Clinical Characteristics and Treatment of Acute Fibrinous and Organizing Pneumonia: Two Case Reports and Literature Review

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Abstract

Background

Acute fibrinous and organizing pneumonia (AFOP) is a rare histologic interstitial pneumonia pattern characterized by the intra-alveolar fibrin deposition and organizing pneumonia. Though a small amount of cases has been reported, its causes and clinical characteristics are still not well known and there is no standard treatment yet.

Case presentation

We report two cases with a histological diagnosis of AFOP. Case 1 was idiopathic AFOP and presented with fever, dyspnea, cough, while the case 2 was associated with SLE and fever was her most common symptom. Their chest CT scan revealed bilateral multiple consolidations, predominantly in the lower lobes. Both cases were diagnosed after a second lung biopsy and treated with corticosteroids.

Conclusions

We not only describe two rare AFOP cases but also demonstrate the most comprehensive review to date in AFOP, including 150 patients since 2002. Most common symptoms include dyspnea, cough, and fever. Consolidation was the most common imaging pattern, followed by GGO and nodules. Given the various etiology and nonspecific clinical presentation, AFOP probably had been under diagnosed. Early identification is very important for AFOP management and a lung biopsy is required for a definitive diagnosis. Corticosteroids was recommended to be the most useful therapy, and treatment options should depend on the etiology and disease severity.

Introduction

Acute fibrinous and organizing pneumonia (AFOP) is a rare histologic interstitial pneumonia pattern characterized by the intra-alveolar fibrin deposition and organizing pneumonia. Since the first description of the disease in 2002 by Beasley[1], a small amount of cases has been reported, but its causes and clinical features are still not well known. Moreover, there is no standard treatment yet. Clinical outcomes also vary due to its diversity, but most cases have been associated with poor prognosis.

Here we present the whole clinical course in two cases with a histological diagnosis of AFOP at a tertiary hospital in China. Furthermore, we described the most comprehensive literate review of the AFOP to identify the clinical characteristics and management, in order to provide clinicians with better understanding of this disease.

Case Presentation

Case 1
On initial physical examination she had anemic appearance and moist rales could be heard on both lungs. Laboratory data showed normal white blood cell count with decreased hemoglobin count (75 g/L), while platelet was slightly elevated (315 ×10^9/L). Serum CRP and ESR were both elevated. Serum PCT, 1-3-β-D Glucan and Galactomannan measurement, T-SPOT and the purified protein derivative test were normal. Blood and sputum cultures were negative as well as influenza A and B, pneumococcal antigen, and *Mycoplasma pneumoniae* IgG and IgM. Tumor markers and serological investigations for connective tissue disease such as SLE, rheumatoid arthritis and vasculitis were all negative. Bronchoscopy was performed and the bronchoalveolar lavage (BAL) culture showed no organisms. Pathology of transbronchial lung biopsy of left lateral basal segment revealed the lung tissue structure is generally preserved, with thickened alveolar walls, fibrous tissue proliferation, accompanied by inflammatory cell infiltration, a large amount of red-stained cellulose-like material exuded from the alveolar cavity, suggesting the possibility of interstitial pneumonia.

On day 6th of admission to our hospital, the patient had fever and chills again, with the highest temperature of 38.5 °C. She was treated by intravenous moxifoxacin for 7 days. Then the antibiotic was escalated to imipenem-cilastatin, but she still had intermittent fever and developed tachypnea. On day 18th of admission, the chest CT was reviewed which showed bilateral pulmonary lesions were advanced (Fig. 1B). Subsequently, percutaneous lung biopsy under the guidance of ultrasound was performed and histological examination demonstrated a large amount of fibrin exudate was seen in the alveolar lumen, the alveolar spacing was significantly widened, accompanied by a large number of lymphocytes, plasma cells and a small number of neutrophils, and focal fibroblast proliferation formation of organizing foci (Fig 2). Base on clinical, considered the possibility of AFOP. Special stains for fungi and mycobacterium tuberculosis infection were negative. These histologic findings were mostly consistent with AFOP.

