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Interesting Cases

Development of Disseminated Drug-resistant Tuberculosis in an Immunocompetent Patient after COVID-19 Infection

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A B S T R A C T

Background: The COVID-19 pandemic which has spread at an alarming pace over the last 2 years has mutualism with yet another older, and often overlooked airborne disease, tuberculosis. The repercussions of the COVID-19 pandemic, with multiple waves making the situation even worse and our worldwide response to it with lockdowns, are in all probability going to leave an extreme and persistent effect on the diagnosis as well as control of TB. It is expected to lead to a further 6.3 million more cases of TB along with an extra 1.4 million deaths because of TB in the duration of 2020 to 2025. We present the following case which shows a rapid development of disseminated TB after COVID-19 infection in an otherwise immunocompetent child.

Case Report: An 11-year-old, female child, came with complaints of fever for 2 months and productive cough for 15 days. On evaluation, the child had tachypnoea and pallor with bilateral fine crepitations. Her SpO2 was 94%. Chest X-ray was suggestive of miliary shadows. Sputum for gene Xpert was positive for MTB with rifampicin resistance. CT brain revealed ring-enhancing lesions with perilesional oedema with shaggy meningeal enhancement. CECT thorax and abdomen showed diffuse miliary nodules with necrotic mediastinal lymphadenopathy and bilateral bulky kidneys with cortical hypodense areas, and early features of pyelonephritis. Urine gene Xpert was also positive for MTB with rifampicin resistance. An ophthalmic examination revealed multiple choroid tubercles. Her COVID-19 antibodies came positive with high inflammatory markers pointing towards post-COVID MIS-C.

Conclusion: She was treated with DR-TB regimen and for MIS-C. She showed clinical and radiological improvement and was discharged on ATT.

Keywords: Disseminated TB, Drug Resistant TB, COVID-19 Pandemic, Paediatric TB, Post-COVID MIS-C

Introduction

The COVID-19 pandemic which has spread at an alarming pace over the last 2 years has mutualism with yet another older and often overlooked airborne disease, tuberculosis. An emerging threat of the pandemic is the development of disseminated TB in an otherwise immunocompetent child. With a decrease in the access to diagnostic and treatment facilities, and due to immunosuppression post-COVID infection, patients with latent TB infection may progress to active tuberculosis. To see the repercussions of the collision of these two dark forces, we present you a case of an 11-year-old girl, who developed disseminated DR-TB (drug-resistant TB) post-COVID-19 infection.

Case Summary

A 11-year-old, female child (immunised for age), presented with chief complaints of fever for 2 months, and cough for 15 days. A history of weight loss was also present along with history of death of her younger sibling, a 9-year-old female, 3 months back due to CNS TB. No history was reported of similar complaints in the past. On examination, the child was conscious and oriented, with a respiratory rate of 40/min (tachyponea+), SpO_2 of 94% on room air, heart rate of 110/min, and BP of 110/70 mmHg. Pallor was seen. BCG scar was seen. Weight was 32 kg and height was 142 cm, falling between 0 to -1 SD. On auscultation, air entry was present with bilateral fine crepitations. The liver was palpable 2 cm below the right costal margin. Laboratory evaluation revealed the following: CBC Hb: 10.2 gm%, WBC: 4000/mm3, platelets: 2,21,000/mm3, N/L: 73/24%, sodium: 138 meq/dl, and potassium: 3.5 meq/dl. Chest X-ray was suggestive of miliary shadows (Figure 1). Mantoux was negative, and HIV was non-reactive. Sputum for gene Xpert was positive for mycobacterium tuberculosis with rifampicin resistance. CECT thorax and abdomen revealed diffuse miliary nodules with necrotic mediastinal lymphadenopathy and bilateral bulky kidneys with cortical hypodense areas in the mid and lower pole of the right kidney, and early features of pyelonephritis (Figures 2 and 3). CECT brain showed multiple ring-enhancing lesions, largest (4x3 mm) with peri lesions oedema with shaggy meningeal enhancement s/o tubercular meningitis with tuberculomas (Figure 4). Ophthalmologic examination showed multiple choroidal tubercles (Figure 5). Urine gene Xpert was also positive for MTB with rifampicin resistance. After the commencement of DR-TB regimen, the child continued to have high-grade fever spikes and developed oral mucosa ulcers, hence she was tested for COVID antibodies which came out positive (Figure 6). CRP came positive (60.1 mg/dl), ESR was 40mm/hr, LDH was 3428 U/L, D-dimer was high (3710 ng/ml) with 379 mg/dl (high) triglycerides and an absolute lymphocyte count of 940. Therefore she was diagnosed with post-COVID MIS-C[1] (Multisystemic Inflammatory Syndrome in Children). 2D echo (to rule out coronary dilatation) was normal, and coronary artery dimensions fell into normal standard deviation.

