Original Article

Cytospin preparation from residual material in needle hub: Does it add to fine needle aspiration diagnosis?

Shilpa Gupta[1], Lopamudra Deka[1], Ruchika Gupta[2], Kusum Gupta[1], Charanjeet Kaur[1], Sompal Singh[1]*

[1]Department of Pathology, Hindu Rao Hospital, Delhi, India
[2]Department of Pathology, Chacha Nehru Bal Chikitsalaya, Delhi, India

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Abstract

Background: Fine needle aspiration is currently the most favored technique for pre-operative diagnosis of most palpable and certain non-palpable masses. The present study aimed at exploring the utility of cytospin preparation from residual material in the needle hub for assisting in routine cytologic diagnosis.

Methods: For this prospective study, 100 cases of fine needle aspiration from lymph node, breast, soft tissue, thyroid and salivary glands were included. After preparation of routine smears, material in needle hub was rinsed in saline and cytospin preparation was made. Routine and cytospin preparations were assessed for cytologic diagnosis and results compared.

Results: Of the 100 cases included, the cytospin preparation showed good staining in all (100%). Cellularity was adequate in 90% of the cases with satisfactory cellular preservation in 72% cases. In 16 cases (16%), the diagnostic material was present in cytospin preparation while routine smears were inadequate for opinion.

Conclusion: Cyto-centrifugation of the residual material in needle hub after fine needle aspiration improves the diagnostic yield of routine smears. Hence, this technique can be utilized to reduce the number of re-aspirations, especially at centers where the requisite equipment is already available.

***Corresponding author:**
Dr. Sompal Singh, Specialist, Department of Pathology, Hindu Rao Hospital, Malka Ganj, Delhi - 110007 (India)
Ph: +91-9810873046; E-mail: sompal151074@gmail.com

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Introduction

Fine needle aspiration cytology (FNAC) is routinely being used for diagnosis of most of the mass lesions, both palpable and non-palpable. The residual material in needle hub after preparation of routine smears may contain diagnostic material. Few studies have evaluated the utilization of this material in the form of cyto-centrifuged smears or cell blocks.[1] Liu et al, in their study, showed that cyto-centrifuged smears provided additional information in 2% of the cases while cell blocks were helpful in 12% of cases.[1] On the other hand, Henry-Stanley and Stanley did not find any additional utility of preparation of needle rinse material for detection of malignancy.[2]

Recent studies have also evaluated the use of liquid based cytology from needle rinse material but found little advantage, mainly due the high cost of the equipment.[3]

The present study was designed to analyze the utility of cytospin preparation prepared from needle rinse material after FNAC.

Materials and Methods

This prospective study included 100 consecutive cases of fine needle aspiration (FNA) performed on an out-patient basis at a tertiary center. FNA was performed either with or without suction with 20 ml syringe and 22/23G needle, according to the site of aspiration. Depending on the nature of the swelling,

