La Prensa MedicaArgentina

Research Article

Characteristics of Chronic Pulmonary Aspergillosis: Review of Cases

Luis Trombetta*

Abstract

Chronic pulmonary aspergillosis (CPA) affects individuals with preexisting lung cavities. Diagnosis is established with the evaluation of respiratory signs and symptoms, radiographic characteristics and the results of mycological examinations. The clinical forms of APC can be considered as a continuous spectrum of manifestations that depend on the individual's immune status. In APC a distinction should be made between acute and subacute invasive pulmonary aspergillosis at one end of the spectrum, and simple *Aspergilloma* at the opposite.

Keywords

Chronic pulmonary aspergillosis; Fungal ball; Aspergilloma

Introduction

The APC is a set of clinical signs and alterations present in the chest radiograph, from asymptomatic forms, the incidental finding in a patient with cough and expectoration to severe forms characterized by dyspnea and hemoptysis, of fatal evolution.

It affects individuals with preexisting pulmonary cavities in which the characteristic "fungal ball" grows. Other subcategories of APC include the cavitary, fibrosing and necrotizing forms, which have their own clinical and radiological signs. The diagnosis of APC is based on clinical, radiological, microbiological and serological manifestations.

Material and Methods

A retrospective, descriptive study was carried out, consisting of the review of the medical records of male patients with a diagnosis of APC in Room 20 of the Hospital Francisco J. Muñiz between 01/01/09 and 12/30/14. .

Age, co-morbidity, respiratory symptoms, chest x-ray and CT scan, sputum and mycological examinations, qualitative and quantitative immunodiffusion (ID), counterimmunoelectrophoresis (CIE), HIV serology, and counting T + CD4 lymphocytes in HIV-positive patients.

Results

Eight patients with a diagnosis of PCA, whose average age was 49 years (32-68), were included. All had a history of pulmonary tuberculosis (TB) and three of them were positive serology for HIV. The most frequent symptoms were cough and hemoptysis (62.5%). Fifty percent of the patients had exacerbated COPD, 37.5% had pneumonia and/or cough and only 1 (12.5%) had a fever. In all 8 cases, chest images were available (Table 1).

In the series examined, the direct examination of the sputum of six patients allowed to observe the presence of elements micromorphologically compatible with *aspergillus*. A direct examination of sputum was negative and in another one the presence of Charcot Leyden crystals with positive culture for *A.fumigatus* was observed. Six sputum cultures and three LBA-positive *A. fumigatus* cultures were obtained. Positive results were obtained in 6 patients in serological tests (Table 2). Patients no. 3, 5 and 6 were HIV positive and CD4 + T lymphocyte counts were 162/mm^3 (17%), 149/mm^3 (13%) and 86/mm^3 (7%) respectively.

Discussion

PCA affects immunocompetent or slightly immunocompromised middle-aged individuals, predominantly male [1]. The clinical forms respond to different pathophysiological mechanisms: allergic, colonization and tissue invasion. Colonization causes intracavitary pulmonary *aspergillosis* that affects the tuberculous cavities and other preformed cavities in which the fungal ball or *Aspergilloma* grows, mainly produced by the species A. fumigatus.

This clinical form is manifested by dyspnea and cough with mucopurulent or hemoptotic expectoration. Hemoptysis is frequent and is the most serious complication [1-2]. *Aspergilloma* is a mass of hyphae within a cavity that is usually located at the apex of the lungs in patients with chronic pneumonia. In direct examination of sputum or BAL, branched and spectated hyaline hyphae are observed, and in the culture the development and isolation of aspergillus.ID and CIE identify specific antibodies in most cases [2].

Clinical symptoms, radiological alterations, positive serological results and culture of the fungus in respiratory samples make up the diagnosis of APC [1]. Denning differentiates 3 subcategories of APC: necrotizing, cavitary and fibrosing [1]. The distinctions between these subcategories are not absolute but reflect the dominant clinical and radiological manifestations. In APC a distinction should be made between acute and subacute invasive pulmonary aspergillosis at one end of the spectrum, and simple *Aspergilloma* at the opposite end.

Table 1: Chest X-ray and/or CT.

