Section: Miscellaneous

Original Research Article

RETROSPECTIVE STUDY OF PATIENTS PRESENTING WITH FLANK PAIN AND URINARY ACID-FAST BACILLI POSITIVITY BY SMEAR MICROSCOPY

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ABSTRACT

Background: Genitourinary tuberculosis (GUTB) is frequently considered paucibacillary and may present with nonspecific urinary or flank symptoms. This study evaluated the clinical profile and practical diagnostic role of urine acid-fast bacilli (AFB) smear microscopy among 180 patients presenting with flank pain and related urinary complaints.

Materials and Methods: This retrospective observational study reviewed records of 180 patients aged 3–77 years who attended TB Hospital, Bhopal, between 1990 and 2013. Patients often had flank pain or swelling, painless hematuria, suprapubic discomfort, difficulty in micturition, fever, weakness, lassitude, or related symptoms. Twenty-four-hour urine samples were examined by Ziehl–Neelsen staining for AFB. Available ultrasonography findings were considered supportive clinical information.

Results: AFB-positive urine smears were documented in a subset of the study population. Positivity occurred in the context of chronic flank pain and urinary or constitutional symptoms. The findings support the diagnostic value of a positive smear, while also demonstrating that a negative smear cannot exclude GUTB because urine disease is commonly paucibacillary. Complete subgroup counts and denominators were not available in the source records for reconstruction of exact positivity rates.

Conclusion: Urine AFB smear microscopy remains a useful, inexpensive, and accessible investigation for suspected GUTB in resource-constrained settings. Its results should be interpreted with clinical findings and imaging, and negative microscopy should not be used in isolation to rule out disease.

Keywords: Flank pain; genitourinary tuberculosis; urine AFB; Ziehl–Neelsen stain; smear microscopy.

INTRODUCTION

Flank pain is a frequent presenting complaint in patients with renal and urinary tract disease. Although calculi, obstruction, pyelonephritis, and other common disorders account for many cases, genitourinary tuberculosis (GUTB) remains an important differential diagnosis in tuberculosis-endemic regions. The disease may be indolent and clinically heterogeneous, presenting with loin pain, hematuria, dysuria, frequency, suprapubic discomfort, fever, malaise, or progressive urinary obstruction. Because these manifestations overlap with other urinary disorders, diagnosis is often delayed.

GUTB usually results from hematogenous dissemination of Mycobacterium tuberculosis from an earlier focus, followed by reactivation in the urinary tract. The kidneys are commonly involved, and infection may subsequently affect the ureters and bladder. Progressive inflammation, fibrosis, strictures, calcification, and loss of renal function may occur when diagnosis and treatment are delayed. Early recognition is therefore important, particularly

in patients with chronic or unexplained urinary symptoms.

Microbiological confirmation is challenging. Urine specimens frequently contain a low bacillary load, making direct smear microscopy insensitive. Nevertheless, Ziehl–Neelsen staining is inexpensive, technically simple, and available in laboratories where mycobacterial culture, nucleic-acid amplification, and drug-resistance testing may not be accessible. A positive smear in an appropriate clinical context can provide a decisive diagnostic clue, whereas a negative result has limited exclusionary value.

The attached study material describes 180 patients examined at TB Hospital, Bhopal, during 1990–2013. The patients ranged from 3 to 77 years of age and included both sexes. Majority of the patients were between in the ages 20 to 55. Presentation included flank pain or swelling, painless hematuria, suprapubic discomfort, difficulty passing urine, fever, weakness, and lassitude. Twenty-four-hour urine was examined using Ziehl–Neelsen staining, and ultrasonography was available for some patients through Dewani Hospital, Bhopal. The material also reflects the diagnostic limitations of the period, when culture facilities were unavailable and molecular testing was not fully standardized locally.

This retrospective manuscript formalizes those observations in a journal-oriented format. The primary objective was to describe the clinical profile of patients presenting with flank pain and related symptoms and to examine the practical role of urine AFB smear microscopy in identifying suspected GUTB in a resource-limited setting.

MATERIALS AND METHODS

Study design and setting. This retrospective observational study was based on clinical and laboratory records from TB Hospital, Bhopal, Madhya Pradesh, India. The review period extended from 1990 to 2013. The study population comprised 180 patients evaluated for flank pain or associated urinary and constitutional complaints.

