

Crazy Paving in Crazy Corona - Rare HRCT Finding of COVID19

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Abstract

COVID19 can manifest itself radiologically in a wide array of fashion and Chest HRCT is a highly sensitive although not very specific for confirming for COVID-19 diagnosis in patients with high clinical suspicion of infection but with negative RT PCR. Common radiological presentation includes minimal basal infiltrates extending towards ill-defined peripheral based infiltrates giving impression of Vats's reverse pulmonary edema sign in chest X ray and HRCT which could be very sensitive and specific for the moderate to severe covid with underlying clinical presentation and in covid RT PCR positive patients. Crazy paving is unusual sign and found classically in the pulmonary alveolar proteinosis and some other rare diseases. Hence Crazy paving should also be considered as a distinct HRCT feature of COVID Pneumonia with underlying classical clinical history and presentation in a COVID RT PCR positive patients and even in RT PCR negative patients, COVID should be actively considered as important differential diagnosis in such classical clinical history and presentation patients.

Keywords: COVID19; RT PCR; HRCT

Introduction

COVID19 can manifest itself radiologically in a wide array of fashion and Chest HRCT is a highly sensitive although not very specific for confirming for COVID-19 diagnosis in patients with high clinical suspicion of infection but with negative RT PCR.

Case History

A 69 yrs old male Patient was referred from ER with presentation of Dizziness since 4 days, attended private hospital found to have high blood sugar reading advised to continue medication, toady 2 hours back suddenly felt dizzy, unable to stand due to weakness, with episodes of vomiting 5 times a day before admission, generalized weakness, poor appetite, fever and on and off dry cough for 4 days.

On clinical examination: Physically active, comfortable, alert, conscious, hemodynamic/vitals stable and febrile (38°C (100.4°F)). On auscultation - Chest bilateral harsh vesicular breath sounds, Per abdomen -- soft, nonsignificant, CVS - S1, S2 normal, no murmur, Family history/Social and personal History was nonsignificant. Patient had Type 2 diabetes mellitus for 14 years Hb1 AC-10.7, but no pertinent surgical history. Denied history of COVID-19 infection and any contact with positive case.

Review of systems revealed constitutional: Well oriented to person, place and time, well-developed and well-nourished. HENT: Head: Normocephalic and atraumatic. Eyes: Pupils are equal, round and reactive to light. EOM are normal. Neck: Normal range of motion. Car-

diovascular: Normal rate and regular rhythm. Pulmonary/Chest: Effort normal and breath sounds normal. Abdominal: Soft. Bowel sounds are normal. Musculoskeletal: Normal range of motion. Neurological: He is alert and oriented to person, place and time. Skin: Skin is warm and dry. Capillary refill takes more than 3 seconds. Psychiatric: He has a normal mood and affect. His behaviour was normal. No Known drug or food Allergies. Pain Score: 0, MEWS score: 0.

Routine labs revealed - WBC $7.5 \times 10^3/uL$, Hb 13.7 g/dL, neutrophil 84%, lymphocyte 12%, Renal (urea electrolytes and creatinine) and liver functions were normal, C-Reactive Protein- 258. ABG revealed hypoxia on room air without CO₂ retention, Ferritin 1942 ng/mL, LDH 445 U/L, Procalcitonin (PCT) 0.26 ng/mL. PT/APTT/INR were within normal limits, novel coronavirus RNA PCR SWAB was negative.

Chest Xray (Figure 1) showed bilateral mid base and lower zone areas of peripheral consolidations, more so on left side suggestive of COVID pneumonia.



Figure 1: Bilateral mid base and lower zone areas of peripheral consolidations, more so on left side suggestive of COVID pneumonia.

In view of classical complain (loss of taste sensation and respiratory complain) and suggestive labs (high ferritin, lymphopenia) favouring COVID-19 infection, hence pt was admitted in isolation, Started on conventional broad spectrum parenteral antibiotics, started on empiric beta-interferon nebulizers and favipravir for 5 days, methylprednisolone 40, enoxaparin, stress ulcer prophylaxis, blood sugar control and supportive treatment.

