

Research Article

PULMONARY CHANGES IN PATIENTS WITH RHEUMATOID ARTHRITIS-A STUDY ON 100 PATIENTS

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ABSTRACT

Introduction: Rheumatoid arthritis is a systemic inflammatory disease characterized by symmetric, relapsing, or chronic destructive synovitis. We aim to study the clinical significance of CAT scan in assessing pulmonary findings in patients with rheumatoid arthritis. **Method:** We conducted a retrospective study and the data was collected for a period of 4 months from May 2018 to August 2020. Our study included 100 patients with confirmed diagnosis of rheumatoid arthritis as per the American College of Rheumatology definition. We studied the CT scan of chest in patients with rheumatoid arthritis and analyzed the most common pulmonary changes seen in these patients. **Results:** The study group included 45 percent males and 55 percent females. The mean age for men included in the study was 55 years (44-89) and for women was 52 years (39-87). The most common CT finding was found to be bronchiectasis/bronchiolectasis which was observed in 64 patients. Emphysema was the second most common followed by pulmonary blebs at apex. Pulmonary fibrosis was seen in 20 percent of the patient. The most common nodule present was micronodules in the parenchyma followed by sub-pleural micronodules. **Conclusion:** High resolution computed tomography is a superior imaging modality of choice as compared to chest x-ray or pulmonary function test to better characterize the parenchymal changes in patients with rheumatoid arthritis during the early stages of the disease. Pulmonary function test have failed to accurately detect the early parenchymal changes in rheumatoid arthritis.

Keywords: Rheumatoid arthritis, lung, pulmonary, CAT scan, CT scan.

INTRODUCTION

Rheumatoid arthritis is a systemic inflammatory disease characterized by symmetric, relapsing, or chronic destructive synovitis. There may also be multisystem involvement.[1] The condition is more common in women, with onset between ages 30 and 60 years.[2] Rheumatoid arthritis characteristically involves 3 or more proximal interphalangeal (PIP) joints, metacarpophalangeal (MCP) joints, wrist and metatarsophalangeal (MTP) joints, although other joints may be involved as well. The eventual, classic presentation is symmetric polyarthritis, but in the early states it can present as oligoarthritis or, less commonly, as recurrent monoarthritis.[3] The most common complication is musculoskeletal disability from destructive arthritis. Extraarticular complications include rheumatoid nodules, dermal vasculitis, keratoconjunctivitis sicca with associated Sjogren syndrome, interstitial lung disease, pericarditis, mononeuritis multiplex, amyloidosis, and increased cardiovascular mortality, and occur primarily in seropositive patients.[4] Suggested initial testing in patients suspected to have RA includes rheumatoid factor (RF), anticyclictrullinated peptide (anti-CCP) antibodies, erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), complete blood count (CBC) with differential, metabolic panel, and x-rays of significantly involved joints.[5] American College of Rheumatology/European League Against Rheumatism (ACR/EULAR) diagnostic criteria may help guide therapy and predict progression of disease.[6] We aim to study the clinical significance of CAT scan in assessing pulmonary findings in patients with rheumatoid arthritis.

METHODS

We conducted a retrospective study and the data was collected for a period of 4 months from May 2018 to August 2020. Our study

included 100 patients with confirmed diagnosis of rheumatoid arthritis as per the American College of Rheumatology definition. Computed tomography scans of the chest obtained from the patient between years 2018-2020 were reviewed. Patient who had obtained CT scan after having lung related symptoms or for screening of lung cancer were included in the study. We collected data from two rheumatology clinics which serve 25000 patients annually. All patients included in the study had no occupational exposure or any other medical condition that causes pulmonary changes. All patients provided informed consent and agreed to share their CT scan finding for the purpose of this study. The study group included 45 percent males and 55 percent females. The mean age for men included in the study was 55 years (44-89) and for women was 52 years (39-87). All patients who had previous smoking history (defined as any history of smoking for the last 15 years) were excluded from the study. During the time the study participants had CT scan imaging performed, the mean age of disease progression in men was 7 years (5-9) and in women was 9 years (4-11). The Rheumatoid Arthritis Severity Scale (RASS) was used to assess the severity of the disease. Out of 100 patients, 78 patients were undergoing treatment at the time of performing the imaging.

RESULTS

The most common CT finding was found to be bronchiectasis/bronchiolectasis which was observed in 64 patients. Opacities depicting honeycombing were observed in 6 of the 64 patients. More detailed analysis showed that central and peripheral bronchiectasis and bronchiolectasis was seen in 12 patients, central and peripheral bronchiectasis in 14 patients, peripheral bronchiectasis and bronchiolectasis in 22 patients, and bronchiolectasis alone in remaining patients. In 80% of these patients the changes were observed mainly in the middle and lower lung fields. Twelve percent patients had exclusive involvement of the

