patient, non-smoking and with no history of atopy. He came in with progressively worsening, insidious respiratory symptoms, reporting cough and dyspnea. The diagnosis of chronic eosinophilic pneumonia was considered based on characteristic imaging, blood eosinophilia and broncho alveolar lavage (BAL) results. The diagnosis was confirmed after conducting a series of biological and radiological tests, which allowed us to rule out other possible conditions. The progress under corticosteroid therapy was favorable. After just one week, the patient reported clinical improvement, normalization of blood eosinophil levels, and radiological clearance.

II. Case Report:

This is a 21-year-old patient with no significant medical history, no smoking history and no toxic habits. He has no history of allergic disease nor medication intake. He presents with a dry cough and chronic dyspnea evolving over 2 months. Clinical examination finds a patient with normal breathing (SpO2 = 98% on room air). Pulmonary auscultation reveals no crackles. The rest of the clinical examination is unremarkable.

A chest X-ray shows bilateral alveolar-interstitial opacities (Figure 1). The chest CT scan reveals bilateral ground-glass opacities, mixed with consolidations with upper zone and peripheral predominance (Figure 2). Sinus CT scan was normal.

The biological workup revealed in the complete blood count (CBC) an elevated eosinophil count of 3050, later controlled at 2500, with lymphocytes = 1700, hemoglobin = 13.5, platelets = 517,000, and prothrombin

time (PT) = 78%. C-reactive protein (CRP) was elevated at 155, while renal and liver function tests were normal. HIV, HBV, and HCV serologies were negative.

Bronchoscopic examination showed a normal endobronchial appearance with no abnormalities. The GenXpert test, cytobacteriological examination, and fungal and parasitological testing of bronchial aspirate were all negative. Bronchoalveolar lavage cytology revealed 45% eosinophils, and histopathological examination of the staged bronchial biopsy showed bronchial mucosa with chronic inflammatory changes, particularly rich in eosinophils.

Further etiological investigations were performed in light of an eosinophilic lung condition. Stool parasitology was negative. Aspergillus serology was negative. Immunological workup (ANCA, ANA, anti-DNA, anti-Jo1, anti-SSA, anti-SSB, anti-Scl70) was negative. Total IgE levels were elevated at 432. Plasma protein electrophoresis showed an inflammatory profile with polyclonal elevation of gammaglobulins. Cardiac enzymes: troponine and CK were within normal. Urine dipstick did show any evidence of proteunurie or hematurie

Plethysmography was normal. Cardiac evaluation was deemed necessary, and cardiac echocardiography revealed a small pericardial effusion in the posterior right ventricle.

The patient was started on corticosteroid therapy. The response to corticosteroids is remarkable after just one week of treatment. The patient reports significant clinical improvement, early radiological clearance is observed on the chest X-ray and a normalization of blood eosinophil levels (figure 1).

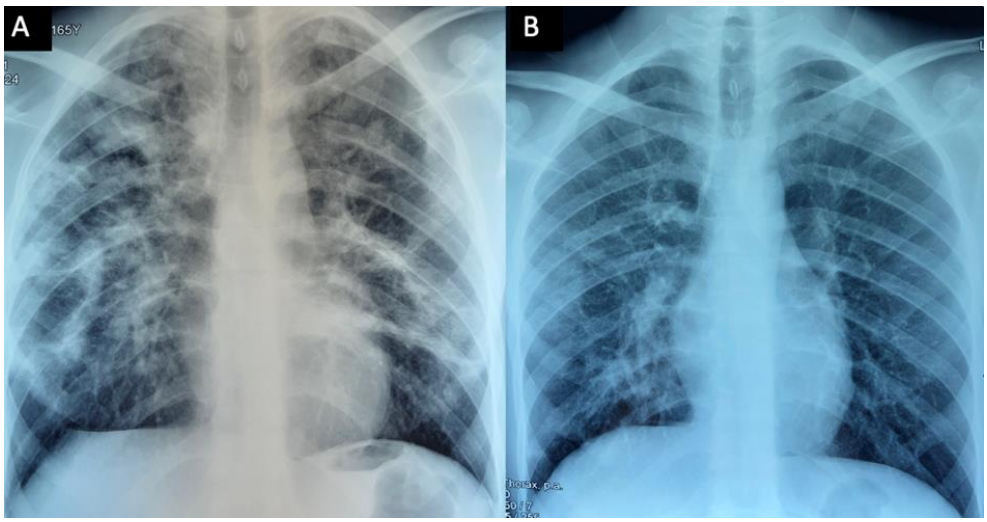

Figure 1: A: chest radiograph shows peripheral infiltrates B: chest radiograph, after one week of corticosteroid therapy, shows radiological clearance

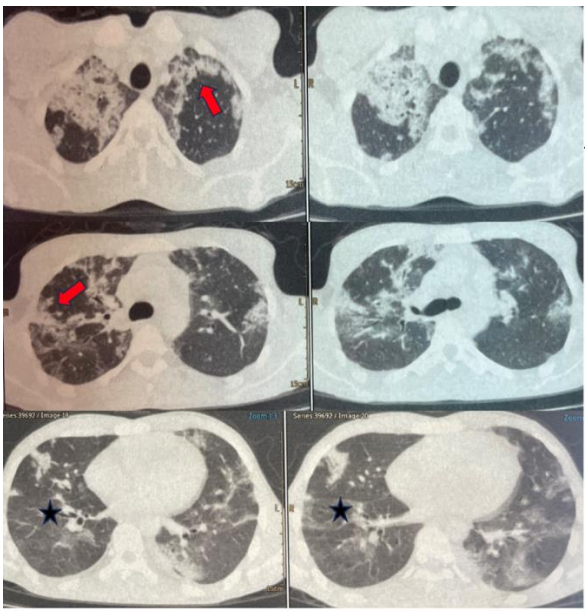

Figure 2: CT scan demonstrates areas of airspace consolidation with peripheral predominance (see arrow) and ground glass opacities (see stars)

