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Role of Fine Needle Aspiration Cytology (FNAC) as a Diagnostic Tool in Paediatric Head and Neck Lymphadenopathy

OA Silas¹, OO Ige², AA Adoga³, LT Nimkur³, and OI Ajetunmobi^{1,*}

¹Pathology department Jos University Teaching Hospital, Jos, Nigeria

²Pediatrics departments Jos University Teaching Hospital, Jos, Nigeria

³Ear, Nose and Throat department Jos Teaching Hospital, Jos, Nigeria

Abstract

A neck mass that is present for longer than a week might be pathological requiring rapid and thorough evaluation.

This study aims to evaluate the positive role Fine needle aspiration cytology plays in the diagnosis of pediatric patients with lymphadenopathy in the head and neck region.

Fine needle aspiration of lymph nodes was carried out, fixed and stained by cytopathologists for 56 patients at the Jos University Teaching Hospital, 43 (76.8%) were inflammatory and 13 (23.2%) malignant. Reactive hyperplasia (72.1%), acute suppurative (18.6%) and tuberculosis (9.3%) constituted the inflammatory lesions. Non Hodgkins lymphoma was the commonest malignant lesion (76.9%) followed by Hodgkins lymphoma (15.4%), the least being Rhabdomyosarcoma (7.7%). Age range 10-14 years had the highest number of cases (46.4%). Males were 36 (64.3%) while females were 20 (35.7%).

All malignant cases diagnosed by FNAC had to undergo confirmation/characterization by histology and had 100% concordance. Thus there were no false positives and specificity was 100%, sensitivity 100%. Of the 43 diagnosed as inflammatory by FNAC, 12 cases which did not resolve after treatment or where patients condition worsened had to undergo surgical biopsy. Out of these only 1 (8.3%) case of fungal infection was misdiagnosed by FNAC. The lymph nodes were generalized 4 (7.1%) and localized in 52 (92.9%). Maximum number of cases 53 (94.6%) had Cervical Lymphadenopathy followed by axillary 2 (3.6%) and inguinal 1 (1.8%). Out of the cervical group of nodes, the upper anterior and upper posterior deep cervical nodes were involved in majority of cases (95%).

Keywords

Fine needle aspiration cytology; Pediatrics; Lymphadenopathy; Jos University Teaching Hospital

*Corresponding author: OI Ajetunmobi, Pathology Department, Jos Teaching Hospital, Jos, Nigeria, Tel: +2348035775213; lanreolorire@gmail.com.

Introduction

Lymphadenopathy is one of the commonest presentations among the pediatric age group [1,2]. It results from various etiologies and poses diagnostic problems. A neck mass that is present for longer than a week might be pathological until proven otherwise. Thus it is essential to arrive at a definitive diagnosis. This study is aimed at evaluating the diagnostic role of fine needle aspiration cytology (FNAC) in pediatric patients presenting with head and neck lymphadenopathy. The need for an accurate, timely and well- structured pathology report has become increasingly important in this age, never forgetting a society that is both erudite and critical. To diagnose a tumor in the absence of clear and relevant clinical and if necessary radiological information is dangerous as it can lead to inaccurate diagnosis and treatment.

FNAC is safe, simple, rapid and relatively cheap [2]. They leave no scars and there is no risk of seeding tumors along the needle tract [2]. It is relatively free of complications, well tolerated by patients, done on an outpatient basis and is repeatable [2].

If clinicians are dissatisfied with their pathologist's reports or the pathologist is not getting adequate clinical information, they need to talk to each other and discuss issues as they both need be reminded that a report is also a form of a legal document which patients show to other members of the professional world, thus with medico legal implications.

In case of suspected malignancy, FNAC is the best choice as it does not cause spread of tumor through the skin tract [2]. FNAC can also be of therapeutic use in cystic swellings [2]. Common causes of neck lymphadenopathy are inflammation, reactive hyperplasia, lymphoproliferative disorder and metastatic disease [3].

Rhabdomyosarcoma is the most common soft tissue sarcoma in children with majority diagnosed before age 10 years and having a male to female ratio of 1.5:1 [2]. Most Western literatures report between 4-5 cases per 1,000,000 children under 14 years of age with embryonal rhabdomyosarcoma being the commonest (60-70%) [2].

Pediatric cancers are the second leading cause of death in age range 5-14 years [1] with head and neck malignancies making up 5% of pediatric cancer cases [1].

Lymphadenopathy is an extremely common clinical finding in children in Africa as well as the rest of the world. It is common in children due to their large lymphoid mass and rapid lymphocytic response to allergens or infection. It is prevalent in the first decade of life, the majority of children between the ages of 2 and 12 years will have an enlarged lymph node at one stage or another. The main concern is the association between malignancy and lymphadenopathy, which may be primary or secondary but particularly includes the lymphomas. Thus lymphadenopathy needs to be actively investigated should it not respond to simple initial treatment so as not to overlook these important conditions.

