

# Tuberculous Pleurisy – Diagnostic Difficulties

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## ABSTRACT

**Aim:** The aim of this study is to show the diagnostic difficulties and importance of various methods for diagnosis of tuberculous pleurisy. **Material and methods:** In this retrospective study we analyzed patients with tuberculous pleurisy treated in Clinic for pulmonary diseases and TB “Podhrastovi” in four-year period from 2011. to 2014., and methods used for establishing diagnosis. In all patients sputum and pleural effusion sample obtained by pleural punctation were examined for Mycobacterium tuberculosis: microscopically and culturally (liquid culture media). Pleural tissue biopsy using Abram’s needle was done in 19 patients. All so obtained samples were histological examined, and 10 were bacteriological examined for Mycobacterium tuberculosis. **Results:** In this four year period 45 patients, or 11.08% of all patients with tuberculosis, were treated in Clinic “Podhrastovi”. Microscopic and cultural examination for Mycobacterium tuberculosis of sputum was positive only in patients with pleural form associated with pulmonary form of tuberculosis. Examination of pleural fluid by liquid culture media was positive in 40 (88.89%) patients. In 9 of 10 patients (90%) Mycobacterium tuberculosis was found by cultural examination in biopsied pleural tissue. In 19 patients (100%) tuberculous granulomas were found in biopsied pleural tissue. **Conclusion:** The most sensitive diagnostic methods for diagnosis of tuberculous pleurisy is the Mycobacterium tuberculosis cultural examination of pleural fluid and pleural biopsied tissue and histological examination of pleural biopsied tissue with 90-100% positive results.

**Key words:** tuberculosis, pleurisy, diagnostics.

## 1. INTRODUCTION

Tuberculous pleurisy is the most common form of extrapulmonary tuberculosis in most countries (1) and so is in Bosnia and Herzegovina. It is the main cause of pleural effusions in most countries (1). Tuberculous pleurisy presents a diagnostic problem because there are limitations of traditional diagnostic tools (1). Initial event in the pathogenesis of primary tuberculous pleurisy is the rupture of subpleural caseous focus from the lung into the pleural space (2). Mycobacterial antigens enter the pleural space and interact with T cells previously sensitized to Mycobacterium that results in a delayed hypersensitivity reaction (3). The definitive diagnosis of tuberculous pleurisy depends upon a demonstration of tuberculous bacilli in the sputum, pleural fluid or pleural biopsy specimens (4). The diagnosis can also be established with demonstration of classical tuberculous granulomas in the pleura or with reasonable certainty by demonstrating elevated levels of adenosine deaminase (ADA) or gamma interferon (IFN $\gamma$ ) in the pleural fluid (1).

### 1.1. Pleural fluid examination

The tuberculous pleural fluid is usually clear and straw coloured, but may be turbid or serosanguinous (1). The effusion is always an exudate, with lymphocytic predominance in about

90% cases (5). Polymorphonuclear cells may predominate during first 2 weeks, but a shift towards lymphocytic predominance was observed at repeat punctations (5).

### 1.2. Chest radiography

Chest radiography usually reveals a small to moderate unilateral pleural effusion. Various studies report the prevalence of coexisting parenchymal lesions in range from 20% to 50% (6, 7). Chest computed tomography (CT) scan improves the diagnostic accuracy showing coexisting parenchymal lesions in 86% of patients with tuberculous pleurisy (8).

### 1.3. Mycobacterium stain and culture

#### 1.3.1. Sputum.

It has been suggested that patients with tuberculous pleurisy without coexisting parenchymal lesion are sputum negative and therefore non-contiguous (1). The mycobacterial culture of spontaneous sputum has low sensitivity with a range from 0-30% (1).

#### 1.3.2. Pleural fluid.

Microscopy of the pleural fluid for acid fast bacilli (AFB-microscopic examination) is positive in less than 10% of tuberculous pleurisy cases, except for HIV - infected patients and tuberculous empyema (4). Mycobacterial solid culture of pleural

fluid has also low sensitivity with a range from 12-70%, with the majority of series showing diagnostic yields of 30 % (4). The use of liquid culture media can provide higher yields and faster results than the conventional methods e.g. solid culture (9).

**1.3.3. Pleural biopsy**

Histological analysis and mycobacterial culture of pleural biopsied tissue have traditionally been the gold standard diagnostic method (1). A blind needle biopsy of pleura using Cope’s or Abram’s needle has been the most sensitive diagnostic test for tuberculous pleurisy (1). Video assisted thoracoscopy has had a very important impact on diagnosis.

