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Case Report

Progressive Primary Pulmonary Tuberculosis in Current Times: Are we really heading Towards 'End of TB' or Still, Many Miles to go for 'Dream Come True'?

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Abstract: Tuberculosis is a more prevalent disease and the leading cause of death from an infectious agent in India. Tuberculosis in India accounts for the highest number of cases and deaths annually in the world. In spite of an efficient National tuberculosis control program for five decades, Tuberculosis is still the number one cause of death due to infectious agents in India and one third of total global deaths occurs in India due to this disease. Burden of drug sensitive and drug resistant cases is highest in the south east Asian region with maximum cases in India and China. India has launched a National strategic plan to end TB in 2017 with a target to eliminate TB by 2025. Main theme of the national strategic plan is 'TB Free India' with the vision of zero TB disease, zero deaths due to TB and decreasing poverty due to TB. Tuberculosis is an ancient disease and history traced before the evolution of mankind on this planet. Tuberculosis primarily affects the lung and is classified pathologically as primary, post-primary and progressive primary tuberculosis. In this case report, a 62-year male, presented with constitutional symptoms for six-month duration with partial response to medical treatment. He was having low grade fever, cough, shortness of breath, weight loss and anorexia for 6 months. His symptoms were progressive and empirically treated as enteric or typhoid fever for four to five occasions with oral and intravenous antibiotics with steroids with general physicians and family physicians. Additionally, he received empirical treatment as jaundice, viral fever, bronchitis, asthma, and generalised debilitating disease. Relatives brought to our center worsened general health with increased shortness of breath. Clinically he was having bilateral crepitations with decreased breath sounds right lower axillary and infrascapular area. Chest x-ray showed right pleural effusion with miliary opacities bilateral lung field. HRCT thorax showed typical miliary opacities with conglomerated pattern and pleural effusion on the right side of thorax. Pleural fluid analysis revealed exudative effusion with raised ADA level. He was unable to produce sputum, we have done bronchoscopy and BAL evaluation confirmed pulmonary tuberculosis and sensitivity pattern. BAL cytology documented acid-fast bacilli in smear and MTB genome with rifampicin sensitivity in cartridge based nucleic acid amplification test. Treatment initiated with anti-tuberculosis (ATT). We have recorded near complete radiological resolution, bacteriological cure after eight months of ATT with good compliance. More awareness is required regarding symptoms, diagnosis and treatment of tuberculosis to family physicians and general practitioners as the majority of the rural population receives treatment from these health professionals.

Keywords: Tuberculosis, Primary Tuberculosis, HRCT thorax, TB free India, Bronchoscopy, Gene Xpert MTB/Rif.

INTRODUCTION

The WHO TB statistics for India for 2021 give an estimated incidence figure of 2,590,000 million cases. This is a rate of 188 per 100,000 population. It is estimated that about 40% of the Indian population is infected with TB bacteria, the vast majority of whom have latent TB rather than TB disease. Tuberculosis is the leading cause of death from an infectious agent worldwide, causing even more deaths in patients with HIV/AIDS. A third of the world's population is said to have contracted the bacteria responsible for tuberculosis, Mycobacterium tuberculosis, with estimates of ten million new infections globally each year. TB is one of the leading causes of mortality in India, killing two persons every 3 min, nearly 1000 every day [1]. Pulmonary tuberculosis can have diverse

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presentations ranging from cavitation, consolidation, tumorous lesions, lower lung filed tuberculosis and endobronchial and miliary nodules [2-12]. Similarly, non-tuberculous pathologies can present with abnormalities such as consolidations, nodules, cavitations mimicking tuberculosis [2-14]. Bronchoscopy is a very crucial interventional pulmonology technique in evaluating these cases [2-14]. High risk factors for tuberculosis would be advanced age, malnutrition, pregnancy, steroids exposure, diabetes mellitus and immunosuppression [9-14]. Tuberculosis in advanced stage may cause cardiac dysfunction and systemic effects which will have poor outcome if timely treatment not received [15-17]. Final outcome in delayed treatment initiation may lead to destroyed lung as post tuberculosis sequel and proportionate number of cases may have lung function abnormalities irrespective of radiological outcome [18-20]. Tuberculosis may be misdiagnosed due to confusing or overlapping clinical and radiological features in high burden setting like India [21-24]. In present case report we have reported advanced pulmonary tuberculosis with delayed diagnosis due to lack of awareness in patient, accompanying relatives and care takers and family physicians to symptoms, available diagnostic modalities and universally acceptable and freely available treatment options for tuberculosis as per NTEP program in India.

CASE SUMMARY

62-year-old male, farmer by occupation, tobacco addict, normotensive and non-diabetic with history of weight loss of 10kg in six month is referred to our center by family physician for recurrent, partially responding constitutional symptoms.

