Original Research Article

Analysis of pleural fluid - A one year study

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Abstract

Background: Cytological study of pleural fluid is a simple, cost effective non invasive technique to detect specific pathologies in the pleural cavity. Though it has relatively low specificity and sensitivity owing to its very nature, it can be of immense help in detecting malignancies and non-neoplastic aetiologies such as infection.
Aim: To evaluate pleural fluids with clinical correlation.
Materials and methods: The present work was a descriptive cross sectional analytical retrospective type of study undertaken at the department of Pathology of a tertiary care rural hospital over a period of one year from January 2015 to December 2015. Pleural fluids were processed according to standard protocol and studied. They were analysed for cell count, cell features and presence of organisms (if any). Malignancies were also noted.
Results: Out of a total of 338 fluid samples received in the one year, a total of 130 cases (38.46%) of pleural fluids were received. Majority of cases were females 72 (55.38%). Mean age of presentation was 51.60 years. A total of 13 cases (10.0%) were malignancies. 89 cases (68.46%) were pleural exudates and 41 (31.53%) were transudates.
Conclusion: Pleural fluid comprised of one of the major specimen to be received for evaluation. Owing to its dynamic nature, the pleural cavity has a potential to be a haven to various pathologies. In our study, exudative effusions were commonly encountered, in which, tuberculosis was the prime cause. Malignancies also played an important role giving rise to effusions.

Key words

Pleural fluid, Transudate, Exudate.

Introduction

Cytological study of various body fluids dates back in the 19th century [1]. Cytological study of individual cells obtained can be done from either exfoliation or fine needle aspiration. The various body cavities viz pleural, peritoneal etc., are potential areas of infections, benign and malignant tumors can arise. Individual cell characteristics can give a good idea regarding the underlying pathology. Pleural effusion can be of two types Transudate and Exudate [2]. Differences between the various forces such as hydrostatic pressure, colloid oncotic pressures, give rise to effusion.

Infections (bacterial, fungal, etc.), various tumors such as primary and secondary malignancies, benign tumors, liver failure, cardiac failures are few conditions associated with pleural effusion.
With this study we aim to analyze the pleural fluids received in our department, with respect to demographic, clinical, radiological and cytological features.

Materials and methods

Present work was a descriptive cross-sectional, retrospective, analytical type of study carried over a period of one year from January 2015 to December 2015 in the department of Pathology at a tertiary care rural hospital. The clinical, demographical and radiological findings were obtained from the cytological requisition sheets.

The samples were received within 15 minutes of tapping. All the samples were centrifuged at 2500 rpm for 15 min. Supernatants were discarded and sediments were taken on the slides and smeared. Two slides were air dried and stained with Leishman and two were fixed with methanol and stained with H&E stain. The slides were studied on light microscopy. Individual cases were evaluated according to following cytological features. Cell type, number, size, architecture (Acini / Sheets/ 3D balls/ Papillae/ Rosette), nuclear and cytoplasmic features, feature of dysplasia, background features. All the data was then statistically analysed.

Results

In our study, total of 338 fluids samples were received. Of these, 130 were of pleural effusion (38.46%). 72 (55.38%) cases were females which formed the majority. Males comprised of 58 (44.61%) of cases.

The youngest patient was a 11 years old male and oldest was a 86 years old male who was diagnosed with primary adenocarcinoma. The mean age across both the sexes was 51.6 years. Amongst males, mean age of presentation was 54.4years whereas females had mean age of 49.3 years.

Of the 130 cases, 89 (68.46%) were exudates and 41 (31.53%) were transudates (**Table – 1**). On gross appearance, 58 cases (44.61%) were turbid whereas 38 (29.23%) were clear, straw coloured (**Table – 1**). Among transudates, 17 (41.46%) and 24 (58.53%) cases were of males and females respectively. Whereas, amongst exudates, 41 (46.06%) and 48 (53.93%) cases were of males and females respectively (**Table – 1**).

Various aetiologies were encountered in our study leading to transudative and exudative effusions (**Table – 2**). Non malignant conditions comprised the majority of cases 117 (90.0%). Malignancies comprised of 13 cases (10.0%). There were 6 cases of lung adenocarcinoma, 3 cases of squamous cell carcinoma of lung, 2 cases of metastatic carcinoma and a single case of lymphoma.

