Original Article

Cytological evaluation of Lymphnode aspirates

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Abstract

Introduction: Lymph nodes have been early targets for aspiration, yielding diagnostic smears in a variety of inflammatory and neoplastic disorders. For diagnosis of unexplained lymphadenopathy Fine Needle Aspiration Cytology (FNAC) is rapidly gaining popularity. In India the technique was first introduced at PGI, Chandigarh in the early seventies followed by AIIMS, Delhi in mid seventies. FNAC is an essential component of pathologist's diagnostic procedure because it is easy to perform, speedy diagnosis, minimaly invasive, suitable in debilitated patients and has low cost and lowrisk of complications. **Aims and objectives:** To evaluate the usefulness of FNAC in diagnosis of lymph node lesions using Papanicolaou (PAP) and May Grunwald Giemsa (MGG) stains, to find out the comparative incidence of various lymph node lesions and to compare the result of FNAC with those of histopathology section which in our study was available for 50 cases. **Materials and methods:** The present study consisted of lymph node aspirates of 200 cases. FNAC was performed using disposable 22-gauge needle, 10ml syringe, franzen handle. Smears were stained with May GrunwaldGiemsa (MGG) and Papanicolaoustain(PAP). Biopsy was available in 50 cases for cytohistological correlation. The biopsy was received in 10% formalin. It was made to undergo routine histological processing and slides were stainded with Hematoxylin and Eosin (H and E). **Results:** The maximum number of cases (24%) were in first decade followed by second decade (21.5%), 3rd decade (16%), 4th decade (11%), above 60 years of age (10%), 5th decade (9%) and 6th decade (8.5%). The youngest patient was 1 year male child and the oldest was a 73 years old female. There were 114 males and 86 females with a male to female ratio 1.3:1. In order of frequency, the nodal sites sampled were most frequent cervical (77%) followed by axillary (8%), inguinal (4%), submandibular (4%), supraclavicular (3%) and post auricular (2%). There were 3 cases from pre auricular and 1 case from mesenteric lymph node. The lesions were categorised as non-neoplastic lymphadenopathy (150 cases, 75%), primary malignancy (18 cases, 9%), metastatic malignancy (26 cases, 13%) and inadequate or non-conclusive smears (6 cases, 3%). Out of 150 (75%) benign cases, maximum number of cases were of reactive lymphadenitis (70 cases, 35%), followed by tubercular lymphadenitis (64 cases, 32%)and acute inflammatory lymphadenitis (16 cases, 8%). Neoplastic lesions (50cases, 25%) of lymph node were classified as primary malignancy (18 cases, 9%) and metastatic malignancy (26 cases, 13%). 18 cases (9%) of primary malignancy were reported as lymphomatous including 14 NHL (7%) and 4 HL (2%).Histopathology was available in 50 cases. Out of 26 cases (13%) of metastatic malignancy, on aspiration, diagnosis of squamous cell carcinomatous deposits was given in 19 cases 9.5%), adenocarcinomatous deposits in 6 cases (3%) and metastasis of malignant melanoma in 1 case (0.5%). Out of 35 cases diagnosed as benign by cytology, one turned out to malignant (Hodgkin's lymphoma) on histopathology, giving an accuracy of 98% in diagnosing non-neoplastic lesions of lymph nodes Out of 20 cases diagnosed as reactive on cytological examination, 2 turned out to be tubercular on histopathology, giving an accuracy of 98% in diagnosing reactive lesions of lymph nodes. Overall evaluation of FNAC in diagnosing lymphadenopathy was sensitivity92.8%, specificity 100%, positive predictive value 100%, negative predictive value 97.2% and overall accuracy 98.0%.

Keywords: Lymph node, FNAC, MGG, PAP, H and E.

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Lymph nodes are collections of lymphoid tissue present along the course of lymphatic vessels. Lymphadenopathy, which is defined as an abnormality in the size or character of lymph nodes, caused by invasion or propagation of either inflammatory or neoplastic cells into the nodes. Various lesions of lymph nodes which are diagnosed by FNAC include -non-neoplastic lesions (reactive lymphadenopathy, granulomatous lymphadenitis like tuberculosis, sarcoidosis), neoplastic Lesions (Lymphoma

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– Non Hodgkin's Lymphoma and Hodgkin's Lymphoma, metastatic deposits) and other rare lesions like sinus histiocytosis, silicone adenopathy, dermatopathic lymphadenopathy, benign epithelial inclusions, toxoplasmosis.[3]Reactive lymphoid hyperplasia is probably the most common diagnosis made and includes many types of lymphadenitis and lymphadenopathy in which the characteristic factors are not expressed well enough to allow a specific diagnosis. [4]The use of FNAC which is a minimally invasive and safe procedure may eliminate the need for open surgical procedures for the sake of diagnosis alone, particularly in high risk patients who are not good candidate for surgery.[5] Moreover, pre operative fine needle aspiration cytology does not adversely affect subsequent histological examination of lymph node.[6]FNAC is safe, quick OPD procedure which is highly sensitive and specific for the diagnosis of malignancy, requires simple and few equipments, with minimal inconvenience to patients, cost effective, obviates (in many cases) the need for frozen sections, reduces the incidence of exploratory laparotomy and thoracotomy.[7]FNAC is especially suitable for easily accessible tumours of head and neck. It is technically easy and rapid and has no complications. The fine needle makes local anaesthesia superfluous, none of the patients complain of pain and there is no after bleeding.[8]