**2. AIM**

The aim of this study is to show the diagnostic difficulties and importance of various methods for diagnosis of tuberculous pleurisy.

**3. MATERIAL AND METHODS**

In this retrospective study we analyzed patients with tuberculous pleurisy treated in Clinic for pulmonary diseases and TB “Podhrastovi” in four-year period from 2011 to 2014 , and methods used for establishing diagnosis. In all patients sputum and pleural effusion sample obtained by pleural punctuation were examined for Mycobacterium tuberculosis: microscopically and culturally (liquid culture media). Pleural tissue biopsy using Abram’s needle was done in 19 patients. All so obtained samples were histological examined, and 10 were bacteriological examined for Mycobacterium tuberculosis.

**4. RESULTS**

In this period 391 patients with tuberculosis were treated in Clinic for pulmonary diseases and TB “ Podhrastovi”. 45 of them or 11.08% had tuberculous pleurisy. There were 15 females average aged 47.2 years and 30 males average aged 46.3 years. In our sample 32 patients had diagnosis of tuberculous pleurisy only, and 13 had tuberculous pleurisy associated with parenchymal form of tuberculosis. Results of various diagnostic methods are shown on Figures 1, 2, 3 and 4.

Microscopic examination of pleural fluid for acid fast bacilli vs. Mycobacterium tuberculosis was positive in 2 ( 4.44%) and negative in 43 ( 95.56%) patients, but in 40 (88.89%) patients positive and 5 (11.11%) patients negative by cultural examination (liquid culture media) for Mycobacterium tuberculosis (Figure 1).

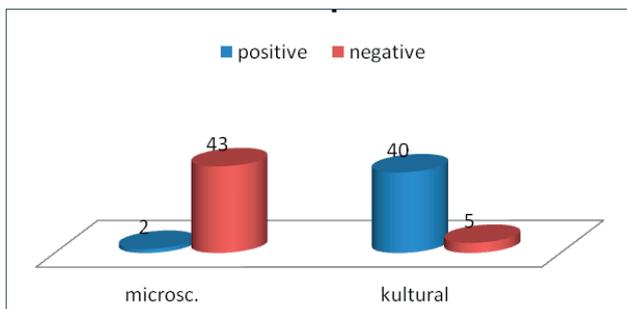


Figure 1. Mycobacterium tuberculosis findings of pleural effusion puncture sample

Microscopic examination of sputum for acid fast bacilli vs. Mycobacterium tuberculosis was positive in 4 (8.89%) and negative in 41 ( 91.11%) patients , but in 13 (28.89%) patients

positive and 32 (71.11%) patients negative by cultural examination (liquid culture media) for Mycobacterium tuberculosis (Figure 2).

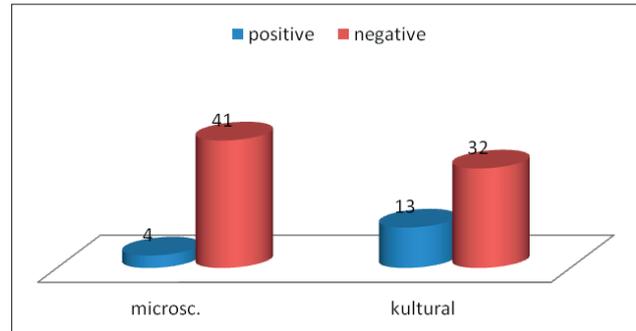


Figure 2. Mycobacterium tuberculosis findings of sputum

Note. Microscopic and cultural examination of sputum was positive only in patients with tuberculous pleurisy associated pulmonary form of TB.

In 10 patients pleural tissue biopsied sample was examined for Mycobacterial tuberculosis. Microscopic examination of tissue for acid fast bacilli vs. Mycobacterium tuberculosis was positive in 0 (0%) and negative in 10 ( 100%) patients, but in 9 (90%) patients positive and 1 (10%) patient negative by cultural examination (liquid culture media) for Mycobacterium tuberculosis (Figure 3).

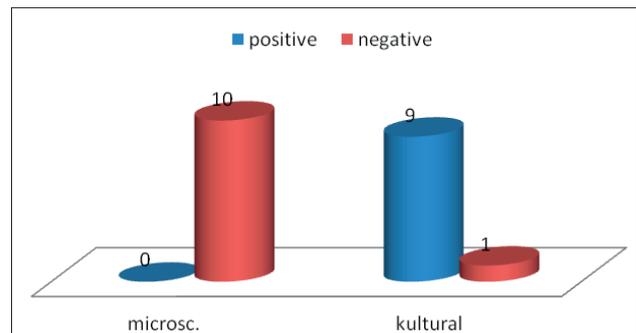


Figure 3. Mycobacterium tuberculosis findings of pleural tissue biopsy

In 19 patients sample of pleural tissue biopsy was patohistological examined. In all of them (100%) tuberculous granulomas were visualized (Figure 4).