Treatment

She was started on a longer MDR regimen containing bedaquiline. Inj. MPS and inj. LMWH were started for MIS-C. She was later tapered to oral prednisolone.

Outcome

The child responded to the treatment, and her repeat inflammatory markers declined. She became afebrile, vitally stable, and was discharged on ATT (Table 1).

Table 1.Comparison of Inflammatory Markers Before and After Treatment

Inflammatory Markers	Before Treatment	After Treatment
C-reactive protein	60.1 mg/dl	0.6 mg/dl
ESR	40 mm/hr	24 mm/hr
LDH	3428 U/L	552 U/L
Ferritin	312.9 ng/ml	-
D-dimer	3710 ng/ml	130 ng/ml

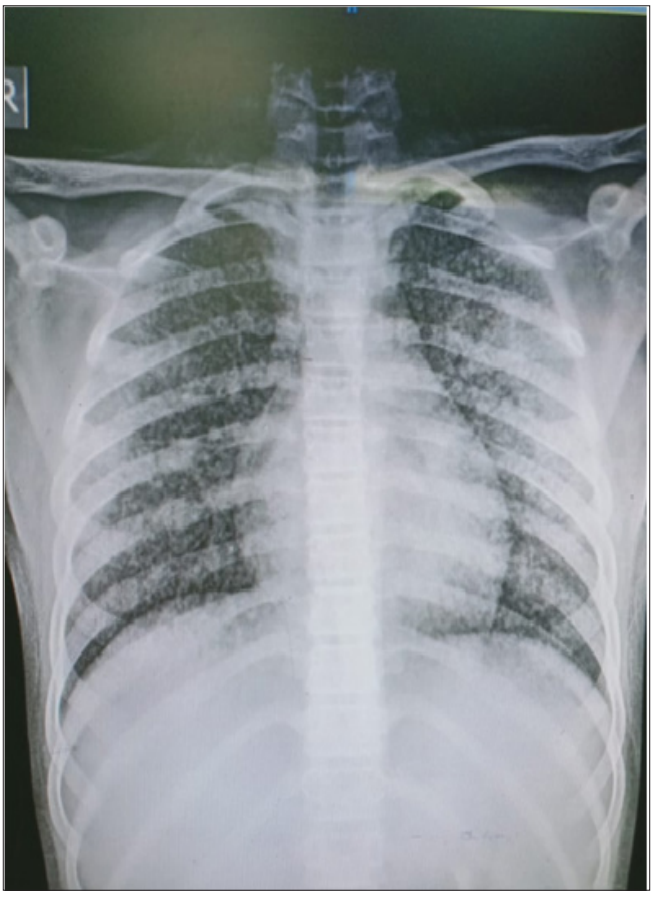


Figure 1.Chest X-Ray Showing Miliary Tubercles

