DOI: 10.7860/JCDR/2024/68439.19500

Original Article

Pathology Section

Can Benefits of Fine Needle Aspiration Cytology be Extended up to Community Level as a Baseline Investigation: A Nine-year Experience from a Tertiary Care Institute in Bankura, West Bengal, India

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ABSTRACT

Introduction: Aspiration cytology has recently become the first-line of investigation during the initial assessment of any swelling. It is also an effective tool for the early diagnosis of malignancy. In this study, the feasibility of extending the benefits of this simple, cost-effective procedure to the community level has been assessed.

Aim: In the present study, attempts were made to prove that most aspirations and subsequent interpretations of aspirated samples could be accomplished by Junior Residents (JRs) even in a tertiary care centre.

Materials and Methods: This cross-sectional study was conducted at Bankura Sammilani Medical College (BSMC), West Bengal, India for a period of nine years (01/01/2014 to 31/12/2022). Conventional aspirations without guidance were included in the study group. The majority of aspirations were successfully conducted by JRs, and only 4.5% (823) of conventional aspirations needed the help and supervision of senior faculties. All adequate aspirations were then independently interpreted by two separate JRs, and the proportion of cases with similar and dissimilar interpretations was duly noted. Finally, all the smears were assessed by senior faculties and compared with the interpretations of JRs.

Results: During this study period, a total of 19,743 aspirations were done of which 18,391 were conventional. JRs aspirated 17,568 (95.5%) of these cases. Data analysis revealed that JRs were successful in 16,570 (83.9%) of total aspirations and also correctly interpreted 13,381 (67.8%) of total cases.

Conclusion: This study proved that one year of training could be sufficient to achieve a desirable level of competency in aspiration and interpretation of cytological samples. So, willing doctors with the necessary training could perform as Community Cytopathologists (CCPs) to extend the benefits of Fine Needle Aspiration Cytology (FNAC) up to the block level, thus escalating the fight against malignancy.

Keywords: Community cytopathologist, Junior residents, Malignancy

INTRODUCTION

The FNAC, though sporadically practiced in different parts of the globe during the early decades of the last century, became an essential part of diagnostic medicine only in the last three decades of the 20th century [1]. It is simple, inexpensive, quick, reasonably accurate, without much of complications, and can easily be utilised as an outdoor service [2]. Another reason for its popularity is that the technique can be easily repeated as it is minimally invasive. However, a major limitation of the investigation is procuring adequate reportable material. Palpable homogenous lesions usually do not pose a problem, but radiological guidance is often required for aspiration of deep-seated non palpable or palpable heterogeneous lesions [3]. Still, only a minor fraction of total aspirations are typically performed under guidance in any given institute [2,4].

In teaching institutes with ongoing postgraduate courses in Pathology, the majority of aspirations are done by postgraduate trainees (Junior Residents or JRs), commonly first-year or second-year JRs, under the guidance of a senior faculty member who usually interferes only in anticipation of complications, like location of target lesions in proximity to vital structures or during repeat aspirations [4]. In most of these complicated cases also, JRs attempt aspirations under the surveillance of senior colleagues. A rigorous one-year training is generally sufficient to transform a newcomer into an independent aspirator.

Another aspect of FNAC is interpretation. Diagnosing a lesion after examining a few aspirated cells and tiny tissue fragments requires expertise [5,6]. However, with rigorous training, a Junior Resident with close to one year of exposure in cytopathology will be able to interpret the majority of aspirates correctly. There will inevitably be misinterpretations, as reported in other studies [6], but these uncommon cases should be disregarded, and efforts should be made to extend the benefits of cytopathology to the community level, at least up to the level of BPHCs. In a community setting, a moderately trained doctor can reasonably aspirate and interpret the majority of lesions. A well-organised referral back up is mandatory for diagnosing complicated cases that often require repeated aspirations with or without radiological guidance. If the proposition seems far-fetched, consider that an expert Haematopathologist can guess smouldering leukaemia, hairy cell leukaemia, or myelodysplastic changes by examining a well-drawn peripheral blood smear, which a less trained Pathologist working in a peripheral set-up may completely miss. Does this phenomenon hinder the establishment of haematological laboratories at the peripheral level? We are also aware that Certified Sonologists are allowed to report sonograms independently with only six months of training. Therefore, we should seriously consider nurturing CCP.