Further clinical details-

1. Fever-for six-month, intermittent, low grade without chills and rigors associated with minimal body ache and fatigability. His symptoms were progressive and empirically treated as enteric or typhoid fever for four to five occasions with oral and intravenous antibiotics with steroids with general physicians and family physicians. Additionally, he received empirical treatment as jaundice, viral fever, bronchitis, asthma, and generalised debilitating disease.
2. Cough-minimal dry, intermittent, with no sputum production.
3. Loss of appetite and weight loss over period of six months.
4. Weakness and myalgia with fatigability for six months.

Clinical examination documented as-

- Thin built, anxious, normal temperature and no pallor, cyanosis, clubbing.
- Heart rate-98/min Respiratory rate: 24/bpm, BP-80/60 mmhg
- PsO2: 92% @ room air resting
- Respiratory system examination revealed-bilateral crepitation with decreased breath sounds in right intrascapular. Stony dull note on percussion, and decreased vocal resonance on auscultation in right inframammary, intrascapular and lower axillary area.
- Cardiovascular, gastrointestinal & nervous system examination were normal.
- We have done tropical workup with routine investigations and chest x-ray.

Chest x-ray documented- [Image 1]

1. Obliteration of right costophrenic angle with homogenous opacification in right lower zone suggestive of pleural effusion. Chronic pleural effusion as observed in chest imaging is conformed with Opacity in right lower zone creating D shaped opacity called as D-Sign.
2. Multiple miliary opacities with conglomeration seen bilaterally in upper and midzone predominantly than lower zones.
3. Hilar opacity in right side of thorax.
4. Normal cardiac silhouette and central mediastinum (Image 1).

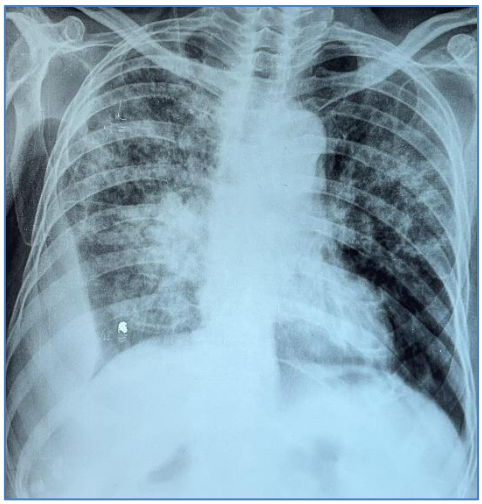


Image 1: Chest x-ray PA showing miliary opacities bilateral lung field, hilar mass and right pleural effusion

Laboratory Examination during hospitalization documented as-

- Hemoglobin-9.5 gm% total white blood cells-16000/mm3 Polymorphs-70%, Platelet count-70000/uL
- CRP- 245 mg/L (0-6 mg/L), random blood sugar level-134 mg% HbA1C-5.60 %
- LDH-1190 IU/L (70-470 IU/L)
- Serum electrolytes: Sodium-134 meq/L (135-145 meq/L) Potassium-3.7 meq/L (3.5-5.5 meq/L) Ionic calcium-1.39 meq/L (1.09-1.36 meq/L)
- D-dimer- 780 ng/ml (<500 ng/ml)
- IL-6-1.75 pg/ml (0.00-7.00 pg/ml)
- Serum creatinine-1.1 mg/dL (0.7-1.4 mg/dL)

- Liver function tests- normal
- Thyroid functions-normal
- Sputum examination after induction documented acid fast bacilli and TB Gene Xpert MTB/RIF were documented MTB genome and rpo-b mutation negative.
- ECG was showing sinus tachycardia.
- Pro-BNP- 96 pg/ml (<125 pg/ml)
- CPK-MB- 10.33 IU/L (0-25 IU/L)
- Trop-I- (cardiac troponin)-.12 ng/L (0-19 ng/L)
- COVID-19 RT PCR test and results documented Negative for SARS-CoV-2.
- Viral markers such as HIV-II and HIV-II antibody negative and Australia antigen negative.

Echocardiography done to rule out myocarditis and structural heart disease in presence of sinus tachycardia and raised cardiac enzymes. Echocardiography examination shown dilated left ventricle, global left ventricular dysfunction with reduced ejection fraction and without structural pericardial or myocardial abnormality.

- Pleural fluid analysis- we have done ultrasound guided thoracocentesis of right pleural cavity and 600 ml pleural fluid drained.
- Gross examination: color- pale yellow, cobweb-present
- Microscopic examination: lymphocytic, (polymorphs 10%, lymphocytes 90%)
- Gram stain- no organisms
- Ziehl Nelsen stain- no acid-fast bacilli
- Fungal stain- negative
- Biochemistry- proteins 4.6 gm%

We have done HRCT thorax with contrast for coin lesion in left lung to assess characteristics of round opacity such as cavitation and calcification [Image 2, 3].

