

Diagnostic utility of fine needle aspiration cytology in paediatric lesions

Savita M. Sonawane¹, Sheela L. Gaikwad², Rutuja U. Londhe^{3,*}

¹Medical Officer, ²Associate Professor, ³Junior Resident, Dept. of Pathology, SRTR Govt. Medical College, Ambajogai, Maharashtra

***Corresponding Author:**

Email: rutuja.londhe@gmail.com

Abstract

Introduction: Fine needle aspiration cytology (FNAC) is well accepted as a useful diagnostic technique in the management of adult patients with swellings. Until recently the application of FNAC to the pediatric population was largely ignored in the Indian and American pediatric literature. There are only few Indian studies of FNAC in pediatric population. Previous reports have studied its utility mainly in head and neck lesions, lymphadenopathy, malignant neoplasms of a particular organ in pediatric population.

Materials and Method: The present study was carried out in a rural tertiary care hospital over a period of 30 months in patients attending the out-patient departments of the hospital presenting with masses and or associated symptoms. It comprises of 148 fine needle aspiration cytology smears aspirated from children of age group 1-14years.

Conclusion: Even though childhood tumors share common cytological features, the diagnosis can be narrowed down to particular type with the help of clinical and radiological features. FNAC can be recommended as a first line investigation in diagnosis of pediatric lesions and is also an effective method for evaluation and primary diagnosis of lesions in pediatric population.

Keywords: FNAC, Pediatric lesions, Rural tertiary care hospital

Introduction

Aspiration cytology, a well-established technique in adult oncology, is now being increasingly applied to childhood tumours as it permits a rapid diagnosis with minimal trauma, morbidity, and a low complication rate. It also eliminates the need for anaesthesia and hospitalization. The low cost of this procedure is especially advantageous in the Indian context.⁽¹⁾ FNAC is a safe, minimally invasive rapid procedure with good patient acceptance and low morbidity. However, it has been slow in gaining popularity in pediatric patients compared with its utilization in adult patients. There is still reluctance to use FNAC as a diagnostic tool in children due to lack of experience as well as the uncommon nature of most mass lesions encountered in pediatric patients. But FNAC have shown excellent results with sensitivity and specificity approaching up to 93% to 100%.⁽¹⁾ Despite strong body of literature, cytopathological approach for diagnosis of pediatric tumors is not universally accepted among clinicians and pathologists. However several studies have shown that in hands of well-trained team and good collaboration with paediatrician, radiologist and cytopathologist, fine needle aspiration (FNA) is a highly accurate approach for quick preliminary as well as final diagnosis.⁽²⁾

Aims and Objectives

1. To study the frequency and distribution of pediatric lesions according to age and sex
2. To study the cytomorphological features of all pediatric lesions and categorize them as non-neoplastic and neoplastic lesions.

3. To analyse the available data and compare with observations of other studies.

Materials and Method

Total 1057 FNAC were performed in department of pathology over the period of June 2013 to November 2015. Among these, 148 FNAC were performed in the pediatric patients under 14 years of age. All these 148 FNAC were included in the study. Appropriate details regarding history, clinical examination, clinical diagnosis, radiological findings and previous significant findings were noted down. The data was analysed in simple statistical tables. The procedures were performed using 22-24 gauge needles, with aspiration by a 10 ml disposable syringe. Prior informed consent was also taken after explaining the whole procedure, its advantages and complication. Sedation was used whenever necessary. Whenever required, help of imaging to guide the FNA was taken, especially for deep seated tumours and tumours with cystic and necrotic changes. Smears were made on minimum four slides. Slides were fixed by both air drying and wet fixed in 95% ethanol. The slides were stained with May Grunwald Giemsa (MGG), PAP stain and Haematoxylin and Eosin (H&E). Special stains were used wherever required. The microscopic diagnosis was interpreted after correlating all the data including the clinical, radiological, cytomorphological and other findings.

Observation/ Results

The present study comprised of 148 fine needle aspiration cytology smears aspirated from children of

age group 1-14 years. All these 148 lesions were identified either by clinically or by imaging method and referred for fine needle aspiration. The following observations were summarized from our study:

Majority of the lesions were inflammatory lesions comprising 84 (56.75%) of all lesions, followed by neoplastic lesions 29 (19.59%). The specific

inflammatory lesions were 27 (18.24%) which include tuberculosis, filarial inflammation, or any fungal infections, hashimoto's and lymphocytic thyroiditis and Sialadenitis.

In neoplastic lesions, majority were benign 27 (18.24%) and 2 (1.35%) were malignant lesions. (Fig. 3).

