

Diagnostic Evaluation of Malignant Pleural Effusion by incorporating Medical Thoracoscopy and Confirmation by Histopathology taken as Gold Standard

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ABSTRACT

Objective: To determine the diagnostic accuracy of medical thoracoscopy for detection of malignant pleural effusion, histopathology findings were taken as gold standard.

Study Design: Retrospective/Observational

Place and Duration: Tertiary Care hospitals in Karachi for period of 6 months from 6th March 2020 to 6th August 2020.

Methodology: One hundred and fifteen patients of both genders clinically diagnosed to have malignant pleural effusions were enrolled in this study. Patients ages were ranging from 25 to 70 years. After taking written consent, detailed demographics including age, sex, BMI and comorbidities were recorded. All patients underwent medical thoracoscopy. Biopsies were performed and samples went to laboratory for histopathological examination. Diagnostic accuracy, PPV, NPV, sensitivity and specificity of thoracoscopy were examined. Data was analyzed by SPSS 27.0.

Results: Out of 115 patients, 72 (62.61%) were males while 43 (37.39%) were females. Mean age was 52.46±10.82 years. Majority 60 (52.17%) patients were ages between 46 to 55 years. 85 (73.91%) patients had malignant pleural effusions by thoracoscopy while by histopathology 93 (80.87%) patients had malignant pleural effusions. The sensitivity, specificity, PPV, NPV and diagnostic accuracy of medical thoracoscopy were 91.40%, 100%, 100%, 73.33% and 93.04%.

Conclusion: It is concluded that medical thoracoscopy is safe and effective procedure for diagnosing malignant thoracoscopy with acceptable diagnostic accuracy rate.

Keywords: Malignant Pleural Effusions, Thoracoscopy, Diagnostic Accuracy

INTRODUCTION

In patients with nonpleural effusion, the discovery of malignant cells in pleural lavage indicating micrometastatic disease, and our previous meta-analysis^[1] showed positive cytological pleural lavage findings with a higher recurrence rate and significantly poorer survival, with a total risk ratio of 5.61 for patients with pleural effusions (95 percussion) malignant cells Evidence of even a minimum pleural outcome is an independent prognostic factor for worse survival for non-small-cell lung cancer patients^[2]. In multiple malignancies, malignant pleural outpouring (MPE) is commonly seen and lung cancer is the most common cause. The presence of MPE in patients suggests systemic cancer spread and life expectancy and quality of patients have decreased^[4,5].

Medical thoracoscopy is a streamlined Thoracoscopic video surgery conducted by qualified pulmonologists under local anaesthesia and conscious sedation. Thoracoscopy is nowadays the gold standard for the detection of pleural effusions with diagnostic findings exceeding 90 percent of malignant pleural diseases^[6-8].

In the trained hands, thoracoscopy is a safe and well tolerated procedure with good diagnostic efficiency and therapeutic efficacy. Complication rates are low (2%–5%) with a normal low (under cutaneous emphysema, bleeding,

infection) with mortality rates <.1%^[9] in trained hands. However, in our own country many patients are diagnosed with radiological tuberculosis^[10] and treated empirically with ATT, resulting in a delay of malignancy diagnosis. We conducted present study to determine the diagnostic accuracy of medical thoracoscopy for diagnosing malignant pleural effusions taking histopathology as gold standard.

MATERIALS AND METHODS

This retrospective/observational study was conducted at Tertiary Care hospitals in Karachi for period of 6 months from 6th March 2020 to 6th August 2020. Total 115 patients of both genders clinically diagnosed to have malignant pleural effusions were enrolled in this study. Patient's ages were ranging from 25 to 80 years. After taking written consent, detailed demographics including age, sex, and BMI were recorded. Patients with transudative pleural effusion, patients with renal failure, patients with coronary artery disease, uncontrolled BP and those with no consent were excluded from this study.

All the patients underwent medical thoracoscopy under general anaesthesia. There was inserted an 11 mm trocar by inserting a 10 mm semicircular pleuroscope to prevent uncontrolled deep penetration. The whole fluid and ipsilateral pneumothorax array were evacuated in steps

afterwards. This was done. The pleuroscope was introduced to examine the entire pleural cavity; semi-stiff pleuroscope helps to see remote or secret lesions. The analysis of the pleural cavity began on the apex, followed by the costaceous pleura, diaphragm and the mediastinal pleura, which ended at the apex. The findings of thoracoscopy were recorded. Biopsies were performed to all the patients and samples were sent to laboratory for complete examination. Diagnostic accuracy, PPV, NPV, sensitivity and specificity of thoracoscopy were examined.

All the data was analyzed by SPSS 27.0. Mean±SD was done. Frequencies and percentages were recorded in tabulation form. Chi-square test was done to compare the medical thoracoscopy and histopathological findings. P-value <0.05 was taken as significant.

