

## STUDY OF THE CAUSES AND DIAGNOSTIC MODALITIES OF MALIGNANT PLEURAL EFFUSIONS IN THE PRE-THORACOSCOPY ERA IN A TERTIARY CARE CENTRE

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### ABSTRACT

#### BACKGROUND

Malignant pleural effusions are a common cause of morbidity in patients with advanced cancers. Common malignancies associated with malignant pleural effusion include lung, breast and lymphomas. Diagnostic methods include cytological analysis and pleural biopsy either closed or thoracoscopic guided. This study was taken up to analyse the cancers associated with malignant pleural effusions and the diagnostic modalities employed towards the diagnosis of malignant pleural effusion.

#### MATERIALS AND METHODS

Retrospective analysis of case records of patients diagnosed as malignant pleural effusion prior to the use of thoracoscopic-guided pleural biopsy during a two year period was done and the results were analysed to assess the causes of malignant pleural effusion and the diagnostic methods employed to confirm the diagnosis of malignant pleural effusion.

#### RESULTS

48 cases of malignant pleural effusion were identified during the study period. The commonest malignancies associated with malignant pleural effusion were lung and breast cancer. Most of the patients were elderly, but some of the cases were identified in younger age groups especially in breast cancer. Cytological analysis and closed pleural biopsies were the diagnostic methods employed for diagnosing malignant pleural effusion.

#### CONCLUSION

The study results were consistent with published data that malignant pleural effusions were commonly associated with lung and breast malignancies. Most of the malignancies were in patients aged more than 50 years, but some cases in younger age group especially associated with breast malignancy were noted. Cytology and closed pleural biopsy are adequate to diagnose malignant pleural effusion even in absence of thoracoscopy.

#### KEYWORDS

Malignant Pleural Effusion, Cancer, Cytology, Pleural Biopsy, Thoracoscopy.

**HOW TO CITE THIS ARTICLE:** Viswanathan VK. Study of the causes and diagnostic modalities of malignant pleural effusions in the pre-thoracoscopy era in a tertiary care centre. *J. Evid. Based Med. Healthc.* 2017; 4(44), 2682-2684. DOI: 10.18410/jebmh/2017/533

#### BACKGROUND

Malignant pleural effusions are a common cause of morbidity in patients with advanced cancer. Cancer of the lung, breast and lymphomas account for approximately 75% of malignant pleural effusions. Metastatic ovarian carcinoma is the fourth leading cause of malignant pleural effusions. Sarcoma and melanomas account for a small percentage of malignant pleural effusion. In about 6% of cases, the primary is unknown.<sup>1</sup>

Malignant pleural effusion is the second leading cause of exudative pleural effusions after parapneumonic effusions.<sup>1</sup> Because, many parapneumonic effusions are small and are not subject to thoracocentesis, malignancy is probably the

*Financial or Other, Competing Interest: None.  
Submission 15-05-2017, Peer Review 19-05-2017,  
Acceptance 28-05-2017, Published 31-05-2017.*

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*DOI: 10.18410/jebmh/2017/533*

leading cause of exudative effusions subject to thoracocentesis.<sup>1</sup>

Most patients with malignant pleural effusion present with progressive dyspnoea, cough or chest pain that compromise the quality of remaining short life of these patients. The prognosis of these patients is poor and mean survival period after confirming the diagnosis is approximately three months.<sup>2</sup>

The diagnostic modalities employed for confirming the diagnosis of malignant pleural effusion include pleural fluid cytology, pleural biopsy done either blindly or by thoracoscopic guidance.

Blind pleural biopsies are usually done using Abrams or Cope's pleural biopsy needles. The main limitation of this is selection of appropriate sites for tissue diagnosis and hence the yield varies depending on several factors such as the site selected for biopsy, the operator's experience, size of the sample obtained. Thoracoscopic pleural biopsy sampling has the advantage of directly visualising the pleura and hence is superior for sampling the appropriate site for taking biopsy. However, the main limitation of thoracoscopy is its cost and is not currently available in many centres at present.



