

Family Cluster of Novel Coronavirus (2019-nCoV) Pneumonia

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Abstract

Background: On January 9 2020, the World Health Organization (WHO) declared the identification, by Chinese Health authorities, of a novel coronavirus, further classified as SARS-CoV-2 responsible of a disease (COVID-19) ranging from asymptomatic cases to severe respiratory involvement. On March 9, 2020, WHO declared COVID-19 a global pandemic. Italy is one of the most affected countries by COVID-19 infection.

Case report: We describe the clinical and the radiological features of one family cluster of 2019-nCoV.

Conclusions: Despite the evidence about comorbidity, age and prognosis, the youngest woman was the patient with the more severe pulmonary radiological findings. This is due to

the worse initial clinical manifestations, where the higher inflammatory state is related to the greater diffusion of the pulmonary lesions

Key words: COVID 19, Interstitial Pneumonia, Coronavirus, Thorax Computed Tomography

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INTRODUCTION

Arising in China in the winter of 2019, COVID-19 (SARS-CoV-2 virus) provoked a global pandemic, and severely stressed the medical systems across the world. The disease can be transmitted through droplets, direct contact and probably fecal-oral route. The most common reason for hospitalization is severe respiratory distress and patients with comorbidities (hypertension, cardiovascular disease, diabetes) have the worst prognosis (1). Fever, cough, dyspnoea, myalgia or fatigue are the most prevalent clinical manifestations.

COVID 19 causes a pro-inflammatory and hypercoagulable state with marked elevations in seen Lactate Dehydrogenase (LDH), Ferritin, C-Reactive Protein (CRP), D-Dimer and Interleukin levels (2). The inflammatory response, including production of inflammatory cells, cytokines (TNF- α , IL-1 and IL-6) and chemokines (IL-8), induces a parenchymal damage (mostly in the lung) and a pro-coagulant effect that predisposes to thrombotic vascular lesions (3,4).

A retrospective study demonstrated that older age, high D-Dimer levels and higher SOFA score on admission were associated with worst prognosis and higher odds of in-hospital death. Furthermore, lymphopenia and increased values of pro-inflammatory cytokine, high-sensitivity cardiac troponin I, lactate dehydrogenase were more commonly seen in severe disease (5).

The poor outcome of the older patients could be due to an age-dependent defect in T-cell and B-cell function that reduce the control of viral

replication and increase the pro-inflammatory responses (6).

In this case series we described a COVID 19 family cluster where the older component, had the better clinical and radiological manifestation.

CASE REPORTS

We describe the clinical and the radiological features of one family cluster of 2019-nCoV.

A 56-year-old woman presented to the hospital with a 6-days history of fever and cough. At the admission, her body temperature was 38.5°C and she had normal breath sounds of both lungs were heard at auscultation. Laboratory showed: White Blood Cells 3140 mmc (WBC), Lymphocyte 450 mmc (Ly), C-Reactive Protein 71.5 mg/L(CRP). Unenhanced Chest Computed Tomography (CT) showed thickening of the intra- and interlobular septa with a radiological framework of "crazy paving" in postero-basal and in the antero-basal segment of the Right Inferior Lobe (RIL), associates with pulmonary consolidation. Similar areas were present in the Upper Left Lobe (ULL) and in the Upper Right Lobe (URL). (Figure 1). A nasopharyngeal swab was positive for 2019-nCoV with the real-time reverse transcription polymerase chain reaction assay.

Her mother, a diabetic 87-year-old woman, was admitted to the hospital the same day with a 7-day history of fever and cough. At admission, her body temperature was 37.0 °C. Normal breath sounds of both lungs were heard at auscultation. Laboratory studies showed: WBC 4.100 mmc, Ly 1100 mmc, CRP 8.10 mg/L. CT showed initial

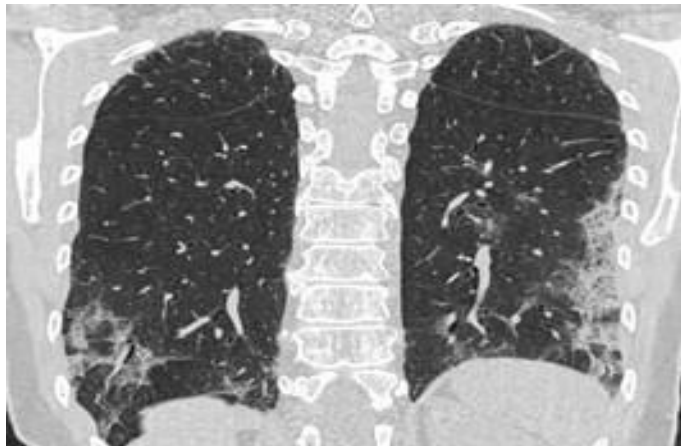


Figure 1. CT shows thickening of the intra- and interlobular septa with a radiological framework of "crazy paving" and pulmonary consolidation