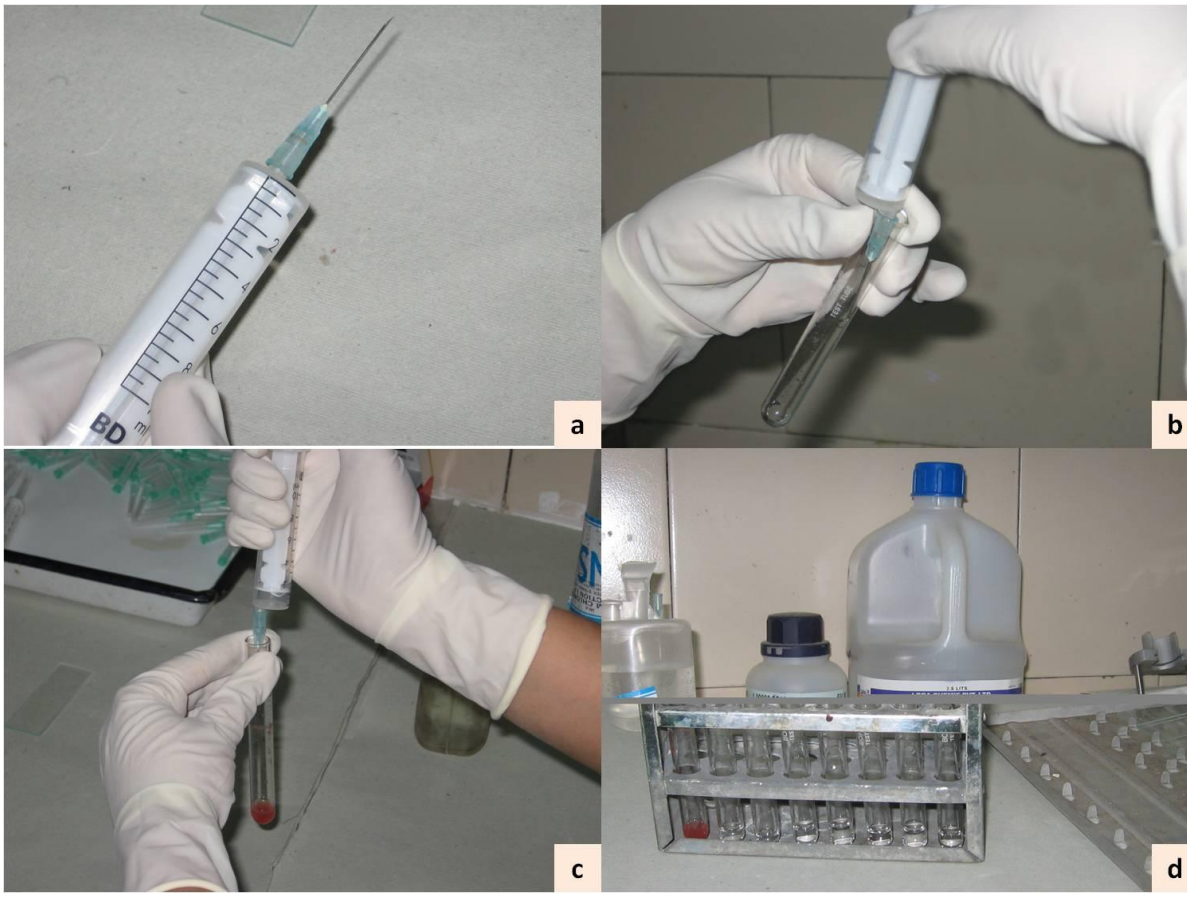

Figure 1 Photograph showing the procedure of preparation of smears from residual material. Needle hub showing the residual material (a), which is dispensed into a tube containing normal saline (b). The hub is thoroughly rinsed with saline (c). The material is ready for cyto-centrifugation.

1-3 passes were made to facilitate adequate material aspiration. Routine smears were prepared by expressing the material onto clean slides, air dried and stained with Giemsa stain. The residual material in hub of the needle was suspended in 2.5 ml of normal saline in all the cases (Figure 1). The resultant solution was processed using the Cytospin4 cytocentrifuge (Thermo Scientific, Japan) and one or more smears were prepared, air dried and stained with Giemsa stain, similar to the routine smears.

The cytospin preparations were assessed for cellularity (low, moderate, high), staining quality (poor, average, good) and cellular degeneration (absent, mild, moderate, marked). The routine smears and cyto-centrifuged smears, in all cases, were evaluated for final diagnosis by three pathologists (SS, KG, RG) in a blinded fashion. The cytologic diagnostic ability of cytospin preparation was compared with the respective routine smears and concordance calculated.

Result

The study included FNA from lymph node (52 cases), breast (24 cases), soft tissue (12 cases), thyroid (8 cases) and salivary gland (4 cases) over a wide age range (2-64 years). The final diagnosis of these 100 cases is tabulated in Table 1. Cytospin preparation yielded 1-3 additional smears (median 1) in these cases. The cytospin preparations showed satisfactory staining in 100% of the cases. These smears revealed adequate cellularity in 90 cases (90%) with good cellular preservation in 72 cases (72%).