Table 1: Distribution of lesions according to sex

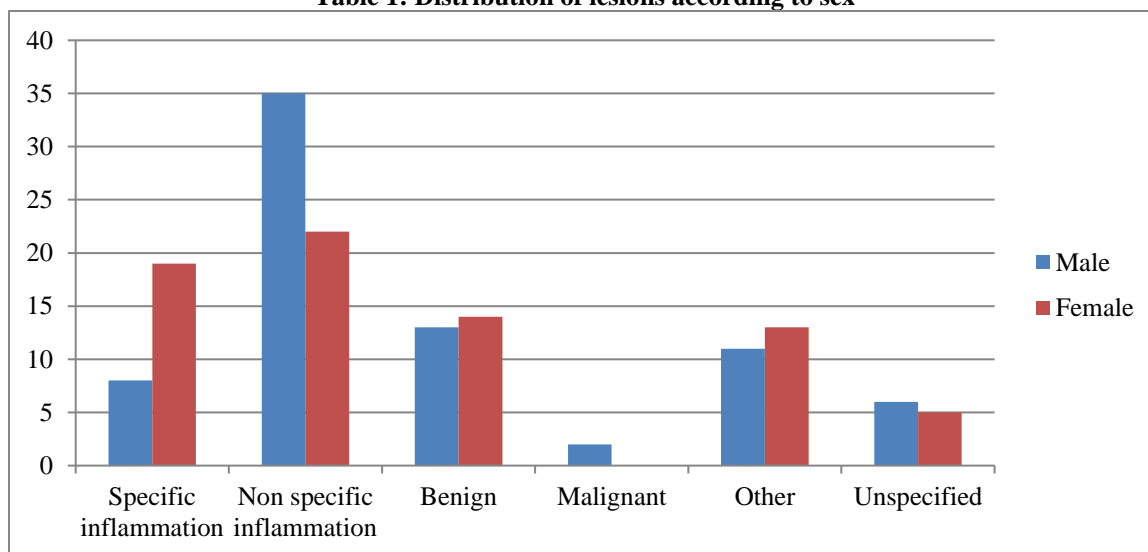


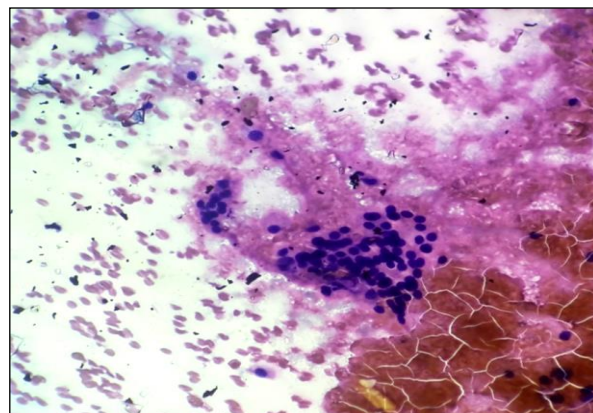
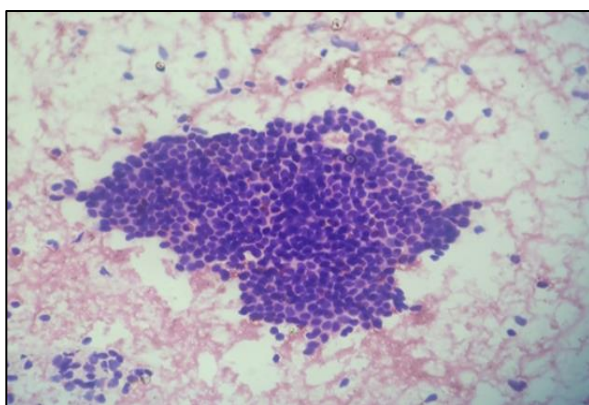
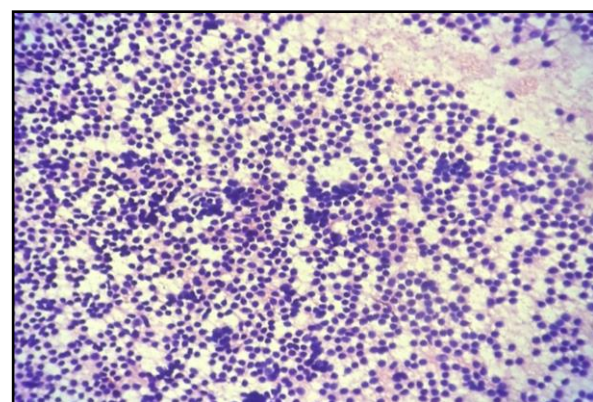
Table 2: Distribution of lesions according to site

Location	Inflammatory		Neoplastic		Other	US*	Total
	Specific	Non-Specific	Benign	Malignant			
Head and Neck							
Lymph Node	16	34	-	2	2	2	56
Salivary Glands	4	2	-	-	1	-	7
Thyroid	4	3	-	-	3	-	10
Soft tissue	-	2	-	-	0	1	3
Thorax & Chest wall							
Chest Wall	-	2	-	-	-	-	2
Breast	-	-	10	-	2	2	14
Bone and Soft tissue							
Soft tissue	-	-	2	-	-	-	2
Lymph Node							
Inguinal LN	2	3	-	-	-	1	6
Axillary LN	1	1	-	-	1	1	4
Extremities							
Upper Limb	-	6	7	-	5	-	18
Lower Limb	-	4	8	-	10	4	26
Total	27	57	27	2	24	11	148

*US – Unsatisfactory.

