

FNAC as a diagnostic tool in paediatric and adolescent lesions

Sanjay M^{1,*}, Sarvesh BM²

^{1,2}Assistant Professor, Department of Pathology, Adichunchanagiri Institute of Medical Sciences, B.G.Nagara, Mandya district, Karnataka state, India 571448

Corresponding Author:

E-mail: sarveshbm75@gmail.com

ABSTRACT

Background: Good number of paediatric population present with mass lesions to the routine outpatient clinic. Triaging these patients into operative candidates and non-operative candidates is important to avoid them from unnecessary surgical exposure thereby preventing complications which may arise.

Aim: The current study aims to evaluate the role of FNAC in pediatric and adolescent age group.

Subjects and Methods: A retrospective study of FNAC in age group ≤ 18 years of age presenting with mass lesions was studied for 2 years. Distribution of cases in different age groups, sex, and site of lesion was analyzed. Pediatric lesions were categorized into non-neoplastic, benign, and malignant conditions. Diagnostic efficacy was assessed by comparing subsequent histopathological examination wherever possible.

Results: FNAC was performed on 1804 cases in 2 years out of which 154 cases 8.5% (154/1804) were ≤ 18 years of age. Out of 154 cases analysed FNAC in the age group of 1 to 10 years constituted 35.7% (55/154) and in the age group of 11 to 18 years constituted 64.3% (99/154) of study population. Male to female ratio was 0.8:1, ultrasound guided aspiration constituted 1.9% of total number of cases. Most common site of FNAC was lymph node (40.2%) and the commonest finding was reactive lymphadenitis (50/62). Among the benign conditions of other sites Hashimoto's thyroiditis in thyroid, Fibroadenoma in breast were the predominant findings. There were 3 malignant lesions one case each of Hodgkins lymphoma, Non-Hodgkins lymphoma and chondroblastoma. The cytological diagnosis concurred with the histopathological findings in all cases.

Conclusion: FNAC is simple reliable and cost effective diagnostic modality in paediatric and adolescent age group. It becomes even more apt in a rural tertiary health care institute because of limited resources.

Keywords: FNAC, Head and Neck, Paediatric, Adolescent.

Access this article online	
Quick Response Code:	Website: www.innovativepublication.com
	DOI: 10.5958/2394-6792.2015.00029.0

INTRODUCTION

Fine Needle Aspiration Cytology (FNAC) is a simple and a rapid diagnostic technique. In recent years it has attained the stature of an indispensable diagnostic tool for a pathologist because of its simplicity, economic viability and early availability of results. The procedure even though involves a needle and considered to be invasive is feasible in pediatric age group because of minimal trauma it is associated with¹. For a long time, the application of FNAC was ignored in the Indian and American paediatric literatures. Previous reports have suggested its utility in only a small series of paediatric populations^{2,3,4}. In literature, there are only few Indian studies of FNAC in pediatric population^{5,6,7}. In addition to being a primary diagnostic procedure it offers ample scope for ancillary techniques such as flow cytometry, electron microscopic examination, cell block preparation and immunocytochemistry of the samples

obtained by the procedure. The single vital advantage of FNAC is lack of anaesthesia which is of important concern in pediatric population⁸.

With medical care becoming expensive day by day any technique which limits physical/psychological trauma to patients; causes minimal financial burden to the patient is highly desirable and FNAC fits the criteria perfectly. For surgeons FNAC is an additional tool which helps in assessing whether a conservative or radical approach is to be undertaken in mass lesions which are accessible.

The present study is to highlight the importance of FNAC in the children and the young where the simple procedure can alleviate the apprehension in cases of mass lesions and at the same time also act as an effective diagnostic tool.

