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Case Report

Health System Obstacles and their Overcoming for Early Detection and Management of Multi- Drug Resistant (MDR) Tuberculosis in a Rural Setting of Haryana, North India

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Abstract

India contributes one fourth of the global burden of multi-drug resistant tuberculosis (MDR-TB) and has inadequate diagnostic infrastructure and institutional capacities for drug susceptibility testing (DST). Subsequently, this leads to a large number of undetected and untreated cases of MDR-TB. In this report, we describe a case of 55 years old man from rural north India presenting with complaints of continued symptoms of chronic cough, fever, and dyspnea despite being diagnosed with recurrent TB recently and receiving treatment from local Community Health Centre (CHC). MDR-TB was suspected, but confirmatory diagnosis capabilities were not available in the local setting. The patient was finally diagnosed with MDR-TB. Treatment was coordinated by the district TB program officer. Through this case, we describe the various barriers of detecting MDR-TB in the rural regions of India. Prompt identification of patients with presumptive MDR-TB, diagnosis of the disease, and initiation of treatment are crucial in preventing the transmission of disease and reduce morbidity and mortality.

Keywords: Community Health Centre (CHC); Multi-drug Resistant Tuberculosis (MDR-TB); India

Background

India has the highest TB burden than any country in the world, accounting for an estimated one-fifth of global TB cases. Out of the estimated 10.0 million new TB cases globally in 2018, India alone accounted for 2.7 million cases with an incidence rate 199 per 100,000 population. Further, 440,000 people died from TB in India [1].

MDR-TB is a variant among the TB categories. It is defined as one which is resistant to two potent first line anti-tubercular drugs, isoniazid and rifampicin [2]. In 2016, of an estimated 500,000 MDR/RR-TB (Rifampicin resistant-TB) patients worldwide, only 186,772 (37%) were reported to be diagnosed, 156,071 (31%) of whom were initiated on treatment [1].

India has the second highest burden of MDR TB in the world after China, with an estimated 99,000 new cases per year. This indicates that a major proportion of the MDR- TB patients are lost in the cascade before diagnosis. India, along with Indonesia and Nigeria, accounted for almost half of this gap [1].

Multi-drug resistant TB (MDR-TB) is a major challenge to worldwide tuberculosis control [3]. In 2015, there were an estimated 480,000 new cases of MDR-TB and 250,000 deaths because of multi-drug resistant tuberculosis/rifampicin resistant tuberculosis (MDR/RR-TB) globally. Drug resistance surveillance data show that 3.9% of new, and 21% of the previously treated, TB cases was estimated to have MDR-TB [4].

The majority of the deaths due to MDR-TB occur in developing countries with poor access to diagnostic and treatment facilities [4]. Despite progress in detection, a total of 55% of the estimated MDR-TB were under-detected due to low implementation of drug susceptibility testing. This is especially true in resource-limited set-

tings where 29% of the diagnosed MDR- TB patients were not on treatment [5]. Delay in TB diagnosis and treatment may result in disease transmission, progression and poor treatment outcome including increased risk of death [6].

MDR-TB is a significant problem in India with the country now suffering the highest number of cases of MDR-TB in the world, contributing one-fourth of the global burden [7]. Further, data from the Revised National TB Control Programme (RNTCP) indicate that majority of the MDR-TB cases remain undiagnosed in India [8]. Prompt identification of patients with presumptive MDR-TB, one who is eligible for DST, confirmatory diagnosis of the disease, and initiation of appropriate treatment are critical for preventing the transmission of disease and reduce associated morbidity and mortality.

In this report, we present a case of MDR-TB, one of many in India, which remained undetected and under-treated due to the failure of the health system. The case highlights the need to improve the coverage of DST and capacity building of the health workforce to better allow for the timely diagnosis and treatment of MDR-TB cases in rural India.

Case Presentation and Discussion

Our patient is a 55 years old male farmer with history of smoking and complains of cough and dyspnea along with intermittent fever for the past 4 months. He reported to our health team in a village of Haryana, India in January 2017. He was recently diagnosed as a relapse case of pulmonary TB in a local Community Health Centre (CHC) which is also a Designated Microscopy Centre (DMC). His sputum was found as 3+ for tubercle bacilli on microscopy. His treatment was started on category-II under directly observed short course chemotherapy (DOTS) from the health facility as he already previously received TB treatment. His initial regimen was Category I of DOTS and he completed the full course of six months in June 2016. His end sputum examination resulted positive. His chest x-ray showed a massive right sided consolidation. He was referred to the district hospital for further evaluation; however, his repeat sputum test done at the district hospital was reportedly negative and the patient was declared cured after two days of hospitalization. He was discharged with antibiotics and bronchodilators. A month later, he started experiencing fever along with a productive cough and dyspnea. The patient contacted a local practitioner and continued to take an unknown treatment without symptom improvement. Further, he consulted with the doctors at the local CHC and was prescribed antibiotics and bronchodilators; but the symptoms worsened despite these therapeutic efforts. After five months of illness, a repeat sputum evaluation was ordered and resulted positive. The case now determined to be of recurrent TB was recurrent TB and was started with category II treatment under the DOTS regimen.

