

Pleural Fluid Cytology as a Means of Diagnosing Malignant Pleural Effusions

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Abstract: A terminal malignancy on the wrong side of the cycle of life is worst. It comes with its set of constraints. . . constraints of co - morbidities, constraints of fitness for procedures, constraints of finances, constraints of caregivers, constraints of prognosis. At such times having a less invasive tool to zero in on the diagnosis helps a lot to ease the burden on the patient & his family. Presenting an observational study to assess the utility of pleural fluid cytology in patients reporting with signs & symptoms of suspected malignancy. **Aim and objectives:** To verify the usefulness of pleural fluid cytology as a mode of diagnosing malignant pleural effusions. To assess whether a less invasive procedure like pleural fluid sampling obtained via thoracocentesis can replace a more invasive percutaneous CT (computed tomography) guided or per - bronchoscopic lung biopsy in diagnosing malignancy in the non - affording or unwilling patients, or in those at risk of more invasive procedures due to age or infirmity. **Methodology:** This is an observational study of 21 elderly patients, aged between 60 to 75 years, presenting with gross, unilateral pleural effusions. Patients with CECT (contrast enhanced computed tomography) chest scans suggestive of gross pleural effusion and underlying lung mass were included in the study. CT guided & per - bronchoscopic biopsy samples were taken from the lung mass depending on the site of the lesion. Only histopathologically confirmed lung malignancy patients were included in the study. Diagnostic & therapeutic pleural tapping was done and samples were analysed. Light microscopy was used for pleural fluid examination. Co - relation between histopathology report positive for lung malignancy & pleural fluid cytology was studied. **Results:** It was observed that 10 out of 14 biopsy proven squamous cell carcinoma lung patients had pleural fluid cytology positive for malignancy (71.4%) while 3 out of 7 biopsy proven adenocarcinoma lung had positive pleural fluid cytology (42.9%). The positive yield from pleural fluid cytology for squamous cell carcinoma lung was found to be more than for adenocarcinoma lung. **Conclusion:** A common radiological presentation of advanced Ca lung is recurrently filling unilateral pleural effusion. Pleural fluid cytology is a quick and cost effective method to help diagnose malignant pleural effusion in suspected cases. A positive pleural fluid cytology helps in confirming a cancerous origin of an undiagnosed lung lesion in those patients unwilling or unfit for more invasive procedures like a lung biopsy or bronchoscopy.

Keywords: pleural fluid cytology, malignant pleural effusion, lung cancer diagnosis, less invasive procedures, squamous cell carcinoma.

1. Introduction

Malignant pleural effusion

Malignant pleural effusion, a type of exudative pleural effusion, is usually massive and unilateral. Its incidence is increasing with increasing cancer prevalence and better life expectancy as a result of newer cancer therapies, and occurs in up to 15% of all cancer patients. A malignant pleural effusion could be primary i. e. due to a pleural pathology, or secondary i. e. as a metastasis from a carcinoma elsewhere. Most common cause of secondary malignant pleural effusion is carcinoma of the lung (Ca lung), other causes being breast cancer, lymphoma, ovarian or gastric cancer, prostate. 50 to 65% of malignant pleural effusions are secondary to lung or breast cancer. Mesothelioma is the most common primary pleural tumor, and more than 90% of mesothelioma cases present with malignant effusions.

Pleural fluid cytology

The mainstay of confirming a pleural effusion as being malignant or not is cytological analysis of a pleural fluid sample obtained via thoracocentesis. Malignant pleural fluid is exudative & is lymphocyte predominant with low glucose

and low pH. Amount of sample sent for pleural fluid cytology should ideally be between 50 - 150 ml.

Aim

- 1) To verify the usefulness of pleural fluid cytology as a mode of diagnosing malignant pleural effusions.
- 2) To assess whether a less invasive procedure like pleural fluid sampling obtained via thoracocentesis can replace a more invasive percutaneous CT (computed tomography) guided or perbronchoscopic lung biopsy in diagnosing malignancy in the non - affording or unwilling patients, or in those at risk of more invasive procedures due to age or infirmity.