SUBJECTS AND METHODS

The present study was performed in the Department of Pathology, in a tertiary care centre of Karnataka, on 154 children and adolescents who were in the age group of 0-18 years, who presented with palpable lesions, after getting the approval of the ethical committee of the institution, between 01/7/2013 to 30/11/2015 and also with the consent of their parents. The patients were placed in comfortable and the most suitable positions. The swellings were made prominent, they were cleaned with 70%

isopropyl alcohol and they were aspirated aseptically. Smears were prepared from the materials which were aspirated in the syringes and they were spread over clean glass slides and fixed for staining.

The following staining methods were used

1. Giemsa Staining
2. Papanicolaou Staining
3. Haematoxylin and Eosin

RESULTS

FNAC was performed on 1804 cases in 2 years out of which 154 cases 8.5% (154/1804) were ≤ 18 years of age. Out of 154 cases, maximum number of pediatric patients i.e., 99 cases 64.3% (99/154) were between 11 and 18 years [Table 1]. Male to female ratio was 0.8:1. The most common site for FNAC was cervical lymph node swelling 40.2% (62/154).[Table 2]. followed by thyroid swelling 16.8%(26/154) and breast and lungs 12.3%(19/154). Ultrasonography guided aspiration was performed in 2 cases.

Reactive lymphadenitis was the most common overall with 50 out of 62 cases (80.6%) of lymph node swelling accounting for it. There were 2 malignant lesions in lymph nodes out of which one was a case of Hodgkins lymphoma and the other one was Non-Hodgkin lymphoma. For these cases of lymphoma immunohistochemistry was advised for confirmation and sub- typing. Among the thyroid swelling.[Table 3b]. Hashimotos thyroiditis[Figure 5] was the commonest amounting to 13 out of 26 cases of thyroid(50%). Miscellaneous lesions included epidermal cyst(6 cases), benign cystic lesion(4 cases), suppurative lesion(5 cases), benign histiocytic proliferation(2 cases), lymphangioma(3 cases).

Special stains namely AFB staining was done in cases of Granulomatous lymphadenitis which confirmed the initial diagnosis. In 11 cases no opinion was possible because of non compliance of the patient and bloody aspirates.

Age group:

Table 1: Age Group of Patients

Age in years	No. of patients
1-10	55
10-19	99

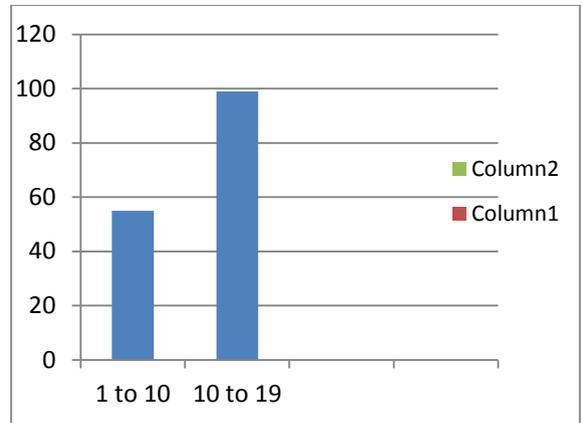


Fig. 1: age group of patient

Site of FNAC

Table 2: Site of FNAC

Site	No. of patients
Lymph node	62
Thyroid	26
Breast	19
Salivary Gland	9
Soft tissue and Bone	6
**Miscellaneous	21

**Miscellaneous lesions included epidermal cyst(6 cases), benign cystic lesion(4 cases), suppurative lesion(5 cases), benign histiocytic proliferation(2 cases), lymphangioma(3 cases).

No opinion in 11 cases due to lack of diagnostic material in the aspiration.