Participants. Patients of either sex and all recorded age groups were eligible. The reported age range was 3–77 years. Presenting features included flank pain or swelling involving one or both flanks, painless hematuria, suprapubic discomfort, difficulty in passage of urine, fever, weakness, lassitude, and other symptoms raising suspicion of urinary tuberculosis. Patients were included on the basis of available clinical records and urine AFB examination. Records without sufficient information for clinical interpretation were not used for subgroup description.

Specimen collection and microscopy. A 24-hour urine specimen was collected, every day for 5 days, a crystal of thymol added to prevent growth of contaminants, and centrifuged. The deposit was then smeared onto a clean dry, fresh slide, allowed to dry and stained by Ziehl–Neelsen staining and microscopic examination for acid-fast bacilli. Acid- and alcohol-fast bacilli identified on stained smears were recorded as positive. The test was interpreted as an adjunct to clinical assessment and not as an independent rule-in/rule-out test.

Imaging and supportive assessment. Ultrasonography was performed free of cost for many patients at Dewani Hospital, Bhopal, and available imaging findings were considered supportive information. Imaging was not treated as a microbiological reference standard.

Outcomes. The principal outcome was documentation of urine AFB positivity by smear microscopy. Secondary descriptive outcomes included age range, sex distribution, presenting symptoms, and the availability of supportive ultrasonography. Because the source document did not contain patient-level counts for every clinical subgroup, exact symptom-specific positivity rates were not calculated.

RESULTS

Table 1: Variable

Variable	Description
Study population	180 patients
Age	3–77 years [Majority 20 to 55]
Sex	Males and females
Study period	1990–2013
Setting	TB Hospital, Bhopal

Table 2: Presenting features

Presenting features	Interpretation
Flank pain or swelling	Possible renal or upper urinary tract involvement
Painless hematuria	Important clinical clue
Suprapubic discomfort	Possible bladder involvement
Difficulty passing urine	Possible lower urinary tract obstruction
Fever, weakness, lassitude	Constitutional features of chronic infection

