



Case Report

The pulmonary radiologic findings of rheumatoid arthritis

Sevket Ozkaya^{a,*}, Salih Bilgin^b, Semra Hamsici^c, Serhat Findik^d^a Rize University, Faculty of Medicine, Department of Pulmonary Medicine, Rize, Turkey^b Samsun Chest Diseases and Thoracic Surgery Hospital, Department of Pulmonary Medicine, Samsun, Turkey^c Samsun Chest Diseases and Thoracic Surgery Hospital, Department of Radiology, Samsun, Turkey^d Department of Pulmonary Medicine, Faculty, of Medicine, Ondokuz Mayıs University, Kurupelit, Samsun, Turkey

ARTICLE INFO

Article history:

Received 8 February 2011

Accepted 23 March 2011

Keywords:

Rheumatoid arthritis

Lung

Radiology

Computed tomography

ABSTRACT

The rheumatoid arthritis (RA) can affect multiple organs and tissues including the lung. Several pleuropulmonary manifestations are associated with rheumatoid arthritis involving the lung parenchyma, pleura, airways, and vasculature. The various pulmonary radiological findings have been defined in patients with RA.

In this study, we aimed to retrospectively evaluate of the pulmonary radiologic findings in the five patients with RA.

In the present study, pleural effusion, hydropneumothorax, chylothorax, pulmonary micronodular, macronodular and necrobiotic nodular lesions, pleural plaques, ground glass opacity and interstitial lung diseases were defined according to chest radiographs and computed tomography. The most common pulmonary radiologic findings were pulmonary nodules in three of patients, necrobiotic nodule in two of patients, pleural plaque in two of patients and pleural effusion in two patients. The one of them had hydropneumothorax. Interstitial lung diseases were defined in two of patients.

In conclusion, the pulmonary changes may be accompanied as a systemic component of the RA. If these changes are well recognized, they can help in the diagnosis of the RA.

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1. Introduction

Rheumatoid Arthritis (RA) is a chronic inflammatory disease typically involving the small joints of the hands and feet in a symmetric fashion. Extra-articular manifestation of RA is frequent and may occur in virtually all organ systems.¹ Elman and Ball first reported the pulmonary manifestation of RA in 1948. They recognized the diffuse pulmonary fibrosis in three patients with RA.² Several pleuropulmonary manifestations are associated with rheumatoid arthritis involving the parenchyma, pleura, airways, and vasculature.^{3,4} Although, the RA is more common in females during the 4th–5th decades, pulmonary diseases are more commonly in males. Respiratory manifestations usually become more prevalent as RA progresses, but they may present simultaneously with joint symptoms or even predate joint involvement.⁵ Many pulmonary manifestations are directly linked to RA itself and may be a result of underlying defects in immunity and chronic inflammation. Some are

due to exposures and to the treatment of RA with disease-modifying antirheumatic drugs.^{6–9}

We aimed to present the most frequent pulmonary radiologic findings in patients with rheumatoid arthritis.

2. Material and methods

The pulmonary involvement of rheumatoid arthritis were identified in five patients with clinical, radiological and laboratory findings at Samsun Chest Diseases and Thoracic Surgery Hospital and Rize Education and Research Hospital. We aimed to retrospectively evaluate the radiological findings on chest radiography and thorax CT. The approval of patients and institution were taken to use their records for our study.

3. Results

Total five patients were evaluated. The patients' characteristics are presented in the figure legends. The male to female ratio was 2/3. Two patients were in fourth decade, two patients were in fifth decade and one patient was in eighth decade.

* Corresponding author. Tel.: +90 532 4741309; fax: +90 464 2123015.

E-mail address: ozkayasevket@yahoo.com (S. Ozkaya).