RESULTS

Among all the 115 patients, 72 (62.61%) were males while 43 (37.39%) were females. Mean age was 52.46±10.82 years. 28 (24.35%) patients were ages less than 45 years, 60 (52.17%) patients were ages between 45 to 55 years, 20 (17.39%) patients were ages 56 to 65 years and 7 (6.09%) patients had ages above 65 years. Mean BMI of patients was 25.36±2.77 kg/m². (Table 1)

Table 1: Baseline details of all the patients (n=115)

Variables	Frequency No.	%age
Mean Age	52.46±10.82	-
Mean BMI (kg/m)	25.36±2.77	-
Age (Yrs)		
<45 years	28	24.35
45 to 55 years	60	52.17
56 to 65 years	20	17.39
Above 65 years	7	6.09
Gender		
Male	72	62.61
Female	43	37.39

85 (73.91%) patients had malignant pleural effusions by thoracoscopy while by histopathology 93 (80.87%) patients had malignant pleural effusions. By comparison we found that 85 (73.91%) patients were true positive, 0 patients with false positive, 8 (6.96%) patients were false negative and 22 (19.13%) patients were true negative. The sensitivity, specificity, PPV, NPV and diagnostic accuracy of medical thoracoscopy were 91.40%, 100%, 100%, 73.33% and 93.04%. (Table 2)

Table 2: Comparison of Medical Thoracoscopy with Histopathology

Medical Thoracoscopy	Histopathology		Total
	Positive	Negative	
Positive	TP 85	FP 0	85
Negative	FN 8	TN 22	30
Total	93	22	115

Statistic	Value	95% CI
Sensitivity	91.40%	83.75% to 96.21%
Specificity	100.00%	84.56% to 100.00%
Positive Likelihood Ratio		
Negative Likelihood Ratio	0.09	0.04 to 0.17
Disease prevalence (*)	80.87%	
Positive Predictive Value (*)	100.00%	
Negative Predictive Value (*)	73.33%	58.64% to 84.21%
Accuracy (*)	93.04%	86.75% to 96.95%

DISCUSSION

The second most frequent type of extrapulmonary tuberculosis following lymph node tuberculosis is tuberculosis pleural effusion^[11]. Tuberculosis in developed nations, on the other hand, is still the leading aetiology of pleural effusion^[12]. The identify of malignant pleural cells in pleural fluid or on pleural biopsy is diagnosed as representing an advanced malignancy associated with high morbidity and mortality that prevents a potential curative approach. In more than 70% of cases, e.g. lung, breast, ovary and lymphoma, malignant pleural effusions and metastases are both caused by pleural malignancy¹³⁻¹⁴.

In present study we analyzed 115 patients suspected to have malignant pleural effusion on the basis of sign and symptoms. Among them majority of patients were males 62.61% while females were 37.39%. Mean age was 52.46±10.82 years. Majority 60 (52.17%) patients were ages between 46 to 55 years. These results were comparable to many of previous studies in which males were predominant as compared to females and majority 60% patients were ages above 50 years^[15-16].

In our study we found that 85 (73.91%) patients had malignant pleural effusions by thoracoscopy while by histopathology 93 (80.87%) patients had malignant pleural effusions. The sensitivity, specificity, PPV, NPV and diagnostic accuracy of medical thoracoscopy were 91.40%, 100%, 100%, 73.33% and 93.04%. A study conducted by Amin M et al^[17] to determine the diagnostic accuracy of medical thoracoscopy for diagnosing malignant pleural effusions and the reported that by thoracoscopy 80% and by histopathology 94% patients had malignant pleural effusions. The diagnostic accuracy was 86% and specificity and PPV was 100%. Wang XJ et al^[18] reported that 41.1% patients had malignant pleural effusion and diagnostic accuracy of medical thoracoscopy was 92.6% which was similar to our study findings.

Many of previous studies demonstrated that medical thoracoscopy was safe and effective for diagnosing malignancy in pleural effusion, however histopathology remains the gold standard^[19-20].

In this study we found minor complications associated with medical thoracoscopy in which 7 patients had bleeding and 2 had postprocedure infection. A study conducted by Suraj KP et al^[21] reported that the diagnostic accuracy of thoracoscopy was 86.2% and the complication rate was 10.3%. Another study by Marwah V et al^[22] reported the diagnostic accuracy of medical thoracoscopy was 96.5% and no major complication was observed except some minor complication such as fever, infection and emphysema.

CONCLUSION

We concluded that medical thoracoscopy is safe and effective procedure for diagnosing malignant thoracoscopy with acceptable diagnostic accuracy rate and fewer rate of complications.

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