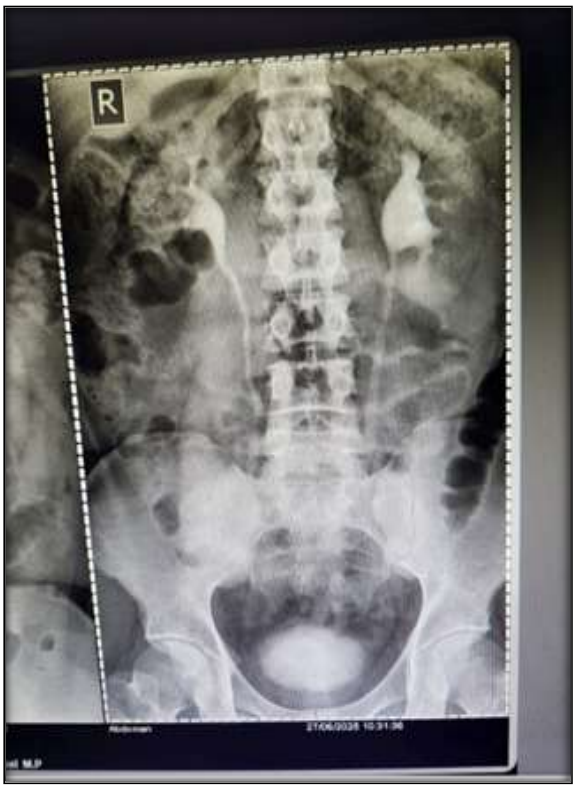
Table 3: Diagnostic procedures

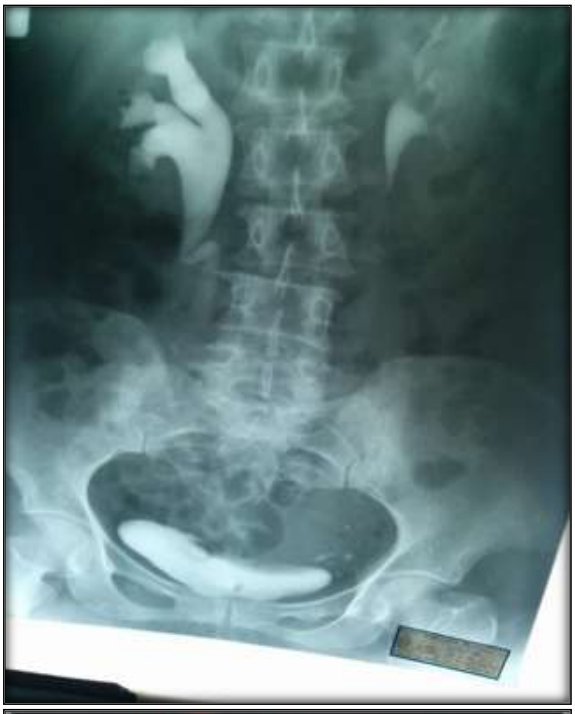
Diagnostic procedures	Role
24-hour urine collection	Improved opportunity for bacillary detection
Urine sediment concentration	Enhanced microscopic examination
Ziehl–Neelsen staining	Detection of AFB
Ultrasonography	Supportive anatomical assessment

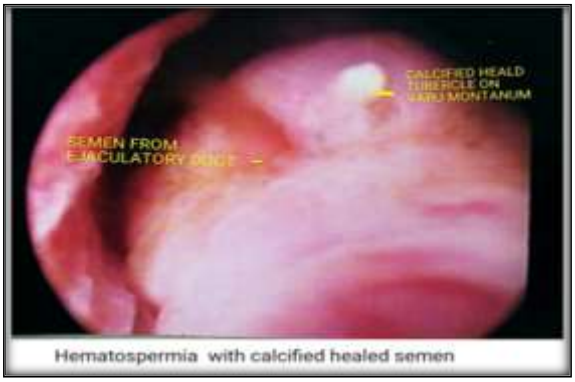
Table 4: Interpretation

Interpretation	Clinical implication
Positive urine AFB smear	Supports GUTB in the appropriate clinical setting
Negative urine AFB smear	Does not exclude GUTB
Chronic symptoms plus smear positivity	Strongly supports active urinary mycobacterial infection
Imaging abnormality	May indicate site or extent of urinary tract involvement

1 Urethral Stricture with dilated ureter proximally
2 Stricture. The dye is not passing easily







Hematospermia with calcified healed semen


Acid Fast Bacilli in Urine

The study included 180 patients with flank pain or related urinary and constitutional complaints. The

recorded age range was 3–77 years, Majority of the patients were between in the ages 20 to 55. The cohort was socially and religiously diverse, reflecting the catchment population of the treating institution.

Patients presented with a spectrum of symptoms. Flank pain or swelling was the dominant clinical concern, while painless hematuria, suprapubic discomfort, difficulty in passing urine, fever, weakness, and lassitude were also documented. The combination of chronic urinary symptoms and constitutional complaints increased clinical suspicion of GUTB.

Urine AFB smear microscopy identified acid-fast bacilli in a subset of patients. In this clinical context, a positive result supported the diagnosis of urinary tuberculosis. The available information did not provide a complete patient-level cross-tabulation of AFB positivity by age, sex, symptom, or ultrasonographic finding; therefore, exact subgroup estimates are intentionally not reported.

The findings demonstrate the practical value of urine smear microscopy in a setting where mycobacterial culture and molecular testing were not routinely available. They also illustrate its principal limitation: a negative result cannot reliably exclude GUTB because urinary disease is often paucibacillary. Clinical assessment, repeated or appropriately collected urine samples, and supportive imaging remain important when suspicion persists.

Statistical Analysis: The study was analyzed descriptively. Age was summarized as a range, and the clinical manifestations and diagnostic procedures were presented as categorical observations. The principal outcome was the presence or absence of AFB on urine smear microscopy. The analysis should report the AFB positivity proportion with a 95% confidence interval, compare positivity by age group and sex, and examine associations with hematuria, dysuria, constitutional symptoms, and abnormal ultrasonography. A multivariable model could be considered only if the number of positive outcomes is adequate.

