TB reactivation, a consequence of COVID-19 acquired immunodeficiency?

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COVID-19 has been associated with lymphopenia secondary to direct effects of SARS-CoV-2 virus on lymphocytes. We report on a case of an elderly patient with previous pulmonary TB, recently diagnosed with COVID-19 complicated by lymphopenia and TB reactivation. We intend to alert clinicians to have a high index of suspicion for TB during the COVID-19 pandemic, especially in TB endemic regions such as South Africa (SA). We further review the mechanism by which SARS-CoV-2 infection may lead to TB reactivation.

Introduction

Acquired immunodeficiency has a potential to predispose the host to opportunistic infections. We discuss a case of COVID-19 induced T-cell immune deficiency complicated by pulmonary TB reactivation.

Case report

We report on an HIV negative 65-year-old male smoker who was previously diagnosed with smear positive pulmonary TB in 2017 and was adequately treated. However, he was complicated by post-tuberculous chronic lung disease.

He presented suggestive of COVID-19, subsequently his SARS-CoV-2 RT-PCR test was positive. After reviewing his chest radiograph (Figure 1), and blood tests revealing a leukocytosis with lymphopenia, raised a suspicion of a superimposed bacterial pneumonia versus recurrent TB. He was treated with empiric broad-spectrum antibiotics. The sputum Auramine stain and GeneXpert were positive for TB and sensitive to Rifampicin. He was started on anti-TB therapy. Unfortunately, our patient succumbed to the pulmonary TB and COVID-19 co-infection.

Discussion

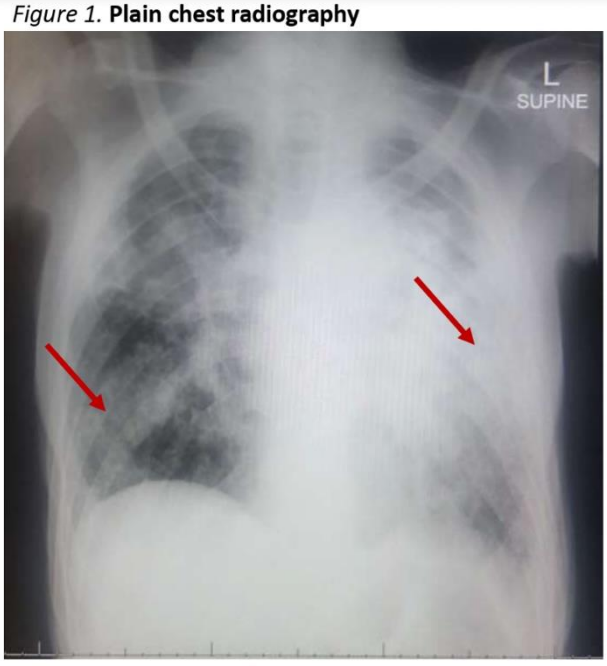
SARS-CoV-2 leads to an immunodeficiency secondary to lymphocyte depletion. Lymphocytes possess the ACE-2 receptors on their surface that attaches to the Spike protein (S-protein) on the surface of the virus for endocytosis. The lymphocytes undergo apoptosis once the virus is endocytosed. Direct injury to other lymphatic organs such as the thymus and spleen can't be ruled out as yet until further studies have been performed.

Tuberculous granulomas are made up of a variety of cells including Macrophages capable of forming multinucleated Langhans giant cells (LGCs) also known as epithelioid cells, monocytes derived dendritic cells, foamy macrophages, neutrophils and lymphocytes. The latter accounts for 15-50% of leukocytes forming the granuloma. Therefore a lymphopenia may result in immunodeficiency capable of tuberculous granuloma instability, compromising the immune mediated Mycobacterium tuberculosis (MTB) containment.

Learning points

- COVID-19 is associated with T-cell immunodeficiency.
- SARS-CoV-2 induced lymphopenia may predispose to TB reactivation.

Figure 1. **Plain chest radiography**



Arrows: Pulmonary infiltrates.