Table 3: Comparative analysis of Overall features of Pediatric FNAC

Author		Suzzane et al ⁽⁹⁾	Wakely et al ⁽³⁾	Gamba P et al ⁽¹⁰⁾	Gois et al ⁽¹¹⁾	Maheshwari V et al ⁽¹⁾	Present Study
Year of Study		1984	1988	1995	2008	2008	2013
No. of Cases (No of FNACs)		57	107 (112)	96 (111)	50	558	148
Youngest age		-	-	20 days	3 Months	2 Months	2 month
Upper age limit		18years	16years	17years	18years	14years	14 years
Sex	Male	33	55	59	27	392	76
	Female	24	52	37	23	196	72
FNAC Category Or Type of Lesion	Inflammatory	21 (36.84%)	46 (31.29%)	90 (81%)	20 (40%)	-	84(56.7%)
	Benign	4 (7.02%)	16 (10.88%)			381 (64.8%)	27(18.2%)
	Cysts or Other	13 (22.81%)	10 (6.80%)			207 (35.2%)	24(16.2%)
	Malignant	19 (33.33%)	39 (26.53%)	12 (10.8%)	20 (40%)	-	2(1.3%)
	Unsatisfactory	7 (12.28%)	1 (0.68%)	9 (4.5%)	10 (20%)	-	11(7.4%)

**Fig. 1: Microfilaria (PAP 10x)****Fig. 3: Colloid Goitre(PAP 40x)****Fig. 2: Fibroadenoma breast (40x PAP)****Fig. 4: Non Hodgkin lymphoma (PAP, 10x)**

The two cases of malignant small round cell tumours showing lymphoma were observed. Smears show monotonous population of lymphoid cells with round nuclei slightly larger than those of normal small lymphocytes and coarse granular nuclear chromatin, absent nucleoli.

Other lesions constituted 24 (16.21%) cases, which include thyroglossal cyst, colloid cyst, lymphatic cyst including a case of cystic hygroma, hamartoma, epidermal inclusion cyst, adenosis of breast, Gynecomastia etc. which were non-inflammatory, non-neoplastic and represented some developmental aberrations or lesions due to hormonal changes. About 11(4.43%) smears which are labelled as unspecified were unsatisfactory for evaluation because of scant or absent material in fine needle aspiration.

Majority of lesions were from the age group of 7-10 years i.e. 61 (41.2%). The youngest child was a newborn child (2 Days) with a soft nasal mass, which was an infected lymphatic cyst.

Incidence among male and female were almost equal with a proportion of 51.1% lesions in males and 48.6% lesions in females. Male, female incidence ratio was 1.05:1. (Table 1)

Most common organ aspirated was lymph node comprising 66 (44.5%) cases followed by bone and soft tissue comprising 30 (20.8%) cases. (Table 2)

Discussion

In the present study, categorization and tabulation of various mass lesions encountered in children of less than 14 years were compared with the various previous studies. Any discrepancies with previous study were analysed.

Most of the lesions in lymph node were nonspecific inflammatory lesions 57 (38.5%), followed by specific inflammatory lesions 27 (18.2%). Out of 66 lesions, 43 (29.1%) were above 7 years of age. Most of the tubercular lymph nodes were single discrete lymph nodes comprising 16 (10.4%) cases and multiple matted lymph nodes were seen in 3 cases. The reactive lymph node was most common type of lesion in lymph nodes comprising 27 (18.24%) cases, followed by tuberculosis 19 (12.83%) in the present study. This is similar to previous studies conducted by Annam V et al,⁽⁴⁾ Khan R A et al,⁽⁵⁾ Dhingra V et al.⁽⁶⁾

A total of 10 aspirates were done from thyroid gland. Youngest age was 7 years male child with colloid cyst. (Fig. 2) There was a slight female preponderance 6 cases with male to female ratio of cases were about 1.6:1. There were 4 cases of lymphocytic thyroiditis, 3 cases of colloid cyst, 2 cases of thyroglossal cyst and a single case of colloid goitre. No malignant lesions were seen in the present study, even though papillary carcinoma of thyroid occurs in children.⁽⁷⁾

A total of 6 aspirates were done from salivary gland in this study which included 5 aspirates from parotid and one aspirate from the submandibular gland. Majority of aspirates were sialadenitis 4 (66.6%) followed by a two cases being cystic lesions.

