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Original Research Article

Diagnostic Value of Exfoliative Cytology in Evaluation of Serous Effusions

Medical Science

KEYWORDS : Fluid Cytology, Effusion, Peritoneal, Pleural, Pericardial

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ABSTRACT

Background and Aims – Diagnostic cytology is the science of interpretation of cells derived from human body which either exfoliates freely from epithelial surface or removed from various tissue source by artificial mean. The cytological examination of exfoliated cells in the body fluid is an important tool in diagnosis. The present study was carried out to establish the usefulness of exfoliative cytology in serous effusions and correlate the findings with clinical diagnosis.
Materials and Methods – A Total of 180 serous effusions samples received for cytopathological examination over the period of 2 years were analyzed. Cytomorphological features of effusions were studied.
Results – The effusion samples comprised of peritoneal (103), pleural (96), and pericardial (1) fluids. A total of 47.78% samples were transu - dative and 52.22% were exudative. A definitive diagnosis of malignancy could be given in 30 (16.66%) of these cases. Adenocarcinoma was the most frequent cause of malignant peritoneal (75%) and pleural effusions (64.28%).
Conclusions – Fluid cytology is an important diagnostic tool and can be applied as a first line diagnostic procedure, the techniques is simple, relatively painless, cost effective, less time consuming and produces very quick results.

Introduction –

Diagnostic cytology is the science of interpretation of cells derived from human body which either exfoliates freely from epithelial surface (exfoliative cytology) or removed from various tissue source by artificial mean. The cytological examination of exfoliated cells in the body fluid is an important tool in diagnosis. It has taken many years of development to establish cytopathological diagnosis of body fluid as an important aid in elucidation of underling disease problems. Cells obtained from serous effusions are of various types and provide first clue of the diagnosis, thus it is important that they should be identified accurately and their characteristics should be described carefully in the smear prepared.

Although body fluid cytology is more useful in recognition of malignant tumor cells, other clinically benign condition like inflammatory condition [1], florid tuberculosis, Rheumatoid involvement of serous cavities can also be distinguished with equal accuracy. The involvement of the serous cavities by malignant neoplasm has important therapeutic and prognostic implication. [2] In most instances malignant cells are found from effusion in patient with known history of malignancy , in some patients biopsy may be tedious and costly, hence cytology is often the only diagnostic procedure employed and is the basis upon which major therapeutic decisions are made [3]. The difficulty in evaluating the accuracy of cytological diagnosis in the body fluid is mainly due to exuberant proliferation of cells within fluid [4] and bland morphological details of the cells, overlapping or over crowding, cells loss and changes due to different laboratory processing methods.

Despite the limitations, cytological evaluation of fluid has become a first line diagnostic procedure. It is simple, cheap and can be repeated several times if required it is less time consuming and cause minimum discomfort to the patient. The present study was carried out to establish the usefulness of exfoliative cytology in serous effusions and correlate the findings with clinical diagnosis.

Materials and Methods –

The present study was conducted in the department of pathology, S.S. Medical College , Rewa (M.P.) over the period of 2 year form 1 January 2014 to 31st December 2015. Relevant clinical information regarding age, Sex symptoms and accompanying signs was obtained. Various serous fluid obtained at the cytopathology and clinical pathology section were examined cytological as early as possible. To prevent coagulation the aspirated fluid was collected in a container containing 3.8% sodium citrate 1 ml per 10 ml fluid. For bloody fluid 1ml glacial acetic acid is added to 50 ml of fluid to lyses RBC. The sample was centrifuged at 2000 RPM for 10 min. The supernatant was poured off then the remaining sediment was transferred to two slide coated with albumin, one was air dried and stained with Gienesa stain, the other were fixed in 95% Alcohol and stained with papanicolaou stains.

Result –

A total of 180 cases of serous effusion were examined cytologically. The most common effusion was peritoneal 130 (57.22%) followed by pleural 76 (42.22%) and pericardial 1(0.55%) .male preponderance(1.5:1) of effusion was seen. For peritoneal effusion male to female ratio being 1.34:1 and for pleural effusion was 1.71: 1 and 1 case of pericardial effusion was found that was a male.