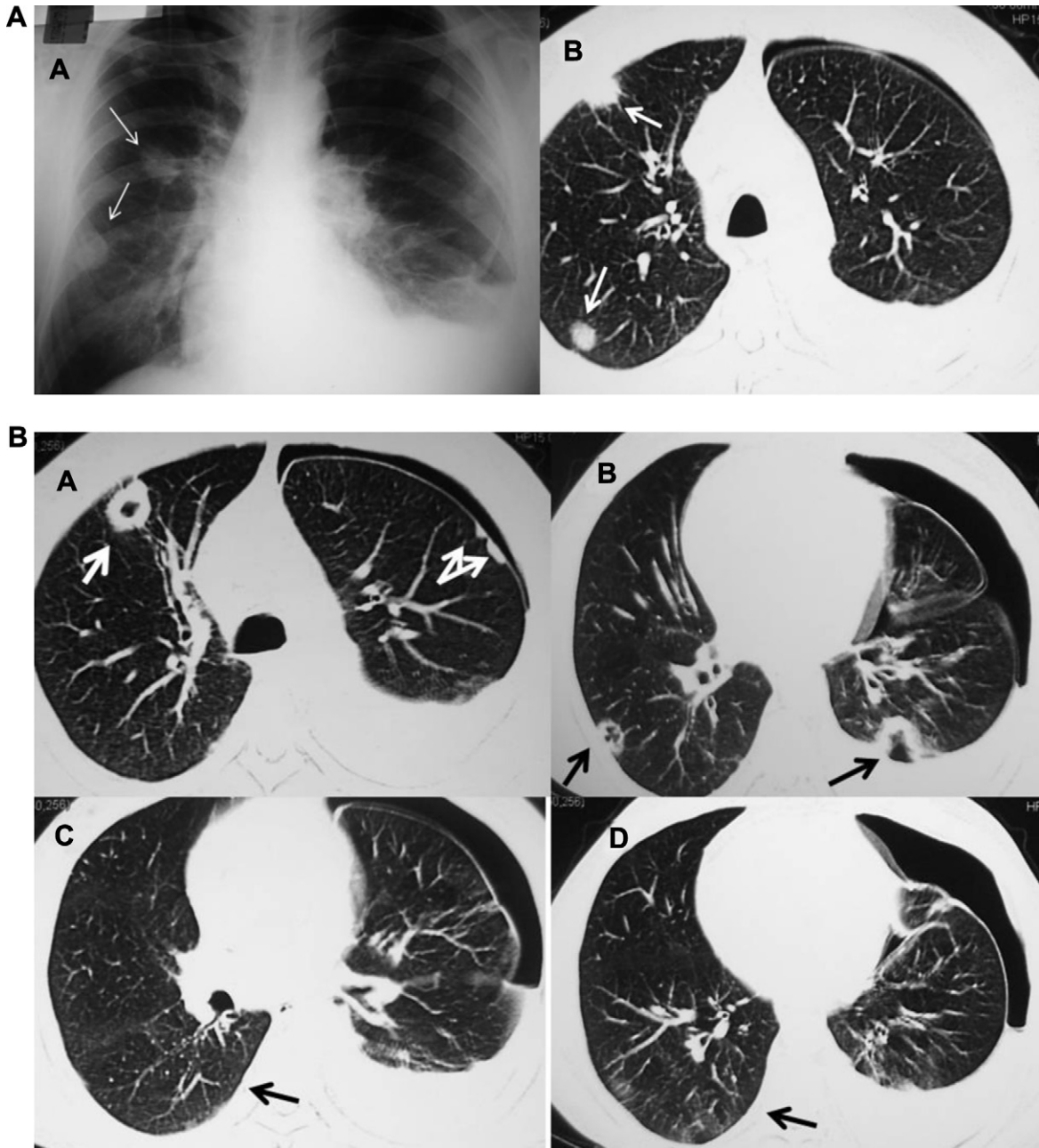


Fig. 1. A and B (Patient 1): The forty six years old Turkish male patient was admitted to the hospital with dyspnea and cough.. There was five years history of seropositive RA. He had receiving immunosuppressive treatment for RA. The chest radiograph and thorax CT showed the bilateral nodular lesions and some of them were cavitate, pleural plaques on visceral pleura, mediastinal lymphadenopathy and hydropneumothorax. The cholesterol levels of first patient were very high (424 mg/ml) in the pleural effusion and this defines to be the pseudochylothorax.