Treatment options depend on number of factors such cell type, extent of the disease, performance status and life expectancy.<sup>3</sup> Intervention options range from observation in cases of asymptomatic effusions through simple thoracentesis to more invasive procedures such as thoracoscopy, pleuroperitoneal shunting and pleurectomy.<sup>4</sup>

**Aims and Objectives**

To analyse the demographics and causes of malignant pleural effusion and the various diagnostic modalities of diagnosing malignant pleural effusion.

**MATERIALS AND METHODS**

48 cases of proven malignant pleural effusion diagnosed over a two year period were taken up for the study using retrospective case records. The demographics of these patients, the causes of malignant pleural effusion and the diagnostic modalities employed were analysed. This study was conducted at Department of Pulmonary Medicine at a time when thoracoscopy was not available and blind pleural biopsy using Abram’s needle was resorted to for diagnosing malignant pleural effusion.

**RESULTS**

During the study period, 48 cases of malignant pleural effusion proven by pleural fluid cytology or pleural biopsy or both were identified from the case records. The 48 cases had been diagnosed as malignant pleural effusion as shown in Table 1. The diagnosis was established by pleural fluid cytology alone in 29 of the 48 cases (61%), closed pleural biopsy alone in 17 of the 48 cases (35%) and by both in 2 of the 48 cases (4%).

Diagnostic Modality	Male	Female	Total
Cytology	14	15	29
Pleural biopsy	10	7	17
Both	2	-	2
<b>Total</b>	<b>26</b>	<b>22</b>	<b>48</b>

*Table 1. Method of Diagnosis*

This table shows the methods employed to diagnose the cases of malignant pleural effusion by either cytology or closed pleural biopsy using Abram’s pleural biopsy needle or both.

The age distribution of patients with malignant pleural effusion was as follows-

Age in Years	Male	Female
20 to 30		2
31 to 40	3	
41 to 50	5	8
51 to 60	6	5
>60 years	12	7
<b>Total</b>	<b>26</b>	<b>22</b>

*Table 2. Age Distribution of Cases*

The table shows the age wise distribution of malignant pleural effusion, the youngest being a 27 years female with

metastatic breast cancer and the eldest 78 years male with anal canal cancer.

The primary sites of malignancy in the total number of cases screened are shown in Table 2. The most common sites were lung in 22 of the 48 cases (46%) and breast in 12 of the 48 (25%). Other malignancies include cervix, gastrointestinal (two each), ovary, osteosarcoma, anal canal, thyroid, lymphoma and haematological malignancies (one each) and unknown (four cases) accounted for the remaining 14 cases (29%).

Primary	Male	Female	Total
Lung	19	3	22
Breast		12	12
Lymphoma and haematological	1	1	2
Ovary	-	1	1
Osteosarcoma	-	1	1
Cervix	-	2	2
Anal canal	-	1	1
Thyroid	1	-	1
Gastrointestinal	-	2	2
Unknown	3	1	4
<b>Total</b>	<b>24</b>	<b>24</b>	<b>48</b>

*Table 3. Primary Cancer Sites Causing Malignant Pleural Effusion*

This table shows that lung and breast cancers are the commonest cancers causing malignant pleural effusion. This table also shows that lung cancer in males and breast cancer in females are the leading cause of malignant pleural effusion. However, lung cancer is the commonest cause of malignant pleural effusion when data of both sexes are combined.

**DISCUSSION**

The discovery of malignant cells in the pleural fluid and from the parietal pleura signifies disseminated or advanced disease and reduced life expectancy in cancer patients. Median survival following diagnosis ranges from 3 to 12 months and is dependent on stage and type of underlying malignancy. The shortest survival is observed in malignant pleural effusion secondary to lung cancer and longest in ovarian cancer while malignant pleural effusion due to unknown primary have intermediate survival time as reported by Sanchez-Armengol and Rodriguez-Pandero in 1993.<sup>2</sup>

Forty eight patients with proven malignant pleural effusions were evaluated to study the site of primary malignancy and diagnostic modalities for malignant pleural effusion.