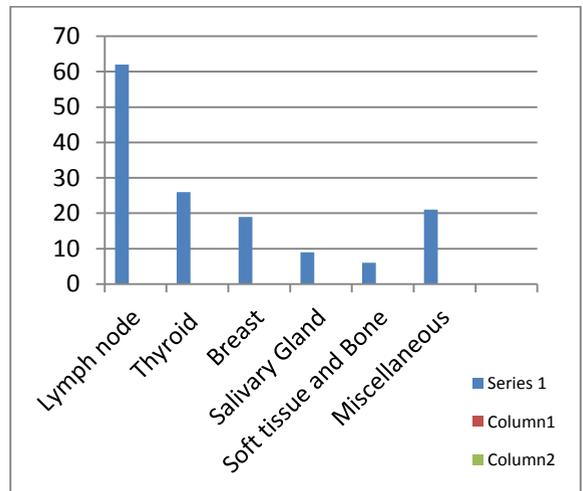


Fig. 2: Site of FNAC

FNAC diagnosis**Lymph Node****Table 3a: Lymph Node**

Lymph Node	
Reactive	50
Granulomatous	9
Lymphoma	2
No opinion	1

Thyroid**Table 3b: Thyroid**

Thyroid	
Hashimotos	13
Thyroglossal cyst	2
Colloid goiter	9
Follicular pattern	1
No opinion	1

Breast:**Table 3c: Breast**

Breast	
Fibroadenoma	14
*Benign	2
Gynaecomastia	2
Hemangioma	1

*Benign breast diseases constitute a heterogeneous group of lesions which includes developmental abnormalities, inflammatory lesions, epithelial and stromal proliferations and neoplasms.

Salivary Gland:**Table 3d: Salivary gland**

Salivary gland	
Pleomorphic adenoma	2
Acute sialadenitis	3
Chronic sialadenitis	2
Lympho epithelial cyst	2

DISCUSSION

FNAC has been a very popular initial diagnostic tool in evaluating both superficial and deep seated lesions in adult patients. FNAC in pediatric and adolescent age group though practical has always been a moderately with minimal popularity because of the need for high accuracy in diagnosing pediatric lesion because of non-compliance in the age group for repeat procedure.

A study by Jain, *et al.*,⁵ reported 6% of unsatisfactory aspirates and attributed them to small size of the lesions and poor handling of aspirated material, however, in the present study 11

unsatisfactory aspirates were obtained and the procedure could not be repeated in pediatric cases.

In a study by Maheshwari, *et al.*,⁹ majority of cases (40.82%) were in the age group of 11-14 years, male dominated the study population (66.67%) with male:female ratio being 2:1.[10] In the present study, maximum number of patients 64.3% (99/327) were in the age group of 11-18 years, female preponderance was observed with male:female ratio of 0.8:1.

Lymph node:

Cervical lymph node enlargement is very common in children¹⁰. Most of the time the cause is just a reaction to infective foci which is transient. However sometimes it points towards a grave disorder, hence identification of the aetiology of lymph node enlargement is of prime importance for the treating clinician.

FNAC helps to identify the cause of cervical lymphadenopathy in majority of the cases. In the present study, most common cause of cervical lymphadenopathy was reactive in 80.6% (50/62) of cases followed by tuberculosis in 14.5% (9/62) of cases. In India, tuberculosis is leading cause of morbidity and mortality in pediatric population accounting for 75% of the total estimated cases worldwide.

Several authors have established FNAC as a quick and effective diagnostic tool in lymphadenopathy in children¹¹ (Shariqahmed and CR-11) as well as in tuberculosis in the present study there was one case of non Hodgkins lymphoma and one case of Hodgkins lymphoma. It is important to realise the roll of FNAC is limited to the diagnosis of lymphoma and further typing as to NHL or Hodgkins lymphoma. However it is not possible always to further subclassify it. Similarly it is recommended to always consider the clinical and other relevant investigations along with FNAC report for a definitive diagnosis.

Thyroid Lesions:

Thyroid lesions are rare in pediatric population representative over 1-2% of the population¹². though majority of the thyroid lesions are benign it is important to know that more of the solitary thyroid nodules are malignant in pediatric population as compared to that in adults. Hence FNAC serves as an important initial diagnostic tool in thereby reducing the scalpel exposure. The FNAC procedure in paediatric population is often apprehensive due the need for sedation, anxiety, short neck.