CXR (Figure 2) next day revealed worsening increased ground-glass infiltrates over the right mid and lower zones and minimally at the left upper zone. The ground-glass infiltrates over the left mid and lower zones, however not significantly changed, No detectable effusion. Findings are likely due to COVID Pneumonia.



Figure 2: Follow-up chest X-ray: PA view compared with earlier chest x-ray dated 02/09/2020 shows increased ground-glass infiltrates over the right mid and lower zones and minimally at the left upper zone. The ground-glass infiltrates over the left mid and lower zones, however not significantly changed (vats reverse pulmonary edema sign present). Impression: Findings are likely due to COVID Pneumonia.

High-resolution nonenhanced axial CT sections of the chest with coronal and sagittal reformatted images. Report: Both lungs show normal volume with altered parenchymal architecture. Evidence of large areas of crazy paving in both lungs, all lobes with ground glass and septal thickening and secondary lobular ground glass opacification with occasional areas of consolidation. Lesions are mainly in the peripheral zones. No evidence of obvious bronchiectasis changes. In the anterior aspect of the upper lobes, there are apparent cystic changes possibly representing emphysema with superimposed inflammatory ground glass opacities rather true cysts, however if clinically warranted a Follow up HRCT after 3 months can be helpful. No sufficient pulmonary findings to suggest fibrosis Mediastinal structures fairly appear within normal limits. Multiple lymph nodes in the mediastinum measuring up to 18 X 11 mm in peritracheal, paraaortic and aortopulmonary windows. No evidence of obvious pleural effusion. Dense calcifications of the coronary vessels. Liver and spleen appear normal in the visualized upper abdomen. Conclusion: Findings are in favor of alveolar proteinosis. Other most probable diagnosis is COVID related pneumonia (COVID spectrum). Differentials Diagnosis includes NSIP, sarcoid, organizing pneumonia, infection, pulmonary edema, pulmonary hemorrhage and other differentials.

COVID-19 antibody came positive, although repeat swabs were also negative. Patient was investigated by Bronchoalveolar Lavage to rule out other causes like nocardia, PCP, nontuberculous mycobacterial and TB as his CT findings are not classical for COVID-19 infection, however all the reports were negative supporting the diagnosis of COVID 19.



Figure 3



Figure 4



Figure 5



Figure 6

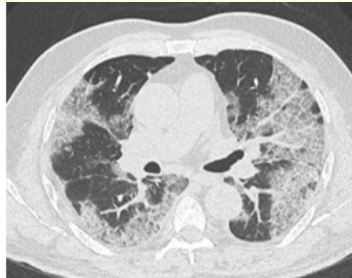


Figure 7

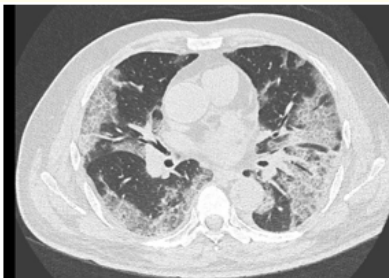


Figure 8



Figure 9

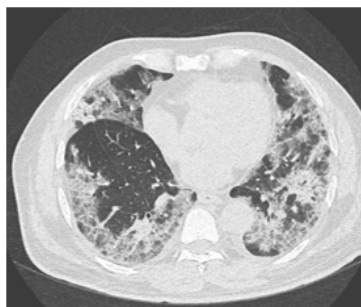


Figure 10

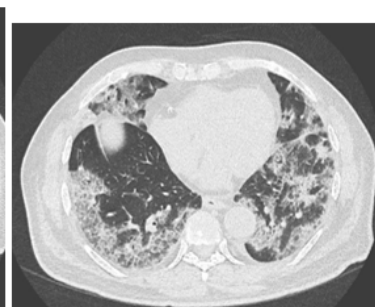


Figure 11

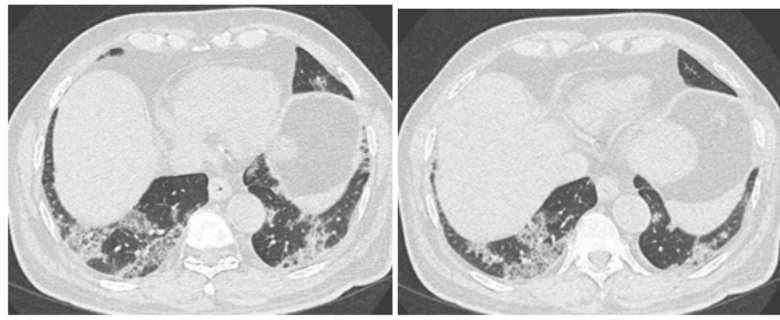


Figure 12

Figure 13



Figure 14: Follow up CXR after 4 weeks showing near complete resolution of infiltrates after course of prednisolone.