Intravenous corticosteroid (methylprednisolone, 80 mg/day for 3 days, followed by 60 mg/d for 1 week and 40 mg/day for another 1 week) was administered. Her clinical symptoms improved and fever did not recur. At the 12th day of the steroid treatment, opacity in both lungs decreased (Fig. 1C). The patient discharged on a regular tapering schedule of methylprednisolone. One month after hospital discharge, the chest CT showed decreased bilateral consolidation. At 3rd month (Fig. 1D) and 6th month follow-up, her clinical condition was stable, but relapse occurred and CT showed new lesion in the upper lobe of the left lung when the dose was reduced to 12mg around 9-month after discharge. She got improvement again after re-prescribed by methylprednisolone of 40 mg/day. The patient was still being follow-up and on another regular and slower tapering of corticosteroids.

Case 2

A 54-year-old non-smoking woman was admitted because of fever for 3 days in April 5, 2017. She had a history of SLE with secondary hematological lesion and had been treated with methylprednisolone and cyclophosphamide for 13 years. She also complained of recurrent joint pain, rash, fatigue during the past 15 months. The patient had no history of substance abuse or occupational exposure.
Physical examination on admission showed moderate anemia appearance, dark red nodular rash on both lower extremities, no edema and no rales heard in both lungs. Blood routine examination revealed a white blood cell count of 10.58*10^9/L with neutrophil pre-dominance (90.1%), hemoglobin 72.0 g/L, and reticulocytes% 2.41%. Anti-cardiolipin antibody, ANA and SSA were positive while other serum examination for autoimmune disease including ANCA, RF and Coombs test were all negative. Other serological investigations showed normal procalcitonin, increased C-reactive protein, lactate dehydrogenase and D-dimer, positive T-SPOT and aspergillus galactomannan measurement, negative human immunodeficiency virus, EB virus, CMV-DNA, Mycoplasma pneumoniae antibody, 1-3-β-D Glucan measurement, Cryptococcus neoformant antigen and tumor markers. The blood cultures revealed no bacteria growth. Chest CT revealed multiple nodules, consolidations and paechy opacities in both lungs, predominantly in the lower lobes, with mediastinal lymph nodes slightly enlarged (Fig. 3A). The lesions were mostly subpleural. During hospitalization, she had been diagnosed with myelodysplastic syndrome (MDS) by bone marrow smear and biopsy.

Moxifoxacin was initiated for anti-infection from the first day of admission and switched to meropenem and linezolid on day 6th. Medrol 20mg/d was used to treat SLE. Empirical antituberculous and antifungal therapy were added on days 3 and 5, respectively. In spite of the treatment, the patient had recurrent high fever with temperature up to 40.5 °C. On day 6th of admission, the patient underwent bronchoscopy and transbronchial lung biopsy. The pathology demonstrated a little bronchial mucosa and cellulolytic exudate, without any evidence of cancer. Fungal stainings were all negative. Culture of BALF, smear microscopy for acid-fast bacilli, and aspergillus antigens were all negative.

Two weeks after admission, chest CT indicated an increase of nodules and consolidations in both lungs and a small amount of bilateral pleural effusion (Fig. 3B). Ultrasound-guided percutaneous lung biopsy was performed and the pathology revealed that the lung tissue was filled with fibrous exudate and the alveolar walls were infiltrated with large amount of lymphocytes, with interstitial fibrosis (Fig 4). Special stain (Grocott methenamine silver) for fungal infection was negative.