DISCUSSION

Genitourinary tuberculosis (GUTB) remains an important form of extrapulmonary tuberculosis and continues to present a diagnostic challenge because its clinical manifestations are frequently nonspecific, chronic, and overlapping with other urinary tract disorders. The present retrospective study evaluated 180 patients who attended TB Hospital, Bhopal, during 1990–2013 with flank pain or related urinary and constitutional symptoms. The patients ranged from 3 to 77 years, with most belonging to the 20–55-year age group. The principal clinical manifestations included flank pain or swelling, painless hematuria, suprapubic discomfort, difficulty in passing urine, fever, weakness, and lassitude. Urine examination by Ziehl–Neelsen smear microscopy demonstrated acid-fast bacilli in a subset of patients. Thus, our observations support the continuing importance of considering GUTB in patients with persistent or unexplained urinary symptoms, particularly in tuberculosis-endemic and resource-constrained settings [File 1].

The clinical profile observed in our study is consistent with the established spectrum of GUTB described by Kulchavenya, Figueiredo et al., and Singh et al. These authors emphasized that GUTB may involve the kidney, ureter, bladder, urethra, and genital organs, with symptoms varying according to the anatomical site and extent of disease. Flank or loin pain reflects possible renal or upper urinary tract involvement, whereas hematuria, suprapubic discomfort, dysuria, and obstructive symptoms may indicate progression to the ureter or bladder. The coexistence of urinary and constitutional symptoms in our patients therefore resembles the heterogeneous presentation reported in previous reviews and clinical series. Our findings reinforce that GUTB should not be suspected only in patients with a known history of pulmonary tuberculosis; it may also occur as an isolated or clinically unrecognized extrapulmonary manifestation.[1-5]

Flank pain or swelling was the dominant presenting complaint in the present series. This observation is clinically relevant because flank pain is commonly attributed to renal calculi, pyelonephritis, hydronephrosis, or musculoskeletal disease. Wise and Shteynshlyuger described renal pain as an important but nonspecific manifestation that should be interpreted in relation to the duration of symptoms and associated urinary findings. Similarly, Yadav et al. reported that patients with urogenital tuberculosis may experience prolonged flank discomfort before the diagnosis is established. Our study is comparable in showing that chronic flank symptoms may be the initial reason for medical consultation, even though the underlying disease is a chronic mycobacterial infection. Persistent flank pain, particularly when associated with hematuria, constitutional symptoms, or abnormal imaging, should therefore prompt targeted evaluation for GUTB rather than repeated empirical treatment for nonspecific urinary infection.[6-12]

The age distribution of our cohort also agrees with previous reports. Although GUTB can occur at any age, most patients in our study were between 20 and 55 years, and the overall age range was broad. Das et al., Kapoor et al., and Mittal et al. similarly described GUTB predominantly among adults, while recognizing that children and older adults may also be affected. The presence of patients as young as 3 years and as old as 77 years in our series demonstrates that age alone cannot reliably exclude the disease. In younger patients, clinicians may need to distinguish GUTB from congenital urinary abnormalities and recurrent bacterial infection, whereas in older patients' malignancy and chronic obstructive uropathy may be competing diagnoses. The broad age range in our study consequently supports an

inclusive diagnostic approach in endemic populations.[3,4,6]

Painless hematuria was another important clinical feature in our study. Hematuria is widely recognized as a key manifestation of urinary tract tuberculosis and may occur as a result of mucosal ulceration, inflammation, papillary involvement, or progressive structural damage. Kapoor et al. emphasized that unexplained hematuria should raise suspicion of GUTB, especially when routine evaluation fails to identify a more common cause. Ghosh et al. similarly described diagnostic difficulty when hematuria occurs without prominent systemic symptoms. Our findings are in agreement with these observations. The presence of painless hematuria in a patient with chronic flank discomfort is particularly important because it may initially appear less urgent than painful hematuria, yet it can signal significant underlying urinary tract disease. In endemic regions, tuberculosis should remain within the differential diagnosis even when hematuria is intermittent or isolated.[4,13]

Suprapubic discomfort and difficulty in passing urine in our patients suggest that the disease was not limited to the renal parenchyma. GUTB may extend along the urinary tract, producing ureteric strictures, vesicoureteric obstruction, bladder inflammation, reduced bladder capacity, and, in advanced cases, obstructive uropathy. Mittal et al. and Kumar et al. highlighted the importance of recognizing lower urinary tract manifestations because they may be mistaken for recurrent bacterial cystitis or nonspecific bladder outlet symptoms. The symptoms documented in our study correspond with this broader understanding of GUTB as a disease that can affect multiple urinary tract segments. Their presence also suggests that a purely renal diagnostic framework may underestimate the extent of disease in symptomatic patients.[6,14]

