



Case report

A miner with No left lung: Extensive pulmonary destruction in delayed effective Multi-Drug-Resistant Tuberculosis treatment

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ABSTRACT

We report a case of extensive pulmonary destruction due to delayed effective pulmonary tuberculosis (TB) treatment in an adult artisanal miner in eastern Democratic Republic of Congo. Xpert MTB/RIF was positive after his second rifampicin-susceptible TB treatment. Chest X-rays were suggestive of large cavity, fibrosis of remaining lung and air-fluid levels at the base of the destroyed lung. The patient passed away after delayed effective TB regimens. Clinicians should be aware that urgent surgical intervention is often required to prevent lethal acute respiratory failure and shock notwithstanding effective chemotherapy in such condition. Effort is needed to timely diagnose multidrug resistance TB and to implement thoracic surgery for TB in high burden countries.

1. Introduction

New confirmed cases of multidrug-resistant tuberculosis (MDR-TB) has almost doubled over the past five years and is associated with roughly one third of deaths due to antimicrobial resistance globally [1, 2]. Factors affecting prognosis, outcomes, and the risk-to-benefit ratio of MDR-TB treatment are related to *Mycobacterium tuberculosis* itself (mycobacterial load, drug-specific resistance profile, strain type etc.), host (HIV-coinfection, diabetes mellitus, radiologic disease burden or disease extent etc.) and national TB programme (access to effective drugs, adherence-promoting measures, social support etc.) [1]. Long delays in the initiation of treatment are a barrier to MDR-TB control [3]. Delayed effective TB treatment has been associated with progressive, extensive damage of one or both lungs [4–6]. Resolution with effective antimicrobial therapy is possible but in many cases, there is a need for an urgent surgical intervention because of life-threatening complications such as acute respiratory failure and shock that persist despite appropriate antimicrobial therapy [5,7–9]. In this report from a post conflict

region in eastern Democratic Republic of Congo, a high TB, MDR and HIV-infection burden country, we describe a case of an extensive lung destruction following both patient and health-system delaying timely treatment initiation.

2. Case report

A 44-year-old artisanal digger of coltan (Niobium + Tantalum) was transferred to hospital for multi-drug-resistant tuberculosis or rifampicin-resistant tuberculosis (MDR/RR-TB) treatment. As per the national guidelines, he has completed the first-line drug regimen, including 2 months of rifampicin (R), isoniazid (H), pyrazinamide (Z), and ethambutol (E), followed by 4 months of R and H (2RHZE/4RH). Due to persistence of symptomatology, he was retreated for failure by an 8-month regimen, including streptomycin (S) for the first 2 months (2SRHZE/1RHZE/5RHE). MDR/RR-TB was suspected as the patient persisted having fever, cough with bloodstained mucopurulent sputum a month after his second rifampicin-susceptible TB (RS-TB) treatment.

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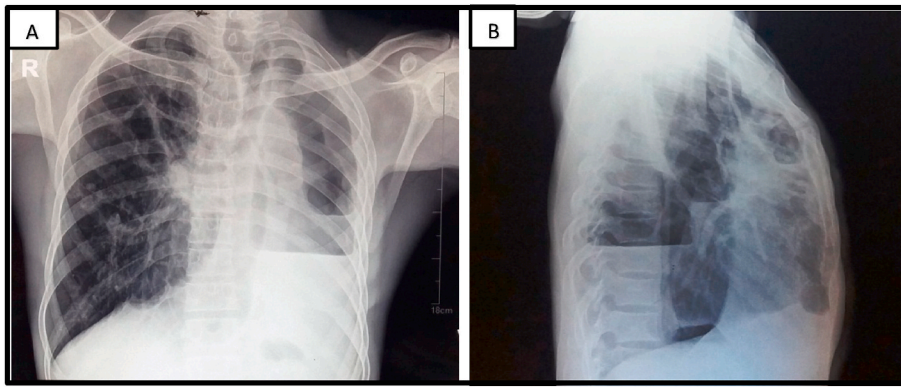


Fig. 1. Pulmonary tuberculosis complication. Chest X-ray at admission face (A) and profile (B) showing diffuse infiltrative pneumopathy complicated by complete left lung parenchymal destruction with pneumothorax and fluid colonization of the spaces (air-fluid level showing same diameter on posteroanterior and lateral view). This coexists with a widespread oligemia of the right lung excessively inflated encompassing rare macular, peribronchovascular haziness and some bands of fibrosis particularly in the supra-hilar zone that may be associated to the well-known long-term tuberculosis.