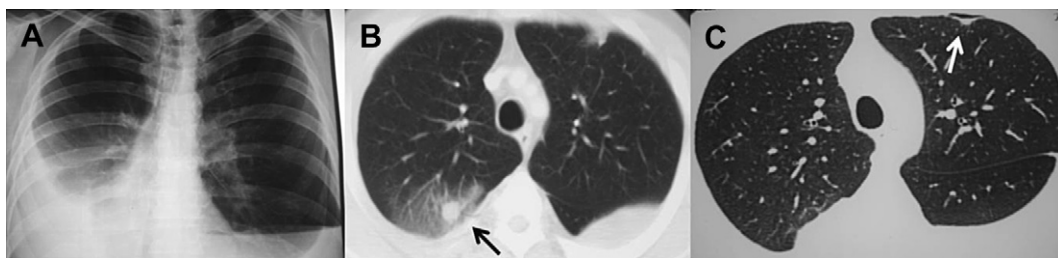


Fig. 2. (Patient 2): The forty five years old Turkish male patient was admitted to hospital with cough. He had a three years history of seropositive RA and he was admitted to our hospital with suffered from chronic cough. He had also receiving immunosuppressive treatment. The performed chest radiography showed the bilateral pleural effusion. The thorax CT revealed the bilateral pleural effusion, nodular lesions and necrobiotic nodular lesions. Also, ground glass opacity was observed around the nodular lesion in thorax CT.