HRCT Thorax documented as-

1. Multiple, tiny, randomly placed parenchymal nodules evenly distributed in both lungs in upper, middle and lower lobes [Image 2].
2. Conglomeration of randomly placed miliary, millet shaped nodules into parenchymal masses seen in right upper lobe and lower lobe [Image 3].
3. Conglomeration pf nodules and few acinonodular opacities seen in left lower lobe and right middle lobe [Image 2, 3].
4. Acinonodular masses and nodules seen in right hilar area [Image 3].
5. Right pleural effusion [Image 2, 3].
6. Random nodules with parenchymal conglomeration with right pleural effusion as presentation of primary tuberculosis and progressed to parenchymal and pleural disease. Radiologically called as progressive pulmonary tuberculosis.

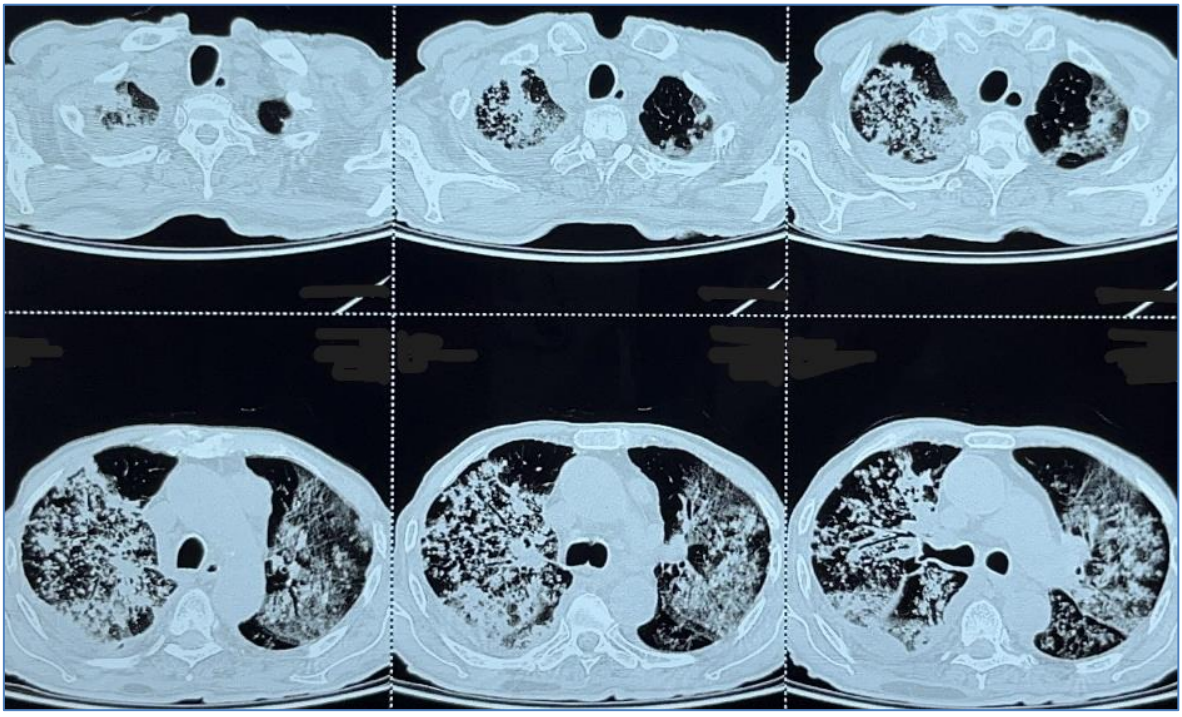


Image 2: HRCT thorax showing miliary opacities with conglomeration

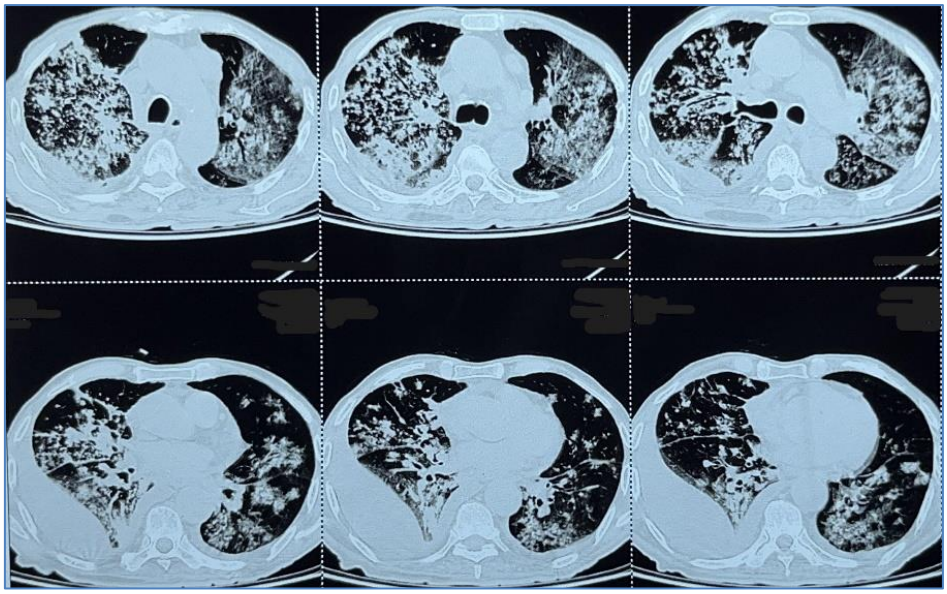


Image 3: HRCT thorax showing miliary opacities with conglomeration and right pleural effusion

We have performed bronchoscopy for miliary opacities with hilar mass with right pleural effusion to rule out concurrent possibility of concurrent malignancy due to right hilar opacity and advanced age of our patient. Fiberoptic videobronchoscopy done with all standard precautions under topical anaesthesia. Bronchoscopy documented pale and unhealthy mucosa of left lower lobe segmental bronchial openings, purulent secretions coming out from medial and posterior basal segmental opening. Bronchoalveolar lavage collected in three different aliquots after instillation of 80 ml saline in right middle and lower lobe basal segments. BAL samples were sent for cytology, gram and ZN stain, bacterial, fungal culture and Gene Xpert MTB/RF.

BAL sampling reports were-

- Gram stain- few gram-positive cocci in pairs and chains
- ZN stain- acid fast bacilli documented
- Bacterial culture- no growth
- Fungal culture- no growth
- Gene Xpert MTB/RIF- documented mycobacterium tuberculosis (MTB) genome and negative for rifampicin resistance (rpo-b mutation).

We have started anti-tuberculosis treatment (ATT) as per the NTEP (National tuberculosis elimination program) protocol according to weight band containing four drugs isoniazid (H), rifampicin (R), ethambutol (E), and pyrazinamide (Z). She was discharged to home with advice for strict anti-TB treatment as four drugs in the first 2 months (HRZE) and three drugs in the next 4 months (HRE) as per the NTEP national guidelines for TB treatment. Microbiological examination documented negative MTB genome in sputum at 2 months of treatment. Radiological resolution of opacity has documented after five months of ATT treatment. We have documented weight gain and general health improvement with best compliance to anti-TB treatment and observed the importance of counselling. She was regularly monthly followed for 6 months; clinical and radiological assessment was done in every visit. We have documented clinical, microbiological and radiological ‘cure’ after six months of treatment.