Patient	Chest x-rays	Chest CT
1	Fractional retraction of right upper lobe with image compatible with fungal ball	not available
2	Pulmonary cavities and fibrosis	Pulmonary cavities and fibrosis
3	not available	Pulmonary cavities and fibrosis
4	Pulmonary cavities and fibrosis	Pulmonary cavities and fibrosis
5	Pulmonary cavities and fibrosis	Pulmonary cavities and fibrosis
6	Pulmonary cavities and fibrosis	Image compatible with fungal ball
7	Pulmonary cavities and fibrosis	Cavities, bronchiectasis, and cystic effusion at left base
8	Pulmonary cavities and fibrosis	not available

***Corresponding author:** Dr. Luis Trombetta, Head of Inpatient Unit, Infectious Hospital Francisco J.Muñiz, GCABA, Assigned Lecturer, Department of Medicine, Infectious Diseases course, Faculty of Medicine, UBA, Tel: 4822 5181; E-mail: lusumar@fibertel.com.ar

Received: September 09, 2017 **Accepted:** September 14, 2017 **Published:** September 20, 2017

Table 2: Direct mycological examinations, cultures and serology.

Patient	Direct sputum	Sputum culture	LBA cultivation	Quantitative ID	Qualitative ID	CIE
1	Hyaline filaments	not available	Negative	negative	negative	1 cathode band
2	Hyaline filaments	*A. fumigatus*	not available	positive	1/8	1 cathode band 3 anodic bands
3	Hyaline filaments	*A. fumigatus*	*A. fumigatus*	positive	1/4	3 cathodic bands 3 anodic bands
4	Hyaline filaments	*A. fumigatus*	*A. fumigatus*	positive	1/8	3 cathodic bands 4 anodic bands
5	Crystals by Charcot Leyden	*A. fumigatus*	not available	not available	not available	not available
6	Hyaline filaments	*A. fumigatus*	*A. fumigatus*	negative	negative	negative
7	Negative	negative	not available	positive	pure serum	1 cathode band
8	Hyaline filaments	*A. fumigatus*	not available	positive	1/8	2 cathodic bands 2 anode bands

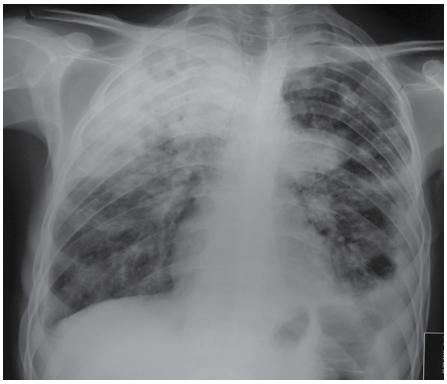

Figure 1: Patient No. 2. Note in the chest X-ray heterogeneous consolidation in the right upper lobe and sequelae of bilateral fibrosis.

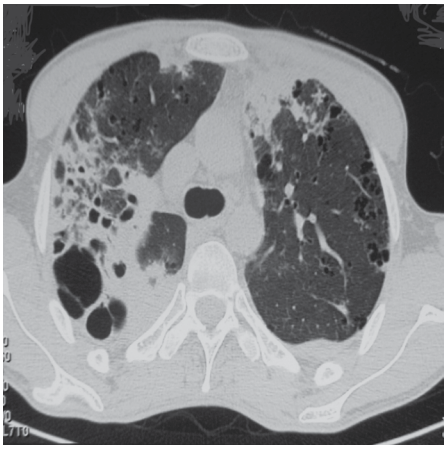

Figure 2: Patient No. 2. Observe in the chest CT multiple pulmonary cavities predominant in the upper right lobe.

The clinical forms of aspergillosis can be considered as a continuous spectrum of manifestations that depend on the immunological state of the individual. Aspergillus produces pathology in function of its capacity of colonization, of tissue invasion in the vascular and bronchial structures and in the generation of immunoallergic processes [3].