FNAC plays a vital role in cancer management [6]. It is a reasonably reliable tool for early detection or exclusion of malignancy in a suspected lesion [7]. Early detection is the most crucial aspect of cancer therapy, improving both mortality and morbidity [7,8]. By

extending the benefits of FNAC to the community level, the fight against cancer can be escalated.

In this study, earnest attempts were made to prove that the majority of cytological aspirations and interpretations occurring in a Medical College could be accomplished by a reasonably trained physician. So, the benefits of this unique investigation should be extended to BPHCs serving a major part of the community. It is pertinent to consider that BSMC is a teaching hospital with a sanctioned MD Pathology course for more than 10 years. Located in a semi-urban set-up, it predominantly caters to the rural population of Bankura and adjoining districts. The objectives of the study were: 1) To demonstrate the achievability of the skill to aspirate and interpret the majority of lesions accurately by FNAC with one year of training; 2) To formulate a plan to extend the benefits of FNAC to the community level.

MATERIALS AND METHODS

The present cross-sectional study was undertaken in the Department of Pathology, BSMC, Bankura, West Bengal, India for a period of nine years (01/01/2014 to 31/12/2022). After procuring necessary clearance from the Institutional Ethics Committee (IEC No- BSMC/IEC/1103, dated- 27/03/24), the authors included all patients undergoing FNAC in our department who were willing to participate in our research activities as part of the study population. Cases requiring radiological guidance for aspirations were categorised separately and not included in the final assessment, as at the block level, provisions for guided FNAC might not be available. The majority of conventional aspirations were done by JRs, with only a minor fraction requiring the participation of seniors. These cases were also categorised into separate groups. During this study period, only those JRs were selected who had a minimum of 6 to 8 months of exposure and training, although this could not be strictly followed.

Cases were chosen based on the following inclusion and exclusion criteria:

Inclusion criteria: All willing patients undergoing FNAC at BSMC during the study period.

Exclusion criteria: Patients requiring radiological guidance during aspiration were excluded from the study.

Study Procedure

After staining the aspirated materials, smears were interpreted separately by two JRs. Cases were categorised into three groups depending on the outcome of these initial interpretations:

A. Both residents put forward a single unambiguous diagnosis.

B. Both residents or at least one of them failed to reach a single diagnosis but could mention a differential diagnosis that overlapped observations of each other.

C. Both residents or at least one of them failed to reach any conclusive diagnosis or differential diagnosis or gave discordant diagnosis.

Cases from groups A and B were clubbed together as consistent interpretations, and group C was considered inconsistent. Finally, the smears were reported by a group of senior doctors following a standard protocol. All inconsistent reports (group C) were considered as wrong interpretations and were not matched with the final assessment by seniors.

Only consistent reports (groups A and B) produced by JRs were matched with the final diagnosis to ascertain accuracy.

STATISTICAL ANALYSIS

All the data were properly tabulated and analysed using MS Excel.

RESULTS

[Table/Fig-1] shows that out of a total of 19,743 cases undergoing fine needle aspirations during the study period of nine years, 18,391 cases did not require any guidance for aspiration (93.2%), and only 6.8% of cases (1352) required radiological guidance. Cases requiring guidance were excluded from the final calculation as provisions for guided aspiration may not be available at the BPHC level. The JRs aspirated 95.5% of the conventional FNAs (17,568 out of 18,391), and in 823 cases (4.5%), the service of senior residents/faculties were called for owing to anticipatory complications [Table/Fig-2]. Of the aspirations drawn by JRs, 94.3% (16,570 out of 17,568) were adequate for reporting, leaving 5.7% where two or more aspirations in a single or more sittings failed to achieve reportable materials [Table/Fig-3].

Total no. of cases undergoing FNA	Type of aspiration	n (%)
19743	Conventional	18391 (93.1)
	Guided	1352 (6.9)

[Table/Fig-1]: Distribution of conventional and guided aspirations.

No. of conventional aspirations	Classes of aspirators	n (%)
18391	JR	17568 (95.5)
	SR/Faculty	823 (4.5)

[Table/Fig-2]: Distribution of aspirator's classes.