DISCUSSION

Discovered in 1882 by Robert Koch, tuberculosis (TB), one of the oldest known infections, is a major global health problem and one of the top ten causes of death worldwide. It is a disease of humans, as it does not affect animals naturally. Tuberculosis is the leading cause of death from an infectious agent worldwide, causing even more deaths in HIV/AIDS patients. A third of the world's population is said to have contracted the bacteria responsible for tuberculosis, Mycobacterium tuberculosis, with estimates of ten million new infections globally each year. The global disease burden of tuberculosis is estimated to be around 24%, with remarkable socioeconomic implications. The major pathology in tuberculosis is necrotizing granulomatous inflammation, with the lungs being the primary organs of involvement of the disease in up to 87% of the cases. Having that said, almost any bodily organ could be a site for the disease. It commonly affects people living in crowded conditions such as institutionalized patients, immigrants from countries with a high prevalence of tuberculosis, immunocompromised such as patients with HIV, and health care workers [25-31].

Etiology:

Mycobacterium species include a variety of organisms with different genomic structures, morphology, and tropism. The genus itself includes more than 170 species. M. tuberculosis is a gram-

negative bacterium. It is a small, aerobic, and nonmotile bacillus. It is characterized by a complex wall structure that is rich in long-chain fatty acids. The genus is divided into two groups: fast-growing and slow-growing organisms. M. tuberculosis belongs to the slow- growing group. M. tuberculosis cell wall is rich in peptidoglycan and complex lipids. These structures are major factors for pathogenesis. The capsule (the outer layer) surrounds the cell wall. It is a main contributor to the bacterium's virulence and survival. M. tuberculosis is a facultative intracellular bacterium. It acts as an inhibitor of macrophages, proliferates within the macrophages, causing the eventual death of invaded macrophages and the release of the bacillus to the alveolar space. Staining with stains such as Ziehl-Neelsen aid in detecting the acid-fast bacilli using microscopy. Mycobacterium tuberculosis is a very slow-growing organism, taking up to 24 hours to grow [32-37].