Table No. – 1

Nature of specimen	No. of specimen	Male	Female
Peritoneal Pleural Pericardial	103 (57.22%) 76 (42.22%) 1 (0.55%)	59 (57.28%) 48 (61.15%) 1 (100.00%)	44 (44.72%) 28 (38.85%) 00 (00 %)

Average age for peritoneal effusion was 48.84 year with difference of 16.02 years in the average age of male and female patients, patients with pleural effusion had an average age of 42.34 years and the age difference between male and female patients was 7.44 years as shown in table No. 2

Table No. – 2
Table showing average age incidence

Nature of effusion	Male(in year)	Female(in year)	Total average Age (In years)
Peritoneal	58.97	42.95	48.81
Pleural	40.80	53.36	42.34
Pericardial	70	0	70
Total	47.40	49.17	48.50

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Table no. -3
Cytological diagnosis of effusion

Nature of specimen	Transudate	Exudates
Peritoneal	54(62.79%)	49 (52.13%)
Pleural	31 (36.05%)	45 (47.87%)
Pericardial	1 (1.16%)	00
Total	86 (47.78%)	94 (52.22%)

Of the 180 specimen,86 (47.78%) were transudative effusion, among transudative effusion , 54 (62.79%) cases belonged to peritoneal effusion, 31 (36.04%) belong to pleural effusion and 1 (1.16%) were from pericardial effusion (Table No. 3). Clinically causes for transudative effusion were cirrhosis of liver, chronic alcoholism, cirrhosis with hepatic encephalopathy, hepatitis, nephrotic syndrome and anemia with hypoproteinemia. Out of 180 fluid specimen 94(52.22%) were exudative effusion of which 49(52.13%) cases belonged to peritoneal effusion while 45 (47.87%) belonged to pleural effusion. Causes for exudative ef fusion ware acute infection, tuberculosis, trauma, suphrenic abscess and malignancy.

Table no-4
Cytological diagnosis of serous effusion

Site	Benign	Suspicious of Malignancy	Classifiable Malignancy (n=30)		
			Adenoca	Squamous cell ca.	Unusual malignancy
Peritoneal (103)	80(57.14%)	07(70.00%)	12	03	01
Pleural (76)	59 (42.14%)	03 (30.00%)	09	05	00
Pericardial (1)	1 (1.14%)	00	00	00	00
Total (180)	140 (77.77%)	10 (5.5%)	21	08	01

Of 180 cases, 140 (77.77%) were benign effusion, 10(5.5%) showed atypical cells suspicious of malignancy and 30(16.66%) were malignant effusion. Of the benign effusion out of 140 benign effusion. 80(57.14%) cases belonged to peritoneal effusion, 59(42.14%) belonged to pleural effusion, 1(1.14%) were from pericardial effusion. Most common cytological diagnosis of the benign effusions was cirrhosis of liver, hepatitis, congestive heart failure, tuberculosis, pneumonia and GIT infection. 10(5.5%) specimen were categorized as suspicious of malignant effu sion, 7(70%) cases belonged to peritoneal effusion and 3(30%) cases belonged to pleural effusion. Total of 30 cytologically malignant effusion, 16 (53.33%) were to peritoneal and 14(46.67%) were pleural effusion. Adenocarcinoma was the most frequent cause of malignant peritoneal and pleural effusion. Among 16 neoplastic peritoneal effusion, 12 (75%) were due to adenocarcinoma, 3(18.75%) were due to squamous cell carcinoma while 1 case due to lymphoma. Similarily 14 cases of malignant pleural effusion, 9(64.28%) cases were due to adenocarcinoma, While 5(35.71%) cases were due to squamous cell carcinoma. Most common cause of malignant peritoneal effusion were due to ovary and GIT malignancies while most common cause of malignant pleural effusion were due to lung and breast malignancies.

Discussion –

In the present study 180 cases of serous effusions attributed to various causes were included. The cases included were patients admitted in various department of S.G.M. Hospital associated of Shyam Shah Medical College Rewa (M.P.) The majority of cases were of peritoneal effusion 103(57.22%) followed by pleural effusion 76(42.22%) cases and only 1 case was of pericardial effusion, which is in accordance with other study [5,6]. This is explained by the fact that the incidence of peritoneal and pleural effusion is very high among patients with serous effusion due to various causes, even slightest effusion is demonstrable in these cavities can be easily aspirated and with minimal discomforts to patients from peritoneal and pleural cavities, however few studies demonstrate a slightly higher incidence of pleural effusion in comparison to peritoneal effusion [7,8] Number of specimen from pericardial cavity was very small in our study which is comparable to other observations [5,7]. Our study shows male to female ratio 1.5:1, the male preponderance noted in this study was similar to that observe in other studies .[5,9,10] In the present study average age for the overall cases was 48.50 years, the similar findings also reported in other studies [5,7] average age for male cases being slightly lower (47.40 year) than female cases (49.17 year).

