

Pulmonary Tuberculosis Associated with Socioeconomic Vulnerability and Ineffective Support Network: Case Report

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Abstract

Tuberculosis is one of the 10 leading causes of death in the world. Its symptoms include fever, malaise, weakness, weight loss, chest pain, cough, expectoration, shortness of breath and sepsis, which is its most frequent complication. Due to these symptoms, many patients with tuberculosis require admission to the Intensive Care Unit, where they usually are placed on mechanical ventilation. Tuberculosis is more prevalent in the population in situations of social and economic vulnerability. The main factors that interfere with adherence to treatment and the prognosis of these patients are the patient's support network and their socioeconomic status. We present the following report of a long-time smoker patient, with chronic kidney disease and previous treatment for tuberculosis, who was brought to the emergency room due to lowering of the sensorium, and was immediately placed on mechanical ventilation. The tests suggested sepsis with a respiratory focus, so a search for Alcohol-Acid-Resistant Bacillus was carried out, with a positive result. The patient was transferred to the Intensive Care Unit due to tachycardia and acute respiratory failure. The patient was a smoker with a high tobacco load, chronic kidney disease, in addition to precarious economic, educational and self-care conditions. This report shows that patients with tuberculosis and its complications can be stabilized through known pharmacological treatment. However, the most effective measure to interrupt the transmission of the disease re-

mains the early diagnosis and the provision of adequate treatment, with guidelines aimed at the cessation of harmful habits, such as smoking.

Keywords

Smoking, Kidney Disease, Sepsis, Respiratory Failure

1. Introduction

Tuberculosis (TB) is one of the ten leading causes of death in the world, sickening about 10 million in 2018 [1]. The disease is transmitted by inhaling aerosol droplets containing the bacteria *Mycobacterium tuberculosis*, a pathogen that has evolved numerous strategies to evade the body's immune responses [2]. The most common symptom observed in patients is fever, which is relatively low at the beginning and increases with the progression of the disease [3]. Other symptoms include malaise, irritability, weakness, unusual fatigue, headache, weight loss, localized or pleuritic chest pain [3], progression of infection, cough, sputum associated with hemoptysis [3], with sepsis being the most frequent complication [4]. Due to these symptoms, many patients with TB need to be admitted to the Intensive Care Unit (ICU), where they usually use mechanical ventilation (MV) [4], mainly due to the acute respiratory failure (ARF) resulting from the disease [5]. Therefore, the most common complications seen in the ICU are AKI, acute renal failure, sepsis, pneumonia, acute respiratory distress syndrome, pneumothorax and multiple organ failure [5].

Even knowing the efforts made by the health system to direct resources to those who are at greater risk [6], TB is more prevalent in the population in situations of social and economic vulnerability, being even more frequent in underdeveloped countries [7]. This can be explained by the fact that individuals with precarious socioeconomic conditions take longer to seek medical care, usually arriving at the consultation with a more advanced form of bacterial infections, such as TB, which worsens the prognosis of the disease [8]. In this context, another important problem is the irregularity of therapy during TB treatment, which can select more resistant or mutated bacterial strains, developing drug-resistant TB acquired by treatment abandonment, or by inadequate or discontinuous therapy [9] [10]. The main factors responsible for irregular treatment are related to the social and economic vulnerability of patients: low education, dark skin color, poor understanding of their own health condition and receiving an advanced diagnosis [11] [12] [13] [14] [15], which may explain the higher prevalence and incidence of TB in the vulnerable population.

Along with the socioeconomic status of patients, a factor that interferes with adherence to treatment is the support network, knowing that TB patients have several medical and non-medical needs that must be met for the cure of this disease [16]. In other words, the lack of family and community care for TB patients leads to non-adherence to treatment, which can lead to possible drug resistance,

prolonged infections and even lead the patient to death [16]. Studies show that patients with TB who are assisted and supervised by family members during treatment have high adherence to the proposed treatment and, consequently, a better prognosis of the disease when compared to patients without family support or with sporadic family support [17].

We present the report of a patient with multiple comorbidities who arrived at the hospital's emergency room in a state of moderate coma to be clarified and with a previous history of TB treatment associated with precarious socioeconomic conditions and an ineffective support network. An atypical and numb presentation that involves the family nucleus in the development of a serious clinical condition is an important element that deserves to be disclosed for the construction of new collaborative knowledge. The patient was recruited and accepted to participate in a survey carried out in the ICU with the CAEE number: 91988318.6.0000.5336—Brazil.

2. Case Report

Female patient, black, 79 years old. She was brought to the hospital's emergency room by the mobile emergency service 48 hours after the onset of symptoms of prostration, loss of appetite and difficulty walking. On admission, the patient had blood pressure of 140/62 mmHg, heart rate of 90 bpm (normal heart rate 60 to 100 bpm), respiratory rate of 24 bpm (12 to 20 bpm), peripheral oxygen saturation of 96% and with a score on the Glasgow scale equal to 7, SAPS3 equal to 31 and Braden equal to 12—value that refers to a high risk of developing pressure ulcers. In addition, upon inspection, the patient had hypotension, sensory lowering, leukocytosis with deviation, hypokalemia, poor hygiene conditions and scaly lesions all over the body. Thus, she was immediately placed on ventilatory support with MV. According to her husband, the patient was not referred to the hospital before due to the prohibition of the grandson—drug addict who lived with the patient. The patient was a longtime smoker, with a history of mastectomy of the right breast 13 years ago, with chronic kidney disease (CKD), stroke and previous treatment for TB—the husband was unable to inform the date of start and end of the treatment of the TB and whether adherence was adequate. At that time, the patient was not using medication for home use.