No. of conventional aspirates done by JRs	Adequacy of aspirate	n (%)
17568	Adequate	16570 (94.3)
	Inadequate	998 (5.7)

[Table/Fig-3]: Adequacy of aspirate done by Junior Resident (JR).

As shown in [Table/Fig-4], during the evaluation of a total of 16,570 cases by JRs, category A, B, and C diagnosis were done in [Table/Fig-5], category A and B diagnosis of JRs were matched with the final reports issued by senior faculty members. Matching or overlapping reports were considered correct, and the rest were deemed incorrect. In category A, 10,226 cases (94.4%) were correct, and 603 (5.6%) were incorrect out of a total of 10,829 cases. In category B, 21.5% of diagnosis were incorrect (867 out of 4,022), and 78.5% (3,155 cases) showed comparable final reports. Above all, in a total of 13,381 cases (out of a total of 19,743 cases, i.e., 67.8%), JRs were able to aspirate and interpret fine needle aspirations correctly. No radiological guidance was needed in any of these cases.

No. of adequate aspirates	Category of diagnosis	n (%)
16570	A	10829 (65.3)
	B	4022 (24.3)
	C	1719 (10.4)

[Table/Fig-4]: Reporting of aspirates by Junior Resident (JRs).

Total no. of cases undergoing FNAC	Total cases aspirated without guidance	Total A and B category cases	No. of consistent diagnosis by both JRs	Diagnosis by senior faculty	
				Consistent	Inconsistent
19743	18391	14851	A (10829)	10226 (94.4%)	603 (5.6%)
			B (4022)	3155 (78.5%)	867 (21.5%)
Total			14851	13381	1470

[Table/Fig-5]: Comparison of reporting by JRs and senior faculties of A and B category cases.

DISCUSSION

The present study was undertaken with the aim of expanding the benefits of a minimally invasive procedure such as FNAC to the community level through BPHCs. In this study, only a small proportion of the total FNA cases (1,352 out of 19,743, 6.8%) required radiological guidance for aspirations. The majority of the lesions were aspirated by the conventional method. In different large series, radiological guidance was utilised in 4% to 9% of cases [4-6].

These cases were not included in the final calculation as radiological guidance might not be available at peripheral centres.

In present study, the majority of conventional aspirations were done by JRs, 17,568 (95.5%). Only in 823 (4.5%) cases, the support of seniors was sought in anticipation of injury to important structures or due to deep-seated small lesions or the possibility of haemorrhage. Complicated repeat aspirations were also accomplished by faculty members. But authors have not found any reference about this finding.

During the aspiration of lesions by the conventional method, postgraduate trainees failed to procure adequate material in 5.7% of cases. Comparable failure rates ranging from as low as 3.5% to 8.9% were also reported by various workers, though without specifying JRs as aspirators [5,6].

Out of a total of 16,570 cases, the initial interpretations by two different JRs (examined separately) were almost similar in 14,851 cases (89.6%). In 1,719 (10.4%) cases, they either failed to interpret or achieved a divergent diagnosis. Out of the 14,851 cases with consistent reports by two JRs, only 1,470 cases (9.9%) were identified as mismatched diagnosis by senior faculty. So, more than 90% of consistent diagnosis by JRs matched the interpretation by senior Pathologists.

If we consider the overall accuracy of all the interpretations made by JRs compared to the final diagnosis by senior faculties, correct diagnosis were achieved in 13,381 cases out of a total of 16,570 cases (80.7%). In different large series, the accuracy of FNAC diagnosis compared to histopathology was reported to vary between 70-95% [3-5,8]. So, in our series, out of the total 19,743 cases undergoing cyto-evaluation at BSMC during the study period, 16,570 cases were successfully aspirated by JRs without any guidance. This high success rate in aspiration (83.9%) can be achieved by one year of training. On the other hand, JRs were also able to correctly diagnose 67.8% of cases (13,381 out of 19,743). One year of training can achieve reasonable success in both aspiration as well as interpretation. Here, we must admit that the working experience of postgraduate trainees vary between less than one year to more than two years.

The claim of one year training is not always justified. Now, moving on to the second part of the objective, we humbly put forward an outline for the future utilisation of aspiration cytology in primary healthcare. This is more like a proposal without any previously available structural details.