Literature reveals high sensitivity and specificity of FNAC ranging from 96%, 66%¹² and 100%, 65% respectively of FNAC in diagnosing thyroid lesions. Majority of thyroid nodules in

children are benign as was seen in the present study¹³. In the present study, Hashimotothyroiditis [Figure 5] was the most common disease. Surgery was performed only in one case of follicular patterned lesion which was later on diagnosed as follicular adenoma on histopathology.

Breast:

Breast lesions comprise 40.2% of the total cases in the present study. It was noted that the predominant lesion in breast was Fibroadenoma [Figure 3] comprising 73.6% of the cases which was more in agreement with the findings of Maheswari et al⁹. The diagnostic accuracy in breast FNAC was 100%. The histopathological correlation wherever possible showed concurrence with FNAC findings.

Salivary gland:

In a study of head and neck lesions in paediatric population, Jain et al⁵ observed salivary gland lesions in 2.1% of the cases. Pleomorphic adenoma [Figure 4] was the most common tumour diagnosis and non neoplastic lesions constituted the major group among all the salivary gland lesions. This was in accordance with our study in which pleomorphic was the commonest tumour and

inflammatory lesions were the commonest cause of salivary gland mass lesions.

Soft tissue:

The soft tissue lesions in the present study were few in number. The commonest finding was Lipoma and a case of giant cell tumour of tendon sheath and chondroblastoma [Figure 6a, 6b] were recorded.

Complications:

These are unusual and restricted to haemorrhage especially in the abdominal masses. However this is very rare. Needle track seeding was a theoretical complication feared of in the past decade but presently this notion has been rejected. In the present study we did not encounter any complications.

To conclude, FNAC is a safe and cost-effective procedure with good patient compliance, no morbidity and can be used as an initial screening tool in superficial and deep seated lesions in pediatric and adolescent age group. Although, the number of cases with histopathological correlation was less, the FNAC findings were validated by histopathological study.

Comparative Study of FNAC from Similar Previous Studies

Table 9: Comparison with other studies

	Amy Rapackwiz et al., [14]	M Jain et al., [05]	U Handa et al., [15]	Present study
Study Topics	Spectrum of head and neck lesions diagnosed by fine-needle aspiration cytology in the pediatric population	FNAC as diagnostic tool in pediatric head and neck lesions	Role of FNAC in paediatric lymphadenopathy	Role of FNAC in head & neck lesions of pediatric age group
Total no. of cases	85 cases	748 cases	692 cases [584 cervical lymph nodes]	154
Age group	0–18 years	0–12 years	0–14 years	0–18
Adequacy of material		94%	93.4%	93%
Age predominance			6–10 years	11–18 years
Sex predominance	Male [69.4%]		Male:female ratio 1.5: 1	M:F 0.8:1
Most common site of lesion	Lymph node cervical 69.4%	Lymph node cervical 81%	Lymph node cervical 84.3%	Lymph node cervical 40.2%
Miscellaneous [cystic & soft tissue]	16 Case [Also in Bone]	7.6%		03.8%
Thyroid		3.2%		16.8%
Salivary gland	2cases	2.1%		5.8%
Nature of Lesion Benign	83%	98.5%	98.46%	98.7%
Malignant	17%	1.5%	1.54%	1.3%

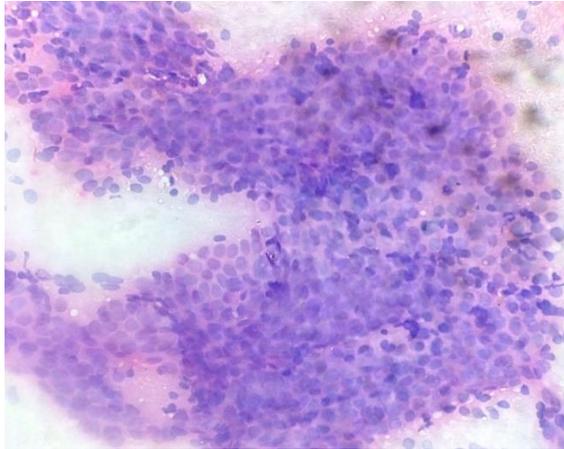


Fig. 3: Tightly cohesive clusters of benign ductal epithelial-Fibroadenoma (40x)