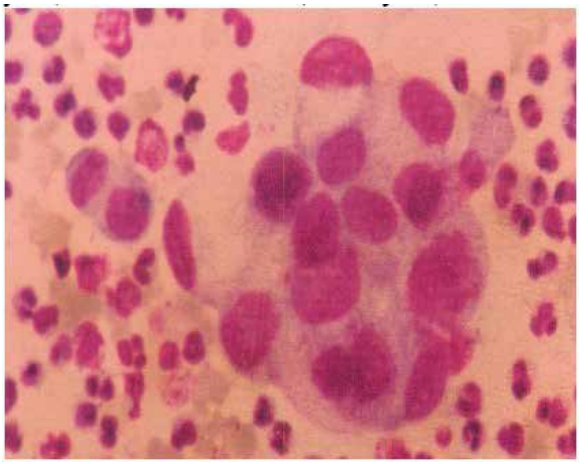

figure no. 1 showing Peritoneal smear showing mucinous cystadenocarcinoma ovary with acute inflammatory cells

The distribution of age in different type of cases of serous effusion depend upon the various diseases in these groups, Since peritoneal effusion cases accounted for maximum number of cases in the study, the average age was found to be highest in these cases of peritoneal effusions. Most of cases 140 (77.77%) in our study diagnosed as benign effusion, 10(5.5%) were diagnose as suspicious for malignancy and 30(16.66%) cases were diagnose as malignant which is in agreement with the other study [5,6] ,however few study demonstrate slightly higher number of malignant effusion than benign effusion [11,12]. The higher preponderance of malignant effusion in all these studies may be explained by the biased selection of malignant cases and cases suspicious of malignancy in their study. In contrast to the other studies in the present study malignant effusions diagnosed were less in comparison to benign effusion as the study included all cases of serous effusions irrespective of the clinical diagnosis, therefore the incidence of malignant and benign conditions in this study correlates to some extent with the prevalence and association of these conditions with serous effusions. Effusions in benign cases may be produced by a wide variety of abnormalities, in the vast majority of these cases the cellular response is quite non specific but certain disease show cellular changes in the effusions that can reflect their presence. Thus cytological diagnosis can be rendered important for various benign conditions [13,14]. In our study among 180 cases of serous effusion. 86(47.78%) cases were transudative. These cases mostly belonged to patients who had effusions due to cirrhosis or due to cardiac involvement, however anemia was also amongst the important causes of transudates. Since these conditions are very commonly found they account for the majority of the cases, similar results also found in other study (10,15). 94(52.22%) cases of serous effusions were diagnosed as exudatives the most common cause found clinically

was acute infection, tuberculosis and malignancy.

Successful detection of cancer cells in serous effusion depends to a great extent on the type of cells composing the neoplasm, which in turn provides a clue to the site of primary neoplasm [16,17]. In our study most common malignant tumor found was adenocarcinoma [21] this is comparable to the other study [18,19]. The higher incidence of adenocarcinoma is due to the tendency of these neoplasms to disseminates their cells freely in serous fluids and secondly in lung because of more peripheral distribution of adenocarcinoma. There is greater opportunity for these tumors to invades the pleural cavity in contrast to other major types of lung cancer. Second common type of malignancy was squamous cell carcinoma , similar finding has been observed by others .[20,21] Although squamous cell carcinoma is very common primary neoplasm but not reported very frequently in body cavity fluids, this is due to inherent tendency of this neoplasm not to disseminate their cells as freely as other neoplasms, one case of malignant effusion due to lymphoma were also found.

Thus it can be inferred from present study that fluid cytology is very useful in classifying benign conditions, further it plays a very useful role in rapid diagnosis of malignant effusions. Thus cytological examination of serous effusion is worthwhile along with the adventages of being a simple and rapid procedure, therefore it should be pursued more widely.

Conclusion –

Our study found that the majority of serous effusions were peritoneal effusion with male preponderance and most of the cases are due to benign conditions. Among malignant effusion, adenocarcinoma most frequently diagnosed. Thus it can be concluded that fluid cytology is an important diagnostic tool and can be applied as a first line diagnostic procedure, the technique is simple, relatively painless. cost effective, less time consuming and produces very quick results.

Fluid cytology although not a substitute for conventional histopathology but as complementary to it and is useful in categorizing benign conditions as well as in the diagnosis of malignant conditions.

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