

A study to compare the diagnostic efficacy of closed pleural biopsy with that of the thoracoscopic guided pleural biopsy in patients of pleural effusion

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Abstract

Background: The diagnostic approach to exudative pleural effusion remains an underappreciated aspect of modern thoracic medicine. 15-20% of the pleural effusions remain undiagnosed. The most efficient approach to pleural exudates remains uncertain and controversial particularly if acquisition of pleural tissue is required. The clinician needs to consider various factors when confronted with the choice between closed pleural biopsy (CPB) and thoracoscopy. Hence this study was planned to compare the diagnostic efficacy of CPB and Thoracoscopic pleural biopsy (TPB). **Materials and Methods:** This was a prospective interventional study in patients of exudative pleural effusion. CPB was performed by Cope's biopsy needle. Then inspection of the pleural cavity was performed by single port rigid thoracoscope (KARL, STORZ TELECAM DX II 20 2330 20) with viewing angle of zero (0) degrees and biopsy taken from the diseased or unhealthy parietal pleura. Accordingly we compared the results of CPB and TPB. **Results:** 46 Patients underwent this study. In all 46 patients both CPB and TPB were performed. TPB was diagnostic in 36 cases (78.2%) while CPB was diagnostic only in 10 cases i.e. 21.7%. 10 (21.7%) cases remained undiagnosed. On thoracoscopic examination 30 patients were having nodularity, 25 (54.3%) were having adhesions and 20 (43.5%) were having hyperemia. 79.3% of the patients with nodularity turned out to be malignant and 71.4% of patients with adhesions and hyperemia tubercular. **Conclusions:** TPB has much greater diagnostic efficacy than CPB.

Key words: Malignancy, pleural diseases, thoracoscopic pleural biopsy, tuberculosis

Introduction

In the majority of patients of pleural effusion, the diagnosis is easily achieved by means of history, clinical examination, radiology and by investigating the pleural fluid. As many as 15–20% of all pleural effusions remain undiagnosed despite intensive efforts.^[1] When faced with diagnostic dilemma, the question of pleural biopsy arises and two options are available in the form of closed pleural biopsy (CPB) and thoracoscopic pleural biopsy (TPB). Our study has tried to evaluate the diagnostic advantages of either procedure. One of these modalities is percutaneous needle biopsy of the parietal pleura. By CPB, 49.1% of undiagnosed exudative pleural effusions could be diagnosed.^[2] CPB provides the highest diagnostic yield in cases of pleural tuberculosis (TB) and malignancy, the two most important causes of exudative pleural effusion. Unaided (blind) CPB has a relatively modest diagnostic yield of <60% for pleural malignancy.^[2] Surgical procedures like thoracoscopy and TPB may help to establish the diagnosis. Using thoracoscopy, the diagnostic accuracy could reach 96% with 91% sensitivity and 100% specificity.^[3]

Materials and Methods

This was a prospective study. A total of 46 patients of exudative pleural effusion were enrolled in this study. Patient's detailed history was taken, and complete clinicoradiological evaluation of the patient was done. A pleural fluid analysis including cytopathological examination was also done. A CPB was performed by the Cope's pleural biopsy needle and tissue sent for histopathological examination (HPE). Thoracoscopy was done with the patient lying in lateral decubitus position with the affected side upward. During the procedure, local anesthesia was used. Rigid endoscope (Karl, Storz Telecam DX II 20 2330 20) with viewing angle of zero degrees was used.

Biopsy specimens (4) of the parietal pleura were obtained under direct vision and were sent for HPE.

Results

The age of all patients ranged from 11 to 84 years with mean (\pm standard deviation [SD]) 56.11 ± 14.24 years and median 58 years. Most of the patients were >40 years consisting 89.1% of the study population, mostly males (69.6%) and nonsmokers (63.0%). The duration of their illness ranged from 1 to 120 months with mean (\pm SD) 11.24 ± 22.76 months and median 4 months.

Among patients, the most common presenting complaint was that of breathlessness (78.3%), followed by cough (63.0%), chest pain (60.9%) and fever the least (45.7%). Mostly had "Hemorrhagic" effusion (71.7%), followed by "Turbid" (13.0%), Straw (10.9%) and Serous (4.3%). 12 cases were found to have malignant cells in the effusion (26.1%).

Findings-closed pleural biopsy versus thoracoscopic pleural biopsy

Thoracoscopic pleural biopsy was able to make a diagnosis in 36 out of 46 patients that is a diagnostic efficacy of 78.3% when compared to CPB, which was able to make a diagnosis only in 10 out of 46 patients that is only 21.7%. This difference is statistically significant ($P < 0.001$). Comparing the detection of TB and Carcinoma of two methods, Chi-square test revealed similar ($P > 0.05$) findings of TB between the two methods ($\chi^2 = 2.19$, $P = 0.139$). However, the detection of Carcinoma was significantly different and higher in TPB when compared to CPB ($\chi^2 = 17.93$, $P < 0.001$) [Table 1].

