

To study diagnostic accuracy between liquid based cytology and conventional cytology in body fluids

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Abstract

Background: Cytological examination of serous effusions have been done for nearly a century in the diagnosis of malignancy and eventually in the detection of primary lesions. It has helped for staging and prognosis of the malignant tumors and also gave information regarding various inflammatory lesions of serous membranes. It has gained increased acceptance to such an extent that a positive diagnosis was often considered as a definitive diagnosis **Aim & Objective:** To study diagnostic accuracy between liquid based cytology and conventional cytology in body fluids. **Methods:** Prospective cross sectional study, Study setting: Pathology Department of tertiary care centre. **Study population:** All the cases who's Body fluids sample such as pleural fluid, peritoneal fluid from all age groups, both male and female **Sample size:** 100 **Results:** majority of cases (34 cases) were found in above 60 years of age. out of total 100 cases, 54 patients were male and 46 cases female. majority of study participants malignancy reported by cytocentrifuge method followed by LBC and Conventional. Majority cases presented with Ca ovary 15 cases followed by ca colon 4 cases ca liver 3 cases 2 cases with ca gall bladder ca lung 1 case and thyroid carcinoma 1 case. Majority cases in LBC was benign 85 in conventional was benign 89 and cytocentrifuge benign 83. **Conclusions:** Cytocentrifuge was superior in demonstrating cellularity, Cell distribution, Cell morphology, Background as compared with conventional method and LBC was superior in demonstrating cellularity, Cell distribution, Cell morphology, Background as compared with conventional method.

Keywords: Cytocentrifuge, LBC, conventional, Malignant, benign

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Introduction

Body cavity effusions are symptoms of different disease. Pleural effusion, ascites and pericardial effusion present accumulation of fluid in preformed body cavities. Associated with inflammation, infarction or malignant conditions, damage to the capillary walls usually occurs and fluid rich in protein and inflammatory cells may accumulate in body cavity¹. The detection of malignant cells in the serous effusion indicates a more advanced stage of cancer.^{2,3}

The cytological diagnosis for pleural, pericardial, and peritoneal effusion is an effective method, which not only gives a correct result but it suggestive of primary origin of cancer². The diagnostic performance of the cytological study of the fluid may be attributable to the fact that the cell population present in sediment is representative of a much larger surface area than that obtained by needle biopsy^{4,5}.

Recent data published by Lee et.al indicate that 20% of body serous membrane effusions per year are malignant: approximately 50% are diagnosed as metastatic adenocarcinomas followed by pulmonary large cell carcinoma and lymphomas/ leukemias (approximately 15% each)^{6,7}.

The cytological methods of both the direct smear method and the liquid based cytological method can be used for effusion cytological diagnosis². Conventional smear may display cell clumping in one corner of the smear, obscuring of cells by mucus, haemorrhage, inflammatory cells, and debris along with multilayering of cells which will hamper cytological interpretation of smear⁸⁻¹⁰.

LBC has been approved by US food and drug administration since 1996¹¹. Liquid based cytology was initially introduced for gynecological cervical smear. Recently, its utility has been studied in both non gynecological and FNAC material¹². Two technologies- Thin Prep (Hologic, Marlborough, MA, U.S.A) and BD Surepath (BD Diagnostics- Tripathi, Burlington, NC, U.S.A) have been more widely used¹³. The fixation solution used in LBC is alcohol based, so the destruction of the DNA and RNA is limited and the structure is stable for a relatively long period¹⁴.

Some researchers have reported that despite the greater cost, the liquid based cytological preparation resulted in (a) a cleaner background smear, (b) good cell distribution, (c) well preserved cytomorphology, (d) reduced screening time, (e) well-preserved cells in solution for longer storage time, and (f) decreased air-dry artifacts better than direct smear preparation². Most comparative studies have shown the liquid based cytology to perform as well as or better than conventional preparations in non-gynecologic cytology¹⁵.

Aim and objective

1. To study diagnostic accuracy between liquid based cytology and conventional cytology in body fluids.
2. Study clinical profile of malignant cases.

Material And Methods

Study design: Prospective cross sectional study

Study setting: Department of Pathology in tertiary care center

Study population: The study population included all the cases whose Body fluids sample such as pleural fluid, peritoneal fluid from all age groups, both male and female patients came in tertiary care center which are referred to Pathology Department by the Clinicians such cases included in the study.

