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The potential role of TNFα in 2019 novel coronavirus pneumonia

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ABSTRACT

The outbreak of 2019 novel coronavirus has spread rapidly in multiple countries. We report the first case of 2019-nCoV infection in a patient with Ankylosing Spondylitis (AS), who was a biological agent (anti-TNFα) user in Wenzhou, China, and describe the clinical course and management of the case.

1. Introduction

On December 31, 2019, a novel coronavirus infection erupted in Wuhan, China, and spread rapidly [1,2]. As of March 4, 2020, a total of 80,424 cases had been reported in China, with 2984 fatal cases. But all the 504 cases that reported in Wenzhou, China, only two had a history of rheumatic disease, as we knew. Here we report 1 case of an Ankylosing Spondylitis (AS) patient under anti-TNFα therapy infected with 2019 novel coronavirus (2019-nCoV).

Written consent was provided from the patient included in this report. The Ruian City People's Hospital institutional review board (IRB) does not require IRB approval for case report describing 1 patient.

1.1. Case presentation

On January 25, 2020, a 48-year-old male who suffered from fever for 3 days went to local hospital to see a doctor. His highest body temperature reached 39 °C, accompanied with chills, cough and fatigue. He disclosed that he had close contact with his son who had returned to Ruian on January 17 from Wuhan, China. Chest radiography, blood routine and 2019-nCoV nucleic acid test was undertaken with suspected novel coronavirus pneumonia (NCP). Only stripes of the lower lobe of the left lung was found by the chest radiography (Fig. 1a). One day later, the Centers for Disease Control and Prevention (CDC) of Wenzhou confirmed that the patient's oropharyngeal swabs tested positive for 2019-nCoV. On January 28, 2020, the patient was admitted to an airborne-isolation unit at local hospital.

The patient had a history of AS for 2 years and using Tumor Necrosis Factor-α(TNF-α) inhibitor to control disease (25mg per times, 8 times for the first month, 4 times for the second month, then reduced to 2 times one month, and recently 1 times every 50 days, the last injection was 50 days ago). In addition, he had a history of hypertriglyceridemia and hypertension, but no history of smoking. The physical examination revealed no obvious abnormalities. After admission, the patient received supplemental oxygen, antiviral (lopinavir and ritonavir tablets, interferon α2β) and antibacterial (moxifloxacin) therapy.

On days 2 through 7 of hospitalization, the patient continued to report a nonproductive cough, fatigued and intermittent fevers, followed by abdominal discomfort and diarrhea. Laboratory results on hospital days 2 showed elevated levels of creatine kinase, ferritin, C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR), lower percentage of lymphocytes. Computerized tomography (CT) taken on hospital day 1 showed infiltrates in lower lobe of both lung (Fig. 1b). A second CT from hospital day 4 showed more obvious evidence of pneumonia (Fig. 1c), and arbidol tablets was added to strengthen antiviral therapy.

A third CT (hospital day 8) showed no obviously improvement of the pneumonia (Fig. 1d). Then methylprednisolone 80 mg daily was added to alleviate alveolar inflammation, which was reduced regularly. Rechecked CT (hospital day 10 and day 18) showed the previous infiltrates lesion absorption (Fig. 1e and f). On hospital day 14, the patient's oropharyngeal swabs tested negative for 2019-nCoV. On hospital day 18, the patient's clinical condition improved significantly.

2. Discussion

This case of report, to our knowledge, is the first case of 2019-nCoV infection in a AS patient who was a regular TNF-α inhibitor user. The

