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## CASE REPORT

# Total Unilateral Collapsed Lung- A Sequela of Pulmonary Tuberculosis- and Pregnancy Outcome

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## ABSTRACT

Lung tissue damage after pulmonary tuberculosis is common and can result in persistent pulmonary disability with a negative influence on a patient's quality of life. On the other hand, a COVID-19 infection in a previously treated tuberculosis patient with residual pulmonary abnormalities imposes an increased risk of death. On their own, both diseases can have a devastating effect on a patient's pulmonary system and as such be the cause of disability or even death. In this case report of total atelectasis of the left lung due to obliteration of the left main bronchus after tuberculosis treatment, we present a pregnant patient, who despite a significant reduction in pulmonary function, managed to have a pregnancy with a favorable outcome. Thereafter the patient even recovered from a COVID-19 infection, illustrating the resilience of the human body.

## Introduction

According to the World Health Organization, an estimated quarter of the global population is infected with tuberculosis (TB). In 2021 about 10.6 million people fell ill with tuberculosis of whom 6.7% were people living with HIV, 450,000 incident patients had multi-drug resistant TB or rifampicin-resistant tuberculosis and about 1.6 million people died of tuberculosis. As such tuberculosis is the second leading cause of infectious death after COVID-19. Moreover, persistent lung tissue damage after pulmonary tuberculosis is common, ranging from pulmonary cavitation to fibrosis and bronchiectasis, airflow obstruction, restrictive ventilatory defects, and impaired diffusion capacity. Other complications could be lobar or multi-lobe atelectasis of the lung caused by caseous material, hemoptysis followed by blood clots, thick inspissated bronchial secretion, granulation tissue, or compression atelectasis due to massive lymphadenopathy.<sup>1,2,3,4</sup> Persistent pulmonary damage is associated with disability and therefore may significantly limit the patient's quality of life<sup>5,6,7,8</sup>. On top of that, the recent COVID-19 pandemic learned that patients with pre-existing pulmonary disease have a more severe disease course and higher mortality<sup>9,10</sup>. As a matter of fact, previous tuberculosis (TB) infection is associated with recovery impairment and an increased risk of death after a COVID-19 infection<sup>11</sup>. These diseases negatively impacting health status can limit a patient's pulmonary capacity and result in persistent pulmonary disability with diminished pulmonary reserves.

In this case, the report we present a case in which despite the complete destruction of the left lung due to pulmonary tuberculosis, the patient managed to have a pregnancy with a favorable outcome for mother and child, and afterward even vanquished a COVID-19 infection, illustrating the resilience of the lungs.

## Case Presentation

A slender 24-year-old, nonsmoking female patient, weighing 48 kg, with no medical history except contact with a pulmonary TB case, presented with a 2-month productive cough but no hemoptysis, fever, and 5 kg weight loss with bilateral pulmonary consolidation on the chest x-ray.



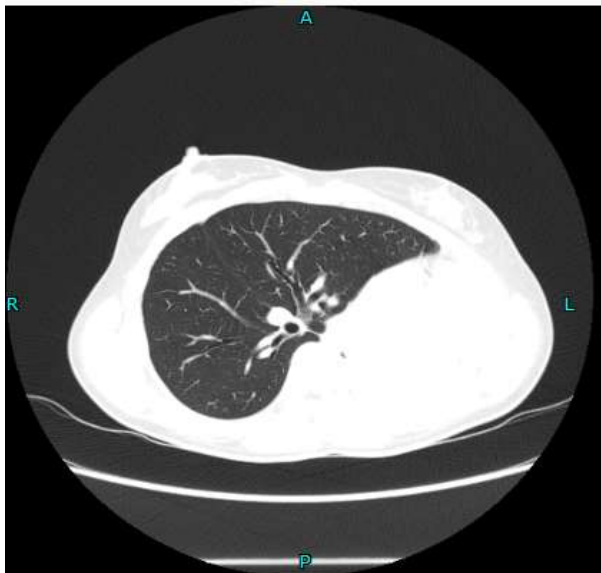
1. Presenting Chest X-ray in March 2019 with bilateral pulmonary consolidation. The sputum Auramine stain was positive for mycobacteria and the GeneXpert test confirmed Rifampicin-sensitive tuberculosis. Her HIV test was negative, and she was diagnosed with drug-sensitive pulmonary tuberculosis. Treatment with first-line tuberculostatic, HREZ (isoniazid, rifampicin, ethambutol, and pyrazinamide) started in March 2019 and continued for 6 months until October 2019. The patient had a good clinical response to treatment, but her chest x-ray showed a peculiar pattern. After initial improvement of the chest x-ray at 3 months of treatment in July 2019, at the end of treatment in October 2019 there was total atelectasis of the left lung, which was confirmed by a CT scan in November 2019.