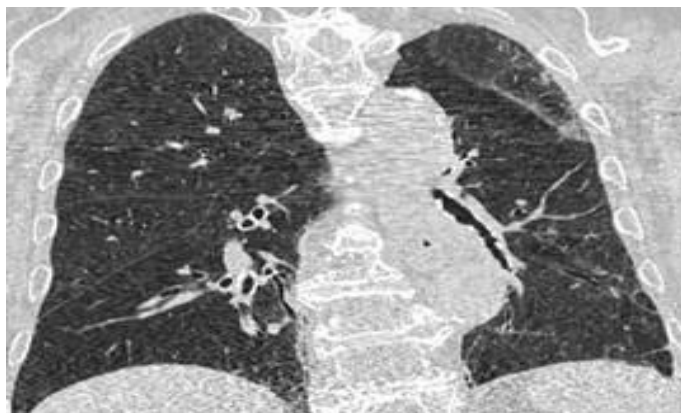


Figure 2. CT shows initial and circumscribed thickening of the interstitial and intralobular septa and areas of Ground Glass Opacity (GGO)

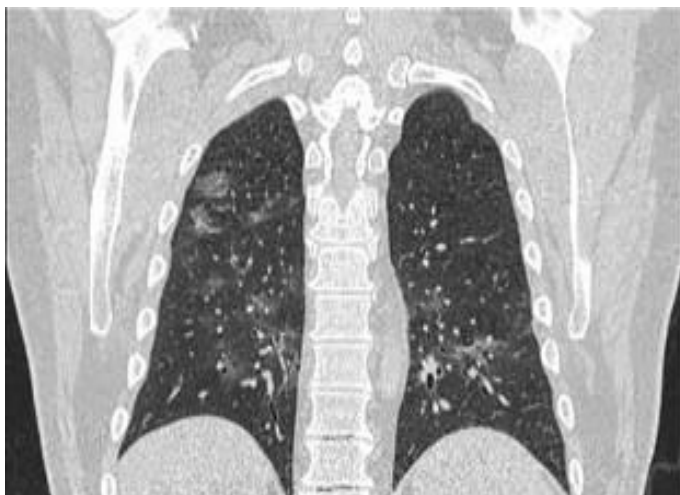


Figure 3. CT shows multilobar and subpleural GGO and crazy paving

and circumscribed thickening of the interstitial and intralobular septa, with subpleural Ground Glass Opacity (GGO) at the expense of both upper lobes, at the rear and at the baseline bilateral and paravertebral bilaterally. (Figure 2) A nasopharyngeal swab was positive for 2019-nCoV.

After two days a 66-old man, brother of the first and son of the second women, presented to the hospital with 6-day history of fever and cough. At admission, his body temperature was 36.3°C. Normal breath sounds of both lungs were heard at auscultation. Laboratory showed: WBC 4.100 mmc, Ly 890 mmc, CRP 39 mg/L. CT showed GGO and crazy paving areas located on the periphery bilaterally (Figure 3). Pharyngeal swab was positive for 2019-nCoV. After the diagnosis of 2019-nCoV pneumonia was made, patients were immediately isolated for clinical monitoring and treatment. They received antiviral therapy and hydroxychloroquine for 10 days. After few days the patients reported symptoms relief; they never needed oxygen support.

DISCUSSION

Polymerase chain reaction (RT-PCR) is the standard of reference for confirming COVID-19 or sequencing, but in an emergency setting the results are not immediately available. In a context of epidemic condition, Computed tomography (CT) can be used as an important complement to RT-PCR for diagnosing COVID-19 pneumonia. Compared to Chest X

Ray, the greater sensitivity of CT for early pneumonic changes is more relevant in the setting of a public health approach that required isolation of all infected patients (7). Even if more than 50% of patients examined during the first two days following symptom onset may have normal radiological findings, CT has crucial role in the early detection and management of COVID-19 pneumonia (8). Some authors reported a 97% sensitivity of chest CT for the diagnosis of COVID-19 (9).

A wide variety of CT findings in COVID-19 have been reported, but the main radiological findings are multilobar, peripheral and sub-pleural Ground Glass Opacities (GGO) (10). Sometimes there are intralobular reticulations, resulting in a crazy paving pattern or areas of focal consolidation. In typical clinical course, CT features change over time, according to the phase and severity of the pulmonary injury. The lung manifestations increased quickly after the onset of symptoms and peaked around 6-11 days. After the second week, a mixed pattern with architectural distortion, consolidation and aspect suggestive of Organizing Pneumonia (OP) became most predominant (11, 12, 13). In the late stage, an increase in GGO had been observed. It is noteworthy that in patients with clinical worsening not explained by an extension of the parenchymal injuries, pulmonary embolism should be suspected and a contrast-enhanced CT examination should be performed (14,15).

In this case series, all patients show radiological findings suggestive for COVID 19 pneumonia. Most pulmonary lesions involved bilateral lungs with multiple lung lobes, with predominant distribution in posterior and peripheral part of the lungs. Despite the evidence about comorbidity, age and prognosis, the youngest woman was the patient with the more severe pulmonary radiological findings. We believe that this is probably due to a higher inflammatory response at the onset of the disease as demonstrated by fever, lymphopenia state and the elevated level of CRP.

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Conflict of Interest Disclosure: The authors declare that they have no conflict of interest.

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