Inclusion criteria:

1. All age group patients whose Body fluids sample such as pleural fluid, peritoneal fluid from both male and female patients came in tertiary care center which are referred to Pathology Department by the Clinicians such cases included in the study.

Exclusion criteria:

1. Patient not giving informed consent
2. Pap smear.
3. CSF fluids.
4. Pericardial fluids.
5. Urine

Approval for the study:

Written approval from Institutional Ethics committee was obtained beforehand. Written approval of Medicine and Radiology department was obtained. After obtaining informed verbal consent from All age group patients whose Body fluids sample such as pleural fluid, peritoneal fluid from both male and female patients came in tertiary care center which are

referred to Pathology Department by the Clinicians such cases included in the study.

Sample Size: 100

Sampling technique:

Convenient sampling technique used for data collection. All patients admitted in the tertiary care center. Fluid samples collected in the clinical wards and submitted to our laboratory were studied. Totally 100 fluid samples were randomly taken and studied. Smears were prepared by both conventional method and Liquid Based cytology methods from all the 100 samples. All these smears were screened and a comparative analysis was made between the conventional and liquid based methods.

Methods of Data Collection and Questionnaire-

Pre-designed and pre-tested questionnaire was used to record the necessary information. Questionnaires included general information, such as age, sex, religion, occupation of parents, residential address, and date of admission.

Medical history- chief complain, past history, general examination, systemic examination. Data on demographic profile of stroke patient, investigation, personal history, medical past history, treatment modalities, and clinical outcome data collected from patients admitted in medicine ward. All the procedures and investigations conducted under direct guidance and supervision of pg guide. Proforma of stroke notes maintained.

Screening procedure:

History of patients including presenting complaints, medical illness, drug history, personal history, past medical history

Collection Of Samples:

Three different body cavity fluids were used in the study. They include pleural fluid, peritoneal fluid and urine. Each fluid is obtained by different techniques performed in the clinical wards. Pleural fluid was obtained by thoracocentesis.

Thoracocentesis was done by inserting a needle in the sixth or seventh intercostal space. The peritoneal fluid was obtained by inserting a needle into the abdominal wall at the most dependent portion of the fluid accumulation. Random voided urine samples were used. The samples were sent with a label and an appropriate requisition. All the fluid samples were divided into 3 parts, each part was subjected to conventional method, Liquid based cytology and cytocentrifuge method.

Data entry and analysis:

The data were entered in Microsoft Excel and data analysis was done by using SPSS demo version no 21 for windows. The analysis was performed by using percentages in frequency tables. $p < 0.05$ was considered as level of significance using the Chi-square test.

Results And Observations

The present Cross-sectional study was done among 100 cases admitted to tertiary care centre during study period.

Table 1: Distribution of cases according to age (N=100)

Age in years	Frequency	Percentage
Less than 18	2	2%
18-30	12	12%
31-45	24	24%
46-60	28	28%
Above 60	34	34%
Total	100	100 (100%)

In the present study, majority of cases (34 cases) were found in above 60 years of age.

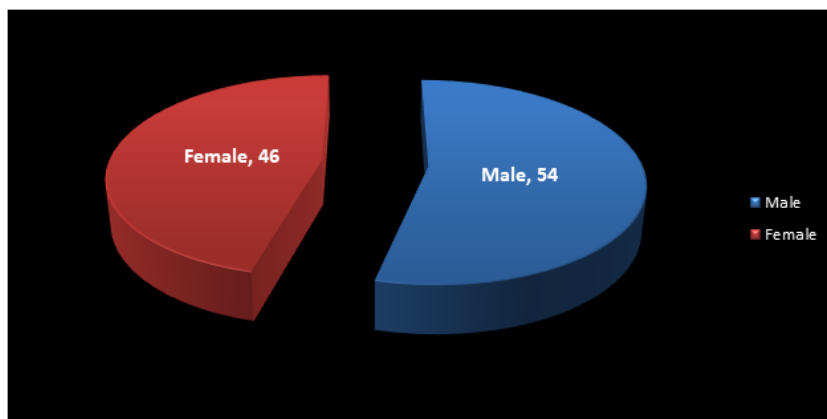


Figure 1: Distribution of cases as per sex (N=100)

In the present study, out of total 100 cases, 54 patients were male and 46 cases female.