Cavitary APC is characterized by the formation and growth of multiple cavities that may contain masses of fungi and affect immunocompetent patients. The cavities are located in the upper lobes and can progress to chronic fibrosing forms. It is usually observed in patients with TB, allergic bronchopulmonary aspergillosis (ABPA), resolved lung cancer, pneumothorax with bulla formation, COPD and cavitary fibrous sarcoidosis. Fibrous APC progresses to extensive fibrosis. Necrotizing APC (chronic or subacute) affects patients with some degree of immune deterioration, such as diabetes, alcoholism, corticosteroid therapy and some patients with AIDS [4]. It produces a slow and progressive infection, which usually appears in a single cavity and thin walls with demonstration of tissue invasion [5] (Figures 1 and 2).

The clinical distinction between a simple *Aspergilloma* and cavitary APC can be difficult. In the necrotizing APC, pulmonary infiltrates are observed in the chest radiographs, mainly in the upper lobes, which can progress to fungal ball cavities and adjacent pleural thickening, unlike what happens in the *Aspergilloma*, where the fungus grows in the interior of an existing cavity [3-6]. At CT, *Aspergilloma* appears as a rounded solid mass that partially occupies the interior of a pulmonary cavity. In the early face the first sign may be the thickening of the wall of the adjacent cavity or pleura. The images in different decubits allow to observe the change of position.

The necrotizing APC presents on the TC multiple nodules in one or both upper lobes that are progressively caved.

The presence of Charcot Leyden crystals is characteristic in ABPA and in aspergillary sinusitis. In all cases the diagnosis must be confirmed with the mycological culture of the respiratory samples.

The immunological diagnosis depends on the antigens used and the clinical form of the disease. The antigens must possess the maximum of antigenic determinants for the Aspergillus species most frequently associated with disease (*A. fumigatus, A. niger, A. flavus and A. terreus*). The sensitivity of ID varies from 50% in allergic bronchopulmonary aspergillosis and 70% in *Aspergilloma*. The diagnosis of APC is uncommon in AIDS and should be considered in patients with severe immunodeficiency [7].

Comments

In the series studied, all patients had a history of pulmonary TB. APC was developed in pre-existing cavities and pulmonary sequelae associated with COPD. Radiographs and CT scans showed images compatible with *Aspergilloma* in two patients, and in the remainder the presence of cavities, bronchiectasis, and fibrosis corresponding to the subcategories of APC. All the data included in the review allowed us to categorize the diagnosis of PCA in its different clinical forms. The presence of Charcot Leyden crystals in sputum, a frequent ABPA, expresses the host's inflammatory eosinophilic response. Diagnosis requires mycological confirmation by culture. In HIV-positive patients negative serology is attributable to immunodeficiency.

The diagnosis of APC is based on a set of clinical signs and symptoms, the characteristics of the alterations found in the images of the thorax, and the mycological and serological diagnosis. The different clinical forms of APC, from *Aspergilloma* to cavitary, fibrosing and necrotizing subcategories, as well as the temporal course of the disease, depend on various factors that interact in the host and include the capacity of the immune response. The evaluation and interpretation of all the elements constitutes the basis of the diagnosis.

References

1. Denning DW, Riniotis K, Dobrashian R, Sambatakou H (2003) Chronic cavitary and fibrosing pulmonary and pleural Aspergillosis: case series, proposed nomenclature change, and review Clinical Infectious Diseases 37: S265-80.
2. Bava A (2002) Introduction to medical mycology. Biochemical Clinical Record Latin American. Supplement 4: 179-186.
3. Oxilia HG, Oxilia RG, Morales L, Falco Fo(2008) Aspergillosis: a pathology to consider. Rev. argent. radio. [On-line] 72: 55-60.
4. Fortun J, Meije Y, Fresco G, Moreno S (2012) Aspergillosis. Clinical forms and treatment. Enfermedades infecciosas y microbiologia clinica. 30: 201-208.
5. Douglas M, Bennett (2012) Infectious Diseases, Principles and Practice. Elsevier, USA.
6. Sánchez CD, Viña AL (2004) Pulmonary aspergillosis. Archivos de Bronconeumología 40: 114-22.
7. Afione C, Della Sala A, Frank L (2008) Pulmonary manifestations in patients with AIDS. RAR 72: 93-105.

Author Affiliations Top

Head of Inpatient Unit, Infectious Hospital Francisco J. Muñiz, GCABA, Assigned Lecturer, Department of Medicine and Infectious Diseases course, Faculty of Medicine, UBA