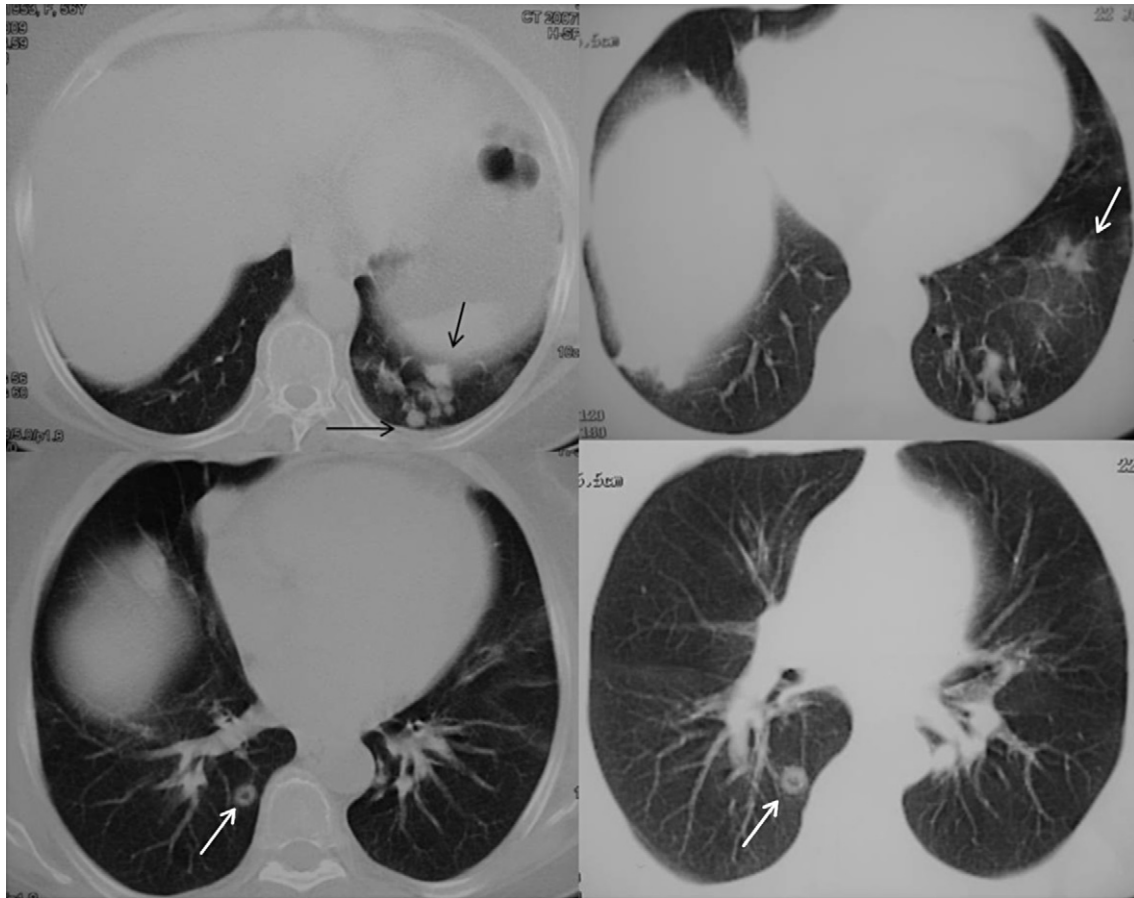


Fig. 3. (Patient 3): The fifty six years old Turkish women was admitted to the hospital with cough and fever. Unlike the first and second patients, she did not have any history of diseases, before. Firstly, she was treated as pneumonia with levofloxacin, but she did not improve. After performed thorax CT, the result of thorax CT revealed the bilateral necrobiotic and nodular lesions which some of them were cavitate. When we listened the detailed medical history from her, she was suffering from arthritic symptoms and she had a story of rheumatoid skin lesion on the olecranon. Her rheumatoid factor was 467 IU/ml in the serum. We think the pulmonary involvement of rheumatoid arthritis according to the clinical, radiological and laboratory findings. After immunosuppressive treatment, her symptoms were improved. As a results, the nodular lesions in this our third patient's lung were the first signs of rheumatoid arthritis.

In the present study, pleural effusion, hydropneumothorax, chylothorax, pulmonary micronodular, macronodular and necrobiotic nodular lesions, pleural plaques, ground glass opacity and interstitial lung diseases were defined according to chest radiographs and computed tomography. The pulmonary nodule was the most common (60%) radiologic findings of RA. The pulmonary nodules were the first sign of rheumatoid arthritis in one of patient. Pulmonary necrobiotic nodule was seen in two of patients and pleural plaque was seen in two of patients. Pleural effusion was detected in two patients and one of them had hydropneumothorax. Interstitial lung diseases were defined in two patient. One of them had usual interstitial pneumonitis and other patient had nonspecific interstitial pneumonitis.

3. Discussion

We aimed to discuss the most frequent pulmonary radiological findings in patients with RA.

The pulmonary rheumatoid nodules occur in less than 1% of patients with rheumatoid arthritis.¹⁰ Radiographically, detectable lung nodules are found in approximately 0.2% of RA patients.¹¹ Furthermore, the CT scanning increases the yield of detection to 22%. These nodules may be single and multiple, varying in size from 0.5 mm up to 7 cm in diameter. They exist the middle and upper zones of lung and tend to be peripheral or pleural.¹² In our study, the

pulmonary nodules were the most common radiologic findings in three patients of five patients with pulmonary involved rheumatoid arthritis (Figs. 1–3). The third patient was presented with cough and pulmonary nodules were the first sign of rheumatoid arthritis (Fig. 3). Several case reports were published with pulmonary micronodular, nodular and necrobiotic nodular lesions in patients with RA.^{3,4,10,13–16} Invoked mechanisms of pathogenesis are vasculitis and immune complex deposition.¹⁷ They can be resolved spontaneously. Also, they can appear the one side of lung and then the other nodule can appear the other side with no relation to the course of the arthritis.^{14,18,19} These nodules have been in the patients with chronic rheumatoid arthritis. However, they can occur before the starting of articular symptoms. The pulmonary nodular lesions were the first signs of rheumatoid arthritis in our third patient. In such of these cases, different diagnosis of pulmonary nodules should be evaluated and rheumatoid arthritis must be kept in mind.