Step 1: Establishment of a nodal training centre: Training should be imparted in Medical Colleges by a group of at least three willing senior faculties having interest in Cytopathology.

Step 2: Recruitment of trainees: Any willing MBBS doctor can be chosen as a possible trainee, provided he/she is willing to serve at the community level afterward. For practical purposes, initial choices should be restricted within Medical Officers working at peripheral centres. Each centre can train 1-4 doctors per year depending on capacity. If the course becomes popular later on, non service candidates can be chosen for training.

Step 3: Training time: Currently, one year of training is recommended. But, depending upon outcomes, the duration can be further reduced. Alternatively, if time permits, other aspects of cytology like fluid cytology, scrape cytology, or exfoliative cytology can be included in the training schedule.

Step 4: Training: Trainees can learn directly by working in the FNAC unit. Instructors should conduct one or two theory classes per week. If feasible, trainee seminars can be arranged. Practical training will be given on three aspects:

a) **Aspiration:** Hands-on training.

b) **Staining:** Trainees should be familiar with different staining procedures. They must master at least one commonly used stain like Leishman-Giemsa or Diff Quick so that they can train technicians at the periphery or even perform staining in emergencies.

c) **Interpretation:** Trainees should screen all smears initially and be present during final reporting.

Technicians should be trained for efficient processing of aspirated samples. Once again, in-service candidates (working as medical technologists in peripheral centres) should be selected. A maximum of three months of training is required. Later on, a trained doctor and technician will work as a team at the periphery.

Step 5: Evaluation: At the end of one year, a skill evaluation of trainees on all three aspects of training should be done. Technicians also need to be evaluated after training.

Step 6: Certification: On successful completion of training and subsequent evaluation, a certificate of "Certified Community Cytopathologist" (CCCP) is given, allowing them to independently practice FNAC. Similarly, successful technicians will receive a "Certified Community Cytotechnician (CCCT)" certificate.

Step 7: Establishment of a community FNAC clinic: Each CCCP will establish an FNAC clinic in three BPHCs. They will work for a full day in each BPHC once a week. Aspirations will be done in the morning session, followed by reporting in the afternoon. CCPTs will stain slides as quickly as possible. Out of rest remaining three days of a CCCP's weekly schedule, two days will be spent on studying and reporting residual cases. They will go to the nodal centre once a week for necessary consultations regarding undiagnosed cases. A CCCT can accompany another CCCP on the remaining three days, thus serving six BPHCs.

Step 8: Data recording: The outcomes of FNAC should be recorded diligently. This will provide unique information about the serving community and definitely help in maintaining a community-level cancer register.

Step 9: Backup service: The following backup facilities must be established at nodal centres for the smooth working of CCCPs:

a) **Consultation:** Trainers must entertain CCCPs once a week to solve diagnostic dilemmas.

b) **Referral:** Difficult-to-aspirate or diagnose cases may be referred from BPHC-FNAC clinics to nodal centres. These cases should be catered directly without going through the complicated outdoor referral system of medical colleges.

Step 10: Duration of the training: It depends upon local conditions. As BSMC is in West Bengal, India, we have proposed according to our needs. It can be altered in other areas. There are currently 32 medical colleges in West Bengal. These nodal centres can train approximately 60-120 CCCPs per year. With close to 1000 BPHCs in West Bengal, and each CCCP serving three BPHCs, an adequate number of CCCPs can be trained to serve all BPHCs in West Bengal within a period of five years. After that, the course can be discontinued or extended to serve at the primary health centre/subcentre level. But, the nodal centres must continue their backup services in every situation.

The establishment of this CCP training program does not require too much expenditure. Medical colleges can initiate the training with already available resources. Funds will be required during the establishment of BPHC-level FNAC clinics, but it can be managed with proper planning. There will be several advantages. The benefits of cytology can be extended to a wider population, providing effective preoperative assessments of lesions at the community level, thereby reducing the burden of unnecessary surgeries and hospital stays on the health infrastructure. Medical colleges without Pathology PGTs will definitely welcome 2-4 individuals to help run the Cytology department.