These findings were mostly consistent with AFOP. High dose of intravenous methylprednisolone (320mg/d for 1 day and 200mg/d for another 2 days, followed by 80 mg/day for 1 week) was administered intravenously, resulting in improvement of clinical symptoms and chest radiography findings (Fig. 3C), which showed absorption of bilateral lung lesions at day 7 of the steroid treatment. However, the patient had fever recurrent after the methylprednisolone tapered to 40mg/d in the 11th day of corticosteroid treatment and chest CT showed the lesions were significantly more advanced than before. The patient's symptoms showed no improvement when the dosage of methylprednisolone was added to 160mg/d. Then the treatment was adjusted to intravenous dexamethasone 30mg/d for 5 days (followed by methylprednisolone 40mg bid), combined with intravenous cyclophosphamide (0.2 QOD for 3 times). The patient's temperature returned to normal five days later.

Discussion And Conclusion
AFOP is a histopathologic diagnosis that was first reported in 2002 by Beasley et al. in a case series involving 17 patients with acute respiratory failure[1] and was defined as a subgroup of idiopathic interstitial lung disease [2] in 2013 in the American Thoracic Society/European Respiratory Society statement. The pathology characterized by fibrin deposition in pulmonary alveoli and organization of loose connective tissue. The other characteristic feature is the absence of Classical hyaline membranes of diffuse alveolar damage and no eosinophil infiltration or granuloma formation.

We performed a literature review of all reports of patients who were diagnosed AFOP over the period from 2002 to 2019, by conducting thorough search in PubMed and Web of Science databases, and searching for the reference lists of relevant articles for further reports as well. The search was limited to publications in English. By Dec 2019, there have been 85 published reports of 160 patients in the literature. However, 4 studies including 12 patients were removed for lacking sufficient clinical data of each case, including 6 SARS patients and 4 patients post lung transplantation reported by Hwang et al and Bierach et al respectively. Finally, a total of 81 eligible reports[3-26] with non-overlapped 148 evaluable cases qualified for the literature review and 150 cases (including the patients in the present study) served as the study population of this analysis.

There was no clear gender difference and AFOP most commonly happened in patients in their fifth to sixth decade of life. Of the 150 cases of AFOP reviewed, 65 were male, 63 were female and the other 22 (by Paraskeva et al[26] )were not reported; the mean age was 54.3±15.8 years (range, 38 days-84 years) (Table 1). There were about 78% patients between 40 and 70 years old at the time of diagnosis, while there were 3 reports in children (one infant). In our case reports, both were female in their fifties, consistent with the average reported age. AFOP have been reported mainly in USA, Europe and the Asia area. Race was not always included in publications; however, when it was reported, patients usually were Caucasian 160 cases; and Asian 37%. There were fewer Hispanic patients 10, and only 4 black patients were described, while race was not specified in 43 cases.

The etiology of AFOP can either be idiopathic or associated with a wide range of medical conditions or risk factors, such as lung transplantation, cancer, medication reaction and so on. In the literature review, 50 cases had no underlying cause or association, diagnosed as idiopathic AFOP, while the other 100 cases were identified as secondary AFOP (Table 2). In addition, 17 (11.3%) patients had no significant medical history and were apparently healthy prior to the present illness (Table 2). It should be noted that there were two cases caused by immune checkpoint inhibitor (ICI) (Nivorumab and pembrolizumab, respectively for specific)[8, 21], which is one of the most popular and effective treatments for metastatic melanoma and advanced non-small cell lung cancer in recent years. AFOP should be taken into account when considering ICI-related pneumonitis for PD1/PD-L1 inhibitors. Smoking appeared not to be a risk factor for only 22(38%) had a history of smoking, of the 58 patients with available data. The smoking ratio seemed to be higher in the secondary-AFOP populations than in the idiopathic-AFOP group, with 47%(14/30) to 29%(8/28).
Clinical manifestations of AFOP appeared to be nonspecific. Most common symptoms reported included dyspnea in 108 (72%), cough in 106 (71%) (87 had a non-productive cough), fever in 64 (43%), and chest pain in 24 (16%) (Table 1). Other less common symptoms included hemoptysis, fatigue, chills, night sweat and weight loss. One patient was asymptomatic. Fever was considered to be more common in AFOP when compared with other forms of interstitial pneumonia[27]. The disease progression was acute in 41 patients, subacute in 62 patients, while the remaining were unspecific.