The patient's history noted that, for four months since the first occurrence of respiratory manifestations to the first RS-TB, the patient self-medicated with cotrimoxazole and sought traditional/religious leaders help without success. On clinical examination, he presented with pyrexia, was dyspneic with reduced chest compliance, dullness on percussion with absence of tactile fremitus and majorly diminished breath sounds on the left side of the chest.

Laboratory investigations showed a leukocytosis (21.7×10^9 per L) with marked eosinophilia. Sputum culture showed gram-negative bacteria (non-identified). Ziehl-Neelsen test for acid-fast bacilli on different sputum samples and HIV-infection serology were negative. Xpert-MTB/RIF on sputum sample was positive. Chest x-ray showed a mosaic of lesions suggestive of a complicated PTB (Fig. 1). CT-Scan was not available in the province. Audiometry confirmed a bilateral sensorineural hearing loss (103 and 105 dB on the right and left respectively) post streptomycin ototoxicity.

In addition to MDR-TB and respiratory failure, we treated possible colonization (bacterial subsequently developed into an abscess and chronic pulmonary aspergillosis). We combined moxifloxacin (*Mfx*), clofazimine (*Cfz*), *E*, and *Z* throughout, supplemented by kanamycin (*Km*), prothionamide (*Pto*), and high dose isoniazid (*Hh*) during a 4-month intensive phase (*4KmMfxPtoCfzZHhE/5MfxCfzZE*) for MDR-TB short regimen. Cochlear implant, line probe assays to detect isoniazid resistance as well as mycobacterial culture were unfortunately not available for logistical reasons. Evolution was characterized by onset of severe septic status requiring "hygienic thoracic surgery" that could have not been performed in our setting. The patient passed away at the third month of hospitalization.

3. Discussion

MDR-TB is a growing serious public health problem [10]. Hereby, we present a case with both patient and system delay resulting in an extensive pulmonary destruction that is currently very difficult to manage in low resource settings. The patient received a MDR-TB treatment since in high MDR-TB, the presence of RR-TB alone may serve as a proxy for MDR-TB.

In high burden MDR-TB country, at high risk of TB persons such miners should be prioritized for easy access to Xpert testing. Unfortunately, functional point of care Xpert MTB/RIF is rare in many rural areas. Strategies to reduce system delay should include trained health workforce and scaling up diagnostic capacity with Xpert MTB/RIF at township level (where they are the most needed) and consequently accelerating decentralized MDR-TB treatment initiation centers [3]. Patient-led active tuberculosis case-finding might supplement the well-known case-finding and assists in patient delay reduction [11].

Extensive TB lung destruction related-mortality usually is high (3/4 and 8/18 deaths in different case series) and is mostly associated with massive hemoptysis, respiratory failure, superinfection or presence of

active TB [4,6,7,12]. Dedha et al. have demonstrated the inadequate penetrability of TB drugs into thick walled cavities and the lack of correlation between drug susceptibility testing and samples acquired directly from the cavity [1,13]. Strikingly, disease extension (bilateral involvement, presence of cavitory disease, number and severity of zones affected could be associated with poor outcome) can easily be evaluated by chest radiography (and sometimes CT or PET-CT). Consequently, MDR-TB patients with well characterized cavitory lesions might benefit with an early decision for surgical intervention that have shown a high success rate [8,14]. TB programs should address access to open thoracic surgery for both acute and long-term TB complications as adjuvant to MDR-TB treatment in sub-Saharan African.

4. Conclusion

Extensive complications during MDR/RR-TB episodes are hardly managed in low-income countries and have negatively affected the quality of care and the TB treatment cost. Our case emphasizes the need for reducing both patient and diagnostic delays to improve MDR/RR-TB outcomes for special groups. This strategy might involve strengthening health education, scaling up diagnostic capacity with Xpert MTB/RIF at township level, expanding decentralization of MDR-TB treatment centers and engaging the global community for a stable chain supply in low-income countries. Furthermore, it is time for a collective thinking to address and implement the management of TB complications in the national TB programme' guidelines.

Contributors

We were both responsible for the diagnosis, treatment, and care of the patient. PDMCK and PM wrote the original draft of the manuscript and obtained the images. We both edited and finalized the final version. Written consent for publication was obtained from the patient' spouse.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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