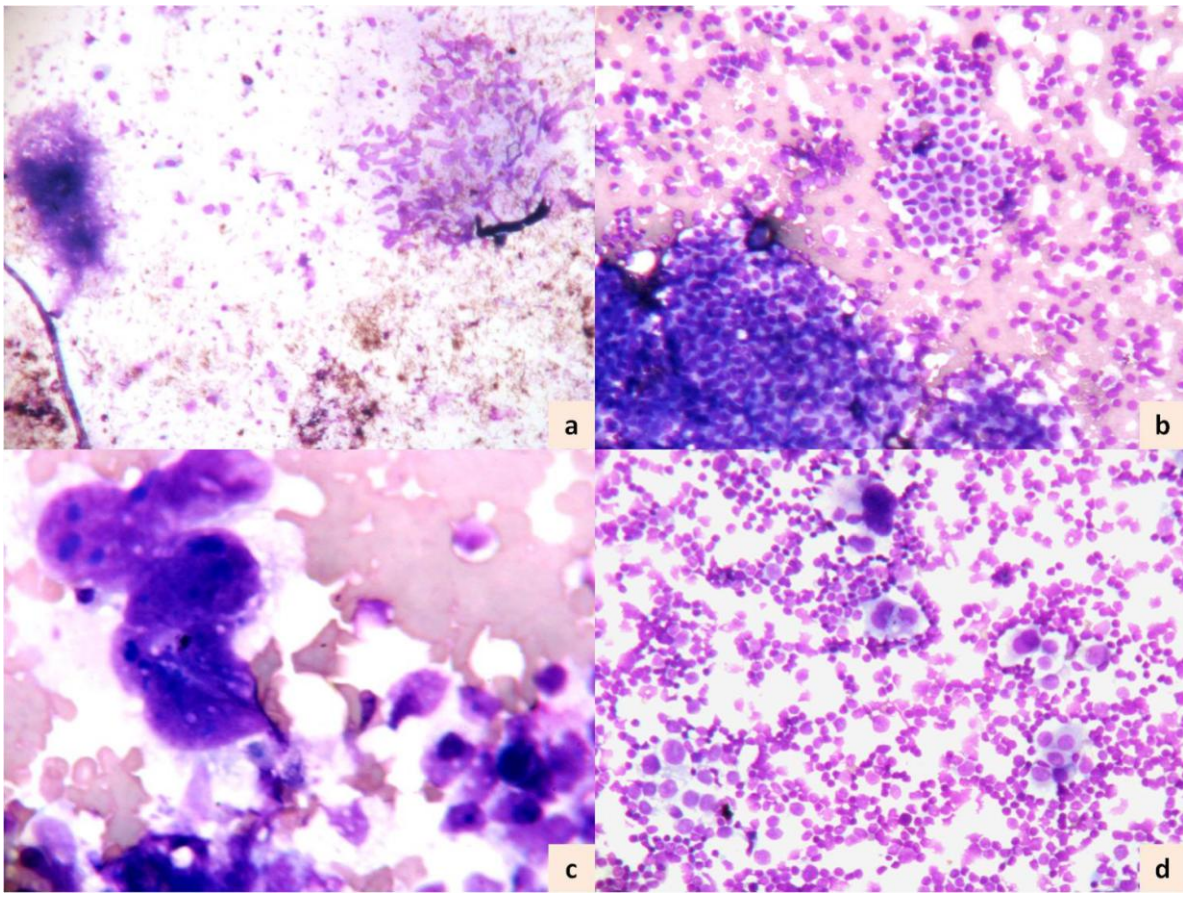

Figure 2: Photomicrographs from various cyto-centrifuged smears showing epithelioid cell granuloma and necrosis (a, Giemsa x200) in a case of tuberculosis. A case of fibroadenoma shows monolayered ductal epithelial cells and bare nuclei in background (b, Giemsa x200). Cyto-centrifuged smears from a case of carcinoma breast shows highly atypical cells (c, Giemsa x200) and metastatic cells in a reactive lymphoid background from a lymph node aspirate (d, Giemsa x200).

Table 1. Clinical detail of cases included in the study

Organ System	Diagnosis	Number of cases
Lymph Node	Tuberculosis	30
	Reactive	16
	Scanty Reactive	2
	Inflammatory	2
	Metastatic	2
Breast	Inflammatory	2
	Adipose Tissue	1
	Benign Breast Disease	15
	Ductal Carcinoma	6
Salivary Gland	Sialadenosis	1
	Pleomorphic Adenoma	3
Thyroid	Colloid Goiter	8
Soft Tissue	Inflammatory	3
	Ganglion	2
	Spindle Cell Lesion	6
	Blood Only	1

Concordance of diagnosis between the routine FNA smears and cytospin preparation was seen in 84 cases (84%). The K-value for concordance between FNA and cytospin preparation was 0.86 (good agreement). The results of cytospin preparations are tabulated in Table 2.

Table 2. Results of cytospin preparation from residual material

Parameters Studied	Number of Cases
Adequate Cellularity	88 (88%)
Good Staining	100 (100%)
Diagnostic Material	84 (84%)
No Degeneration	68 (68%)
Concordance of Diagnosis	84 (84%)

In 16 cases, the diagnostic material was present only in cytospin preparation while the routine smears were non-diagnostic. Of these 16 cases, 10 were finally diagnosed as tubercular lymphadenitis (granuloma in cyto-centrifuged smears; scant material in routine FNA). Four (4) cases of reactive lymphadenitis were diagnosed on cytospin preparation while routine FNA showed mainly blood. Two breast FNAs yielded only adipose tissue in routine smears and in these, the cytospin preparation revealed benign appearing ductal epithelial cells, assisting in diagnosis of benign breast disease (Figure 2).

