Aspect of Thoracoscopic Biopsy in Pleural Malignancy

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ABSTRACT

BACKGROUND
Medical thoracoscopy, in the educated fingers of a pulmonologist, is a secure and powerful process for the diagnosis and treatment of many pleural diseases. If the centres for thoracoscopy are available, thoracoscopy should be carried out on those undiagnosed sufferers due to its excessive sensitivity in malignant and tuberculous pleural effusions. That is why the ultimate decade witnessed an interest in thoracoscopy as a diagnostic device for pleural diseases. In the existing study, we wanted to describe our experience with the function of thoracoscopic biopsy in patients who underwent thoracoscopy for diagnostic purposes.

METHODS
The study protocol and ethical approval were taken by the Institutional Review Board for human studies of B. J. Medical College, Gujarat. It was a prospective study conducted in the Department of Pulmonary Medicine, B. J. Medical College, Ahmedabad, between July 2014 and November 2016. 39 patients who underwent medical thoracoscopy for undiagnosed pleural effusions were enrolled in this study. Undiagnosed pleural effusion was defined as failure to achieve a diagnosis by initial pleural fluid analysis including pleural fluid adenosine deaminase (ADA) levels and at least three pleural fluid analyses negative for malignant cells. Diagnostic pleural fluid aspiration was done to obtain pleural fluid specimens.

RESULTS
In the present study with the help of thoracoscopy, 36 (92.31 %) patients were diagnosed successfully while only 3 patients remained undiagnosed. In the present study, on thorascopic examination 21 (53.85 %) patients had pleural nodules, 5 (12.82 %) patients had pleural thickening, 5 (12.82 %) patients had pleural plaque-like erythema. The remaining patients had other uncommon findings e.g. nonspecific pleuritis 3 (7.69 %).

CONCLUSIONS
Among all the patients with undiagnosed exudative pleural effusion, irrespective of smoking status which fails to respond to conventional medical management, diagnostic thoracoscopy should be considered as early as possible. The diagnostic yield of thoracoscopy for pleural pathology remains very high (92.3 %)

KEYWORDS
Diagnosis, Malignant Pleural Effusion, Thoracoscopy.
BACKGROUND

The correct diagnosis of the pleural disease is a vast challenge. Conservative estimates propose that 25 % of diseases visible in a pulmonologist's practice contain the pleura. Of those cases, 25 % of them are not able to be attributed to a specific diagnosis, even after thoracentesis and closed pleural biopsy. As many as 50 % of the sufferers of these undiagnosed diseases will subsequently be recognized with a malignancy. If the centres for pleuroscopy/thoracoscopy are available, thoracoscopy needs to be carried out on those undiagnosed sufferers due to its excessive sensitivity in malignant and tuberculous pleural effusions. That is why the ultimate decade witnessed an interest in thoracoscopy as a diagnostic device for pleural diseases. Medical thoracoscopy also named pleuroscopy as an endoscopic examination of the pleural space. It is a least invasive procedure that was first invented in 1910 by Hans Christian Jacobaeus. He is called as the "Father of Thoracoscopy." Jacobaeus published an early report on the use of thoracoscopy to localize and diagnose the pleural disease.¹

Before the application of thoracoscopy, hydrothorax exfoliative cytologic examination and closed pleural biopsy were the two methods typically used; however, these methods have a low positive diagnostic rate.² The clinical application of thoracoscopy thus provides a novel诊断性方法 for undiagnosed pleural effusions. Compared to conventional closed pleural biopsy, thoracoscopy has notable advantages. It overcomes the blindness of closed pleural biopsy and markedly improves the diagnostic accuracy of pleural effusions, and therefore improves the positive diagnostic rate of pleural diseases.³⁴⁵ Medical thoracoscopy, with inside the educated fingers of a pulmonologist, is a secure and powerful investigation for the diagnosis and treatment of many pleural diseases. It is typically done in a bronchoscopy suite, with anaesthetic and aware sedation, with cardiopulmonary tracking and without intubation or mechanical ventilation.

It lets one visualise the complete pleural floor and carry out confined diagnostic and healing procedures. The most important indication for thoracoscopy is an assessment of exudative pleural effusions which stay undiagnosed after pleural fluid analysis, in which thoracoscopy is recommended as an alternative to closed pleural biopsy. With thoracoscopy, you can visualize the complete visceral and parietal pleura and take a pleural biopsy from involved sites below vision. The diagnostic yield is with inside the order of 91–95 % for malignancy and may be as excessive as 100 % for pleural tuberculosis. Although thoracoscopy may be used to visualise pleural blebs and bullae in sufferers with spontaneous pneumothorax, that is seldom the indication for thoracoscopy.