Most of the patients with malignant pleural effusion were above 50 years of age (40 out of 48 patients; 83%). But, malignant pleural effusions were also seen in some patients at younger age group especially in cases of breast malignancy.

In the study group, the most common cancers associated with malignant pleural effusions were found to be that of the lung and the breast, which together accounted for 61% of primary malignancies. The commonest malignancy

associated with malignant pleural effusion in males was lung malignancy and in females, it was found to be breast malignancy. However, if data of both sexes are pooled, lung cancer is the commonest malignancy associated with malignant pleural effusion.

These findings are consistent with the review of literature, which shows that lung cancer is the most common metastatic tumour to the pleura in males and breast cancer in females. Together both these malignancies account for approximately 50-65% of all malignant pleural effusions. Studies of Springs and Boddington reported that these two accounted for 68% of malignant pleural effusions.<sup>1</sup> Lymphomas, tumours of genitourinary tract and gastrointestinal tract as a group account for a further 25% of malignant pleural effusions. Unknown primary are responsible for 6% of malignant pleural effusion.<sup>4</sup>

Postmortem studies suggest that most malignant pleural effusions arise from tumour emboli to visceral pleural surface with secondary seeding to parietal pleura.<sup>5</sup> Other possible mechanisms include direct tumour invasion (in lung cancer, chest wall neoplasm and breast cancer), haematogenous spread to the pleura and lymphatic involvement.<sup>6</sup>

Many patients presenting with malignant pleural effusion have moderate-to-large pleural effusions, while only about 10% of patients have massive effusion at diagnosis.<sup>6</sup> Ultrasound aids in identifying pleural lesions in patients with malignant pleural effusion and is helpful in directing thoracentesis in patients with small effusions and avoiding thoracentesis complications.<sup>7</sup>

CT scan of patients with malignancies may aid in recognising small unrecognised effusions. It is also useful in evaluating patients with malignant pleural effusions for mediastinal lymph node involvement and underlying parenchymal disease. It also has a role in demonstrating pleural, parenchymal and distant metastases.<sup>6</sup>

Cytological examination of the pleural fluid is the simplest method to diagnose malignant pleural effusion. Diagnostic yield is dependent on factors such as extent of the disease and site of primary malignancy. Percentage of cases in which cytological examination establishes a diagnosis ranges from 40 to 87%.<sup>1</sup> The yield of cytological analysis alone in diagnosing malignant pleural effusion was 61% in this study.

In malignant pleural effusion, closed pleural biopsy is less sensitive than cytology. Blind percutaneous biopsies of the parietal pleura report a diagnosis of 40 to 75%. However, studies have shown that 7 to 12% of cases can be diagnosed by pleural biopsy when the fluid cytology is negative.<sup>6</sup> In this study, the yield of closed pleural biopsy was 35% and 4% of cases were proven by both cytology and pleural biopsy.

Marel M et al reported that three steps of history, cytological examination and closed pleural biopsy could diagnose 97% of cases of pleural effusion. Thoracoscopy and open pleural biopsy are needed only in 3% of patients.<sup>8</sup> In another series by Loddenkemper in 1983, the diagnostic yield was 62% by pleural fluid cytology, 44% by closed pleural biopsy and 95% by medical thoracoscopy.<sup>9</sup>

## CONCLUSION

Malignant pleural effusions are a common cause of morbidity in patients with advanced cancer. Presence of malignant pleural effusion decreases the quality of life and increased the suffering of patients with advanced malignancies. The above study shows that it is encountered in all age groups, but more common in the elderly. The most common causes of malignant pleural effusion are lung cancer in males and breast malignancy in females. Lung cancer is the leading cause of malignant pleural effusion among both the sexes. Pleural fluid cytology and closed pleural biopsy are adequate to diagnose malignant pleural effusions in settings without access to thoracoscopy.

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