Lymphadenopathy represents the response to localized or generalized pathology as a result of antigenic stimulation or infiltration by cellular elements. Generalized enlargement of lymph nodes is defined as two or more non continuous lymph node regions with enlarged

nodes including intra-abdominal lymphadenopathy. It most often results from systemic disease due to infectious agents but malignancies, autoimmune disease and lipid storage diseases as well as drug reactions and other miscellaneous pathologies also contribute to the overall picture. In contrast localized lymphadenopathy occurs mainly as a result of disease or infections in the node or their drainage areas. It can be cervical, axillary, inguinal or other (e.g. supratrochlear occipital etc). Many are caused by viral infections which result in small self-limiting lymph nodes. Others could be caused by bacterias e.g tuberculosis etc. while toxoplasmosis, schistosomiasis, dengue fever, trypanosomiasis, kalaazar, toxocariasis, and elephantiasis are also known causes. Lymphadenopathy in the posterior triangle of the neck is viewed with suspicion because lymphoma often presents there. Enlarged post auricular node in children older than 2 years of age is likely to be clinically significant. Lymphadenopathy in the supraclavicular region is highly significant as up to 60% are caused by malignant tumours.

Fine needle aspiration biopsy (FNAB) and sampling are indicated by any of the following conditions; no response to antibiotic therapy in 4-6 weeks (>2 cm), rapid increase in size, hard matted nodes in the posterior triangle or supraclavicular region. For suspected malignancy adjunct test are immunostaining and flow cytometry.

The objective of this study is to evaluate the diagnostic role of fine needle aspiration cytology in pediatric head and neck lymphadenopathy.

Materials and Methods

This study was carried out in patients up to 16 years of age who had palpable head and neck lymphadenopathy over a three-year period.

A total of 56 cases were included in the study for cytological examinations, histopathological examination was performed in 25 patients.

Those diagnosed as malignant by FNAC (13) and those diagnosed as reactive or inflammatory by FNAC (12) but did not resolve after treatment with antibiotics or anti-TB drugs with worsening of patients conditions had to undergo surgical excision for histologic diagnosis/ confirmation. Of the 12 reactive/inflammatory ones, 1 case was found to be due to fungal infection by histology. While the 11 others had diagnosis correlated with that by FNAC. All malignant lesions by FNAC (13) correlated with the histology result with no false positive (specificity 100%). Both dry and wet fixed smears were stained with giemsa, pap and routine hematoxyline and eosin (H&E) stains. Aspiration was performed by cytopathologists using 25 or 27 gauge needles, smeared on glass slides, fixed in 95% ethanol and stained by papanicolaou method or air-dried and stained with giemsa. Follow up by histology was done for most. Ziehl-Neelsen stain was used where necessary. Data gotten was managed using simple statistical formulae.

Results

A total of 56 samples were analyzed out of which 43 (76.8%) were inflammatory and 13 (23.2%) malignant. Of the inflammatory lesions reactive hyperplasia constituted the highest

(72.1%) followed by acute suppurative (18.6%) then tuberculosis (9.3%). Non Hodgkins lymphoma was the commonest malignant lesion (76.9%) followed by Hodgkins lymphoma (15.4%), the least being rhabdomyosarcoma (7.7%) (Table 1).

Those reactive/inflammatory ones by FNAC (12) that did not resolve after treatment and/or with worsening patient's condition were subjected to surgical biopsy for histologic diagnosis. Out of these, 1 was found to be due to fungal infection by histology. Of the 13 cytologically diagnosed as malignant, histology was done for confirmation and characterization and all 13 correlated with cytologic diagnosis of malignancy (Table 2).

Pattern of distribution of the lymph nodes were generalized in 4 (7.1%) and localized in 52 (92.9%) cases. Maximum number of cases 53 (94.6%) had Cervical Lymphadenopathy followed by axillary 2 (3.6%) and inguinal 1 (1.8%) (Table 3). Out of the cervical group of nodes, the upper anterior and upper posterior deep cervical nodes were involved in majority of cases (95%).

Age range 10-14 years had the highest number of cases (46.4%) while age range 0-4 years had the least number of cases (8.9%) (Table 4).

Discussion

Overall, a total of 56 samples were analyzed out of which 76.8% were inflammatory and 23.2% malignant (Table 1). This is consistent with findings of Siara et al. [1], Lochamet al. [3], Sankara et al. [4], Dhingra et al. [2], who reported high findings for inflammatory lesion as 64%, 68%, 70% and 88.5% respectively. Though our finding of 23.2%, for malignant lesions was generally higher than that of the other workers above. This might be due to the fact that our centre is the only place in our region where cytopathologists are found, thus all suspected lymphomas and metastatic tumours necessitating FNAC are referred to our centre. This is however consistent with the work of Shonubi et al. [5] in Sagamu Ogun state, Nigeria who reported 45% for malignant lesions. Of the inflammatory lesions, reactive hyperplasia constituted the highest form (72.1%) which is consistent with finding of most workers (Table 1) [4,6,7].