Pathophysiology:

Tuberculosis pulmonary inflammation is characterized by lung tissue destruction and necrosis, unlike other lung infections that affect mainly the airways [38]. The main virulence factors that play roles in the pathogenesis of M. tuberculosis include cell wall mycolic acid glycolipids, lipoarabinomannan (LAM), sulfatides, and trehalose dimycolate [39]. The exact role each factor plays is not very understood. The virulence effect varies as there are factors that help evade local immune cells, induce cytokines, and another affecting cellular metabolism [40]. Mce1A protein, although still not clear how plays an important role in tuberculosis cellular transport [41]. M. tuberculosis cell wall also contains different kinds of mycolic acids that are integral to the organism growth inside macrophages [42]. Other virulence secretion systems have also been described. Examples are ESX-1, sec, and TAT systems. These systems facilitate the mycobacterium translocation [43]. Unlike most gram-negative bacteria, the main virulence factor of tuberculosis evolves around "survival" within its human host, rather than actively attacking the host or evading its defenses. The main example is when it develops cholesterol uptake mechanisms from the host to enhance its survival [44].

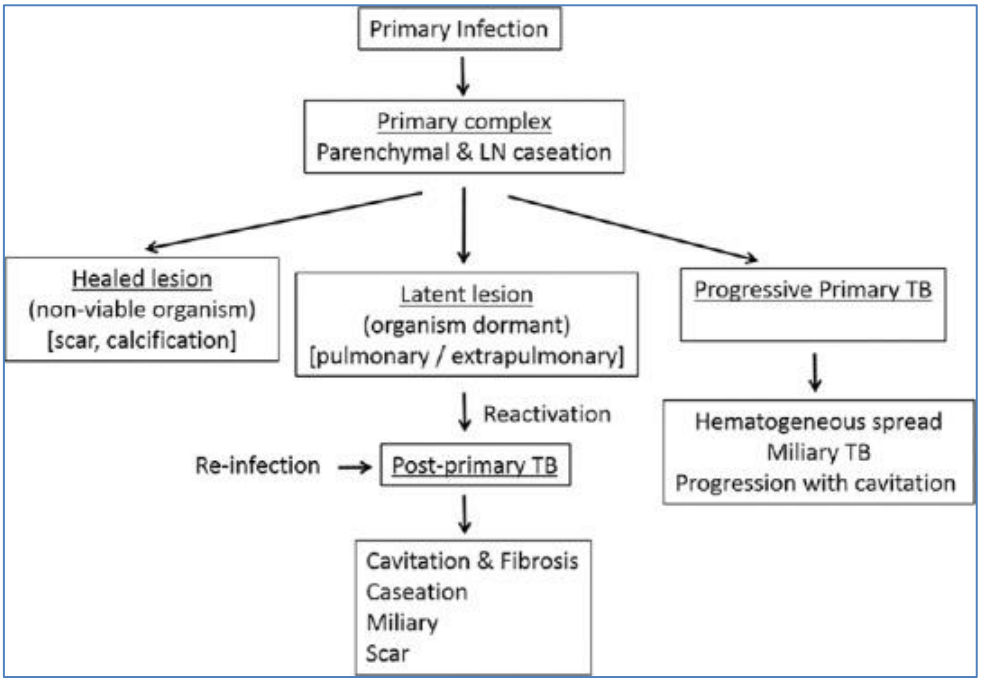


Image 4: Natural history of Pulmonary Tuberculosis [45]

Pulmonary tuberculosis is conventionally divided into primary and post-primary (or reactivation) TB (PPT), each with corresponding radiological patterns, albeit with considerable overlap. Primary tuberculosis is the infection that occurs in immunocompetent people when they are first infected with MTB. Although it may progress causing meningitis or disseminated tuberculosis, especially in very young or immunosuppressed individuals, primary tuberculosis typically develops and spreads as caseating granulomas to regional lymph nodes and systemically for only a few weeks before regressing as immunity develops. While the lesions may heal, they are seldom sterilized and organisms persist. However, primary TB is now increasingly encountered in adult patients, accounting for 23-34% of all adult cases and even more in non-endemic areas [46]. The primary parenchymal focus is known as the Ghon focus and the combination of Ghon focus and enlarged draining LNs constitutes the primary complex: The Ranke or Ghon complex. Primary TB may involve lung parenchyma, LNs, tracheobronchial tree, and pleura. Classically, four entities are described: Gangliopulmonary TB, TB pleuritis, miliary TB, and tracheobronchial TB. Only

the Gangliopulmonary form is characteristic of primary TB and the rest may be seen in post-primary disease as well [47]. Generally, the primary disease is self-limiting and immune- competent persons remain asymptomatic. Frequently, the only radiological evidence of primary TB is a combination of parenchymal scar (±calcified) and calcified hilar and/or paratracheal LNs. Complications of gangliopulmonary TB include perforation of an enlarged LN into a bronchus, bronchial compression due to adenopathy leading to retro- obstructive pneumonia, and/or atelectasis.

