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Original Article

A Critical Analysis and Correlation Between Thoracoscopy Findings and Pleural Cytology in Malignant Diseases of Pleura

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Abstract

Background: Primary or secondary malignant diseases of the pleura present variable thoracoscopy findings and so as cytology of pleural aspirations and histopathology. There are few studies correlating these two important modes of investigations in the accurate diagnosis of the malignant diseases of the pleura.

Aim: Aim of the study was to correlate the thoracoscopy findings and cytology features of different malignant diseases of the pleural lesions and the pathological types of malignancy in malignant pleural effusion (MPE).

Materials and Methods: A retrospective study was conducted by reviewing the medical records of 49 patients attending the Department of Medicine and Surgery with clinical signs and symptoms of MPE. The patients with confirmed MPE by pleural fluid cytology and tissue biopsy as well as macroscopic appearances of malignant pleural lesions on thoracoscopy were identified.

Results: Metastatic adenocarcinoma was found in 27 (55.10%), malignant lymphoma in 9 (18.36%), malignant mesothelioma in 5 (10.20%), squamous cell carcinoma in 4 (8.16%), small cell carcinoma in 2 (4.08), and spindle cell tumor 2 (4.08%). Among the thoracoscopy findings nodular appearance was observed in 34 (69.38%), masses in 8 (16.32%), plaques in 3 (6.12%), and adhesions in 4 (8.165) of patients. Nodular finding was found in metastatic adenocarcinoma and malignant lymphoma 25 (76.47%) and 6 (66.66%), respectively.

Conclusion: Thoracoscopy inspection would give the reasonable consistent macroscopic sign and can be correlated with cytology and biopsy findings of different malignant pleural lesions.

Key words: Aspirations, Cytology, Effusion, Lymphoma, Malignancy, Metastases, Pleura, Spindle cell tumor, Thoracoscopy

INTRODUCTION

Malignant pleural effusion (MPE) is one of the commonly encountered clinical conditions for which patients attend oncology centers.[1] MPE usually presents in the disseminated and advanced stage of malignancy.[2] In postmortem review studies, malignant effusions were found in 15% of patients who died with malignancies. Studies have shown that MPE is also one of the leading causes of exudative effusion and among them nearly 42-77% are secondary to malignancy.[1] All neoplasms have been reported to involve the pleura, but carcinoma lung has been the most common neoplasm, accounting for approximately one-third of all malignant effusions. Breast carcinoma is the second most common malignant disease followed by lymphomas (Hodgkin's disease and non-Hodgkin's). In 5-10% of malignant effusions, no primary tumor is identified.[3] The incidence of mesothelioma varies according to the geographic location and exposure to industrial toxic agents. The most pleural metastases arise from tumor emboli to the visceral pleural surface, with secondary seeding to the parietal pleura. The other possible mechanisms include direct tumor invasion (in lung cancers, chest wall neoplasm and breast carcinoma). Hematogenous spread to parietal pleura and lymphatic involvement cannot be ruled out. Interference with the integrity of the

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lymphatic system anywhere between the parietal pleura and mediastinal lymph nodes can result in pleural fluid formation.[4] Thoracoscopy is highly sensitive for detecting pleural neoplasias with negative pleural fluid cytology.[5,6] The possibility of visualizing the pleural cavity and obtaining directed biopsy specimen's accounts for diagnosis of more than 90% of pleural neoplasias.[6-8] However, its precise indication in the workup of patients with pleural effusion remains controversial.[9] In the present context, the aim of this study is to correlate the thoracoscopy findings and cytology features of different malignant diseases of the pleural lesions and the pathological types of MPE.

MATERIALS AND METHODS

A total of 49 patients were included in this retrospective study attending the medicine and surgery departments of the tertiary teaching hospital attached to Kannur Medical College, Anjarakandy, Kannur, Kerala. The period of the study was between April 2014 and February 2017. Ethical committee clearance was obtained before commencing the study.

Inclusion Criteria

1. Patients with signs and symptoms of pleural effusion undergoing medical thoracoscopy (MT) were included in the study.
2. Patients with positive cytology for malignant cells in pleural effusion were included in the study.
3. Patients with all types of malignant lesions of pleura were included in the study.

Exclusion Criteria

1. Patients with mediastinal tumors were excluded from the study.
2. Patients with terminal illness were excluded from the study.

All the patients were assessed before subjecting them for thoracoscopy by, (i) detailed medical history, (ii) investigations done to reach the final diagnosis including: Chest radiographs and chest-computed tomography, pleural aspiration with cytology and closed pleural biopsy. Before thoracoscopy procedure, pleural effusion was drained and ipsilateral pneumothorax was induced. Procedure was done under local anesthesia with spontaneous breathing mild sedation (midazolam, fentanyl) by an experienced pulmonologist in the operating room. In lateral decubitus position, with the involved side upward a small skin incision was done with blunt dissection to enter the pleural space between the third and sixth intercostal space, along the mid-axillary line. The ribs were not spread. A rigid thoracoscope (Karl Storz, Germany) was inserted, and the pleural cavity was visualized. All the layers and surfaces of the pleura were inspected and any pathological lesions were described and identified. Biopsies were performed under direct visual control in all suspect areas, systematically in several parts of the parietal pleura, and sometimes in the visceral pleura, with diathermy forceps. All specimens were stained by hematoxylin and eosin and examined by an expert pathologist to diagnose the histopathological type of malignancy. An intercostal tube was inserted before wound closure to evacuate air and fluid. Chest radiographs were routinely obtained with a portable unit, immediately after the procedure and daily thereafter until chest tube removal. On malignant diagnosis, cases underwent pleurodesis routinely.