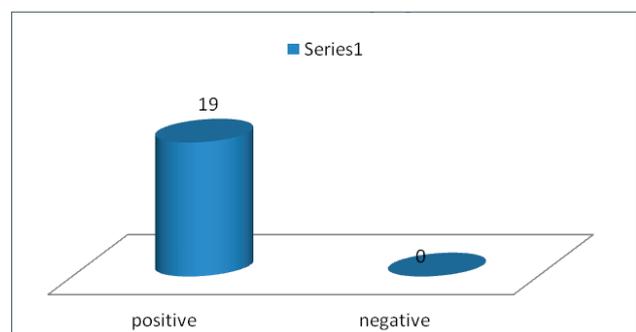


Figure 4. Patohistological findings of pleural tissue biopsy

**5. DISCUSSION**

Tuberculous pleurisy is the most common form of extrapulmonary tuberculosis in most countries (1) and so is in Bosnia and Herzegovina. It is the main cause of pleural effusions in most countries (1). Tuberculous pleurisy presents a diagnostic

problem because there are limitations of former traditional diagnostic tools (1). The relative incidence of tuberculous pleurisy is usually higher in countries with high tuberculous prevalence. Tuberculous pleurisy accounts for about 4% of all tuberculosis cases in United States but 20% in South Africa (10, 11, 12). In our study tuberculous pleurisy presents 11.08% of all tuberculosis cases.

Tuberculous pleurisy is more likely to occur in younger patients who are more immunocompetent (12). Patients with tuberculous pleurisy tend to be younger than patients with pulmonary tuberculosis (1). In industrialized countries the mean age of patients with tuberculous pleurisy tends to be older. In our study there were 15 females average aged 47.2 years and 30 males average aged 46.3 years. The youngest were one male aged 17, and one female aged 19 years. The oldest were one female aged 88, and one male aged 81 years. So we should take tuberculous pleurisy in consideration in any patient with unilateral pleural effusion.

In our study *Mycobacterium tuberculosis* findings of pleural effusion puncture sample was cultural positive in 40 (88.89%) patients in liquid culture. *Mycobacterium tuberculosis* findings of sputum was positive only in patients with tuberculous pleurisy associated with pulmonary form of tuberculosis that supports the suggestion that patients with tuberculous pleurisy without coexisting parenchymal lesion are sputum negative and therefore non-contiguous (1). Some authors found that in absence of pulmonary infiltration, the positivity of sputum will be in the range of 4-7% (13). Higher yield of mycobacterial culture (52%) was reported in a single specimen of induced sputum (14) that we did not confirm in our study.

In 19 patients we did needle biopsy of the pleura. In all patients sample of pleural tissue biopsy was pathohistological examined and in all of them (100%) tuberculous granulomas were visualized. In 10 patients sample of pleural tissue biopsy was examined for *Mycobacterium tuberculosis*. Microscopic examination of tissue for acid fast bacilli vs. *Mycobacterium tuberculosis* was positive in 0 (0%) and negative in 10 (100%) patients, but in 9 (90%) patients positive and 1 (10%) patients negative by cultural examination (liquid culture media).

In one study of 248 patients with tuberculous pleurisy who underwent needle biopsy of the pleura, the biopsy showed granulomas in 198 patients (60%). The AFB stain of the biopsy was positive in 64 (25.8%) and the culture of the biopsy tissue was positive in 140 (56%) (7). In this study at least one of the three tests was positive in 227 (91%). Although other diseases including fungal diseases, sarcoidosis, tularaemia and rheumatoid pleurisy may produce granulomatous pleurisy, more than 95% of patients with granulomatous pleurisy have tuberculosis

(2). Some authors (15) performed a direct comparative study and found that the sensitivity of histology, culture and combined histology/culture was 66%, 48% and 79%, respectively for closed - needle biopsy and 100%, 76% and 100% respectively, for thoracoscopy. In addition, both were 100% specific.

## 6. CONCLUSION

Tuberculous pleurisy presents a diagnostic problem because there are limitations of diagnostic tools. The most sensitive diagnostic methods for diagnosis of tuberculous pleurisy is the *Mycobacterium tuberculosis* cultural examination of pleural fluid and pleural biopsied tissue and histological examination of pleural biopsied tissue with 90-100% positive results.

CONFLICT OF INTEREST: NONE DECLARED.

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