A total of 14 cases were aspirated from breast lesion. Majority of the lesions were fibroadenomas 10 (76.92%) with youngest age of presentation being 14

years. 2 lesions were that of gynecomastia and 2 of fibrocystic breast disease. This is similar to study conducted by Kapila K et al⁽⁸⁾ in which a total of 44 benign lesions were seen in children of less than 12 years, 33 of which were in female children; in which fibroadenoma were 6 cases and other benign lesions and inflammatory lesions were 21 cases and 4 cases respectively. (Fig. 1) 8 cases were in males with 6 cases of gynecomastia.

In the present study proportion of benign pediatric tumors is around 27 (18.24%) of all cases. Majority of the cases are soft tissue tumors (13) followed by Fibroadenoma (10). It was similar to other studies conducted by Maheshwari et al⁽¹⁾ and Wakely P. E et al.⁽³⁾ In the present study there were 2 cases of malignant tumours amongst all pediatric lesions. (Table 3) Both the malignant lesions were malignant small round cell tumours.

Male predominance of lesions is a common finding in nearly all the previous studies, like our study.

Conclusion

FNAC is a rapid, easy, simple, minimally invasive technique well accepted in the adult population. It widely used for pediatric age groups. FNAC can be a reliable and easy technique for investigation in children. From this study it was clear that there is more widespread utilization of FNAC in children especially in enlarged cervical lymph nodes. Most of them were reactive lymph nodes which does not need further investigation. It is also useful and best screening method in the diagnosis of tubercular lymph nodes. Even though common childhood tumors share common cytological features, with the help of clinical and radiological features, the diagnosis can be narrowed down to particular type. Overall FNAC in pediatric age group is as useful as in general population and greatest utility is seen in enlarged lymph nodes.

References

1. Maheshwari V, Alam K, Jain A, Aggarwal S, Chana R. Diagnostic utility of fine needle aspiration cytology in pediatric tumors. *J Cytol. Medknow Publications*; 2008 Apr 1;25(2):45.
2. Suci V, Fabre M, Klijanieko J, Marinsiele Z.P VP. Sternberg's Diagnostic Surgical Pathology. In: Stacey E. Mills, Joel K. Greenon, Jason L. Hornick, Teri A. Longacre VER, editor. vol 1. 6th ed. Philadelphia: Lippincott Williams & Wilkins; 2010. p. 833-90.
3. Wakely PE, Kardos TF, Frable WJ. Application of fine needle aspiration biopsy to pediatrics. *Hum Pathol.* 1988 Dec;19(12):1383-6.
4. Annam V, Kulkarni MH, Puranik RB. Clinicopathologic Profile of Significant Cervical Lymphadenopathy in Children Aged 1-12 Years. *Acta Cytol. Karger Publishers*; 2009 Jan;53(2):174-8.
5. 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). Sociedade Brasileira de Pediatria*; 2008 Oct 13;84(5):449-54.

6. Dhingra V , Misra V , Mishra R, Bhatia R SM. Fine Needle Aspiration Cytology (FNAC) As a Diagnostic Tool in Paediatric Lymphadenopathy. *J Clin Diagnostic Res.* 2010;4(1):2452-7.
7. Al-Qahtani KH, Tunio MA, Al Asiri M, Aljohani NJ, Bayoumi Y, Riaz K, et al. "Clinicopathological features and treatment outcomes of differentiated thyroid cancer in Saudi children and adults". *J Otolaryngol Head Neck Surg.* 2015 Jan;44(1):48.
8. Kapila K, Pathan SK, Al-Mosawy FA, George SS, Haji BE, Al-Ayadhy B. Fine needle aspiration cytology of breast masses in children and adolescents: experience with 1404 aspirates. *Acta Cytol.* 2008 Jan;52(6):681-6.
9. Taylor SSR, Nunez C. Fine-needle aspiration biopsy in a pediatric population. Report of 64 consecutive cases. *Cancer.* Wiley Subscription Services, Inc., A Wiley Company; 1984 Oct 1;54(7):1449-53.
10. Gamba PG, Messineo A, Antonello LM, Boccato P, Blandamura S, Cecchetto G, et al. A simple exam to screen superficial masses: Fine-needle aspiration cytology. *Med Pediatr Oncol.* 1995 Feb;24(2):97-9.
11. Gois WAF de, Correa CAA, Alves EM de O, Tubino P. Fine needle aspiration biopsy in the diagnosis of lymphadenopathies and solid tumors in children and adolescents. *Rev Col Bras Cir.* 2008 Feb;35(1):5-8.