Fever, weakness, and lassitude were recorded among the constitutional features in our study. These symptoms are nonspecific, but their importance increases when they coexist with chronic urinary complaints. Farer et al. demonstrated that extrapulmonary tuberculosis may present with relatively vague systemic manifestations, while Narayana et al. described the urinary system involvement as a potentially indolent process that may progress without dramatic constitutional illness. Our observations are therefore consistent with the possibility that patients with GUTB may not display the classic picture of high-grade fever or overt pulmonary disease. Mild constitutional symptoms should not be disregarded when accompanied by persistent flank pain, hematuria, or urinary obstruction. The combination may represent chronic tuberculosis even when the systemic illness appears clinically modest.[9,15]

A central finding of the present study was the practical role of urine acid-fast bacilli (AFB) smear microscopy. Concentrated urinary sediment was examined following Ziehl–Neelsen staining, and a positive smear was interpreted as supportive microbiological evidence in a compatible clinical setting. This approach is consistent with the diagnostic principles described by Das et al., Kulchavenya, and Wise and Shteynshlyuger, who recommend combining clinical assessment with microbiological and imaging investigations. A positive urine smear can be particularly valuable in settings where mycobacterial culture, nucleic-acid amplification, and drug-susceptibility testing are unavailable or delayed. In our study setting, microscopy provided an accessible method of identifying patients who required further management for suspected urinary tuberculosis.[1,3,7]

The usefulness of urine smear microscopy must, however, be balanced against its limited sensitivity. Urinary tuberculosis is frequently paucibacillary, and bacilli may be shed intermittently. Consequently, a negative smear cannot exclude GUTB. This limitation is consistent with the reports of Varghese et al., Deshmukh and Bhargava, Chaudhary and Dhillon, Feki et al., and Purohit et al. These studies emphasized that the diagnostic yield of microscopy depends on bacillary concentration, specimen quality, timing, processing technique, and the number of specimens examined. Our study supports this interpretation because smear positivity was documented in only a subset of clinically suspected patients, while the available records did not contain sufficient patient-level information to calculate a complete sensitivity estimate or symptom-specific positivity rate. The appropriate interpretation is therefore that microscopy is a useful rule-in investigation but a weak rule-out investigation.[11,16–19]

The use of a 24-hour urine specimen and sediment concentration in our study reflects an attempt to improve bacillary recovery under historical resource limitations. Larger-volume or repeated specimens may increase the probability of detecting organisms compared with a single low-volume sample. Nevertheless, collection and processing procedures must be standardized, and the possibility of contamination or technical variation should be considered. The older study period is also relevant because laboratory practices and diagnostic standards may have changed over time. Although our approach reflects the facilities available at the time, current practice should complement microscopy with culture and molecular assays wherever these are accessible. This comparison highlights both the practical value and the methodological limitations of historical urine smear-based diagnosis.[10,11,18]

Ultrasonography was available for many patients through Dewani Hospital, Bhopal, and was used as supportive clinical information in the present study. This is consistent with the recommendations of Kapoor et al., Kulchavenya, and Singh et al., who consider imaging important for identifying anatomical consequences of GUTB. Ultrasonography may demonstrate hydronephrosis, renal enlargement or atrophy, parenchymal

abnormalities, bladder wall changes, or obstruction, but it cannot independently confirm tuberculosis. Our study appropriately treated imaging as supportive rather than as a microbiological reference standard. This distinction is important because imaging abnormalities may overlap with calculi, bacterial infection, malignancy, and other causes of chronic urinary tract damage.[1,4,5]

Compared with more recent diagnostic frameworks, our study was conducted in a setting with substantial limitations in confirmatory testing. Culture facilities were unavailable or not routinely accessible, and molecular testing was not standardized locally during much of the study period. The absence of a uniform reference standard means that the diagnostic performance of smear microscopy cannot be calculated from the available records. This limitation distinguishes our work from contemporary studies that compare smear microscopy with culture, polymerase chain reaction, or cartridge-based molecular assays. Nevertheless, the study remains clinically relevant because the diagnostic realities described in it continue to exist in many high-burden areas. The WHO Global Tuberculosis Report 2024 continues to emphasize the worldwide burden of tuberculosis and the need to expand access to timely diagnosis and treatment. In such settings, inexpensive preliminary tests may remain important components of a staged diagnostic pathway.[20]

