ORIGINAL ARTICLE

Cytopathological Spectrum of Pleural Fluid Effusion at a Tertiary Care Hospital of Karachi

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ABSTRACT

Objective: To evaluate the spectrum of pleural fluid effusion received for the period of one year at a tertiary care centre of Karachi

Methodology: This descriptive study was conducted after ethical approval at the Burhani Hospital Laboratory, Karachi. Data of cytopathologically diagnosed pleural fluid effusion was collected from the records available between June 2018 and May 2019. Relevant data pertaining registration number, age, gender of the patients, and diagnosis were recorded. Data was entered and analysed using SPSS version 21.

Results: Of the total 59 cases received, 44 (74.4%) were males and 12 (25.5%) were females. Age range was between 35 and 70 years with mean value = 55±12.8. Out of 59 cases, 15 (25.4%) were mixed inflammatory infiltrate, 12 (20.3%) showed chronic inflammatory cells, 08 (13.5%) had predominantly neutrophils, 06 (10%) were with atypical cells, 04 (6.7%) presented with adenocarcinoma, and 14 (23.7%) were labelled as inadequate/haemorrhagic samples.

Conclusion: Majority of the pleural effusion samples were adequate. Inflammatory lesions were more common in comparison to malignancy. Adenocarcinoma was the most common neoplastic entity. Pleural fluid cytology is an effective initial diagnostic modality in Pakistani health care setup.

Key Words: Adenocarcinoma, atypical, inflammatory cells, pleural effusion

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INTRODUCTION

Pleural fluid effusion refers to the accumulation of excess fluid within the pleural cavity. About a million people suffer from pleural effusion each year. Only in the United States, there are 1.3 million new cases each year. The common factors responsible for pleural effusion (PE) include conditions leading to volume overload, pulmonary infections, pleural infections, congestive heart failure, and malignancy[1,2]. In almost half of the patients with pleural effusion, the underlying cause is direct involvement of pleura by a metastatic tumor. The indirect pleural involvement in malignancy may be due to pulmonary embolism, post radiotherapy effect, or hypoproteinemia[3].

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Pleural fluid cytology is the one of the traditional and reliable methods of analysis of pleural fluid. In addition, cytological examination of pleural fluid is helpful in diagnosis of malignancy[4]. In suspicious cases of malignant pleural effusions (MPE), the yield of pleural fluid cytology is reported to be 60%. However, a definitive diagnosis on cytology may not be obtained due to overlapping of cells, indistinct histological features, inflammatory infiltrate, and decreased number of representative cells[5]. Mycobacterium tuberculosis is endemic in Pakistan and the microbiological yield of acid fast bacilli is reported to be around 50%. Pleural fluid cytology is also helpful in distinguishing tuberculous pleural effusion (TPE) from MPE[6]. Limited published literature from Karachi region is available regarding pleural fluid cytology. The aim of this study was to observe the spectrum of pleural fluid cytology cases received in the period of one year at a tertiary care centre of Karachi.

METHODOLOGY

This descriptive study was conducted after ethical approval (IRB no: JSMU/IRB/2019/-273) and Lab approval at Burhani Diagnostic and Laboratory, Karachi.

Data was collected from the records available between June 2018 and May 2019. All cytological diagnosed cases of pleural fluid reported during one year were included in the study. Relevant data pertaining to registration number, age, gender of the patients, and diagnosis were recorded. Cases with incomplete data were excluded from the study. Data was entered and analysis was done using SPSS version 21.

RESULTS

For the period of one year, 59 cases of pleural fluid cytology were recorded. Males were 44 (74.5%) and females were 15 (25.4%). M:F ratio in our study was 2.9:1. Age range was between 35 and 70 years with mean value = 55±12.8 (Table 1) .

Table 1: Distribution of Histological Findings in Pleural Fluid Cytology (n=59)

S. No.	Histological Finding	N (%)
1.	Mixed Inflammatory infiltrate	15 (25.4)
2.	Chronic inflammation	12 (20.3)
3.	Predominantly neutrophils	08 (13.5)
4.	Atypical cells	06 (10)
5.	Adenocarcinoma	04 (6.7)
6.	Inadequate / haemorrhagic samples	14 (23.7)
7.	Total	59 (100)

From the total 10 cases of mixed inflammatory infiltrate, 10 were males and 5 were females. Out of 12 cases of chronic inflammatory infiltrate, 10 were males and 2 were females. Predominantly neutrophils were seen in 5 cases of males and 3 females. Out of the total 14 cases with inadequate and haemorrhagic samples, 9 were males and 5 were females. Whereas, all the cases with atypical cells and adenocarcinoma were seen only in males (Figures 1 and 2) .

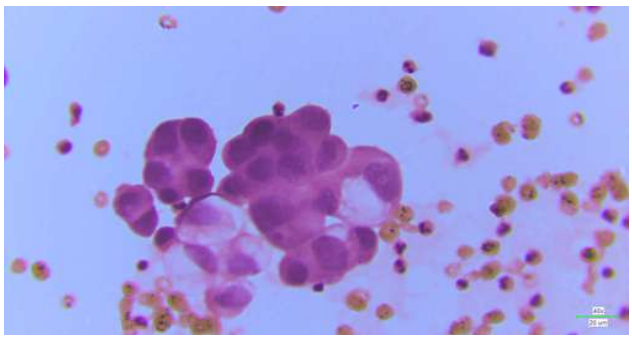

Figure 1: Photomicrograph of Pleural Fluid Showing Atypical Cells (H&E. 40X)

Four cases diagnosed as adenocarcinoma and six with atypical cell population, were further advised for clinical correlation and immunohistochemistry analysis to rule out the primary site.