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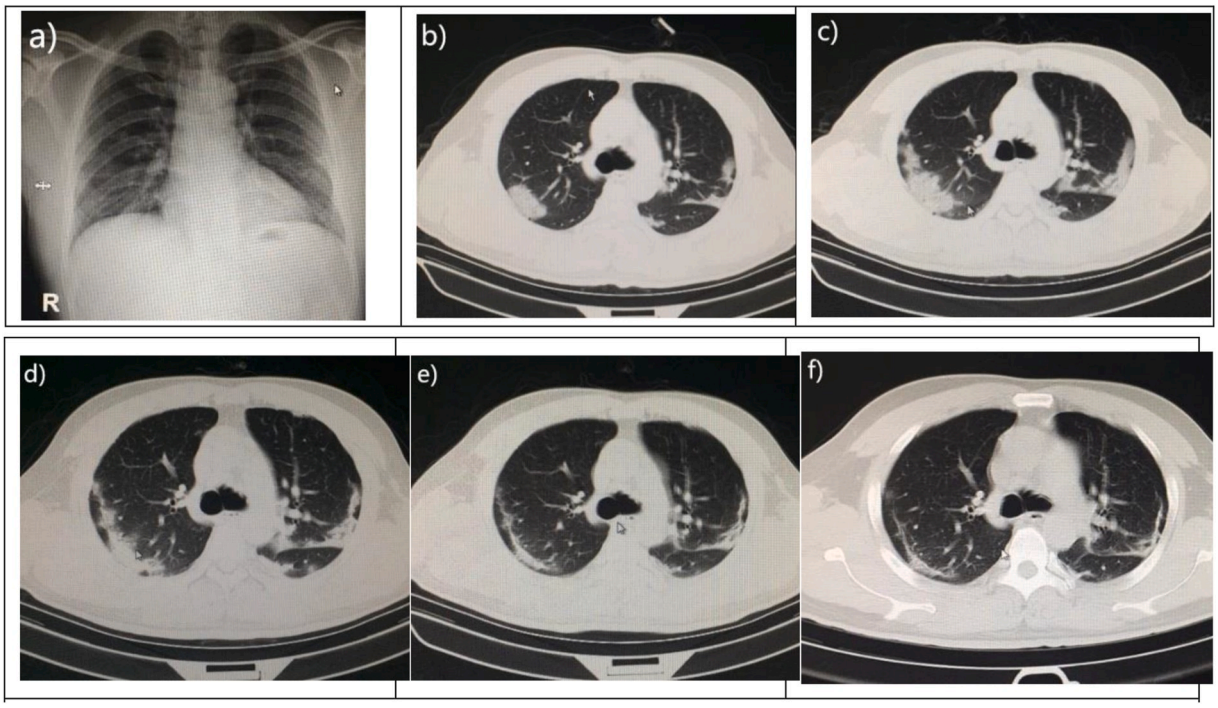

Fig. 1. a) Posteroanterior Chest Radiographs, January 25, 2020. b–f: Computerized Tomography. b) January 28, 2020; c) January 31, 2020; d) February 04, 2020; e) February 06, 2020; f) February 14, 2020.
a: Stripes shadow of the lower lobe of the left lung.
b-c: Infiltrates shadows in the lung bases were visible, indicating likely atypical pneumonia; the infiltrates lesions have steadily increased over time.
d-f: the previous bilateral lower-lobe infiltrates lesion absorption as time passed by.

dosing interval was a bit longer than usual usage due to low disease activity of AS. We found low incidence of NCP in rheumatic disease patient, and the reason remain unclear.

Recent study reported that the pathological of 2019-nCoV manifested with increased CCR4+ Th17 cells which may lead to high levels of cytokine [3]. Some studies also found patients infected with 2019-nCoV had high amounts of cytokine, including IL2, IL10, and TNFα [4]. Pulmonary epithelia damage leading to respiratory distress syndrome (ARDS) can be a consequence of a cytokine storm, consist of IL-1β, TNF [5]. Anti-TNFα may have a protect effect as a decrease in serum TNF-α and IL-1β is associated with decreased lung injury and lethality in rats [6]. And earlier infliximab (anti-TNFα monoclonal antibody) administration is associated with better therapeutic result and prognosis in patient with dermatomyositis with acute interstitial pneumonia [7]. Since no-specific treatment has been recommended for 2019-nCoV infection, anti-TNFα therapy may be a potential treatment for NCP.

Despite its anti-inflammation effect, exposed to anti-TNF agent may increase risk of all infections, markedly bacterial and fungal opportunistic infections [8,9]. This patient had normal levels of cytokine, which may due to his pervious injection of TNFα. But the true role of TNFα in NCP remain unknown, and whether anti-TNF therapy is benefit for NCP need more real world data.

3. Conclusion

In the study, we presented a case of patient with rheumatic disease under anti-TNFα therapy infected with 2019-nCoV. Anti-TNF therapy may have positive effect in NCP.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.rmcr.2020.101087.

CRediT authorship contribution statement

Wenjing Ye: Conceptualization, Writing - original draft. Saisai Lu: Conceptualization, Writing - original draft, Resources, Writing - review & editing. Ali xue: Supervision, Writing - review & editing.

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