The central necrosis may occur in some of pulmonary nodules. They are seen as cavitate and called as rheumatoid necrobiotic nodules. Up to 50 percent will cavitate. The pulmonary necrobiotic nodules occur in less than 0.5% of patients.¹⁰ In rheumatoid necrobiotic nodule, a central zone of eosinophilic fibrinoid necrosis is surrounded by palisading fibroblasts and the nodule is often centered on necrotic inflamed blood vessel.²⁰ If they are localized peripherally, they may be ruptured to the adjacent pleural space and associated with pleural effusion, pneumothorax, or

pyopneumothorax.¹³ The first patient was presented with hydro-pneumothorax due to the cavitary nodule was ruptured to the adjacent pleural space (Fig. 1). The pulmonary necrobiotic nodules were detected in two of three patients with rheumatoid nodules (Figs. 1 and 3). Necrobiotic nodules favor the middle and upper zones, can be either single or multiple, tend to be peripheral or pleural, and range from millimeters up to 7 cm in diameter; however these nodules can be quite variable in appearance, and the natural history follows an unpredictable course. Interestingly, necrobiotic nodules also can occur in lung before clinical arthritis develops or even the absence of rheumatoid factor.^{15,16} The rheumatoid necrobiotic nodules were the first signs of rheumatoid arthritis in one of our patients. They may resolve spontaneously recur or appear first in one lung and then in other, with no relation to the course of arthritis.^{3,12}

Pleural involvement in RA includes pleural effusion, pleural thickening or plaque and pneumothorax (Figs. 1–3). Pleural involvement was observed in two patients. The first patient was

admitted to the hospital with dyspnea and cough and hydro-pneumothorax and pleural plaques were detected (Fig. 1). Also, the pleural plaques and pleural effusion were defined in second patients (Fig. 2). Hydropneumothorax is caused from the rupture of cavitary nodules into the adjacent pleural space, as seen in our patient. Although its prevalence has been estimated to be less than 5%, 20% of RA patients have symptoms related to pleural disease, and a high frequency (40–75%) of pleural involvement is noted in autopsy reports.^{21,22} Men are thought to be most at risk for getting pleural involvement, usually in their 40s and 50s, and nodules are associated with this, as seen in our patients. Jardin et al., reported the subpleural micronodules and/or pseudoplaques were seen in 17% of patients. The some articles suggesting the most common pulmonary manifestation of RA is pleural effusion.^{2,23} The pleural effusion may be bilateral and they often noticeable on chest radiography (Figs. 1 and 2). Asymptomatic pleural effusion may be present in as many as 70% patients, while symptomatic effusion occurs in 5%.