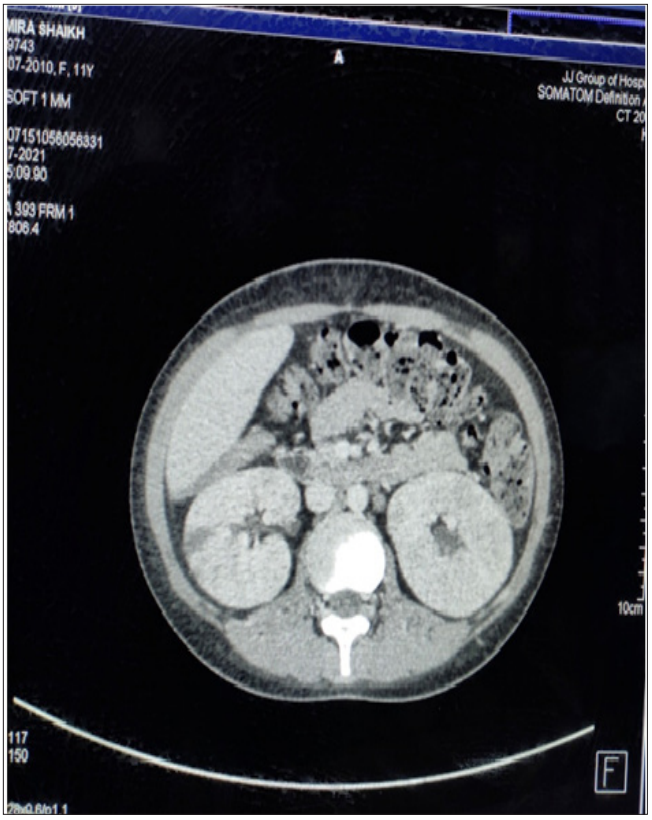


Figure 2.CECT Abdomen Showing Pyelonephritis

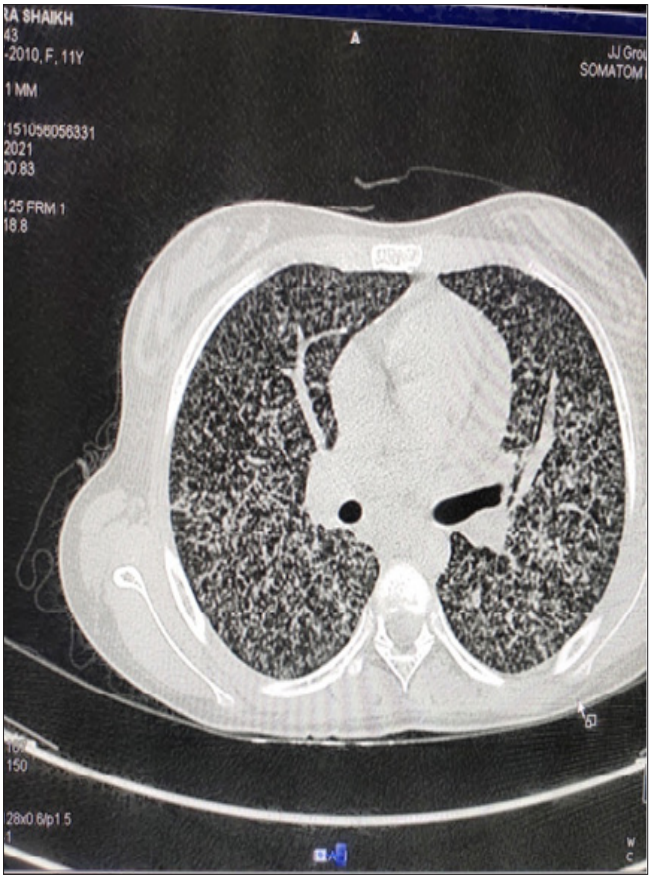


Figure 3.CECT Thorax Showing Miliary Tubercles

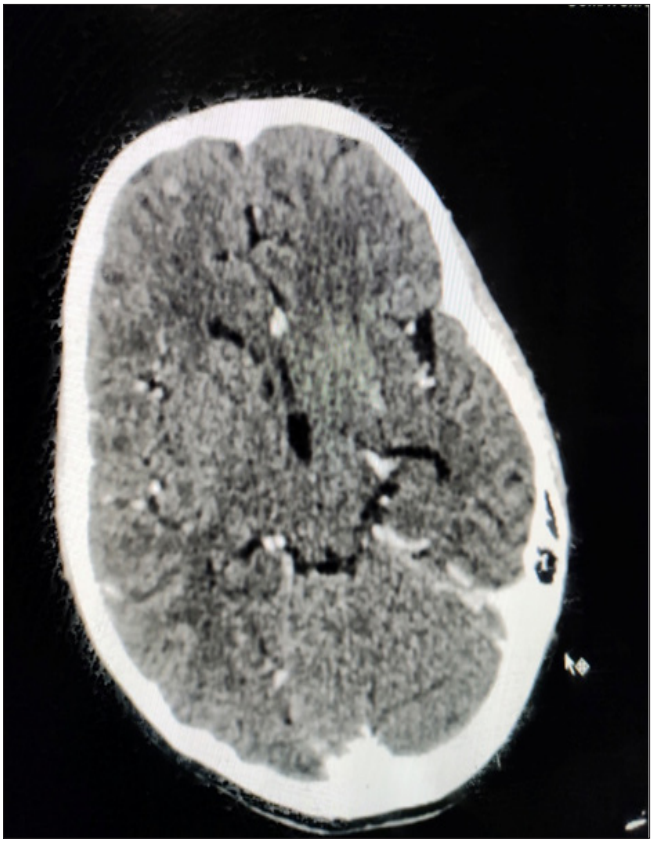


Figure 4.CT Brain Showing Tuberculoma

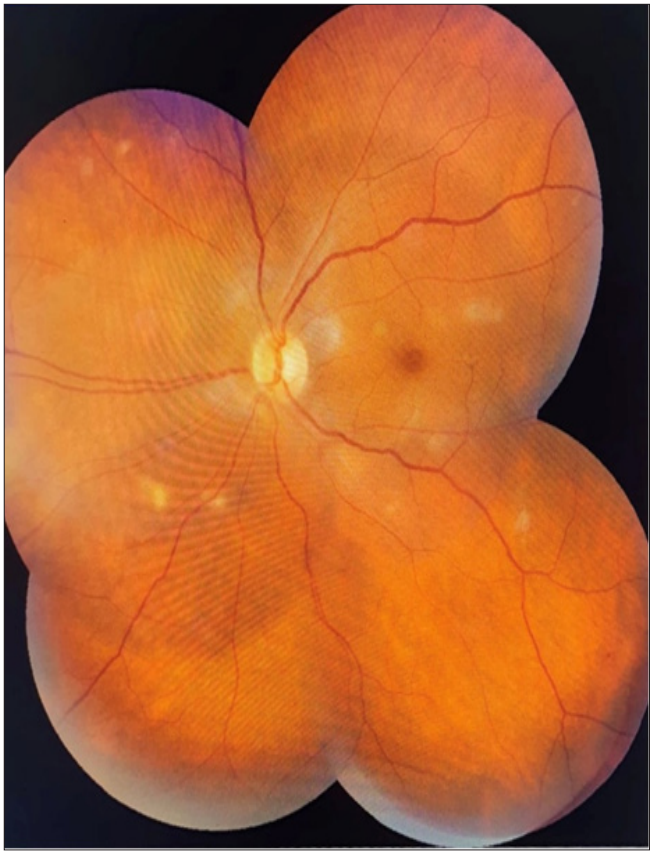
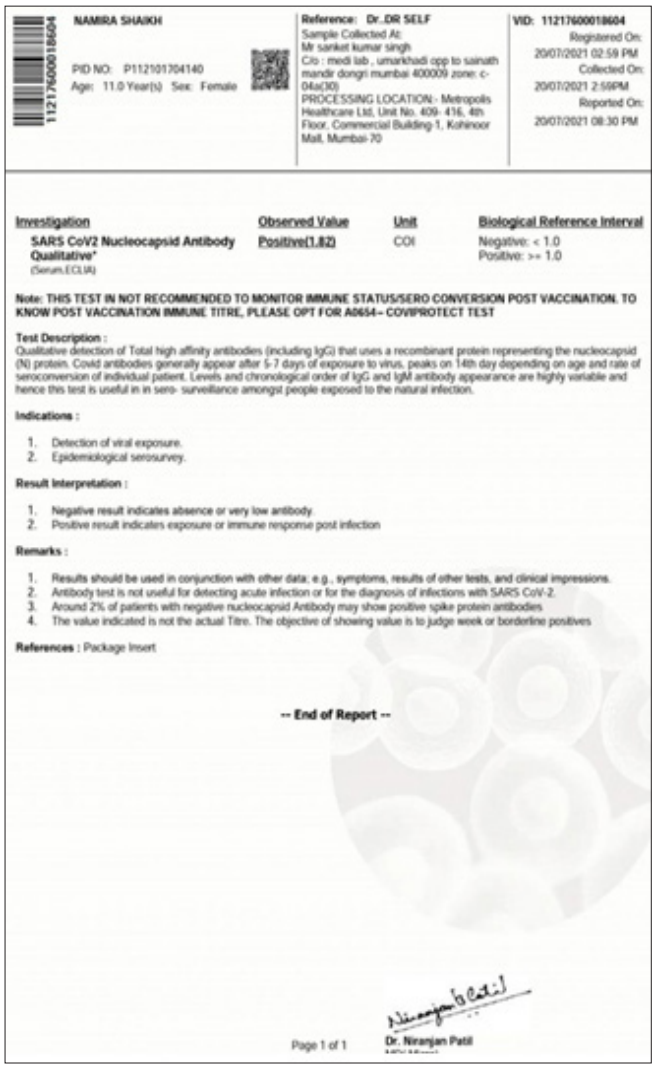