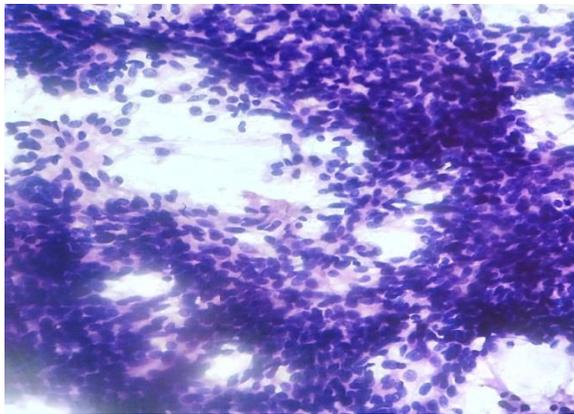


Fig. 4: Benign epithelial cells against a chondromyxoid background – pleomorphic adenoma (40x).

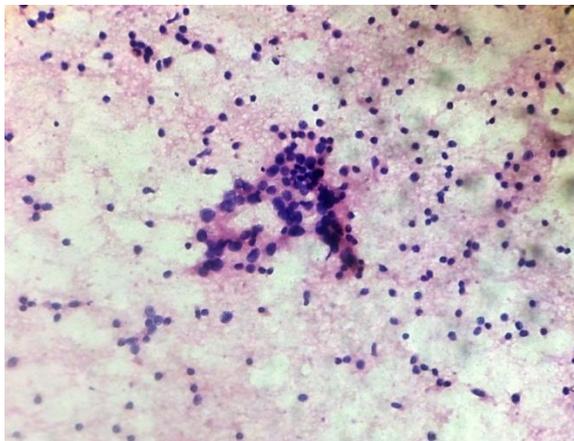


Fig. 5: Thyroid follicles with Hurthle cells surrounded by lymphocytes – Hashimoto's thyroiditis (40x).

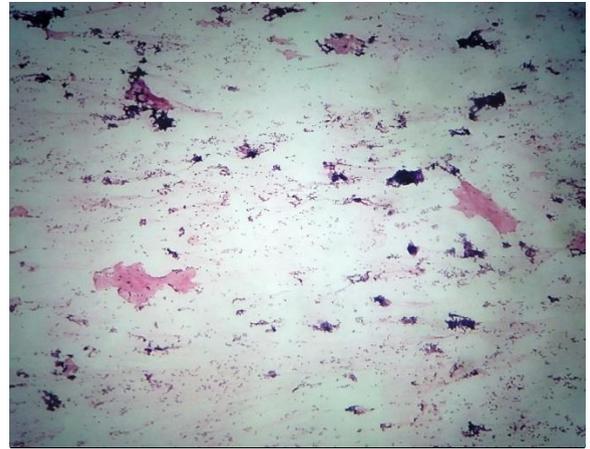


Fig. 6a: Chondroblasts with osteoid (10x) - Chondroblastoma.