The medical team carried out tests to try to explain the lowering of the sensorium. Chest tomography (CT) showed a lesion in the apical posterior segment of the left upper lobe measuring 2.2×1.4 cm and another in the middle lobe close to the oblique laceration, measuring 2.2×1.5 cm with an internal nodular image of 0.3 cm, both lesions with the presence of granulomatous inflammatory infiltrate, indicating the same etiology. In the lumbar puncture, the presence of blood in small amounts and elevation of proteins without other alterations was detected. Head CT showed a previous vascular insult. From this, a hypothesis of probable sepsis of the respiratory focus was suggested to explain the lowering of the sensorium. For this reason, a test for Alcohol-Acid-Resistant Bacillus (BAAR)

was carried out in the sputum, with a positive result. The patient was placed in an isolation room with TB protective measures to avoid the risk of contagion. In the days following admission, the patient presented descending leukocytosis, lesions in the oral cavity, bacterial endocarditis and decline in renal function, in addition to infection by gram-positive cocci, gram-negative bacilli, *Stenotrophomonas* and gram-negative bacillus of *Pantoea sp.* in blood culture collected from a new catheter.

Due to an episode of tachycardia and ARF due to pulmonary sepsis resulting from pulmonary TB, the patient was admitted to the ICU in an isolation room with protective measures against TB. After 29 days in the ICU, the patient evolved with stabilization of the respiratory condition. During the ICU stay, the patient received pharmacological intervention with Azithromycin[®], Ampicillin[®], Sulbactam, Piperacillin, Tazobactam[®], Meropenem[®], Vancomycin[®], Levofloxacin[®], Ceftriazone[®] and with the regimen Rifampicin, Isoniazid, Pyrazinamide[®] and Ethambutol (RHZE[®]). Afterwards, she was discharged to the ward and remained in isolation under the care of the infectology service, maintaining AFB positive even after using the RHZE[®] and Ceftriaxone[®] regimen for 30 days.

3. Discussion

The patient in the study had TB and some complications that led to the need for ICU admission, such as decline in renal function, sepsis and ARF. Tuberculosis is a serious infectious disease, whose main route of transmission is the air through the inhalation of contaminated droplets [18]. According to the most recent version of the Global Tuberculosis Report, released by the World Health Organization in October 2020, 10 million people acquired TB in 2019—96 thousand of them in Brazil—and 1.2 million people died of TB in 2019 [1]. This disease affects people of all ages, but it is more prevalent in the population in situations of social and economic vulnerability, being even more frequent in underdeveloped countries [18]. In addition, people with a previous history of contact with infected people, carriers of the human immunodeficiency virus, patients with CKD and smokers not only have a greater chance of contracting the disease, but also of developing complications with worse evolution [5] [12] [19]. Regarding TB complications, the prevalence of the disease in patients with CKD is 13.7% higher than in patients without renal disorders [13]. This study recommends that patients with CKD be routinely tested for AFB, which can optimize the offer of early treatment and, consequently, reduce the length of hospital stay for TB and its complications [13]. Sepsis is considered the most frequent complication in patients with TB [14], and the patient in this study presented septic symptoms four days after admission. Mycobacterium tuberculosis causes structural and vascular damage, metabolic abnormalities and increased systemic inflammatory response, which may explain the onset of sepsis [5]. The management of sepsis in patients with TB is still considered inadequate and research is being carried out to evaluate the spectrum of action of immunomodulatory

drugs [5]. The patient in this study also had AKI due to immunosuppression and, as shown in the literature, the main cause of ICU admission among patients with TB is ARF requiring MV [20].

An observational study evaluated 208 TB patients treated with the RHZE[®] fixed-dose combination regimen, noting that 90.4% of patients were fully cured [18] [19]. The patient in the present report presented stabilization of the respiratory condition with this scheme. However, he was AFB positive even after 30 days of treatment with the RHZE[®] and Ceftriaxone[®] regimen. This fact may be associated with the fact that the patient is a smoker and/or due to irregular treatment. Shah and Reed [5] showed that patients with TB who continue to smoke show poor response to treatment, delaying the definitive cure of the disease. In addition, among the main factors associated with poor adherence to pharmacological treatment in Brazil are black patients, with low education and with little understanding of their health condition [12]. In addition, the abandonment of TB treatment is predominantly linked to low education, lack of family support and the association of TB with the occurrence of chronic diseases [13] [14] [15]. The patient in the present report maintained AFB positive even after 30 days with adequate treatment for her comorbidity. Explanations for this may involve precarious socioeconomic conditions, lack of self-care and an ineffective support network—an unstructured family nucleus led by a drug user. Therefore, the numb and atypical situation that involves the patient's family nucleus, added to the challenges of her socioeconomic condition, are elements that deserve to be disclosed for the construction of new collaborative knowledge.

4. Conclusion

This report showed a classic case of pulmonary TB and its complications. The patient was a smoker with a high tobacco load and CKD, in addition to precarious economic, educational and self-care conditions. Because of TB, she had sepsis and AKI—the most common complications of TB [5] [14]—and was admitted to the ICU for AKI requiring MV—the most frequent cause of admission to the ICU among patients with TB [20]. Therefore, the patient presented predisposing factors both for the appearance of the disease and for its problems. Despite the severity of the case, the patient showed progressive improvement, allowing discharge to the ward after sepsis management, improvement of respiratory function and stabilization of other comorbidities. This was possible due to the pharmacological treatment scheme used, which is widely known in the literature for producing a good response, which is the cure of TB [18] [19]. Therefore, this study shows that patients with TB and its complications can have the disease stabilized through known pharmacological treatment. However, it highlights that the most effective measure to stop the transmission of the disease is the early diagnosis and the provision of adequate treatment, with guidelines aimed at the cessation of harmful habits—such as smoking—to obtain a better result.

Conflicts of Interest

The authors declare that they have no conflict of interest regarding this article.

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