2. Methodology

This is an observational study of 21 elderly patients, aged between 60 to 75 years, presenting with gross, unilateral pleural effusions. Patients with CECT (contrast enhanced computed tomography) chest scans suggestive of gross pleural effusion and underlying lung mass were included in the study. CT guided & per - bronchoscopic biopsy samples were taken from the lung mass depending on the site of the

lesion. Only histopathologically confirmed lung malignancy patients were included in the study. Diagnostic & therapeutic pleural tapping was done and samples were analysed. Light microscopy was used for pleural fluid examination. Co - relation between histopathology report positive for lung malignancy & pleural fluid cytology was studied.

21 patients admitted in MGM Medical College and Hospital, Chhatrapati Sambhajnagar, a tertiary care hospital, during the period December 2023 to July 2024, with biopsy proven lung malignancy and with associated pleural effusions were included in the study. These patients presented with insidious onset dyspnea with acute worsening over the preceding week, cough, chest pain, loss of weight. They were in the age group 60 to 75 years. All of them gave a history of chronic exposure to smoke, either cigarette/bidi or domestic chulha. A few of them presented with hoarseness of voice & puffiness of face, and were referred by ENT (Ear, Nose, Throat) surgeons following CT neck & chest suggestive of mediastinal lymphadenopathy, lung mass, pleural effusion. The presenting symptom in a couple of them was severe backache with MRI (magnetic resonance imaging) spine showing metastases.

3. Results

Out of 21 patients included in study

13 were male (62%)

8 were female (38%)

All patients had biopsy proven lung malignancy.

Of these,

14 (66.6%) had squamous cell carcinoma

7 (33.3%) had adenocarcinoma

11 (78.5%) were male.

2 (28.5%) were male

3 (21.5%) were female.

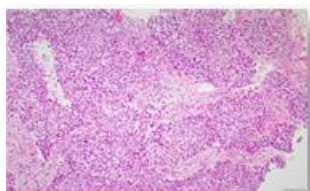
5 (71.5%) female.

13 of the 21 patients (61.9%) had pleural fluid cytology positive for malignant cells

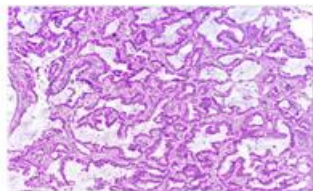
10 Patients were of squamous cell carcinoma (76.9%)

3 Patients of adenocarcinoma (23%)

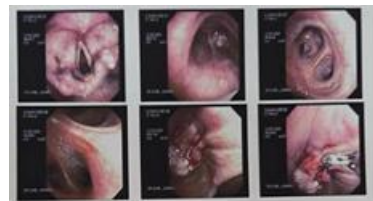
It was observed that 10 out of 14 biopsy proven squamous cell carcinoma lung patients had pleural fluid cytology positive for malignancy (71.4%) while 3 out of 7 biopsy proven adenocarcinoma lung had positive pleural fluid cytology (42.9%). The positive yield from pleural fluid cytology for squamous cell carcinoma lung was found to be more than for adenocarcinoma lung.



Squamous cell carcinoma



Adenocarcinoma



Bronchoscopic image of patient of CA Lung

A few avoidable errors were noted during the review of the cases under study, viz.

- 1) Inadequate sample, 50 to 150 ml of pleural fluid is recommended.
- 2) Contaminated or improper sample collection, care be taken while selecting the container used to transport the sample,
- 3) Improper slide preparation,
- 4) Observer error, a high degree of suspicion will fetch higher results

4. Conclusion

A common radiological presentation of advanced Ca lung is recurrently filling unilateral pleural effusion. Pleural fluid cytology is a quick and cost effective method to help diagnose malignant pleural effusion in suspected cases. A positive pleural fluid cytology helps in confirming a cancerous origin of an undiagnosed lung lesion in those patients unwilling or unfit for more invasive procedures like a lung biopsy or bronchoscopy. This is all the more relevant since many patients have distant metastases by the time they present. The positivity yield from pleural fluid cytology for squamous cell carcinoma lung was found to be more than for adenocarcinoma lung. However in view of our study sample size being small, a study with a larger sample size is suggested. Attention is to be paid to minimize mistakes. A high degree of suspicion and finetuning of human skills should improve the diagnostic efficacy of malignant pleural fluid analysis.