Most patients underwent chest CT scan, except 2 patients with acute process only had X-rays and radiologic images were not specified in 3 cases. The most common CT findings were bilateral patchy infiltrate and diffuse consolidation, often with basal or peripheral distribution. One hundred and sixteen patients presented a bilateral distribution, while 18 cases were limited to unilateral lung (the ratio of right to left was 2 to 1). Lung lesion was localized or greater in lower lobes in 29 cases, while 11 cases reported mainly in the upper lobes. The most common imaging pattern was consolidation in 79 patients, of which there were 28 cases together with ground-glass opacity GGO; GGO in 61 patients and nodules in 29 cases (Table 1). Compared with patients of secondary-AFOP, patients of idiopathic -AFOP showed more imaging finding with consolidation and less proportion with GGO. Air bronchogram was often reported with consolidation. Other less common radiographic findings included traction bronchiectasis, mild or medium hilar and mediastinal adenopathy and halo sign. Pleural involvement seemed not to be common presentation, for only 7 cases were with mild bilateral effusion, 3 with slight right pleural effusion and only 2 patients had pneumothorax. In addition, the images present as interstitial pneumonia in 11 cases and showed the lesion as a solitary mass suggestive of a primary lung tumor in 2 cases. All of these atypical images were seen in the Secondary-AFOP.

The nonspecific clinical features result in misdiagnosis and a delay in the diagnosis of AFOP. At the time of initial diagnosis, most cases were misdiagnosed as lung infection, while a few cases were misdiagnosed as lung cancer. Of the cases caused by non-infectious factors, 81 cases were empirically treated with antibiotics, the vast majority with broad-spectrum antibiotics and some with antifungal therapy, when 60 cases were not specific. Beasley and his colleagues[1] described a mean time from onset of symptoms to diagnosis of 19 days, and Gomes et al[4] reported a mean time of 43.9 days.

A lung biopsy is required for a definitive diagnosis of AFOP, including examinations for microbiology to exclude infections. The lung lesion tissue was procured by surgical lung biopsy (mainly by video-assisted thoracic surgery, VATS) in 60 patients, transbronchial lung biopsy in 43 patients, image-guided (CT- or ultrasound-guided) percutaneous lung biopsy in 31 patients, autopsy in 13 patients and unspecified lung biopsy techniques in 3 patients. Of the cases reviewed, 28 patients underwent BAL before pathological diagnosis and no conclusive findings were found. Both of our cases’ BAL culture and transbronchial biopsy were inconclusive and the diagnosis was confirmed by percutaneous lung biopsy. It is best diagnosed with open-lung biopsy (or video-assisted thoracic surgery biopsy), given the risk of missing areas of hyaline membranes of diffuse alveolar damage. However, we suggest that the method of lung biopsy should be based on the actual clinical situation, including the location of lung lesions and the
patient's tolerance to the operations. The differential diagnosis should include bronchiolitis obliterans organizing pneumonia, eosinophil pneumonia, and diffuse alveolar damage.

Regarding therapy for AFOP, there are still no standard treatment recommendations. The most common therapy in the literature for AFOP was corticosteroids, with 132 out of 150 patients (88%). There is no consensus on the dose and duration of corticosteroids and the therapy should be individualized, according to the etiology, clinical course and response. The initial dosage of steroids was reported in 55 cases, varying from prednisone 0.5 mg/kg/day (or equivalent) to methylprednisolone 1000 mg/day, with 28 (51%) cases of prednisone 0.5-1.5 mg/kg/day. A pulse therapy of corticosteroids (prednisone 500mg/day to methylprednisolone 1000mg/day) was administered in 12 cases. Relapse may occur during steroid tapers and symptoms mostly could relieve again when higher doses were resumed. In our two cases, steroid was prescribed as soon as the diagnosis was established and relapse happened when steroid reduced.