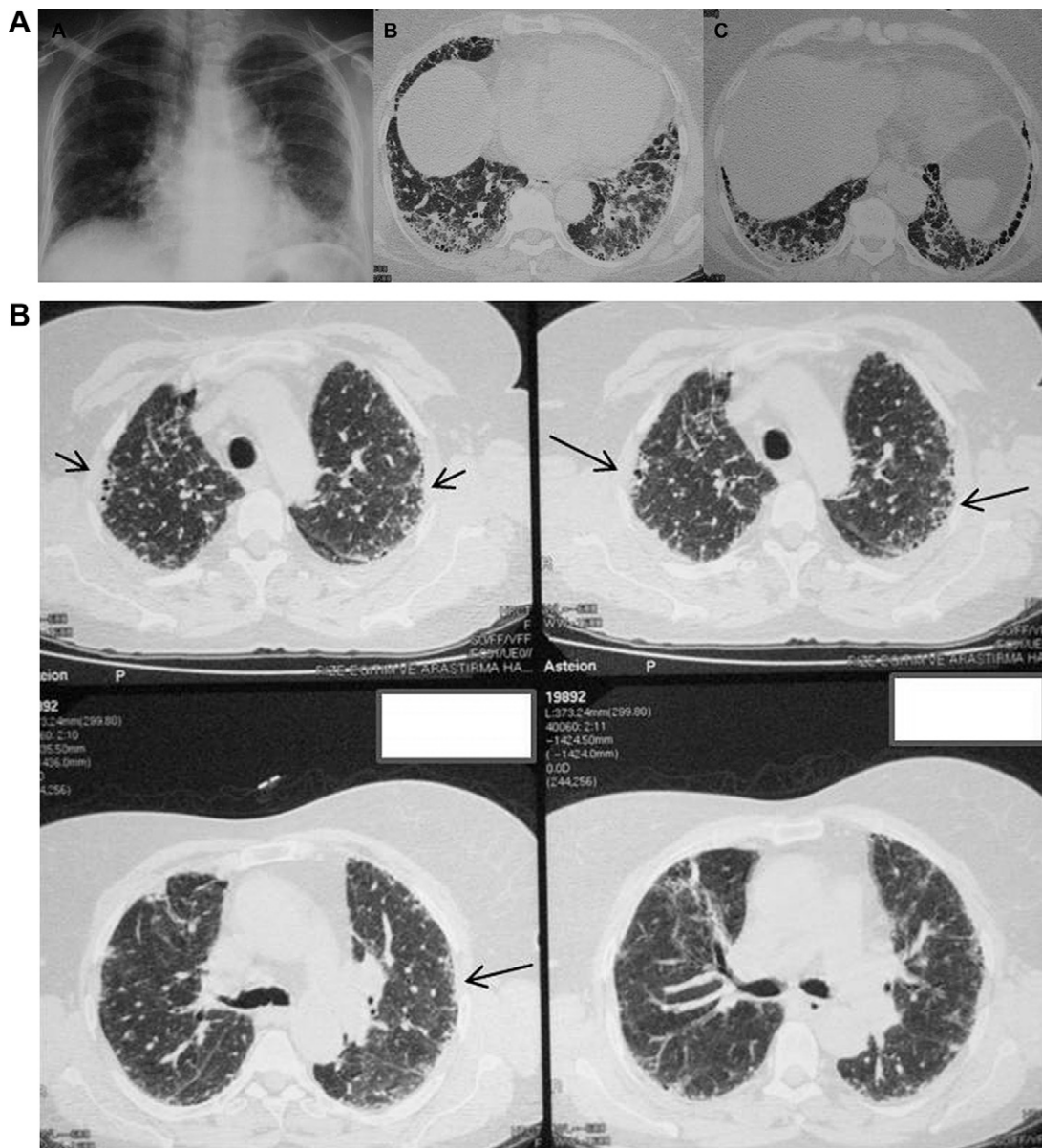


Fig. 4. A and B (Patient 4): The eighty one years old Turkish male patient was admitted to hospital with exertional dyspnea. He had a fifty five years history of seropositive RA and RF was 2110 mg/dl in serum. He had also receiving immunosuppressive treatment. Chest radiograph showed reticulonodular and irregular linear opacities on lower zones. The HRCT images of lung showed the honeycombing and septal thickening at the lung base.