upper lung field and remaining had diffuse involvement. Bronchial wall thickening was noticed in 10 percent of these patients. Emphysema was the second most common findings seen on CT scan. Sixteen percent patients were reported to have such findings with majority of them having less than 30percent of the lung surface involved. Tenpercent patients had areas of ground glass opacities mainly in the lower lung fields. The most common nodule present was micronodules in the parenchyma followed by sub-pleural micronodules. Forty patients out of 100 patients had respiratory symptoms which prompted HRCT. Thirty eight patients had HRCT done for purpose of screening. Sixty two percent patients had HRCT done after respiratory complain among which bronchiectasis was the most common radiological finding. Emphysema was the second most common followed by pulmonary blebs at apex. In patients without any respiratory complains the micro nodules in the sub pleural region were the most common followed by emphysematous changes. Honeycombing was observed in 6 of 64 patients and all had respiratory complains which prompted a HRCT. Of the patients with bronchiectasis 40 percent had complain of sputum production, 25 percent had complain of dry cough and rest had nonspecific dyspnea on exertion. Bronchial wall thickening was seen in 23 percent of the patients. Dyspnea was seen in 86 percent of the patient with bronchial wall thickening. There was peripheral dilation of bronchus more commonly seen in patients with respiratory symptoms as compared to those without respiratory symptoms. Statistical significance could not be determined due to low sample size. Central bronchial wall thickening was seen in only 2 patients. No respiratory complains were present in any of them. Pulmonary fibrosis was seen in 20 percent of the patient. Seventy percent patients who had pulmonary fibrosis were also found to have bronchiectasis. Younger patients less than 50year of age were more common to have bronchiectasis followed by emphysema. Older patients (>50 years of age) had more commonly bronchiectasis with pulmonary fibrosis as the radiological lung finding. Twenty patients had distant smoking history, defined as more than 15 years since cessation. All of them had bronchiectasis present on CAT scan. Fifteen percent of patients who had a CAT scan after respiratory symptoms. The main complains were shortness of breath on exertion and dry cough. The most common radiological finding in patients with symptoms was found to be pulmonary fibrosis in 40 percent patients with 10 percent having unilateral fibrosis and 90 percent had bilaterally fibrosis. Emphysema was found to be the second most common cause of dyspnea and cough.

DISCUSSION

Our study aimed to evaluate the common radiological findings seen in patients of rheumatoid arthritis. We found that the most common lung finding was bronchiectasis and bronchiolectasis in sixty four percent of our study population. Peripheral bronchiectasis was more commonly seen as compared to central bronchiectasis with close to thirty percent patients having peripheral bronchiectasis. Honeycombing was also commonly seen with bronchiectasis. There are multiple factors that play a role in involvement of lung in patients with rheumatoid arthritis. Presence of HLA-DR4, smoking, positive rheumatoid factor has been implicated in causation of lung findings in rheumatoid arthritis.[6-9] In our patient sample, 42 patients had rheumatoid factor positive, 9 patients had HLA-DR4 positive, and none had significant history of smoking. Some studies have demonstrated the causation on interstitial lung disease in patients with rheumatoid arthritis.[10-11] One study had demonstrated that smoking caused pulmonary changes in patients with rheumatoid factor positive rheumatoid arthritis.[12] Few studies have reported that patients with rheumatoid arthritis have blockage of the bigger and smaller respiratory tracts.[13-14] Bronchiectasis is very common in

such patients as well.[15] Our study sample included only patients who had no significant smoking history, studies have shown that smokers have obstructive airway disease but causation of obstructive disease in patients with rheumatoid arthritis was not clear.[16-18] Restrictive symptoms were uncommon in rheumatoid arthritis patients.[19] There has been a well-established association between development of interstitial lung disease in patients with rheumatoid arthritis. Many studies have found radiological findings of interstitial lung disease on CAT scan and some estimate as high as forty percent or more.[20-21] Our study also arrived at the same conclusion that interstitial lung disease is quite prevalent in population with rheumatoid arthritis. A study done on patients with rheumatoid arthritis showed that incidence of bronchiectasis was as high as twenty five percent.[22] Our study also came to a similar conclusion. Our study had a significantly higher percentage of patients with findings of bronchiectasis. Some studies have also included patients with smoking while analyzing radiological findings of bronchiectasis. It is difficult to predict that whether genesis of bronchial wall changes preceded rheumatoid arthritis or vice versa. Many studies have also assessed the association of pulmonary function test and lung findings in rheumatoid arthritis. Patients with ground glass findings on CAT scan have shown to have decreased forced expiratory volume in the first second.[23-24] Some studies have attributed ground glass findings with decrease in forced vital capacity.[25] It has been seen that patients with bronchiectasis and reticulonodular patterns have lower peak expiratory flow and forced vital capacity as compared to patients with normal lung parenchyma.[23] The patients with seropositive rheumatoid arthritis have been found to have more risk of developing changes in pulmonary function test as compared to patients who were seronegative.[26] Few studies have reported results on the contrary.[27] One study reported no statistically significant relationship between the disease progression of rheumatoid arthritis and pulmonary function test findings.[28] Patients with seropositive rheumatoid arthritis have been reported to have more obstructive and restrictive abnormalities, independent of smoking.[29] High resolution computed tomography has been found to be very sensitive in detecting any parenchymal change very early in the disease progression. Chest x ray tend to detect findings only at advanced stages where finding like diffuse ground glass opacities and pleural effusion appears. In summary, high resolution computed tomography is a superior imaging modality of choice as compared to chest x-ray or pulmonary function test to better characterize the parenchymal changes in patients with rheumatoid arthritis. Pulmonary function test have failed to accurately detect the early parenchymal changes in rheumatoid arthritis.

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