Table 2: Distribution of cases as per malignancy (N=100)

Malignant	Frequency	Percentage
Malignant	27	27%
Non Malignant	73	73%
Total	100	100 (100%)

Above table shows that majority of study participants were non malignant contributing 73 (73%) and Malignant 27 (27%).

Table 3: Distribution of malignancy cases according to methods (N=27)

Methods	Frequency
LBC	15
CONVENTIONAL	11
Cytocentrifuge	17

Above table shows that majority of study participants malignancy reported by cytocentrifuge method followed by LBC and Conventional

Table 4: Distribution of malignant cases (N=27)

Malignant cases	Frequency
Carcinoma ovary	15
Ca colon	04
Hepatocellular ca	03
Ca gall blader	02
Ca lung	01
Thyroid carcinoma	01
Total	27

Majority cases presented with Ca ovary 15 cases followed by ca colon 4 cases ca liver 3 cases 2 cases with ca gall blader ca lung 1 case and thyroid carcinoma 1 case.

Table 5: Distribution of cases on basis of cytological diagnosis (N=100)

	Frequency	Percentage
LBC	Benign 85	85%
	Suspicious 13	13%
	Malignant 2	2%
Conventional	Benign 89	89%

	Suspicious 8	8%
	Malignant 3	3%
Cytocentrifuse	Benign 83	83%
	Suspicious 15	15%
	Malignant 2	2%

Majority cases in LBC was benign 85 in conventional was benign 89 and cytocentrifuse benign 83.

Discussion

The present Cross-sectional study was done among 100 cases admitted to tertiary care center during study period.

In current study majority of cases were found in above 60 years group e.g.34 followed by 46-60 years age group 28 cases, 24 cases in 31-45 years age group, 18-30 years age group 12 cases and 2 cases found in less than 18 years age group. Similar result found in the study of Kushwaha R et al ¹⁶. He reported that the majority of cases found in the above 50 years age group.

In current study most of study participants were Males contributing 54 (54%) and Females 46 (46%). Similar result observed in the study of Udasimath S et al ¹⁷. He reported that the most of cases were males.

In current study Majority of study participants were non malignant contributing 73 (73%) and Malignant 27 (27%). Similar result reported by Bjelakovic G et al ¹⁸.

In current study majority of study participants malignancy reported by cytocentrifuge method followed by LBC and Conventional. study conducted by Siddiqui R.P et al ¹⁹ he found that the majority of study participants malignancy reported by cytocentrifuge method.

In current study Majority cases presented with Ca ovary 15 cases followed by ca colon 4 cases ca liver 3 cases 2 cases with ca gall blader ca lung 1 case and thyroid carcinoma 1 case. Similar result reported by Babloyan et al ²⁰.

In current study Majority cases in LBC was benign 85 in conventional was benign 89 and cytocentrifuse benign 83. Similar result reported by Babloyan et al ²⁰.

Conclusion

- majority of cases were found in above 60 years group
- Most of study participants were Males

References

1. Marianne Engels,'Cytology of body cavity effusions', J Lab Med 2008;32(6):418–424 2008 by Walter de Gruyter • Berlin • New York. DOI 10.1515/JLM.2008.058
2. Jangsiriwitayakorn P, et.al.,'Comparative Analysis of Modified Liquid-Based Cytology and CytoRich Red Preparation in Assessment of Serous Effusion for Cancer Diagnosis', Asian Pac J Cancer Prev. 2018;19(6):1571-1575. Published 2018 Jun 25. doi:10.22034/APJCP.2018.19.6.1571
3. Patarapadungkit, N., et.al. (2019), 'Modified Liquid-Based Cytology Technique for Immunocytochemistry in Effusion Specimen' Asian Pacific Journal of Cancer Prevention, 20(9), 2611-2617. doi: 10.31557/APJCP.2019.20.9.2611
4. Mahendra Singh et.al, 'Comparative Study for the use of Different Techniques in Serous Fluid Cytology'. Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 18, March 02; Page: 3154-3161, DOI:10.14260/jemds/2015/456
5. Dr.ArchanaJoshi et.al., 'Diagnostic utility of various techniques used in body fluid cytology ', IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) e-ISSN: 2279-0853, p-ISSN: 2279-0861. Volume 13, Issue 1 Ver. V. (Jan. 2014), PP 13-18