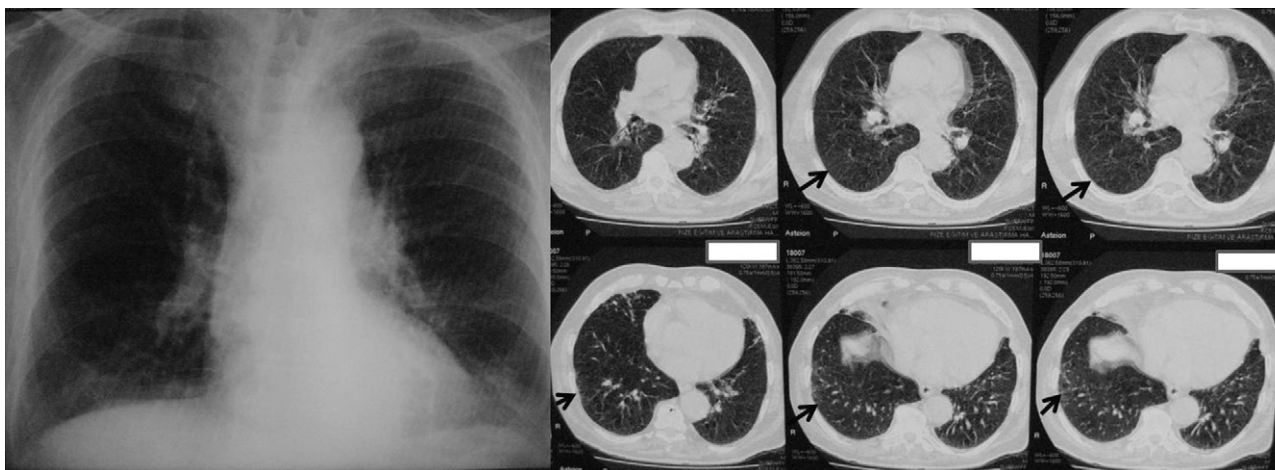


Fig. 5. (Patient 5): The fifty five years old Turkish female patient was admitted to hospital with chronic cough and dyspnea. She had a eight years history of seropositive RA. She had also receiving immunosuppressive treatment. Chest radiograph and CT images showed nonspecific interstitial pneumonitis with reticulonodular and irregular linear opacities.

The reported prevalence of RA-associated fibrosing interstitial lung disease varies significantly depending on the method of detection and the population examined. Interstitial lung disease had a prevalence initially reported to be around 1.6–5%. But, using HRCT, the prevalence of ILD in unselected RA patients has been as high 63%. However, clinically significant disease is less common and estimated to occur in approximately 10% of patients.¹

The main histologic patterns of ILD associated with RA are UIP, nonspecific interstitial pneumonia (NSIP), organizing pneumonia (also called bronchiolitis obliterans organizing pneumonia), and diffuse alveolar damage.^{22,24–26}

While the non-specific interstitial pneumonia (NSIP) radiographic and histological pattern is the most common in the connective tissue disease as a whole, in RA usual interstitial pneumonia is the most common pattern (Fig. 4 and 5).¹

In our series, two of five patients had interstitial involvement of RA. The chest radiograph showed reticulonodular and irregular linear opacities on lower zones (Fig. 4). The HRCT images of lung showed the honeycombing and septal thickening at the lung base (Fig. 4). While the findings are nonspecific, they are typical for that of RA.

Walker and his colleagues defined interstitial lung disease by the radiograph. They found that 1.6% of a large cohort of rheumatoid patients had evident radiographic interstitial lung disease. The clinical manifestations of interstitial lung disease in RA are relatively similar to idiopathic pulmonary fibrosis, as seen in our fourth patient.¹¹

Our first case presented with hydropneumothorax with cavitory nodules which ruptured to the adjacent pleural space was seen on thorax CT.

The pulmonary manifestations of RA also include bronchiolar disease such as follicular bronchiolitis and constrictive bronchiolitis (also called bronchiolitis obliterans). These diseases are usually seen in patients with positive rheumatoid factor and active joint disease. The symptoms are characterized by dyspnea and nonproductive cough.²² Although chest radiograph is generally normal, computed tomography may show areas of air trapping, small nodular opacities in centrilobular distribution (follicular bronchiolitis and bronchiolitis obliterans), patchy areas of low attenuation (bronchiolitis obliterans), and peribronchial thickening (follicular bronchiolitis and bronchiolitis obliterans). The bronchiolitis as peribronchial micronodular infiltration was observed in first patient (Fig. 1B). Also, ground glass opacities were defined in the first patient (Fig. 2).

In conclusion, the pulmonary changes may be accompanied as a systemic component of the RA. If these changes are well recognized, they can help in the diagnosis of the RA.

4. Conflicts of interest

The work has been seen and approved by all co-authors. We are confirm that this manuscript is not under simultaneous consideration by any other publication. There is no actual and potential conflicts of interest for us, the authors.

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