PPT occurs in previously sensitized patients and results either from re-infection or from reactivation of dormant bacilli in primary infection (90% of cases) owing to immunosuppression, malnutrition, senility, and debilitation. Thus, PPT occurs predominantly in adolescents and adults and usually begins with necrotizing consolidation followed by transbronchial spread. PPT is characterized by: 1. Liquefaction of caseous necrosis, 2. formation of cavities, 3. progressive fibrosis and lung destruction, and 4. bronchogenic spread. Apico-posterior segments of the upper lobes and superior segments of the lower lobes are the usual sites of involvement. Initially, there is liquefaction of regions of caseous necrosis, which then communicate with the tracheobronchial tree to form cavities [47].

Radiological patterns encountered in both primary and/or post-primary TB [45]

1. **Miliary TB:** Miliary TB results from hematogenous dissemination of the TB bacilli leading to the development of innumerable small granulomas in lungs and other organs. Though classically encountered in children, the incidence in adults is increasing. Early in the course of the disease, CXR may be normal in 25-40% of cases. CT, especially HRCT, can demonstrate miliary disease before it becomes radiographically apparent. Presence of 1-3 mm nodules, both sharply and poorly defined, diffusely spread in random distribution in both lungs, often associated with interstitial septal thickening is characteristic. There may be some basal predominance due to gravity-dependent increased blood flow to the lung bases. Initially, the foci are about 1 mm in diameter. Untreated, they may reach 3-5 mm in size and may become confluent, presenting a "snow-storm" appearance [47-49].
2. **Pleural involvement:** Involvement of the pleura is one of the most common forms of EPTB and is more common in the primary disease. In case of primary TB, it manifests as unilateral free large effusion, without loculations. It occurs 3-6 months after infection, as a result of delayed hypersensitivity response to mycobacterial antigens. It is often asymptomatic and microbiological analyses are often negative. Though rare in children, it is common in adolescents and young adults. Pleural involvement can be seen in up to 38% cases of primary TB and up to 18% cases of PPT [47].
3. **Tracheobronchial TB**: Tracheobronchial involvement occurs in 2-4% of patients with PTB. It usually occurs as a complication of primary TB, originating from perforation of an involved LN into a bronchus, though it may occur in PPT as well by ascending endobronchial spread. Lymphatic submucosal spread and hematogenous infection may also be responsible. CT in acute tracheobronchitis may reveal circumferential narrowing of the involved segment associated with smooth or irregular wall thickening. Abnormal enhancement and adjacent adenopathy may also be seen. Less commonly, ulcerated polypoid mass or peribronchial soft tissue cuff may be seen. Involvement of the small airways is in the form of acute bronchiolitis with centrilobular "tree-in-bud" nodules [50-52].
4. **Tuberculoma:** Tuberculomas are persistent nodules or mass-like lesions which can be seen in both primary TB and PPT. Pulmonary tuberculomas can range in size from being subcentimetric to 5 cm in diameter, and may be solitary or multiple. They are most often the result of healed primary TB and are usually smooth-walled and sharply defined. The majority of these lesions remain stable in size and may calcify. Nodular or diffuse calcification can be seen in 20-30% of tuberculomas. Cavitation is seen in 10-50% of cases. In 80% of cases, small round opacities (satellite lesions) may be observed in the immediate vicinity of the main lesion [47].

Radiological features of active Pulmonary Tuberculosis:

1. Thick-walled cavity.
2. Cavity with air-fluid levels.
3. Acinar/centrilobular nodules (bronchogenic spread).
4. Consolidation.
5. Clustered nodules.
6. Miliary nodules.
7. Rim-enhancing LNs.
8. Pleural effusion or empyema.

History of pathology of tuberculosis in pre-chemotherapy era:

The pathology tuberculosis was described in the 19th and early 20th centuries with two major components termed 'productive' and 'exudative'. In 1821, Laennec, using clinical and gross pathologic observations, reported that primary and post primary TB were distinct manifestations of the same disease. A half century later with the introduction of microscopes, Virchow disputed this and claimed that they were totally different diseases. He reported that primary tuberculosis was a tumor while post primary was an infection. This argument was resolved by Koch's

discovery of the causative organism. However, Koch observed that second exposure to MTB produces a fundamentally different disease than the first. From the 1880's until the 1950's many authors described the two different histologic patterns of tuberculosis using diverse nomenclatures. Productive lesions or tubercles are granulomas, especially caseating granulomas. Exudative lesions are tuberculous pneumonia. Each occurred in multiple variations and progressed through a series of stages. It is unlikely that many important features of the pathology of tuberculosis were not described. However, studies of the pathology of post primary tuberculosis effectively ended when interest in the disease and availability of human lung tissues plummeted with the introduction of antibiotics in the 1950's [53].