Medical thoracoscopy may be used for therapeutic procedures, consisting of adhesiolysis and evacuation of pleural fluid in sufferers with empyema, pleurodesis in sufferers with recurrent pleural effusion and spontaneous pneumothorax. In the existing study, we described our experience with the function of thoroscopic biopsy in patients who underwent thoracoscopy for diagnostic purposes.

METHODS

This was a prospective cross-sectional study conducted in the Department of Pulmonary Medicine, B. J. Medical College, Ahmedabad, Gujarat between July 2014 and November 2016. The study protocol and ethical approval were taken by the Institutional Review Board for human studies. Total 39 patients who underwent medical thoracoscopy for undiagnosed pleural effusions were enrolled in this study. The pleural fluid which had failed to achieve a diagnosis by initial pleural fluid analysis including pleural fluid adenosine deaminase (ADA) levels and at least three pleural fluid analyses negative for malignant cells was called undiagnosed pleural effusion in this study.

Detailed clinical evaluation with history was taken and clinical examination was done. A pleural fluid examination was done for diagnosis to obtain pleural fluid specimens. Differential cell counts, protein, adenosine deaminase (ADA), cytological examination, gram-stain, Ziehl-Neelsen stain were performed. Serum was taken at the same time for the measurement of protein levels. A computed tomography scan (CT) of the chest was performed on all patients to assess whether thoracoscopy can be done or not.

Inclusion Criteria

In the current study, only those patients were enrolled who failed to respond to initial fifteen days of conventional medical management, remained symptomatic (after repeated thoracentesis/ATT/antibiotics), found fit for the medical thoracoscopy with good performance status, however, breathlessness alone was not necessarily a contraindication as dyspnoea secondary to the effusion was relieved by the procedure. Patients with baseline SpO2 > 90 %, without bleeding coagulopathy (PT with INR < 2) were enrolled.

Exclusion Criteria

- Patients with transudative pleural effusion, according to Light's criteria.
- Patients whose initial pleural fluid examination through thoracentesis or closed pleural biopsy could reach a definitive histopathological diagnosis.
- Patients who were not fit for performing thoracoscopy as in the following cases: Patients with severe uncorrected hypoxemia despite continuous oxygen administration.
- Patients who could not withstand the lateral decubitus for a period long enough to perform a thoracoscopy.
- Patients with unstable cardiovascular and haemodynamic status.

For patients with coagulative defects, at least the prothrombin concentration should be greater than 60 %, and the platelet count should be greater than 60,000.

The patient was asked to lie in the lateral decubitus position breathing spontaneously, with the normal lung in the dependent position and the arm raised above the head. The side of the chest which had to be examined was disinfected; 15–30 ml of lidocaine 2 % was injected at the
point of entry, through all layers of chest wall up to the pleura. Pleural fluid aspiration was done to confirm the presence of pleural fluid at the insertion site. A single puncture, 1-cm incision was made in the mid-axillary line between the 4th and 7th intercostal spaces of the chest wall, and a track was created by blunt dissection. A trocar was inserted at the site and the pleural cavity opened to atmospheric pressure, any remaining pleural fluid was aspirated. The pleural cavity was fully examined by a pathologist irrespective of the biopsy method but knowing clinical history. The acceptability of specimens and tissue diagnosis was noted. When the pleural biopsy was conclusively positive for malignancy it was labelled as malignant effusion. A final diagnosis was made with tissue diagnosis examined by the pathologist irrespectively of biopsy method used unless there was any bias towards any technique.

Specimens were fixed in 10% neutral buffered formalin. The pleural cavity was fully examined by a pathologist irrespective of biopsy method but knowing clinical history. The acceptability of specimens and tissue diagnosis was noted. When the pleural biopsy was conclusively positive for malignancy it was labelled as malignant effusion. A final diagnosis was made with tissue diagnosis examined by the pathologist irrespectively of biopsy method used unless there was any bias towards any technique.

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In the present study on thoracoscopic examination, 21 (53.85 %) patients had pleural nodules, 5 (12.82 %) patients had pleural thickening, 5 (12.82 %) patients had pleural plaque-like erythema. The remaining patients had other uncommon findings e.g. nonspecific pleuritis (7.69 %) (Table 8).

| Thoracoscopic findings | No. of Cases | % |
|------------------------|-------------|---|
| Pleural nodules        | 21          | 53.85% |
| Pleural thickening     | 5           | 12.82% |
| Plaque like erythema   | 5           | 12.82% |
| Normal pleura/nonspecific findings | 3 | 7.69% |
| Adhesion               | 2           | 5.13% |
| Black brown patches    | 1           | 2.56% |
| Purulent               | 2           | 5.13% |