A case of MDR-TB was suspected and the treatment team enquired the Senior Medical Officer (SMO) of the CHC about testing for MDR-TB but he was not aware of the entire procedure. Later, we communicated with the District tuberculosis officer (DTO) who informed us that the diagnostic facilities for MDR-TB were only available in 12 of 22 districts in the state of Haryana. Due to the high probability of the case being MDR- TB, we arranged for the patient to get tested by coordinating with the DTO.

After two weeks, the patient visited our health center and informed that he was called to the district hospital by the DTO and was tested for MDR-TB. Diagnostic tests including Cartridge- Based Nucleic Acid Amplification Test (CBNAAT) and Line Probe Assay (LPA) at the district hospital confirmed the diagnosis of MDR-TB. Based on clinical and diagnostic evaluations, he was started on Category-IV of DOTS plus regimen from the district hospital. He was discharged after one week of hospitalization and assigned a DOTS provider in his village, a local practitioner. After a month of therapy with first and second line Anti-Tubercular Therapy (ATT) under DOTS plus, the patent had started to show improvements in his symptoms. His cough and fever subsided and his appetite returned. On his last follow up, he had completed six months of intensive phase of therapy and has improved significantly. His sputum examination completed at 6 months of treatment was also found to be negative.

Global health problem list

- Lack of timely suspicion and early detection of MDR-TB cases by the routine public health system;
- Lack of infrastructure, trained manpower, and robust decision-making, detecting and treating MDR-TB cases, particularly in underserved and rural areas;
- Poor coverage of laboratory facilities for detection of MDR-TB in India;
- Patient's faith in local practitioners leading to suboptimal TB care.

Global health problem analysis

The current case study demonstrates one of the thousands of the MDR-TB cases in rural communities that remains undetected and untreated. The case remained undiagnosed as a result of poor diagnostic and decision-making capacities for MDR-TB in the rural health system of India. The case was diagnosed only after the active intervention of the community physicians from a tertiary care institute working in the area, highlighting the need to strengthen decision making processes for pro-active management of critical public health challenges.

India's Revised National Tuberculosis Control Programme (RNTCP) adopted the World Health Organization (WHO) recommended programmatic management of drug-resistant TB (PMDT) for effective delivery of DR-TB services [9,10]. However, the RNTCP has been consistently challenged with a treatment initiation gap among patients diagnosed with MDR- TB. The case detection rate for MDR-TB was 22% as only 28,876 cases were notified against an estimated 130,000 MDR-TB cases in 2015 and a total of 24,396 (84%) of the diagnosed cases were put on treatment [4,11]. Many studies have raised concerns over the high rates of pre-diagnosis and pre-treatment attrition and/or delays in the diagnosis and treatment pathway (DTP) for MDR-TB [12-22]. Prompt identification of patients with presumptive MDR-TB (one who is eligible for DST), diagnosis of MDR-TB and initiation of treatment are crucial to prevent the transmission of disease and reduce high morbidity and mortality [9].

In 2012, The RNTCP of India adopted rapid tests such as automated real time PCR (Xpert MTB/RIF) and Line probe assays to diagnose MDR-TB/RR-TB as recommended by the WHO [23]; these methods reduce the time needed for diagnosis. As per the national strategic plan to eliminate TB (2017–25), India is gearing up to provide universal DST–establish a DST facility in every district and offer DST to every notified TB patient at diagnosis in a phased manner [24,25]. However, the coverage of these remains poor due to various operational difficulties like a lack of well-trained staff, the far distances of DST laboratories at district hospitals, and a lack of referrals from sub-district and lower levels.

Urgent action is required to improve the coverage and quality of diagnosis, treatment, and care for people with drug-resistant TB. The above case study represents one of the thousands of MDR- TB cases, which remain undetected and untreated due to ineffective implementation of the TB control programme at the grass-root level. With increasing numbers of MDR-TB cases, the timely diagnosis of patients proves a daunting task. With India's commitment to sustainable development goals (SDGs) [26], much is needed to achieve the goal of ending the global TB epidemic. One of the two pillars of "End TB strategy" by World Health Organization (WHO) too asks for early diagnosis of TB including universal drug susceptibility testing to detect cases of drug resistant TB cases [27].

Learning Points/Take Home Messages/Conclusion

- Multidrug-resistant tuberculosis (MDR-TB) is a major but underestimated problemin India.
- Majority of the MDR-TB patients are undiagnosed in India due to lack of institutional capacities including poor laboratory for Drug Sensitivity Testing (DST) and trained manpower, particularly in the rural areas.
- In addition to scaling up the DOT-plus programme, strengthening the health system with adequate number of active DST laboratories, training and re-sensitizing the doctors and staffs in the rural healthcare delivery systems is required. Such approaches can facilitate early suspicion and diagnosis of MDR TB cases. Moreover, sufficient workforce to operate microscopy centers is required and institutional measures to transport sputum to the designated DST diagnostic facility should be developed.
- Multi-pronged strategies for improving diagnostic capacities ensuring timely diagnosis and high- quality treatment will be central to preventing transmission of disease and addressing the MDR-TB challenges in India.

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