Discussion

FNAC is a minimally invasive procedure being used increasingly for pre-operative diagnosis of palpable as well as non-palpable masses (under radiologic guidance). In routine FNAC, variable number of smears is prepared from the material expressed onto glass slides. The residual material that remains adherent to the hub of the needle, even after tapping on the slide, is usually discarded. This is considered wastage since diagnostic material may be present in the needle hub in certain number of cases. Various techniques to utilize this residual material have been investigated. These include cytospin and cell block preparation. Cytospins prepared by washing the needle hub with saline and cyto-centrifugation yield smears with material concentrated to a small area on the slide that can be utilized for special stains or immunocytochemistry.[1]

Cell block preparations, on the other hand, require rinsing of the needle with a fixative like buffered formalin, Bouin's solution, picric acid, Carnoy fixative or ethanol.[4-7] This rinsing is followed by centrifugation and processing of the pellets as a tissue to make wax blocks. These cell blocks yield multiple sections and hence, can be utilized for histochemical stains and immunohistochemistry, as required.

Various authors have compared the diagnostic efficacy of cytospin and cell blocks with routine smears. In a study by Liu et al, cytospins contribute additional information in 2% of cases while cell blocks provided additional information in 12% of the cases beyond that obtained from routine smears. In cases with non-diagnostic smear, cytospins added information in 10% and cell blocks in 44% of the cases. However, the cost of this additional information by cytospin and cell blocks was prohibitive for routine use in all cases.[1] Keyhani – Rofoga et al reported that cell block preparation improved original smear diagnosis in 55% of the cases with a sensitivity of cell block from 60- 80%.[8] Wojcik and Selvaggi showed that 84.5% of the cases had identical smear and cell block result and 14.3% had superior smear results in detecting malignant cells. In none of their cases was cell block positive with a negative smear.[9] Nathan NA et al, in their study, showed 15.2% improvement when both smears and cell blocks were studied together. The overall sensitivity of cell blocks was 89.4% considering both FNACs and fluid specimens.[10]

The present study evaluated the utility of cytospin preparation from material in needle hub in diagnosis of routine FNAs without use of further special stains or immunocytochemistry. We found a good agreement (K-value 0.86) between smear diagnosis and that rendered on cytospin preparation. In addition, cytospin preparation yielded diagnostic material in 16% of cases where conventional smears were non diagnostic. Though all of these cases were benign in nature, the technique of cytospin preparation was helpful in ten cases where a diagnosis of tuberculosis could be made and appropriate therapy initiated. In the other cases, cytospin preparation had diagnostic material, thus obviating the need for a repeat FNA. Our results are in contrast to an earlier study by Henry –Stanley and Stanley. These authors studied needle rinse material in diagnosis of malignancy and showed that this effort rarely identified additional malignancies, not detected by smears.[2] On the other hand, Axe et al, while comparing smear and rinse preparation in detection of liver cancer, reported that 21.2% of cases were diagnostic on rinse only and would have been considered as equivocal on smears alone.[11] Another study evaluating endoscopic brushings processed by direct smear and rinsing showed that combination of both techniques reduced the proportion of unsatisfactory samples and improved the rate of diagnosis of malignancies.[12] The results of the present study are in consonance with the latter studies. More recent studies have evaluated the use of needle rinse material in preparation of liquid based cytology smears. Salhadar A et al, in their study, concluded that routine use of ThinPrep from needle /syringe rinse as an adjunct to fine needle aspiration smears was not justified due to the high cost and low proportion of cases benefited from this exercise.[3] This observation is due to the extremely high cost of preparation of thin prep smears using expensive equipment. Though we have not done cost-analysis in the present study, we would like to state that cytospin equipment is currently available in most of the laboratories involved in cytopathology reporting and hence routine use of cytospin smears from needle rinse material appears feasible, especially in countries where health care costs are borne by the state and not the patient, like ours. This may help in reducing the number of re-aspirations, which are uncomfortable for the patient and also raise a doubt on the technical skill of the person involved.

Conclusion

In conclusion, preparation of additional smears from needle rinse material after fine needle aspiration improves the diagnostic yield and this preparation technique may be employed routinely to reduce the non-diagnostic results of FNAC.

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None.

Competing Interests

None declared

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