The greatest benefit of extending the service of Cytology at the community level is in the field of cancer detection. It will help in two ways: Firstly, aspiration cytology can identify non malignant lesions

quickly, leading to a reduction in unnecessary surgeries. Secondly, it will also identify malignant lesions early, improving management and outcomes. Most of these advantages of FNAC are already confirmed by previous studies, usually at a tertiary care centre [6,9].

The incidence of malignancy is rapidly rising in a country like India. Early detection of cases is crucial for oncotherapy. So far, FNAC remains the single most important cost-effective tool for early cancer detection [6]. To achieve success in cancer management, the benefits of Cytology must be extended to the community level. This could also help in maintaining a countrywide cancer register, a cherished goal still unachieved, possibly due to unavailability of community-based data.

Limitation(s)

This study was conducted in a less explored field, leading to insufficient materials for comparison and referencing. It was not always possible to select Junior Residents with one year of experience. Care had to be taken to choose Junior Residents with more than six months and less than 18 months of exposure and training, although this was not always achievable. The lack of facilities or established set-ups for training CCCPs meant that the protocol was suggested arbitrarily without a solid foundation.

CONCLUSION(S)

FNAC is presently considered the investigation of choice for the initial evaluation of any mass lesion. Radiology is another effective tool for preoperative assessment of these lesions. However, even conventional, low-cost aspiration cytology can provide more information than costly radiological assessments. FNAC is currently only practiced in apex institutions. The scarcity of properly trained Cytopathologists is the most important limiting factor preventing the spread of the benefits of this simple, cost-effective procedure at the community level. So, sincere steps must be undertaken for the training of CCCPs. These reasonably trained cytopathologists will be able to extend the benefits of FNAC at least up to the block level, aiding in the early diagnosis of malignancy. This research work was conducted with the hope of generating interest in this lesser-known application field of Cytopathology. It may open avenues for future studies, paving the way for better utilisation of FNAC at the community level and escalating the fight against malignancy.

REFERENCES

[1] Martin H, Ellis EB. Biopsy by needle puncture and aspiration. Ann Surg. 1930;92(2):169-81.
[2] McGuirt WF. Differential diagnosis of neck masses. Cummings CW, Fredrickson JM, Harker LA, Krause CJ, Schuller DE, editors. Otolaryngology? Head and Neck Surgery. 4th ed. St. Louis: Mosby Year Book; 2006. p. 2540-2553.
[3] Parajuli S, Tuladhar A, Basnet RB. Ultrasound and computed tomography guided fine needle aspiration cytology in diagnosing intra-abdominal and intra-thoracic lesions. J Pathol Nepal. 2011;1:17-21.
[4] Sobha Rani G, Md K Faheem N, Sai Prasad BV, Sudhakar Reddy E. Efficiency of ultrasound guided aspiration cytology in deep seated lesions - A diagnostic evaluation. Int J Med Health Sci. 2012;1(1):02-12.
[5] Sinna EA, Ezzat N, Basnet RB. Diagnostic accuracy of fine needle aspiration cytology in thyroid lesions. J Egypt Natl Canc Inst. 2012;24(2):63-70.
[6] Buley ID, Roskell DE. Fine needle aspiration cytology in tumour diagnosis: Uses and limitations. Clin Oncol (R Coll Radiol). 2000;12(3):166-71.
[7] Ahluwalia H, Gupta SC, Singh M, Gupta SC, Mishra V, Singh PA, et al. Spectrum of head-neck cancersat Allahabad. Indian J Otolaryngol Head Neck Surg. 2001;53(1):16-21.
[8] Mehrotra R, Singh M, Gupta RK, Singh M, Kapoor AK. Trends of prevalence and pathological spectrum of head and neck cancers in North India. Indian J Cancer. 2005;42(2):89-93.
[9] Field AS. Training for cytotechnologists and cytopathologists in the developing world. Cytopathology. 2016;27(5):313-16.

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PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Nov 14, 2023
- Manual Googling: Feb 15, 2024
- iThenticate Software: Apr 27, 2024 (4%)

ETYMOLOGY: Author Origin

EMENDATIONS: 6

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? No
- For any images presented appropriate consent has been obtained from the subjects. No

Date of Submission: **Nov 08, 2023**
Date of Peer Review: **Jan 18, 2024**
Date of Acceptance: **Apr 30, 2024**
Date of Publishing: **Jun 01, 2024**