MATERIALS AND METHODS

The present study consisted of lymph node aspirates of 200 cases received in Department of Pathology, Govt. Medical College Patiala. The final diagnosis and clinical data was recorded and correlated with special reference to age, site of lesion, chief complaints, clinical investigations and metastasis if any. Lymph nodes included were those of neck region (cervical, supraclavicular, postauricular, preauricular, submandibular), axilla, groin and abdominal cavity. For performing FNAC the material used was disposable 22-gauge needle, 10ml syringe,franzenhandle, clean, grease free glass slides and spirit as skin disinfectant. Smears were air dried, fixed in methanol and stained with May GrunwaldGiemsa (MGG) and one slide was immediately fixed in 95% alcohol and stained with Papanicolaou (PAP). Out of these 200 cases, biopsy was avialbale in 50 cases. The specimen received for histopathology was subjected to routine gross examination, paraffin sections were prepared and stained with H and E. The results were compared with those of cytology.

RESULTS

Table 1: Showing age and sex wise distribution of lesions of lymph nodes

Age (in Yrs)	Male	Female	Total	Percentage
0-10	37	11	48	24.0%
11-20	17	26	43	21.5%
21-30	14	18	32	16.0%
31-40	14	8	22	11.0%
41-50	9	9	18	9.0%
51-60	7	10	17	8.5%
> 60 yrs	4	16	20	10.0%
Total	**114**	**86**	**200**	**100%**

Table 2: Showing sites of aspirated lymph nodes

Site	No. of cases	Percentage
Cervical	154	77.0%
Preauricular	3	1.5%
Submandibular	8	4.0%
Post auricular	4	2.0%
Axillary	16	8.0%
Mesenteric	1	0.5%
Inguinal	8	4.0%
Supraclavicular	6	3.0%
Total	**200**	**100%**

Table 3: Showing results of 200 cases of FNAC

Category	No. of cases	%age
Non-neoplastic	150	75%
Primary malignancy	18	09%
Metastatic	26	13%
Inadequate	06	03%

Table 4: Showing cytological and histopathological Correlation (in 50 cases)

Cytological Diagnosis	No. of cases	Histopathological diagnosis	
		Non Neoplastic	Malignant
Non-neoplastic	37	36	1
Primary malignancy	10	0	10
Metastatic	3	0	3
Total	**50**	**36**	**14**

Table 5: Showing cytological and histopathological Correlation (in 50 cases) with different causes

Cytological Diagnosis	No. of cases	Histopathological diagnosis					
		Reactive	Tuberculosis	Inflammatory	Hodgkin's Disease	Non Hodgkin'sLymphoma	Metastasis
Reactive	20	17	2	-	1	-	-
Tubercular	11	-	11	-	-	-	-
Inflammatory	6	-	-	6	-	-	-

Positive	Negative
True Positive = 13	True Negative = 36
False Positive = 0	False negative = 1

Table 6: Showing split up of 150 non-neoplastic lesions

Cytological Diagnosis	No. of cases	%age
Reactive	70	35%
Tubercular	64	32%
Inflammatory	16	08%
Total	**150**	**75%**

Table 7: Showing split up of 18 cases of Primary malignancy

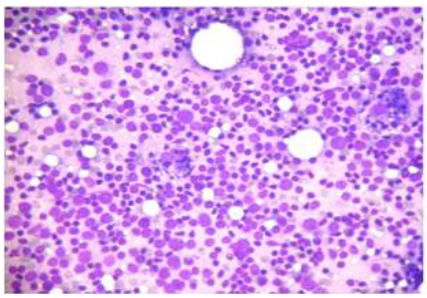
Cytological diagnosis	No. of cases	%age
Hodgkin's lymphoma	4	2%
Non-Hodgkin's lymphoma	14	7%

Table 8: Showing split up of 26 cases of Malignancy

Cytological Diagnosis	No. of cases	%age
Squamous cell carcinoma secondaries	19	9.5%
Adenocarcinomatoussecondaries	6	3.0%
Malignant melanoma	1	0.5%

Table 9: Showing evaluation of FNAC in individual lesions

Parameter	Lesions					
	Reactive	TB	Inflammation	Hodgkin's Disease	Non Hodkin's Lymphoma	Metastasis
Sensitivity (%)	100	84.6	100	75	100	100
Specificity (%)	96.9	100	100	100	100	100
Positive Predictive value (%)	94.4	100	100	100	100	100
Negative Predictive value (%)	100	94.8	100	97.8	100	100
Overall accuracy (%)	98	96	100	98	100	100



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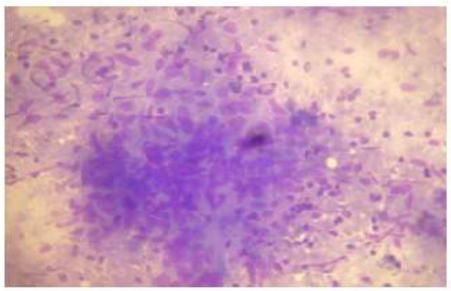