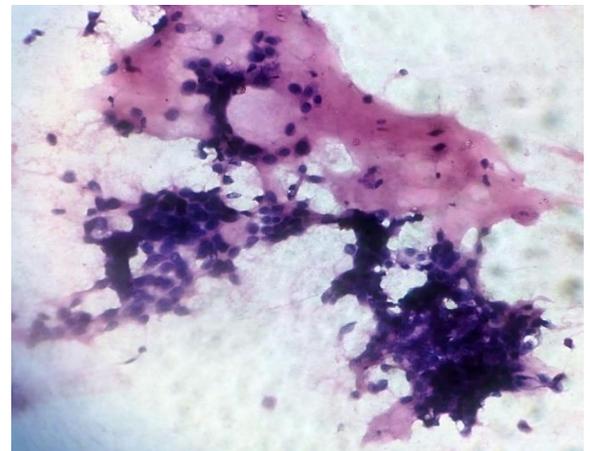


Fig. 8b: Chondroblasts with osteoid (40x) – Chondroblastoma.

REFERENCES:

1. Mitra P, Bharti R, Pandey MK. Role of Fine Needle Aspiration Cytology in Head and Neck Lesions of Paediatric Age Group. *JCDR*. 2013;7(6):1055-1058.
2. Cohen MB, Bottles K, Ablin AR, Miller TR. The use of fine needle aspiration biopsy in children. *West J Med*. 1989;150:665–67.
3. Mobley DL, Wakely PE, Frable MAN. Fine needle aspiration biopsy: Application to pediatric head and neck masses. *Laryngoscope*. 1991;101:469–72.
4. Howell LP, Russell LA, Howard PH, Teplitz RL. Fine needle aspiration biopsy of superficial masses in children. *West J Med*. 1991;155:33–38.
5. Jain M, Majumdar DD, Agarwal K, Bais AS, Choudhury M. FNAC as a diagnostic tool in pediatric head and neck lesions. *Indian Pediatr*. 1999;36:921–3.
6. Dey P, Mallik MK, Gupta SK, Vasishta RK. Role of fine needle aspiration cytology in the diagnosis of soft tissue tumours and tumour-like lesions. *Cytopathology*. 2004;15:32–7.
7. Khan RA, Wahab S, Chana RS, Naseem S, Siddique S. Children with significant cervical lymphadenopathy: Clinicopathological analysis and role of fine-needle aspiration in Indian setup. *J Pediatr (Rio J)* 2008;84:449–54.
8. Prathima S, Suresh T, Harendra Kumar M, Krishnappa J. Fine Needle Aspiration Cytology in Pediatric Age

- Group with Special Reference to Pediatric Tumors: A Retrospective Study Evaluating Its Diagnostic Role and Efficacy. *Ann Med Health Sci Res.* 2014 Jan-Feb; 4(1): 44–47.
9. Maheshwari V, Alam K, Jain A, Agarwal S, Chana RS. Diagnostic utility of fine needle aspiration cytology in pediatric tumors. *J Cytol.* 2008;25:45–9.
 10. Ponder TB, Smith D, Ramzy I. Lymphadenopathy in children and adolescents: role of fine-needle aspiration in management. *Cancer Detect Prev.* 2000;24:228–33.
 11. Sharique Ahmad, Nasim Akhtar, Shivam Singla and Geetika Srivastva. FNAC as a diagnostic tool in pediatric patients with lymphadenopathy. *Annals of Biological Research,* 2013, 4 (4):92-95
 12. Vasudev V, Hemalatha A.L, Rakhi B, and Githanjali S. Efficacy and Pitfalls of FNAC of Thyroid Lesions in Children and Adolescents. *J Clin Diagn Res.* 2014 Jan;8(1): 35–38.
 13. Kapila K, Pathan SK, George SS, Haji BE, Das DK, Qadan LR. Fine needle aspiration cytology of the thyroid in children and adolescents: experience with 792 aspirates. *Acta Cytol.* 2010 Jul-Aug;54(4):569-74.
 14. Rapkiewicz Amy, Bich Thuy Le, Aylin Simsir, Joan Cangiarella, Pascale Levine. *Cancer Cytopathol.* 2007;111:242–51.
 15. Handa U, Mohan H, Bal A. Role of fine needle aspiration cytology in evaluation of pediatric lymphadenopathy. *Cytopathology.* 2003;14:66–69.