Other drugs reported in the literature were antibiotics (especially for those caused by infection), immunosuppressants, etanercept, indomethacin and immunoglobulin, with varying results. Immunosuppressive agents such as cyclophosphamide, mycophenolate mofetil, cyclosporine, azathioprine, tacrolimus and so on, had been tried in 17 patients, all combined with corticosteroids. Patients secondary to autoimmune diseases may benefit most from immunosuppressant combined with steroids. GL Simmons et al[25] reported the first case AFOP after HSCT in 2016 successfully treated with etanercept, a TNF inhibitor, and Zhou et al reported that lowdose indomethacin combined with methylprednisolone was a new choice of treatment for AFOP after a surgical resection of rectal adenocarcinoma[28]. AFOP associated of anti-EJ autoantibodies with necrotizing myopathy was recently reported with good response to intravenous methylprednisolone and immunoglobulin[23].

Other therapeutic interventions included drug discontinuation, surgical resection, and organ transplantation. For patients suspected to be caused by drugs or environmental/occupational exposures, withdrawal is the most fundamental treatment. In 13 cases caused by a medication, treatment with corticosteroids and discontinuation of the drug mostly resulted in improvement and resolve, except 2 patients died even though they were treated combined with immunosuppressive agents and 2 cases died of other complication. Lung resection was reported as a successful cure while the disease is relatively localized, by Santos C et al from Portugal[29]. Labarinas S et al described a case of AFOP associated with hepatic failure and very severe aplastic anemia, responding to immunosuppressive therapy and hematopoietic stem cell transplantation[30]. There was one report of bilateral lung re-transplantation with subsequent improvement of symptoms in a patient suffering AFOP after lung transplantation[31] and lung transplantation was also reported last year by Alessio Campisi (Italy) as a successful cure in two cases of idiopathic AFOP[6]. Though AFOP has been described following organ transplantation, organ transplantation may be indicated to treat AFOP refractory to medical treatment[6, 30, 31]. However, further studies are required to find out whether these kind of patients will undergo recurrence of AFOP.
The prognosis of AFOP appears to have two different clinical patterns: one is an acute onset with a fast progression, more likely leading to respiratory failure and death, and the other is a subacute form associated with a less fulminating course and a more favorable outcome. Among the 150 case reports, 59 (39%) patients died (10 were unrelated to AFOP) (Table 1). Of those 49 cases died of AFOP, the progression was acute in 17 (81%) cases while 28 cases were not specified. Median time between onset of symptom to death of 22 AFOP patients after lung transplantation reported by Paraskeva et al was 101 days. AFOP after lung transplantation seemed to have relatively poor prognosis with poor response to drugs. Patients with acute presentation or secondary-AFOP had higher mortality rate than their corresponding cases. This might due to the secondary-cases with more or worse underlying diseases and lower responsive rate to corticosteroid. Additionally, we found that the development of dyspnea and GGO on CT scan as well as lack of consolidation in AFOP seemed to be associated with poor prognosis. However, findings from the present study require further evaluation.

In conclusion, this is the largest review to date dealing with AFOP, which includes 150 patients of AFOP, reported over an 18-year period. Given the various etiology, nonspecific clinical presentation and insufficient understanding of pathology, AFOP probably had been under diagnosed or misdiagnosis. Our two cases highlight the importance of being aware of this uncommon pattern of acute lung injury. AFOP should be considered when encountering a suspected pulmonary infection case unresponsive to empirical antibiotic therapy, especially with bilateral, basilar or peripheral-predominant consolidation, with or without GGO or nodular infiltration on CT scan. We highly suggest appropriate lung biopsy and thorough pathologic evaluation for these patients, to establish the diagnosis and to improve the outcome by administering more aggressive therapy. Corticosteroids was recommended to be the most useful therapy currently, and treatment options should depend on the etiology and disease severity.