2. Chest X-ray July 2019, 3 months after treatment, with resolution of nearly all pulmonary infiltrates.



3. Chest X Ray at the end of treatment in October 2019, with total atelectasis of the left lung.



4. Thoracic CT scan image November 2019, confirming total atelectasis left lung. No significant intrathoracic lymphadenopathy was detected. At bronchoscopy in December 2019 the ostium of the left main bronchus could not be identified, no tumor could be detected, and the ostium of the right main bronchus was patent. Repeat sputum Auramine stain was negative for Mycobacteria. The patient had no pulmonary symptoms, so a wait-and-see policy was performed.

In May 2020 she made an office visit because of dyspnea and being 5 months pregnant. No Chest X-ray was done, but spirometry showed a considerable restriction, with FVC: 1.7 Liter = 50%R, FEV1:1.3 Liter=50%R=75% VC. (FVC: forced vital capacity, FEV1: forced expiratory

volume in 1 second, VC: vital capacity). The primary Ceasar section was advised, and the patient delivered a healthy son in February 2021. In Oct 2021 she made an office visit because of coughing. On the Chest X-ray (CXR # 5), air could be seen in the left upper thoracic field. A diagnosis of upper respiratory tract infection was made, and symptoms were treated.



5. Chest X-ray October 2021, with air in the left upper thoracic region. In January 2022 she acquired COVID-19 infection without significant pulmonary symptoms. Eventually, she missed some office visits, but on her last visit in September 2022, she had no complaints and the Chest X-ray showed persistent air in the left upper thoracic region. A repeat bronchoscopy was not performed.



6: Chest X-ray September 2022, with persistent air in the left upper thoracic region.

## Discussion

Tuberculosis is an infectious disease predominantly affecting the lungs. With the current treatment regimens, 85% of people can be cured<sup>12</sup>. Although bacteriologically cured, more than 50% of patients suffer from post-tuberculosis lung impairment, which is probably based on host-pathogen immunological interaction<sup>13,14,15</sup>. The resulting lung remodeling is manifested by bronchiectasis, lung tissue scarring, fibrosis, and cavitation<sup>4</sup>. Risk factors for post-tuberculosis lung diseases are multiple episodes of tuberculosis, drug-resistant tuberculosis, delay in diagnosis, and probably smoking<sup>16</sup>. Obstructive lung disease, bronchiectasis, tissue scarring, and cavernous lesions are rather common post-tuberculous pulmonary lesions, not atelectasis let alone atelectasis of a whole lung<sup>17</sup>. Recently Soriano and Alvarez described a case of near total atelectasis of the left lung due to bronchial occlusion post tuberculosis, in a female patient of 24 years presenting with dyspnea, pleuritic chest pain, and desaturation. The bronchial occlusion was successfully treated with cryotherapy, corticosteroids, and balloon dilatation.<sup>18</sup> Previously Watanabe and colleagues have performed surgery for bronchial stricture to prevent obstructive emphysema, bronchiectasis, and progression to total bronchial obliteration<sup>19</sup>. The patient in our case was seen for routine follow-up at the end of tuberculosis treatment. To our surprise, her chest X-ray was suggestive of total atelectasis of the left lung with compensatory expansion of the right lung in the upper part of the left thoracic cavity<sup>20</sup>. Thoracic CT imaging confirmed the chest X-ray findings and showed no structural lesions in the hyperinflated right lung. At bronchoscopy, no lesions were seen in the airways of the right lung, but the ostium of the left main bronchus could not be identified as a consequence of bronchial cicatrization. Although our patient had no risk factors for post-tuberculous lung disease, she developed total atelectasis of the left lung. Spirometry revealed the pulmonary function to be limited to 50% of the expected normal values. As our patient had no complaints, no lesions in the right lung, and the remaining vitality of the left lung, if any, was unclear, we had no reason for invasive bronchial intervention and advocated a wait-and-see policy. As such, the patient was given lifestyle instructions about living on a sole

lung. Despite these cautions she eventually became pregnant, had no dyspnea or other adverse events during her pregnancy, and delivered a healthy baby boy via cesarean section. Thereafter, she even repressed a COVID-19 infection in January 2022 and to date has no pulmonary discomfort. In our opinion this case report emphasizes the resilience of the human body/lungs, without the need for surgical intervention in case of atelectasis due to pulmonary tuberculosis, and that a wait-and-see policy can be advocated when no structural lesions are present in the residuary lungs.

## Conclusions

In this patient, severe pulmonary damage occurred after a first episode of tuberculosis, in the absence of known risk factors. Expansion of her right lung into the left hemithorax, compensating for total atelectasis of the left lung, allowed for maintaining a reasonable pulmonary function. Despite the still limited function, she managed to resume an almost normal lifestyle, have a favorable pregnancy outcome, and vanquish a COVID-19 infection.

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