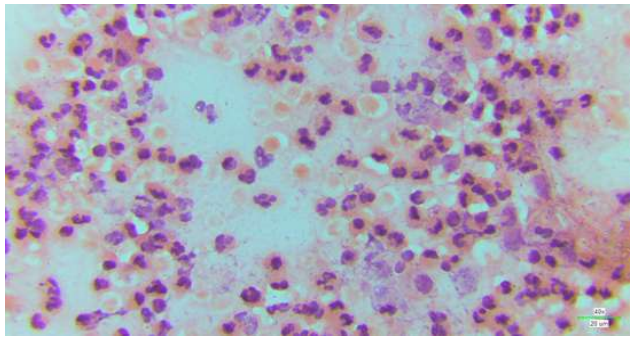

Figure 2: Photomicrograph of Pleural Fluid Showing Predominantly Acute Inflammatory Cells (H&E. 20X)

DISCUSSION

Pleural effusion can occur in multiple diseases and pose a diagnostic challenge. Pleural fluid cytology is a traditional and useful diagnostic modality for the initial investigation of pleural effusion. In resource poor countries like Pakistan, where expensive diagnostic approach is not available at majority of health care centres, pleural fluid cytology remains the first line of investigation. It provides the right pathway for further diagnostic workup and correct management of the patient[7].

M: F ratio in our study was 2.9:1. Karachi cancer registry consolidated data of 5 year from 2017-2021 stated lung cancer to be in the top 5-10 most frequent preventable cancer list[8]. Additionally shaukat khanum cancer registry showed a declining trend for this malignancy placing it at 9th position for males. However, the recent declining trend revealed this malignancy to be at 9th position for males. Furthermore, in female population of Pakistan, lung cancer remains uncommon.

In one year's duration, we received 59 pleural cytology samples. About 6.7% cases were diagnosed as adenocarcinoma. Shaukat Khanum cancer registry, 2018, reported adenocarcinoma of lung as the most frequent subtype followed by squamous cell carcinoma in the local population[9]. A research from Peshawar showed a total of 39.1% malignant pleural effusions out of which 11.2% were malignant mesothelioma while the rest were secondary malignancies metastasized to lungs. These results may attributed to the fact that this study used both cytology and pleural biopsy for diagnosis[10].

Moreover, 10% of the samples in the current series showed atypical cells. The confirmed diagnosis of the primary site of the neoplastic changes in these cells remained uncertain. Further work up including Immunohistochemistry and an inquest for primary site of malignancy was advised. The suspicious cell

population poses diagnostic challenge to pathologists. Reactive mesothelial cells, clumping of cells, increased number of inflammatory infiltrate, tend to overlap with suspicious malignant cells to create difficulty in leading to definitive diagnosis[11]. However, another study on fluid cytology stressed upon the significance of utilization of ancillary techniques to accurately diagnose a malignancy instead of only relying on cytomorphologic features[12].

A considerable number of smears were infiltrated by inflammatory cells. About 25.4% samples showed mixed inflammatory cells, followed by 20.3% and 13.5% predominantly lymphocytic and neutrophilic infiltrate respectively. Acute inflammatory cells are mostly observed in cases with recent infection, pneumonia or empyema. A Turkish study is in agreement with our findings with 8.3% parapneumonic inflammation[13]. Lymphocytic infiltrate may indicate presence of tuberculous lesion in the background. In agreement with our study, an Indian research also recorded 21.8% lymphocytic and 10.9% mixed inflammatory cell population[14]. Since tuberculosis is prevalent in Pakistani population, , another study on the local population reported 44% chronic or granulomatous inflammation, supporting our findings[15].

About 23.7% samples either had inadequate number of cells or were haemorrhagic. Although haemorrhage may be an indication of a malignant lesion, yet not all haemorrhagic smears can be concluded as cancerous. Presence of definitive nuclear pleomorphism, altered nuclear cytoplasmic ratio, and other parameters are still required for a definitive diagnosis[12]. Other studies also reported a smaller percentage of inconclusive sampling. A Turkish and a Pakistani study revealed about 10% of inadequate samples each[13,15].

One of the limitations of the current study was a smaller sample size and another was that we could not follow up the patients who were advised for further immunohistochemistry and clinical correlation. Hence, we were unable to provide definitive diagnosis of these cases. However, we have attempted to identify the pleural cytology cases commonly diagnosed in our setup. Further studies are advised to be conducted on a larger population and not just on pleural fluid but other fluids also to highlight the importance of cytology.

CONCLUSION

Majority of the pleural effusion samples were adequate. Inflammatory lesions were more common in comparison to malignancy. Adenocarcinoma was the most common neoplastic entity. Pleural fluid cytology is an effective initial diagnostic modality in Pakistani health care setup.

Conflict of interest: Authors declare that there is no conflict of interest.

Authors' Contribution: SMH conceived the idea and literature review, AS did statistics and manuscript writing. NJ did manuscript writing & editing. SMH did critical review & final approval.

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