Discussion

In our opinion, given the rarity of pulmonary alveolar proteinosis, the imaging findings are suggestive of extensive organizing pneumonia (can be idiopathic? cryptogenic- or secondary to e.g. viral infection, occasionally seen in bacterial infections, inflammatory diseases, or drug reaction). Differential diagnosis includes:

- 1. Pulmonary alveolar proteinosis:** Patient had very short history of 4 days classically suggestive of COVID and COVID IgG came positive suggestive of POST COVID infection. BAL GM CSF was negative and no culture for TB, AFB, or respiratory pathogen were positive hence ruled out any bacterial or tubercular or NTM infection and there was no history of drug intake in the recent past except for his routine DM medicine [1].
- 2. Non-specific interstitial pneumonitis:** Nonspecific interstitial pneumonia (NSIP) is an idiopathic interstitial pneumonia. It is much less common than idiopathic pulmonary fibrosis (IPF). Most patients are women, age range 40 and 50 and have no known cause. However, a similar pathologic process can happen in connective tissue disorder, drug induced pulmonary disease and hypersensitivity pneumonitis. Usually, patient present with dry cough and dyspnoea for months to years [2,3].

- 3. Sarcoidosis:** Sarcoidosis is a systemic entity characterized by the development of noncaseating granulomatous inflammation. Although the most common parenchymal findings include irregular thickening of the bronchovesicular bundles and small nodules along vessels, alveolar sarcoidosis can manifest as ground-glass attenuation and crazy-paving attenuation [4].
- 4. Pulmonary edema:** There was no cardiac history and CXR was not having classical batwing appearance and cardiac enzymes were normal. Initial CXR showed vats reverse pulmonary edema sign which is very commonly found in COVID patients.
- 5. Pulmonary hemorrhage:** Patient was not having any diffuse interstitial and alveolar infiltrates and no hemoptysis and no drop in Hb hence pulmonary hemorrhage was ruled out.

The diagnosis is based on reverse transcription-polymerase chain reaction (RT-PCR) or gene sequencing of sputum, throat swab or lower respiratory tract secretions. It is emerging that chest CT, thanks to its high sensitivity (98%), could play a critical role in the diagnosis of COVID-19 at the early stage of infection when chest X-ray is often negative or in patients with negative RT-PCR results but high clinical suspicion of infection [5].

A Chinese retrospective study conducted on 21 patients with COVID-19 reported that on chest CT 71% of cases presented bilateral involvement, 57% ground-glass opacities, 33% rounded opacities, 33% peripheral distribution, 29% consolidation with ground-glass opacities and only 19% of the patients presented crazy-paving pattern [6]. Classically, moderate to severe COVID shows Vats's reverse pulmonary edema sign, sparing the periphery and apexes and then can go to ARDS with diffuse involvement of both lungs [7].

In our case HRCT showed a unilateral crazy paving pattern with ground-glass opacity superimposed by interlobular and intralobular septal thickening, resembling irregular paving stones. It could be considered the result from the alveolar oedema and interstitial inflammatory of acute lung injury [4] and although is less frequent than ground-glass opacities, it must be considered as suggestive for COVID-19, entering progressive or peak stage [8].

Our patient was continued on the same treatment and over the time improved and was discharged after resolution of symptoms on the prednisolone and asymptomatic treatment. Follow up CXR after 4 weeks showed near complete resolution of infiltrates after course of prednisolone and patient responded very well.

Conclusion

COVID19 can manifest itself radiologically in a wide array of fashion and Chest HRCT is a highly sensitive confirming for COVID-19 diagnosis in patients with high clinical suspicion of infection but with negative RT PCR. Hence Crazy paving should also be considered as a distinct HRCT feature of COVID Pneumonia.

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