The NSP for TB elimination 2017 -2025 (National Strategic Plan for Tuberculosis Elimination): [54]

India has been engaged in Tuberculosis (TB control activities for more than 50 years). Yet TB continues to be India's severest health crisis. TB kills an estimated 480,000 Indians every year and more than 1,400 every day. India also has more than a million 'missing' cases every year that are not notified and most remain either undiagnosed or unaccountably and inadequately diagnosed and treated in the private sector. This tragic loss of life, continued suffering, poverty need to end with concerted efforts from all of us. India is now better prepared to address TB better than ever before. It possesses advanced and effective interventions and technologies for diagnosis, treatment and care of TB. This NSP for 2017– 25 for TB elimination in India (NSP) embraces these opportunities to leverage its full potential and proposes transformational changes to TB care service delivery.

Vision, Goals and Targets of NSP

The NSP proposes bold strategies with commensurate resources to rapidly decline TB in the country by 2030 in line with the global End TB targets and Sustainable Development Goal's to attain the vision of a TB-free India.

VISION: TB-Free India with zero deaths, disease and poverty due to tuberculosis.
GOAL: To achieve a rapid decline in burden of TB, morbidity and mortality while working towards elimination of TB in India by 2025.

Achieve: **90-90-90 targets**.

1. **90 %:** Reduction in TB Incidence.
2. **90 %:** Reduction in TB mortality.
3. **90 %:** Reduction in catastrophic health expenditures due to TB.

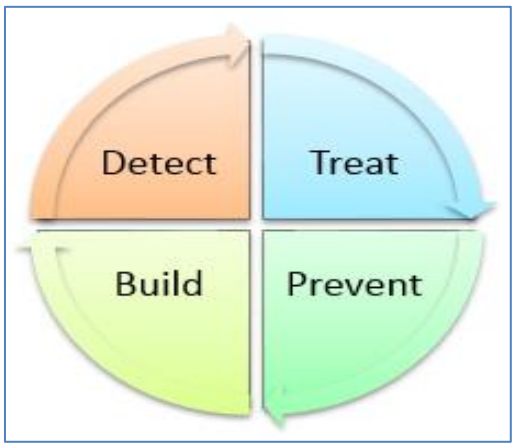
The objectives of NSP to achieve:

1. Notification rate for all cases- 90%
2. Treatment success rate in new case - 90%
3. Treatment success rate in retreatment cases - 85%
4. Improve outcomes in private sector patients.
5. Improve outcomes DR -TB cases.
6. Decreased morbidity and mortality of HIV associated TB

Points of Serious Concern

- One TB case can infect 10 to 15 persons in a year.
- Killing 5 lakhs of people every year. (1000 every day and more than 2 every 3 minutes)
- Children to become orphans.
- Tuberculosis kills more women than all causes of maternal mortality combined together.
- It kills more adults of economically productive age group (15–50 years) than any other infectious disease.
- 3 lakhs children are forced to leave school
- More than 1,00,000 women are stigmatized and rejected by their families
- More than 90 percent of these deaths are preventable
- Provided early diagnosis and prompt treatment is given.

Strategy in NSP for Elimination of TB-



A. Strategy in NSP Detect: Detect

- Detect TB early
- Drug sensitive TB and drug resistant TB.
- To reach TB patients seeking care from private providers.
- Detect TB among "high risk" or key populations

B. Strategy in NSP Detect: Treat

Appropriate anti-TB treatment

- Initiate
- Sustain
- Provide social support.

Through:

- Preventing the loss of TB cases.
- Providing free TB drugs
- Provide short course regimens
- Providing nutritional support.

C. Strategy in NSP: Prevent

- Preventing the emergence of TB in susceptible populations.

Through:

- Air-borne infection control measures.
- Treatment for TB infection
- Addressing the social determinants

D. Strategy in NSP: Build

- Build and strengthen relevant policies.
- Extra human resources capacity.

Through

- High level political commitment.
- Building supportive structures for surveillance, research.
- Technical assistance at national and state levels

Daily Burden in India

- Every day, more than 20,000 people become infected with TB bacilli.
- More than 5,000 people develop the disease.
- More than 1,000 people die of this disease
- Nearly 2 persons die every 3 minutes
- About 80 working days are lost per year per case.

Burden of TB Infection

- India has the highest estimated burden of tuberculosis infection (TBI) globally.
- 35-40 crore Indian population having TBI.
- Among TB infection people 26 lakh (18-36 lakh) are estimated to develop tuberculosis annually.
- 5–10% of those infected will develop TB disease over the course of their lives, usually within the first 2 years after initial infection

The risk for TB disease after infection depends on several factors-

- >25 times risk among contacts of bacteriologically confirmed TB patients compared to general populations,
- 16-21 times risk in HIV co-infection
- 3-4 times in other immune-compromised status.