III. Discussion:

Eosinophilic lung diseases represent a heterogeneous group of disorders characterized by the presence of peripheral blood eosinophilia (defiend as an eosinophilic count. 500X10 9 cells/L), increased eosinophils in BAL fluid (defiend by > 5% of eosinophils in the differential cell count), or eosinophilic infiltration of lung parenchyma demonstrated on lung biopsy specimens (3) Idiopathic chronic eosinophilic pneumonia , one of etiologies of eosinophilic lung disease , is a rare condition representing 0-2.5% of cases in various interstitial lung disease registries. It can occur at any age but is most commonly seen in patients in their 30s to 50s and is extremely rare in children. Women are frequently affected than men. A strong association between CEP and allergic disease has been observed. Between one-third and one-half of the patients have asthma, atopic dermatitis or allergic rhinitis. Smoking is rare among CEP patients, with fewer than 10% being smokers, and more than 60% having never smoked (4)(5).

We present the case of this rare condition diagnosed in our 20-year-old patient. As described in epidemiological data, our patient has no history of allergic disease and is a non-smoker.

Our patient presented with chronic respiratory symptoms that had persisted for 2 months. He mainly reported a dry cough and exertional dyspnea. The most common clinical symptom is shortness of breath, typically moderate it occurs in 60% to 90% of patients. Other symptoms may include cough (90%), rhinitis or sinusitis (20%), and, less frequently, chest pain or hemoptysis (10% or less) (6)

chest radiograph showed bilateral alveolar infiltrates and CT scan finds bilateral ground-glass attenuations accompanied by consolidations predominant in the apices with mediastinal lymph nodes enlargement. Several diagnoses were considered: an acute interstitial lung disease of infectious or cardiac origin, infection in an immunosuppressed context, tuberculosis or organized pneumonia. However, our patient exhibited radiological findings similar to those described in the majority of cases of chronic eosinophilic pneumonia.

Characteristic imaging are peripheral alveolar opacities with indistinct borders, varying in density from ground glass to areas of consolidation with air bronchograms the migration of the opacities is highly suggestive of the diagnosis when present, but it is only observed in one-quarter of cases. This migratory nature of alveolar opacities is also seen in organized pneumonia, particularly in its cryptogenic form, which represents the main differential diagnosis for this presentation. The peripheral predominance of the lesions (appearing as the inverse of pulmonary edema) is seen in only a quarter of patients, but is highly suggestive when present. The opacities mainly affect the upper lobes. Pleural effusion is rare and typically not significant. Mediastinal lymphadenopathy can also be observed on CT scans (7)

The BAL (bronchoalveolar lavage) typically reveals a very high eosinophilia, often exceeding 40% of the cellular elements, which is the highest value observed among the different causes of eosinophilic lung disease (8).

On laboratory findings and unlike acute eosinophilic pneumonia, where peripheral eosinophilia is rare at the onset of the disease, blood eosinophilia is commonly seen along with elevated IgE levels, which are key features of CEP. Additionally, mild elevations in C-reactive protein and white blood cell count are also observed (5)

Chronic eosinophilic pneumonia is a condition that affects only the lungs. To establish this diagnosis, it is necessary to rule out other causes of eosinophilic lung disease. Our patient presented with clinical, radiological, and biological findings supportive of this diagnosis. The patient was not on any medications. We conducted a comprehensive biological assessment that allowed us to exclude parasitic causes through serologies and stool examination, as well as fungal and vascular causes, particularly eosinophilic granulomatosis with Polyangiitis.

Our patient had normal respiratory function with a normal DLCO (diffusing capacity of the lungs for carbon monoxide). In fact, spirometry in patients with chronic eosinophilic pneumonia (CEP) can be normal in up to one-third of cases, but may also reveal either an obstructive or restrictive pattern. Obstruction is more likely in patients with underlying asthma. The diffusing capacity of the lungs for carbon monoxide (DLCO) is reduced in approximately one-quarter of patients (9)

Treatment is based on corticosteroid therapy. A study found that 3 months of corticosteroid treatment is as effective as 6 months of treatment at a dose of 0.5 mg/kg/day. Considering the risks associated with prolonged prednisolone use, a 3-month treatment regimen may be a better option for patients with CEP (10)

The prognosis under corticosteroid therapy is favorable and remarkable, with both clinical and radiological improvement. In the long term, relapses are common when tapering off or stopping corticosteroid therapy.

The response to corticosteroid therapy in our patient was remarkable. After just one week, he reported clinical improvement. The chest X-ray cleared up, and the blood eosinophil levels returned to normal

IV. Conclusion:

The diagnosis of eosinophilic lung disease often depends on clinical imaging features and the demonstration of alveolar eosinophilia. While peripheral blood eosinophilia is a useful marker, it may sometimes

be absent. Eosinophilic lung disease can arise from a diverse range of conditions. Some forms have identifiable causes, such as specific parasitic infections and medications that trigger pulmonary eosinophilia, while others, like acute and chronic eosinophilic pneumonias, are idiopathic with no known underlying cause.

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