Statistical Analysis

Data were analyzed using online socialsciencestatistics.com. Normally distributed data were presented as number of incidence and percentage.

OBSERVATIONS AND RESULTS

Among the 49 patients males were 38 (77.55%) and females were 11 (22.44%). The mean age of studied population was 58.37 years with standard deviation 13.6. The patient's ages ranged from 45 to 80 years. Metastatic adenocarcinoma was found in 27 (55.10%), malignant lymphoma in 9 (18.36%), malignant mesothelioma in 5 (10.20%), squamous cell carcinoma in 4 (8.16%), small cell carcinoma in 2 (4.08), and spindle cell tumor 2 (4.08%) (Table 1).

Among the thoracoscopy findings nodular appearance was observed in 34 (69.38%), masses in 8 (16.32%), plaques in 3 (6.12%), and adhesions in 4 (8.165) of patients. Nodular finding was found in metastatic adenocarcinoma and malignant lymphoma 25 (76.47%) and 6 (66.66%), respectively (Table 2). Nodular finding was found in metastatic adenocarcinoma and malignant lymphoma 25 (76.47%) and 6 (66.66%), respectively.

This study showed that few complications such as empyema in 2, residual pneumothorax in 2, and subcutaneous emphysema in 1 patient and were managed by conservative treatment. There were no deaths related to the procedure.

Table 1: The different malignant diseases of pleura observed in the study (*n*=49)

Type of lesion	*n* (%)
Metastatic adenocarcinoma	27 (55.10)
Malignant lymphoma	09 (18.36)
Malignant mesothelioma	05 (10.20)
Squamous cell carcinoma	04 (8.16)
Small cell carcinoma	02 (4.08)
Spindle cell tumor	02 (4.08)
Total	49 (100)

Table 2: Thoracoscopy findings in different lesions (*n*=49)

Type of lesion	Mass-34 (69.38%)	Nodule-08 (16.32%)	Plaque-03 (6.12%)	Adhesions-04 (8.16%)
Metastatic adenocarcinoma - 27	25 (76.47%)	06 (66.66%)	01	01
Malignant lymphoma - 09	04	01	00	00
Malignant mesothelioma - 05	01	00	01	01
Squamous cell carcinoma - 04	02	00	01	00
Small cell carcinoma - 02	01	01	00	01
Spindle cell tumor - 02	01	00	00	01
Total - 49				

DISCUSSION

MT is being used increasingly to confirm the dilemma of pleural effusion which could not be actually worked out without its help. In the present study, 49 patients who underwent MT and showed malignant etiology of pleura effusion, various types of macroscopic features (mass, nodules, plaques, and adhesions) in pleural layers; visceral and parietal; were visualized including costal, mediastinal and diaphragmatic partitions. These lesions can be observed in magnification with panoramic view of the hemithorax with high resolution so that it allows adequate biopsy to be taken for histologic, and possibly immunocytologic examination.[10] MT also allows for therapeutic procedures such as decortications, pleurectomy, mechanical pleurodesis, and talc insufflations and last but not least, visual directed placement of chest drains.[11] Among the Thoracoscopy findings nodular appearance was observed in 34 (69.38%), masses in 8 (16.32%), plaques in 3 (6.12%), and adhesions in 4 (8.16%) of patients. Nodular finding was found in metastatic adenocarcinoma and malignant lymphoma 25 (76.47%) and 6 (66.66%), respectively. This was in agreement with the study done by Jiang *et al.*,[12] who found that; the endoscopic findings of MPE mostly showed nodules of varying sizes. The nodules could be grape-like, cauliflower - like, fused into masses, or diffused small nodules and the main pathological diagnosis of MPE was pleural metastases (37.8% of cases). Metastatic adenocarcinoma proved to be in higher percentage in thoracoscopy nodules (76.47%); this can be explained by implantation theory of pleural metastasis. Malignant lymphoma presented higher percentage in thoracoscopy nodules also (66.66%). The classic view of malignant pleural mesothelioma is a thickening in the pleural space with encasement of the lung by rind like visceral pleura. The tumor can form additional small nodules over the diaphragmatic surfaces or other less involved areas. Hyalinized pleural plaques over the parietal pleura and diaphragmatic surface can become invaded by mesothelioma. Rare cases of malignant mesothelioma are characterized by a single mass lesion without the diffuse thickening or satellite nodules.[13] A study done by England,[14] Rodriquez-Panadero *et al.*[15] and Light,[16] demonstrated that involvement of the parietal pleura is frequently patchy and that the parietal pleura is involved later in the course of malignancy than the visceral one. In the present study, MT revealed that all the cases of the pleural plaques were of parietal origin while the rest of cases with nodules, masses were in both visceral and parietal pleurae referring to the extensive degree of pleural affection and advanced form of malignancy. This study showed few complications such as empyema in 2, residual pneumothorax in 2, and subcutaneous emphysema in 1 patient and were managed by conservative treatment. There were no deaths related to the procedure. According to Marel *et al.*,[17] the main risks of thoracoscopy are those associated with early complications after the procedure as pulmonary edema and excessive bleeding and or hemorrhage necessitating a thoracotomy to stop it.

CONCLUSION

The correlation between the thoracoscopy findings of pleura is complimentary to the pleural fluid cytology and histopathological diagnosis of pleural biopsy. MT plays an important role in the diagnosis and management of MPE through direct access, visualization, handling, biopsy, and intervention.

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