Develop TB disease after contact with a TB patient

- 75% within 1 year.
- 97% within 2 years.

Decrease the risk of TB disease after TPT:

- 60%
- Up to 90% among PLHIV.

Study in India published 2020

- Positive TST & IGRA among HHC is 71%.

Scaling up TPT would Decline rate of TB incidence from 2.5% at present to 10% required annually

Although India has managed to scale up basic TB services in the public health system, treating more than 10 million TB patients under RNTCP, the rate of decline is too slow to meet the 2030 Sustainable Development Goals (SDG) and 2035 End TB targets. Although sufficient insight and expertise exists to inform TB program decision-making, these resources have often been underutilized in terms of meeting the needs of policy makers for quantitative analysis and improvements in TB control policy and implementation.

CONCLUSION

In present case report, we have reported a progressive pulmonary tuberculosis in geriatric patient with constitutional symptoms empirically treated as nonspecific ailments such as asthma, bronchitis, jaundice and enteric fever. Lack of knowledge regarding symptoms and treatment options available to treat tuberculosis in general physicians and family physicians in peripheral setting has resulted into progressive pulmonary tuberculosis. We have done basic investigations such as chest x-ray and sputum examination which has given clues to final diagnosis. Progressive pulmonary tuberculosis is treatable with available ATT and we have documented 'cure' in our case.

Learning Points:

1. Tuberculosis is a common infectious disease in India and with available efficient ATT drugs now considered as preventable cause of death due to the infectious agent of mankind.
2. Pulmonary tuberculosis is divided into primary and post primary tuberculosis as per pathology. Primary tuberculosis is most commonly reported in children.
3. Primary tuberculosis primarily includes lung, lymph node and pleural disease. Miliary TB and lymph node TB is the most common pattern. Post primary tuberculosis primarily has cavitation and consolidation. Pleural effusion is documented in primary and post primary TB.
4. Progressive primary tuberculosis is defined as involvement of lung plus pleura or lung plus lymph nodes involvement because of TB pathology. Progressive pulmonary tuberculosis

is considered when a patient is having miliary TB with pleural effusion.

5. Progressive pulmonary tuberculosis is commonly documented in paediatric cases, cases with immunosuppression such as HIV/AIDS, cases receiving immunosuppressive medicines like steroids, anticancer medicines & geriatric cases.
6. Progressive primary pulmonary tuberculosis is an indicator of advanced disease, very commonly observed in the pre chemotherapy era before inventions of anti-tuberculosis treatment. In the absence of ATT, pulmonary tuberculosis patients were having progressive pulmonary tuberculosis.
7. Progressive primary pulmonary tuberculosis is not routinely documented in current settings due to universal availability of most effective ATT. Currently available diagnostic modalities such as sputum smear, rapidly performing cartridge based nucleic acid amplification tests are most sensitive and specific to detect TB early. Chest radiology is sensitive, although not very specific techniques to suspect TB early.
8. Only possible chance of Progressive primary pulmonary tuberculosis in the current era would be delay in initiation of ATT, defaulter case of pulmonary TB, Geriatric and paediatric cases with delay in diagnosis. If progressive pulmonary tuberculosis is documented in the current era, then one can think about the level of underestimation by treating physicians in diagnosing TB in spite of universally available cost effective and free diagnostic and treatment modalities in all parts of India.
9. As per vision of NSP 2017-2025 India is TB-Free India with zero deaths, disease and poverty due to tuberculosis & goal is to achieve a rapid decline in burden of TB, morbidity and mortality while working towards elimination of TB in India by 2025.
10. Tuberculosis disease burden has decreased due to more awareness among general community, patients & health professionals by government agencies, social media and nongovernment organizations. Still, we have not achieved a hundred percent goal due to more involvement of the private sector from rural to urban setting in primary to tertiary care to respiratory diseases in India.
11. Tuberculosis seems to be difficult to eliminate as per NSP by 2025 and main hurdle is timely diagnosis and reporting, notification with early initiation of ATT. We are not sure when 'End TB' time will come because TB bacilli was present before our presence on this planet and the susceptible population will be there for years to continue this deadly but easily treatable disease.
12. 'Miles to go to end TB' due to difficult patients i.e., difficult to accept TB diagnosis due to social stigma, difficult doctor i.e., treating physician either don't diagnose TB with available free methods or they don't tell and treat due to fear of lost to follow-up, and lastly difficult treatment i.e., patient will not afford private treatment due to financial burden, they don't want government treatment due to myth of inefficient medicines or breach of their disease privacy and social stigma when they receive from government centres.
13. Tuberculosis needs giant efforts from patient and doctor combo with backup of universally available and free ATT to combat this pandemic and to 'dream come true for end TB strategy'.

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