**Abbreviations**

AFOP: Acute fibrinous and organizing pneumonia

BAL: Bronchoalveolar lavage

MDS: Myelodysplastic syndrome

GGO: Ground-glass opacity

VATS: Video-assisted thoracic surgery

CTD: Connective tissue disease

ICI: Immune checkpoint inhibitor

**Declarations**

**Competing interests**
The authors declare that they have no competing interests.

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**Ethics approval and consent to participate**

The study was approved by the Institutional Research Ethics Committee of the First Affiliated Hospital of Sun Yat-Sen University. The institutional review board waived the requirement for approval and signed informed consent form because this study was not an intervening trial and retrospective in nature.

**Consent for publication**

Written informed consent was obtained from both patients for the publication of case reports and any accompanying images.

**Availability of data and materials**

The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

**Authors’ contributions**

KT, CX, HC and YK conceived and designed the study. KT, HC, YK and XH contributed to data acquisition and HC and YK were the major contributors. HC, YK and XH take responsibility for data analysis. HC, YK, XH, and YL drafted the manuscript and KT and CX revised it. ZY provided critical contribution to the processing and interpretation of the pathological findings. All authors read and approved the final manuscript.

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Table 1. Clinical characteristic and prognosis of patients with AFOP

| Variable                   | Total (n=150) | Idiopathic-AFOP (n=50) | Secondary-AFOP (n=100) |
|----------------------------|---------------|------------------------|------------------------|
| Age (y)                    | 54.3±15.8     | 57.6±14.1              | 52.3±16.5              |
| Gender, male*              | 65/128(51)    | 23/50(46)              | 42/78 (42)             |
| Symptoms                   |               |                        |                        |
| Fever                      | 64(43)        | 27(54)                 | 37(37)                 |
| Dyspnea                    | 108(72)       | 40(80)                 | 68(68)                 |
| Cough                      | 106(71)       | 36(72)                 | 70(70)                 |
| Chest pain                 | 24(16)        | 14(28)                 | 10(10)                 |
| Hemoptysis                 | 9(6)          | 5(10)                  | 4(4)                   |
| Progression, acute*        | 41/103(40)    | 16/41(39)              | 25/62(40)              |
| Smoking status*            | 22/58(38)     | 8/28(29)               | 14/31(45)              |
| CT pattern*                |               |                        |                        |
| Consolidation              | 79/145(54)    | 32/46(70)              | 47/99(47)              |
| GGO                        | 61/145(42)    | 14/46(30)              | 47/99(47)              |
| Nodulars                   | 29/145(20)    | 10/46(22)              | 19/99(19)              |
| Mortality                  |               |                        |                        |
| All-cause death            | 59 (39.3)     | 10 (20)                | 49 (49)                |
| Related death              | 49 (32.7)     | 10 (20)                | 39(44)                 |

Values are mean ± SD or n (%).

* not including all the cases for some were not reported.

