



STUDY OF COMPARISON OF CONVENTIONAL CYTOLOGY SMEAR WITH CELL BLOCK IN EXUDATIVE BODY FLUIDS

Pathology

Dr Sharib Anwar PG Resident, Department Of Pathology, Jhalawar Medical College, Jhalawar, Rajasthan

Dr Rishi Diwan Senior Professor & HOD, Department Of Pathology, Jhalawar Medical College, Jhalawar, Rajasthan

ABSTRACT

Background: Cytological analysis of exudative body fluids is essential for diagnosing malignant and benign conditions, guiding patient management while remaining minimally invasive. The conventional cytology smear (CS) is widely used, but the cell block (CB) technique is gaining attention for its enhanced diagnostic capabilities. This study compares CS and CB methods in evaluating exudative body fluids, focusing on diagnostic yield, cellularity, morphological preservation, and architectural retention. **Methods:** This prospective, cross-sectional study was conducted in the Department of Pathology, Jhalawar Medical College, from August 2023 to August 2024. All exudative body fluid samples submitted for cytological examination were included, except autolysed, insufficient, or improperly labeled samples. Each specimen underwent division: one for CS and the other for CB analysis. Mair's point scoring system was used to assess background, cellularity, morphology, and architectural features. Results were analyzed using Fisher's exact test, with $p < 0.05$ considered statistically significant. **Results:** Among 202 samples (mean age: 39.4 years; 107 females, 95 males), pleural fluid comprised 70.8%, ascitic fluid 20.5%, and cerebrospinal fluid 8.4%. CB significantly outperformed CS in all assessed parameters: **Background:** Minimal obscuring material in 69.2% (CB) vs. 11.4% (CS); **Cellularity:** Abundant in 75.4% (CB) vs. 56.1% (CS); **Morphology:** Minimal cellular degeneration in 77.7% (CB) vs. 58.6% (CS); **Architecture:** Excellent in 36.7% (CB) vs. 5.9% (CS). CB detected malignancy in 8.9% of cases compared to 5.4% by CS, with overall diagnostic yields of 91.5% and 85.1%, respectively. The difference was statistically significant ($p < 0.05$). **Conclusion:** The cell block technique demonstrates clear advantages over conventional smears for diagnosing exudative body fluids, including improved cellularity, morphology, architecture, and higher diagnostic yield for malignancy. CB should be incorporated routinely as an adjunct to CS for enhanced diagnostic accuracy.

KEYWORDS

Exudative effusion, Conventional smear, Cell block Cytology, Malignancy, Mair's point scoring system.

INTRODUCTION

Cytological assessment of serous effusions remains a cornerstone for the diagnosis, staging, and management of malignancies, also aiding in the evaluation of non-neoplastic disorders. The identification of cancer cells in body fluids dates back to the 19th century, but technological advancements, like the cell block method, have transformed cytopathological diagnostics.¹

The conventional smear is easy, rapid, and cost-effective but can suffer from low sensitivity due to architectural loss, cell dispersal, and background obscuration. The cell block technique, by comparison, offers cytological and architectural details, enabling ancillary techniques like immunohistochemistry (IHC) and special stains. Yet, CB is less frequently adopted in routine practice, often depending on individual pathologist discretion.^{2,3}

This study aims to systematically compare CS and CB techniques in the evaluation of exudative body fluids using standardized criteria, seeking to clarify their relative performance and highlight the practical value of the CB method in clinical workflows.⁴

Aims And Objectives

- To assess Cell block ability to enhance cytodiagnostic sensitivity.
- To compare diagnostic parameters like cellularity, architecture, and cellular degeneration in both cell block and conventional smear
- To evaluate combined CS and CB efficacy in diagnosing malignancies in exudative fluids.

MATERIALS AND METHODS

Study Design And Area

- Design:** Prospective cross-sectional observational study
- Duration:** August 2023 - August 2024
- Location:** Department of Pathology, Jhalawar Medical College, Jhalawar

Sample Selection

- Inclusion:** All exudative body fluids sent to the pathology department for cytological evaluation, properly labeled with patient details.
- Exclusion:** Autolysed samples, inadequate quantity, poor preservation, mislabeled specimens, or cases with local skin infection at aspiration site.⁵

Sample Processing

Each Specimen Was Split Equally:

- CS Preparation:** Centrifugation at 2,500 rpm for 20 min; smears stained with May Grünwald–Giemsa and hematoxylin and eosin.
- CB Preparation:** Fixed sediment method (Thapar et al.³), using ethanol-formalin fixative (1:1). Post-centrifugation sediment was processed as a routine histopathological specimen, embedded in paraffin, sectioned (4–5 µm), and stained with H&E.³

Evaluation Criteria

Mair's Point Scoring System^{3,6} Evaluated:

- Background** (amount of obscuring material)
- Cellularity** (amount of diagnostic material)
- Morphology** (cellular detail, degeneration/trauma)
- Architecture** (retention of architectural features)
- Scoring:** 0-2 for each category.

Diagnostic Categories - Cases were classified as nondiagnostic, benign, suspicious, or malignant.

Statistical Analysis - Parameters were compared using Fisher's exact test; $p < 0.05$ indicated statistical significance.