www.iosrjournals.org

6. Esther Diana Rossi et.al., 'The Role of Liquid-Based Cytology and Ancillary Techniques in Pleural and Pericardic Effusions: An Institutional Experience', DOI: 10.1002/cncy.21518, wileyonlinelibrary.com
7. Rossi E, Bizzarro T, et al. (2017), 'The Role of Liquid Based Cytology and Ancillary Techniques in the Peritoneal Washing Analysis: Our Institutional Experience', PLoS ONE 12(1): e0168625. doi:10.1371/journal.pone.0168625
8. Tyagi R, Gupta N, Bhagat P, Gainer S, Rai B, Dhaliwal LK, et al. Impact of SurePath® liquid-based preparation in cytological analysis of peritoneal washing in practice of gynecologic oncology. J Cytol 2017;34:95- 100.
9. Nasar Yousuf Alwahaibi, et.al., 'Comparison of ThinPrep® and Conventional Preparations for Peritoneal and Pleural Cytology Smears', www.sciencedomain.org Annual Research & Review in Biology.4(20):3139-3149, 2014.
10. Sonti Sulochana et.al. 'Liquid based cytology-is it effective in body fluids and fine needle aspiration cytology?', Journal of Pharmaceutical Sciences and Research. www.jpsr.pharmainfo.in Sonti Sulochana et al /J. Pharm. Sci. & Res. Vol. 11(10), 2019, 3391-3403 ISSN:0975-1459
11. Esther Diana Rossi et.al., 'The diagnostic and prognostic role of liquid-based cytology: are we ready to monitor therapy and resistance?', 10.1586/14737140.2015.1053874. ISSN 1473-7140.
12. Kumari M, Singh M., 'A comparison of liquid-based cytology and conventional smears in fine needle aspiration cytology of thyroid lesions: Diagnostic efficacy and pitfalls', Thyroid Res Pract 2020;17:14-8.
13. Pawar PS et.al., 'Comparative study of manual liquid-based cytology (MLBC) technique and direct smear technique (conventional) on fine-needle cytology/fineneedle aspiration cytology samples', J Cytol 2014;31:83-6.
14. Imura, J. et.al., 'Introduction and utility of liquid-based cytology on aspiration biopsy of peripheral nodular lesions of the lung', Oncology Letters, 7, 669-673. <https://doi.org/10.3892/ol.2013.1763>
15. Mittal R, Kundal R, Singh H, et.al., 'Study of Ascetic Fluid by Liquid Based Cytology and Its Comparison with Conventional Cytosmears and Cell Block Preparations', Ann. Int. Med. Den. Res. 2016; 2(6):PT16-PT22.
16. Mahendra Singh, Lubna Khan, Yogendra N. Verma, Neelima Sachan, Chayanika Pantola, Adrija Pathak, Rachita Gulati, Anuradha Gautam. "Comparative Study for the use of Different Techniques in Serous Fluid Cytology". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 18, March 02; Page: 3154-3161, DOI:10.14260/jemds/2015/456
17. Udasimath S, Arakeri SU, Karigowdar MH. Diagnostic utility of the cell block method versus the conventional smear study in pleural fluid cytology. J Cytol 2012; 29:11-15
18. Bjelakovic G, Tasic T, Stamenkovic, Stojkovic M, Katic V, Ostasinovic M et al. Biochemical, Cytological and Microbiological characteristics of the cirrhotic, malignant and "mixed" ascites. Archive of oncology 2001;9:95 -101.
19. Siddiqui R.P, Memen M.J, Sahu S. A COMPARATIVE STUDY OF CYTOLOGIC EVALUATION BETWEEN CONVENTIONAL METHOD & LIQUID BASED CYTOLOGY IN PLEURAL, PERICARDIAL & PERITONEAL FLUIDS. International Journal of Scientific Research. Volume - 9 | Issue - 9 | September - 2020 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
20. Babloyan S, Voulgaris Z, Papaefthimiou M, Beglaryan G, Kyroudi A, Karakitsos P. Comparison of quality between conventional and thinprep cytology in investigation of

patients with epithelial ovarian cancer. The New Armenian Medical Journal 2009;3(3):22
– 28.