AFOP=Acute fibrinous organizing pneumonia, GGO= Ground-glass opacity

Table 2. Possible causes or associations with AFOP
| Associations                                      | n |
|--------------------------------------------------|---|
| Lung transplantation (LT)                        | 25|
| Autoimmune diseases/CTD                         | 13|
|                                                   |   |
| Juvenile dermatomyositis                        | 1 |
| Systemic sclerosis                              | 1 |
| Polymyositis                                    | 1 |
| Sjogren's syndrome                              | 2 |
| Anti-synthetase syndrome                        | 2 |
| Systemic lupus erythematosus                    | 2 |
| Collagen vascular disease                       | 1 |
| CTD (with asbestos and fiberglass exposure) *   | 1 |
| Fibromyalgia                                    | 1 |
| Severe AA (suspected to be autoimmune)          | 1 |
| Medications/Drugs                                | 15|
| Amiodarone (1 with zoologist exposure *)         | 2 |
| Abacavir                                        | 1 |
| Decitabine                                      | 2 |
| Bleomycin (1 with Aba infection *)               | 3 |
| Sirolimus                                       | 1 |
| Everolimus                                      | 1 |
| Nivolumab                                       | 1 |
| Cocaine                                         | 1 |
| Azacytidine                                     | 1 |
| Adjuvant chemotherapy&radiotherapy               | 1 |
| Pembrolizumab                                   | 1 |
| Infection                                       | 14|
| Lung abscess                                    | 1 |
| *Haemophilus influenza*                         | 1 |
| Sepsis                                          | 1 |
| Condition                                                                 | Count |
|---------------------------------------------------------------------------|-------|
| *Chlamydia pneumoniae*                                                   | 1     |
| *Mycoplasma pneumoniae*                                                  | 1     |
| *Mycobacterium tuberculosis*                                             | 1     |
| Aspergillosis                                                             | 1     |
| *Respiratory syncytial virus*                                            | 1     |
| Aba*                                                                     | 2     |
| *Pneumocystis jirovecii* (and HIV)*                                      | 1     |
| Influenza virus (after double LT)                                        | 1     |
| Not mentioned                                                            | 2     |
| **Hematological malignances**                                            | 9     |
| Lymphoma                                                                 | 5     |
| Acute leukemia                                                           | 2     |
| Myelodysplastic syndrome                                                 | 2     |
| **HSCT** (3 of lymphoma, 2 of leukemia)                                  | 5     |
| **Solid tumor**                                                          | 12    |
| **Environmental exposures**                                              | 8     |
| Zoologist exposed to exotic animals(with usage of amiodarone)            | 1     |
| Hair spay                                                                | 1     |
| Coal miner                                                               | 1     |
| Asbestoe and fiberglass exposure (with CTD) *                            | 1     |
| Poultry                                                                  | 1     |
| Herbicide or pesticide                                                   | 1     |
| Construction worker(with Aba infection) *                                | 1     |
| Risk occupational exposure (not specified)                              | 1     |
| **Whipple's disease**                                                    | 1     |
| **Chronic glomerulonephritis**                                           | 1     |
| **HIV** (One with *Pneumocystis jirovecii* infection*)                   | 2     |
the case was combined with another association.

AFOP = Acute fibrinous organizing pneumonia, HSCT=Hematopoietic stem cell transplantation, CTD=Connective tissue disease, AA=aplastic anemia, Aba=Acinetobacter baumanii

Figures

Figure 1

The initial CT images (A) and the follow-up CT images (B–D) of case 1. (A) CT of one day before admission showed bilateral consolidations, predominantly in both lower lobes, with basal and subpleural distribution, and patchy-like GGO located in the peripheral regions of the left upper lobe. (B) CT images on day 18th of admission after antibiotic treatment showed lesions progression. (C) CT images of follow-up at the 12th day of the steroid treatment and (D) follow-up at 3rd month after discharge showed lesions absorption.
Figure 2

Histologic findings of case 1 on lung biopsy. (A) hematoxylin and eosin stain, ×100; (B) hematoxylin and eosin stain, ×200. Alveoli were filled with fibrin exudate without pulmonary hyaline membrane, the alveolar septum was thickened and infiltrated with a few of inflammatory cells, which were consistent with AFOP.
Figure 3

The initial CT images (A) and the follow-up CT images (B, C) of case 2. (A) Chest CT on admission revealed multiple nodules, consolidations and pachy opacities in both lungs, mostly in the lower lobes. (B) CT images on day 14th of admission showed bilateral lesions increased and enlarged. (C) CT images at the 7th day of the steroid treatment showed absorption of bilateral lung lesions.
Figure 4

Histologic findings of case 2 on lung biopsy (A) hematoxylin and eosin stain, ×100; (B) hematoxylin and eosin stain, ×200. There was abundant of fibrous exudate in the aleoli and interstitial fibrosis with scant inflammatory cells.