Amongst the non-malignant causes, tuberculosis was the predominant aetiology with 33 (25.38%) cases. All the cases were exudates which on cytology revealed leucocytosis with increased lymphocytes. Increased polymorphonuclear cell count was noted in cases of Abscess and Pneumonia. Amongst all these cases, few cases showed reactive mesothelial cells. However, unequivocal malignancies could not been established in those cases.

Table – 1: Distribution of cases according to clinical features.

Parameters	**Transudate (41)**	**Exudate (89)**
Mean age (51)	47	56
Male (58)	17 (41.46%)	41 (46.06%)
Female (72)	24 (58.53%)	48 (53.93%)
Gross features		
Clear (straw coloured)	35 (85.36%)	3 (3.37%)
Hemorrhagic	5 (12.19%)	29 (32.58%)
Turbid	1 (2.43%)	57 (64.04%)

Table – 2: Distribution of cases according to the diagnosis and nature of effusions.

Aetiological factors	**Number of cases (130)**		
	Transudate (41)	**Exudate (89)**	**Total**
CCF	20 (15.38%)	-	20 (15.38%)
Cirrhosis	16 (12.30%)	-	16 (12.30%)
Trauma	08 (6.15%)	05 (3.84%)	13 (8.46%)
Tuberculosis	-	33 (25.38%)	33 (25.38%)
Pneumonia	-	17 (13.07%)	17 (13.07%)
Empyema	-	12 (9.23%)	12 (9.23%)
Other infection	-	06 (4.61%)	06 (4.61%)
Malignancy	02 (1.53%)	11 (8.46%)	13 (10.0%)

Discussion

Exfoliative cytological evaluation of the pleural cavity can help in the diagnosis of various aetiologies like bacterial, fungal, viral and mycobacterium infections. Not just infectious causes, even malignancies such as primary or secondary adenocarcinoma, squamous cell carcinoma or hematological neoplasms can lead to pleural effusion [3].

Clinical presentation, more specifically laterality of effusion can give a good idea regarding primary provisional diagnosis. Massive bilateral pulmonary effusions are more commonly seen with malignancies or constrictive pericarditis. However, predominantly bilateral effusion is seen in heart failure [3]. Loculated effusions are seen in conditions such as tuberculosis, empyema, hemothorax [4].

In our study, tuberculosis was the most common pathology to be noted (25.38%) followed by congestive cardiac failure (CCF) 20 (15.38%), Pneumonia 17 (13.07%), Empyema 12 (9.23%) and 13 (10.0%) cases of various malignancies. Other causes encountered were cirrhosis, trauma and other infections (hepatic/pelvic abscess). Our study was in concordance with study done by Alusi, et.al. [5].

Male preponderance has been noted in various studies. But in our study female were predominantly affected with various aetiologies. Our study was in concordance with Antonangelo, et al. [6], which reported female preponderance.

Among 13 malignant cases, 9 were females and 4 were males. Similar studies done by Sears et.al showed malignant pleural effusion to be found in females predominantly than male [7].

Gross morphology of pleural effusion in our study was not quite specific in cases of malignancies. 06 out of 13 cases showed haemorrhagic fluid, 02cases revealed clear fluid and 5 cases revealed turbidity. In spite of this, the

dictum that bloody fluid is a strong predictor of malignancy should not be ignored [5].

According to Kushwaha et.al the age group affected most commonly was the 6th decade [8]. Dagli, et al. showed mean age of 58.4 years [9]. Our study was in concordance with the above mentioned studies with mean age of presentation being 51.6 years.

We encountered lung, breast, hematological and metastatic malignancies which were similarly observed in studies by Sahn, et al.; Valdes, et al.; and Kushwaha, et.al. [8, 10, 11].

Conclusion

Pleural fluid cytology is a useful diagnostic adjunct in various pathologies. In rural areas and in urban pockets, tuberculosis is a rampant disease which is a common aetiology of bilateral massive pleural effusion. Though the number of malignant cases is not high in our study, there is definite evidence of rise in malignancies and hence meticulous evaluation of all pleural effusion (clear, hemorrhagic, turbid) is of paramount importance. However, pleural fluid cytology should always be evaluated under the light of clinical, radiological and biochemical findings for better understanding of the underlying disease process and improve patient care.

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