Figure 5.Choroid Tubercles



NAMIRA SHAIKH
PID NO: P112101704140
Age: 11.0 Year(s) Sex: Female

Reference: Dr..DR SELF
Sample Collected At:
Mr sanket kumar singh
C/o : medi lab , umarkhadi opp to sainath mandir dongri mumbai 400009 zone: c-04ac(30)
PROCESSING LOCATION - Metropolis Healthcare Ltd, Unit No. 409- 416, 4th Floor, Commercial Building 1, Kohinoor Mall, Mumbai-70

VID: 112176000018604
Registered On: 20/07/2021 02:59 PM
Collected On: 20/07/2021 2:59PM
Reported On: 20/07/2021 08:30 PM

Investigation	Observed Value	Unit	Biological Reference Interval
SARS CoV2 Nucleocapsid Antibody Qualitative* (Serum,ECLIA)	Positive(1.82)	COI	Negative: < 1.0 Positive: >= 1.0

Note: THIS TEST IN NOT RECOMMENDED TO MONITOR IMMUNE STATUS/SERO CONVERSION POST VACCINATION. TO KNOW POST VACCINATION IMMUNE TITRE, PLEASE OPT FOR A0654– COVIPROTECT TEST

Test Description :
Qualitative detection of Total high affinity antibodies (including IgG) that uses a recombinant protein representing the nucleocapsid (N) protein. Covid antibodies generally appear after 5-7 days of exposure to virus, peaks on 14th day depending on age and rate of seroconversion of individual patient. Levels and chronological order of IgG and IgM antibody appearance are highly variable and hence this test is useful in in sero- surveillance amongst people exposed to the natural infection.

Indications :
1. Detection of viral exposure.
2. Epidemiological serosurvey.

Result Interpretation :
1. Negative result indicates absence or very low antibody.
2. Positive result indicates exposure or immune response post infection

Remarks :
1. Results should be used in conjunction with other data; e.g., symptoms, results of other tests, and clinical impressions.
2. Antibody test is not useful for detecting acute infection or for the diagnosis of infections with SARS CoV-2.
3. Around 2% of patients with negative nucleocapsid Antibody may show positive spike protein antibodies
4. The value indicated is not the actual Titre. The objective of showing value is to judge week or borderline positives

References : Package Insert

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Page 1 of 1
Dr. Niranjan Patil

Figure 6.Patient Report Showing Positivity for COVID Antibody

Discussion

In all probability, the result of the COVID-19 pandemic on the age-old bacterial disease TB is going to be catastrophic. TB has a bidirectional relationship with COVID-19.[2] The short-term suppression of immunity caused by TB can make an individual susceptible to COVID-19. Similarly, COVID-19 can lead to an enhancement in vulnerability to TB.

In a study conducted in Wuhan, 76% of the participants who were COVID positive, had substantial depletion within T-cell lymphocyte counts. A drastic decrease in counts of CD8 and CD4 was seen.[3]

Patients with latent TB may develop active TB due to T-cell depletion and dysfunction. Post COVID, the development of multi-system inflammatory syndrome in children leads to immune dysregulation, which can render an otherwise immunocompetent child susceptible to active TB infection. Moreover, the ongoing pandemic and multiple waves making the situation even worse and our worldwide response to it with lockdowns, are in all probability, going to leave an extreme and persistent effect on the diagnosis as well as controlof TB.[2]

Conclusion

Post-COVID-19 immune function abnormalities may cause an increase in TB cases due to the reactivation of latent TB or new infection. In children, the development of post-COVID MIS-C is a menace which can potentially lead to the dissemination of TB.

Source of Funding: None

Conflict of Interest: None

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