Table 8. Gross Thoracoscopic Findings in the Studied Group

Out of 39 cases, thoracoscopy helped in the diagnosis of 36 patients. 22 (56.41 %) patients were diagnosed with pleural malignancy, 6 (15.38 %) patients were pleural tuberculosis, 8 (20.52 %) had nonspecific inflammatory pleuritis. 3 (7.69%) patients were found to have normal pleura or no definite diagnosis. (Table 9)

| Complications | No. | % |
|---------------|-----|---|
| Pain          | 17  | 43.59% |
| Minor bleeding| 4   | 10.26% |
| Dyspnea       | 4   | 10.26% |
| Fever         | 3   | 7.69% |

Table 12. A Post-Thoracoscopic Complication in the Studied Group

The most common type of malignancy obtained by thorascopic pleural biopsy in the studied group was metastatic adenocarcinoma among 12 (54.54 %) patients; the next common type of malignancy was malignant mesothelioma (3 out of 22) (13.65 %). Squamous cell carcinoma among 3 (13.65%). Remaining four patients with uncommon malignancy, 1 patient was diagnosed as a round cell tumour (4.54 %), metastatic breast adenocarcinoma (4.54 %), 1 small cell carcinoma (4.54 %) and 1 metastatic parotid adenoid cystic carcinoma (4.54 %) respectively. (Table 10)

Cytologic examination of pleural fluid is the first recommendation in a patient with undiagnosed pleural effusion which is suspected as malignant. Repeated thoracentesis can enhance the sensitivity of cytology, but it is usually only 50 to 70 %.

In the present study, the diagnostic yield of medical pleuroscopy was found to be 92.31 % which is comparable with Prabhu et al.6 (97%), L. A. Helala et al.7 (95%), Mehta et al.8 (80%), Thangakunam8 (66.75%) study groups.

In the present study, malignancy was the most common histopathological diagnosis (56.41 %) which is comparable with Nattusamy et al.10 (62.5 %), Mootha et al.11 (48.57 %) while TB was 15.38 % comparable with Mootha et al.11 22.85 %. Nonspecific pleuritis was 20.52 % comparable with Nattusamy et al.10 (29.17 %) and Mootha et al.11 (25.71 %).

Metastatic adenocarcinoma was the commonest diagnosis (54.54 %) which is comparable with other studies i.e. Prabhu et al.6 (62.5%), Thangakunam et al.8 (75%) and Nattusamy et al.10 (35.42%) study groups. In the present study, malignant mesothelioma was the second most common diagnosis (13.65 %) comparable with Prabhu et al.6 (12,5%), Thangakunam et al.8 (12.5%). Small cell carcinoma was 4.54 % comparable with Nattusamy10 (6.25 %). Metastatic breast adenocarcinoma was 4.54 % comparable with 6.25 %.

In the present study, the most common thorascoscopic finding was pleural nodularity (53.85 %) which is comparable with other studies done by Nattusamy et al. (88 %). Other commonest finding was diffuse pleural thickening (12.82 %) which is again comparable with the study by Mehta et al.8 which showed similar findings among 7.89 % of the patients. Another nonspecific thorascoscopic finding was adhesion (5.13 %) of the patients which is comparable with the study of Mehta et al.8 with similar findings among 15.78 % of patients.

Regarding biochemical characteristics of pleural fluid, the present study showed the mean total leukocyte count as 962.692, the mean protein was 4.52 which is comparable with V. K. Mootha et al. and Nattusamy et al. study groups which obtained TLC 1525 and 1109 respectively while protein was 4.89 and 4.58 respectively. The mean sugar of the fluid was 63.66 which is comparable with V. K. Mootha et al. study group (72.22), mean ADA of the fluid was 32.98 which is comparable with V. K. Mootha et al. study group (39.1).

In the present study, the post pleuroscopy complications were postoperative pain (43.59 %), fever, minor bleeding, dyspnoea which is comparable with M. M. A. M. Shaheen et al.12 (40%) study group.

In the present study with the help of thoracoscopy, 36 (92.31 %) patients were diagnosed successfully while only 3 patients remained undiagnosed. (Table 11)
CONCLUSIONS

Diagnostic thoracoscopy is considered the gold standard for the diagnosis of pleural malignancy. The use of diagnostic thoracoscopy helps in the early diagnosis of pleural malignancy and prevents wrong treatment. Among all the patients with undiagnosed exudative pleural effusion, irrespective of smoking status which fails to respond to conventional medical management, diagnostic thoracoscopy should be considered as early as possible. The diagnostic yield of thoracoscopy for pleural pathology remains very high (92.3%).

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