Thoracoscopic findings

Among patients of pleural effusion, the percentage of Nodularity was the highest (65.2%) followed by Adhesions (54.3%) and Hyperemic the least (43.5%). Distribution of thoracoscopic findings is shown in Table 2.

The Thoracoscopy findings "Nodularity" showed significant ($P < 0.05$) association with disease. The "Nodularity" of Carcinoma patients were significantly higher as compared to both TB and inconclusive patients ($\chi^2 = 7.70$, $P = 0.021$). However, "Adhesions" ($\chi^2 = 2.87$, $P = 0.238$) and "Hyperemic" ($\chi^2 = 2.64$, $P = 0.267$) both did not ($P > 0.05$) showed any association with the disease, that is, found to be statistically the same.

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Table 1: Overall detection rate of CPB and TPB and detection of TB and carcinoma by CPB and TPB methods in pleural effusion patients

Detection	CPB (n=46) (%)	TPB (n=46) (%)	χ^2 value (df=1)	P
Total	10	36	18.32	<0.001
TB	2 (4.3)	6 (13.0)	2.19	0.139
Carcinoma	9 (19.6)	29 (63.0)	17.93	<0.001

CPB=Closed pleural biopsy, TPB=Thoracoscopic pleural biopsy, TB=Tuberculosis

Table 2: Frequency distribution of disease according to thoracoscopy findings

Methods	TB (n=7) (%)	Carcinoma (n=29) (%)	Inconclusive (n=10) (%)	χ^2 value	P
Nodularity	2 (28.6)	23 (79.3)	5 (50.0)	7.70	0.021
Adhesions	5 (71.4)	13 (44.8)	7 (70.0)	2.87	0.238
Hyperemic	5 (71.4)	11 (37.9)	4 (40.0)	2.64	0.267

TB=Tuberculosis

Discussion

Pleural effusion is a very common clinical problem. As many as 15–20% of all pleural effusions remain undiagnosed despite intensive efforts.^[1] Diagnostic and therapeutic thoracentesis has been the standard initial intervention since the early 19th century.^[4] Needle biopsy of the pleura was first described in 1955 using vim Silverman needle and later by Abram,^[5] Cope^[6] and Raja^[7] introduced different types of needle. We have done a prospective study to compare the diagnostic efficacy of CPB with that of thoracoscopic guided pleural biopsy in the patients of exudative pleural effusion. Pleural fluid analysis was able to make a diagnosis in 12 out of 46 patients, that is, 26% and CPB was able to make a diagnosis in 10 out of 46 that is, 21% while TPB was able to diagnose 36 out of 46 patients, that is, a diagnostic efficacy of 78.3%. In case of malignancy pleural fluid analysis has much more sensitivity than CPB, 12 out of 29 patients were able to be diagnosed, that is, 41.3% by pleural fluid analysis as compared to CPB which diagnosed only 8 out of 29 malignant patients, that is, 24.1%. In a study to determine the diagnostic yield of CPB it was found that Pleural biopsy is 46% sensitive and 100% specific for TB in one bite and sensitivity and specificity for malignancy is 50% and 100%.^[8] Unaided (blind) CPB has a relatively modest diagnostic yield of <60% for pleural malignancy.^[2] Of note is the fact that the overall yield for malignancy over pleural fluid cytology is only increased by 7–27%.^[2] Surgical procedures like thoracoscopy may help to obtain the pleural tissue. The most common among the diagnostic uses of thoracoscopy is the evaluation of unknown exudative pleural effusion.^[9] Using thoracoscopy, the diagnostic accuracy could reach 96% with 91% sensitivity and 100% specificity.^[3] In a study done by Loddenkemper *et al.*,^[10] in malignant pleural effusion, the pleural fluid cytology was diagnostic in 62% cases and CPB was diagnostic in 44% cases. The diagnostic sensitivity of TPB was 95%. The study done by David *et al.*^[11] reported that the diagnostic yield of thoracoscopy is between 90% and 100% in contrast to 44% for CPB and pleural fluid cytology. In another study done by Harris *et al.*^[12] the pleural fluid cytology was

positive in 58% cases, and CPB was positive in 43% cases. Pleural fluid cytology and CPB in combination were positive in 65% of cases. Dhanya and Ravindran.^[13] reported that the diagnostic accuracy of thoracoscopy in setting of undiagnosed pleural effusion varied widely with a range of about 60–90%. The result of our study (78.26%) is comparable to that of the above mentioned study.

On HPE, the most common histological pattern obtained was that of carcinoma. Tubercular pathology was found in 15.2% case and 10 were found to be of indeterminate etiology.

In a series of 566 examination by Viskum and Enk^[14] the most common side effect of thoracoscopy was subcutaneous emphysema (6.9%). We did not get any serious complication in the whole study except that of subcutaneous emphysema that developed in two patients while doing CPB.

Conclusion

Thoracoscopy has a much greater yield (78.3%) when compared to CPB. All patients should go for a pleural fluid cytology and if it is inconclusive they should be subjected to thoracoscopic biopsy, when available instead of CPB as TPB has a much greater diagnostic efficacy and also it is a minimally invasive procedure with minimal to no complications and also it requires very less time and effort to gain expertise.

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