However tuberculous lesions was seen in only 9.3% cases which is low compared to those of other workers due to the lower sample size in our case and the fact that in our environment clinicians in peripheral hospitals treat directly based on other clinical and investigation findings without fine needle aspiration. Thus most tuberculous cases are treated by them but sent for aspiration only if treatment fails.

In this study non Hodgkins lymphoma was the commonest malignant lesion observed 76.9% followed by Hodgkin lymphoma (15.4%), which is consistent with finding of other workers (Table 2) [7-9]. However, while no case of metastatic leukemic infiltrate was recorded in our centre during the period of study, other workers reported leukemic infiltrate [9-11]. This could be attributed to the fact that in our centre, leukemic patients are diagnosed by hematologists using bone marrow aspirate, and are thus usually referred to them for management even with lymphadenopathy. One case of rhabdomyosarcoma was diagnosed on cytology and confirmed histologically.

This study demonstrated an overall specificity of 100% and sensitivity of 100% for diagnosis of malignant lesions by FNAC. This is consistent with study documented by Atanda et al [12] who demonstrated 100% sensitivity though specificity was 95.7%.

In this study no benign lesion was misdiagnosed as malignant and vice versa thus making FNAC a very fast cheap and reliable tool for diagnosis of malignant lesions. This is consistent with findings by other researchers [12,13]. Thus buttressing the fact that FNAC is very reliable, fast and cheap tool for diagnosis of malignancies and other benign lesions. Factors which could improve sensitivity, specificity and accuracy of FNAC includes the experience of the cytopathologist, availability of adequate clinical information including other investigation findings. For difficult cases, samples from FNAC can be used for further studies e.g immunohistochemistry.

Cervical group of lymph nodes showed a higher incidence of tuberculosis in children followed by axillary group (Table 3) consistent with findings of other workers [10,11].

Localized lymphadenopathy constituted highest distribution with 92.9% and only 7.1% for generalized (Figure 1). This is also consistent with most findings [9-11]. Generalized lymphadenopathy in all reports and in this study was due to lymphomas [5,8-11,14].

Ages range 10-14 years had the highest number of cases (46.4%) while age range 0 – 4 years had the least number of cases (8.9%) (Table 4). This is also consistent with most findings by other workers [14-16]. This might be due to the fact that most cases of lymphadenopathy at the earlier age range 0-4 years are usually due to self limiting viruses and resolve at home without hospital visitation. Males were found to be more than females as reported by Atanda et al. [12].

Figure 2 is a cytology smear of cervical node in a seven year old boy showing background of lymphocytes with small round blue cells exhibiting occasional spindling and large nucleated blasts (rhabdomyoblasts).

Conclusion

It is very obvious that fine needle aspiration cytology is a veritable tool in diagnosis of paediatric head and neck lesions in our setting. It has helped to avoid unnecessary excision biopsies, and its attendant complications especially in benign inflammatory condition. It is used to distinguish between benign and malignant lesions so directing appropriate treatment options. It is cheap, quick and devoid of serious side effects. More cytopathologists should be trained in low resource settings so as to meet up with the demand of our increasing population. It is our hope that health care professionals should be aware of the importance of this investigatory procedure and refer patients for it appropriately especially in our low resource setting.

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Figure 1.
Anatomic distribution of lymph node sites.

Figure 2.

Cytology smear of cervical node showing large atypical cell with large eccentric nuclei and abundant eosinophilic cytoplasm exhibiting spindling i.e Rhabdomyoblast (white arrow) in a lymphocytic background. Diagnosed as rhabdomyosarcoma. Stain H&E; Magnification $\times$ 40.

Table 1

Cytological examinations.

SL. No	Disease	Total No	Percentage (%)
1.	Inflammatory	43	(76.8%)
	Reactive hyperplasia	31	72.1%
	Acute Suppurative	8	18.6%
	Tuberculosis	4	9.3%
2.	Malignant	13	(23.2%)
	Non- Hodgkin lymphoma	10	76.9
	Hodgkin lymphoma	2	15.4
	Rhabdomyosarcoma	1	7.7
	Metastatic Tumor	-	0.0
		56	

Table 2

Cytohistological correlation.

SL. No	Disease/ Number	Number of Cases Diagnosed on Cytology	Number of Cases Confirmed by Histology	Concordance (%)
1.	Inflammatory (12)			
	Reactive hyperplasia	5	5	100
	Acute Suppurative	4	3	75
	Tuberculosis	3	3	100
2.	Malignant (13)			
	Non-Hodgkin lymphoma	10	10	100
	Hodgkin lymphoma	2	2	100
	Rhabdomyosarcoma	1	1	100

Table 3

Lymph nodes biopsied.

Site	Frequency
Cervical	53
Axillary	2
Inguinal	1
Total	56

Table 4

Age distribution.

Age (years)	Frequency (%)
0-4	5 (8.9%)
5-9	16 (28.6%)
10-14	26 (46.4%)
15-18	9 (16.1%)