RESULTS

Demographics And Sample Distribution

- Total Cases:** 202
- Mean Age:** 39.4 years (range: 2–73 years)
- Females:** 53.2%; Males: 46.8%
- Types Of Fluid:** Pleural (70.8%), Ascitic (20.5%), CSF (8.4%)

Table 1: Comparative Table Of Diagnostic Parameters Between CS And CB

Parameter	Conventional Smear (CS)	Cell Block (CB)	P-value
Minimal Background (%)	11.4%	69.2%	<0.05
Abundant Cellularity (%)	56.1%	75.4%	<0.05
Minimal Cell Degeneration (%)	58.6%	77.7%	<0.05
Excellent Architecture (%)	5.9%	36.7%	<0.05
Malignant Cases Detected (%)	5.4%	8.9%	<0.05
Overall Diagnostic Yield (%)	85.1%	91.5%	<0.05
Non-Diagnostic Cases (%)	10.9	6.9	<0.05

- Cell block significantly reduced background obscuring material.
- Cell block provided higher cellularity and reduced cellular degeneration.
- Architecture preservation was markedly better in CB samples.

- Cell block method detects more malignant cases compared to conventional smears, thereby improving the sensitivity for malignancy.
 - Cell block preparation offers a higher overall diagnostic yield than conventional smears in evaluating exudative body fluids.
 - Fewer cases remain non-diagnostic with the cell block technique compared to the conventional smear, improving the rate of definitive diagnosis.
9. in effusion cytology. *Int J Med Sci Public Health*. 2016;5(4):764–769.
Calabretto ML, Giol L, Sulfaro S. Diagnostic utility of cell-block from bronchial washing in pulmonary neoplasms. *Diagn Cytopathol*. 1996 Sep;15(3):191–2.

Table 2: Comparison Of Cell Block (CB) Diagnosis With The Conventional Smear (CS) Diagnosis

CS Diagnosis	CB Malignant	CB Benign	CB Suspicious	CB Non-diagnostic	Total (CS)
Malignant	8	2	0	1	11
Benign	6	152	3	0	161
Suspicious	2	3	3	0	8
Non-diagnostic	2	10	0	10	22
Total (CB)	18	167	6	11	202

- The data shows a high level of concordance between CB (Cell Block) and CS (Conventional Smear) diagnoses. Among malignant cases, more number of cases were correctly identified by CB, demonstrating its reliability in detecting malignancies. Similarly, benign cases were accurately categorized, reflecting minimal false positives or false negatives..

DISCUSSION

Cell block technique provides advantages in cytological diagnosis of exudative fluids:

- Increased cellularity and concentration enable better visualization.
- Superior morphology and architecture facilitate identification of malignant features and tumor origin.
- CB permits ancillary studies like IHC, PCR, and special stains, adding diagnostic depth.
- Despite slightly longer processing and potential specimen exhaustion, benefits in diagnostic accuracy are substantial.

Comparison Of Diagnostic Yield By CB Over CS In Other Studies

Author	Increase in diagnostic yield for malignancy
“Calabretto et al” (1996) ⁽⁹⁾	6.5%
“Thapar et al” (2009) ⁽³⁾	13%
“Shivakumarswamy et al” (2012) ⁽⁴⁾	15%
“Shubhada et al” (2013) ⁽⁸⁾	6%
Our study	8.91%

Our findings align with prior studies confirming enhanced diagnostic yield and morphological quality of CB. The higher malignancy detection rate supports CB's critical role as an adjunct diagnostic modality.⁸

CONCLUSION

The cell block method is superior to conventional cytology smears in evaluating exudative body fluids. It improves cellularity, morphology, and architectural preservation, resulting in higher diagnostic accuracy for malignant and benign conditions. Routine incorporation of cell block preparation alongside cytology smears is strongly recommended.

Recommendations

- Laboratories should standardize and routinely implement the cell block method as an adjunct to conventional smears for body fluid cytology.
- Protocol optimization can further maximize diagnostic yield and preserve tissue for ancillary techniques.

REFERENCES

1. Pratibha Bista, et al. Comparison of diagnostic efficacy of cell block with cytological smear in body fluids. *Int J Med Res Rev* 2018;6(9):496–501.

2. Joshi AR, et al. Comparative study of cell block method and conventional smear study in cytological analysis of body fluids. *J Cytol Histol*. 2015;6(3):1-3.

3. Thapar M, et al. Utility of cell block versus smear examination in effusion cytology. *J Cytol*. 2009;26(2):60–64.

4. Shivkumarswami, et al. Evaluation of diagnostic efficacy of cell block technique in exudative effusions. *Indian J Pathol Microbiol*. 2014;57(3):393–397.

5. Ugurluoglu C, et al. The role of the cell block method in the cytological diagnosis of malignant pleural effusions. *Diagn Cytopathol*. 2007;35(9):613–617.

6. Nathan NA, et al. Cell block cytology: Improved preparation and its efficacy in diagnostic cytology. *Am J Clin Pathol*. 2000;114(4):599–606.

7. Matreja PS, et al. Role of combined approach using conventional cytology and cell block in diagnosis of effusion cytology. *J Evid Based Med Healthc*. 2015;2(9):1233–1237.

8. Shubhada B, et al. Comparative study of diagnostic accuracy of cytosmear and cell block