The present study also compares with earlier Indian reports in demonstrating that GUTB is often identified through the integration of several imperfect clues rather than a single definitive observation. Das et al., Kapoor et al., Ghosh et al., and Yadav et al. all described diagnostic delay caused by the similarity between GUTB and common urinary conditions. Our patients had symptoms that could have been attributed to renal stones, bacterial urinary tract infection, obstruction, or other urological disorders. The study therefore emphasizes the importance of maintaining clinical suspicion when symptoms are persistent, recurrent, or poorly explained by routine investigations. This is particularly important because delayed treatment can result in fibrosis, ureteric strictures, calcification, contracted bladder, impaired renal function, and irreversible anatomical damage.[3,4,12,13]

The findings have practical implications for clinicians working in endemic and resource-limited regions. A patient with chronic flank pain should be questioned carefully regarding hematuria, dysuria, frequency, suprapubic pain, difficulty in micturition, fever, weight loss, weakness, previous tuberculosis, and contact history. Urine AFB smear microscopy may be requested when the clinical suspicion is appropriate, but negative results should lead to further assessment rather than immediate exclusion of GUTB. Repeated or properly collected specimens, imaging, mycobacterial culture, and molecular tests should be selected according to availability and clinical urgency. This pragmatic, stepwise approach is supported by the literature and is consistent with the experience represented by our study.[1,5–8,18]

The strengths of our study include the relatively large clinical series of 180 patients, the inclusion of a broad age range, the focus on a clinically relevant symptom complex, and the evaluation of a diagnostic method that is feasible in routine practice. The study also reflects real-world clinical practice in a tuberculosis hospital rather than a highly selected tertiary research environment. However, several limitations must be acknowledged. The retrospective design made the study dependent on the completeness and accuracy of historical records. Exact subgroup counts, denominators, symptom-specific smear positivity, sex-wise comparisons, and detailed ultrasonographic findings were not available for reconstruction. There was also no consistent culture or molecular reference standard, and changes in laboratory practice over the long study period may have influenced the observed results.

In summary, our study is broadly concordant with the cited literature. It confirms that GUTB may present with chronic flank pain, painless hematuria, suprapubic discomfort, difficulty in micturition, fever, weakness, and lassitude across a wide age range. It also supports the role of urine Ziehl–Neelsen smear microscopy as an inexpensive and accessible adjunct, while confirming that a negative smear cannot rule out disease because of the paucibacillary nature of urinary tuberculosis. The principal contribution of our series is its demonstration of these established diagnostic principles in patients evaluated in a resource-constrained Indian setting. Future prospective studies should record exact clinical and imaging variables, use repeated standardized urine specimens, and compare microscopy with culture and molecular reference standards to determine diagnostic accuracy more precisely.

CONCLUSION

In this retrospective series of 180 patients evaluated at TB Hospital, Bhopal, flank pain occurred in a clinical setting that included hematuria, urinary discomfort, difficulty in micturition, fever, weakness, and lassitude. Urine Ziehl–Neelsen smear microscopy detected AFB in a subset of patients and provided useful microbiological support for suspected GUTB.

The study reinforces that genitourinary tuberculosis should be considered in patients with persistent or unexplained flank pain, particularly when urinary and constitutional symptoms coexist. A positive urine AFB smear is clinically important and may permit earlier treatment in settings where culture and molecular tests are unavailable. The test should, however, be interpreted as part of a broader diagnostic pathway that includes careful clinical assessment, appropriate urine collection, and imaging when indicated.

A negative smear does not exclude GUTB because urinary tuberculosis is frequently paucibacillary and direct microscopy has limited sensitivity. Where resources permit, culture and molecular assays should complement microscopy. In resource-constrained settings, improved specimen collection and repeated testing may increase diagnostic yield.

Future studies should use prospectively defined inclusion criteria, record exact symptom and imaging data, and compare smear microscopy with culture or molecular reference standards. Such work would allow reliable estimates of diagnostic performance and identify clinical predictors of positivity. Until those data are available, urine AFB smear microscopy remains a practical and relevant test for selected patients with suspected urinary tuberculosis.

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