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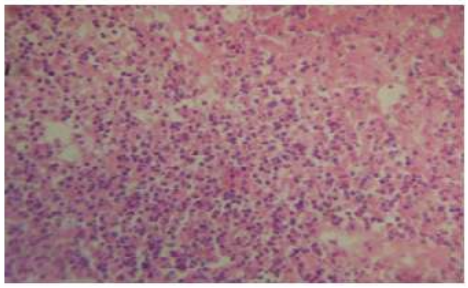

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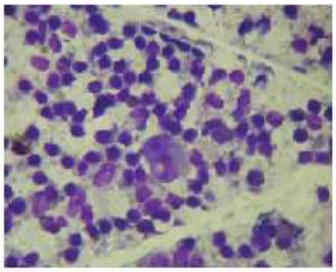

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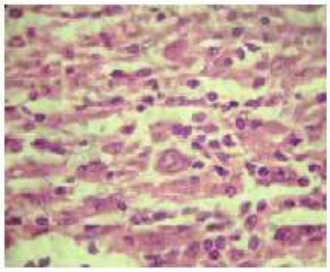

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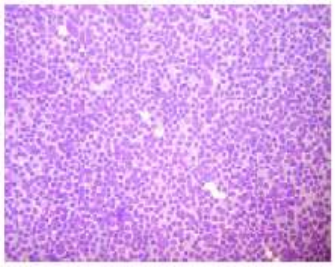

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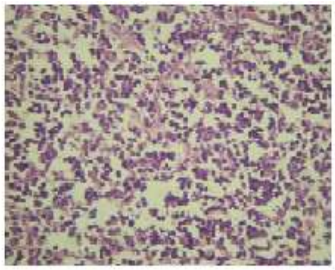

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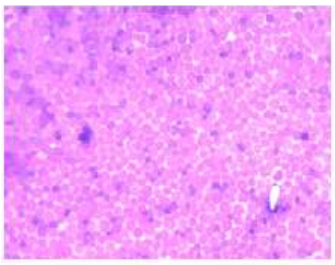
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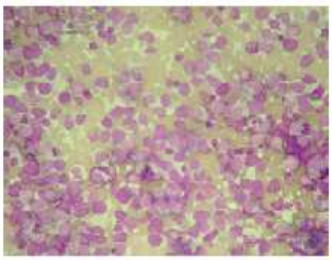
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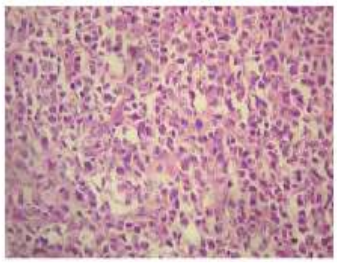
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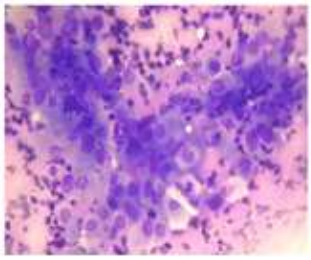
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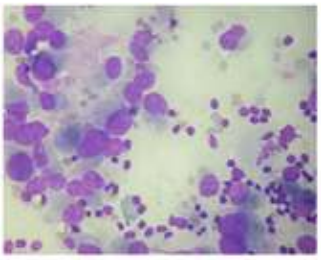
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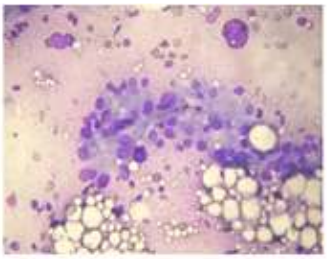
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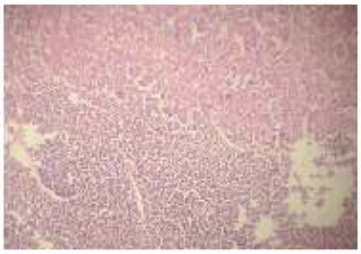
Figure 10b:

Legend

Figure 1: Microphotograph of reactive lymphadenitis showing mixed population of lymphoid cells. Cytology (MGG x 400)
Figure 2: Microphotograph of tubercular epithelioid cell granuloma in the background of caseous necrosis. Cytology (MGG x 400)
Figure 3: Microphotograph of acute inflammatory lymphadenitis. Histopathology (HandE x 400)
Figure4a: Microphotograph of Hodgkin's lymphoma showing RS cell cytology (MGG x 1000)
Figure 4b: Microphotograph of Hodgkin's lymphoma. Histopathology (HandE x 1000)
Figure 5a: Microphotograph of small cell lymphocytic lymphoma showing monotonous population of small lymphoid cells cytology (MGG x 400)
Figure 5b: Microphotograph of small cell lymphocytic lymphoma. Histopathology (HandE x 400)
Figure 6a: Microphotograph of intermediate cell (centroblastic/ centrocytic) lymphoma. Cytology (MGG x 400)
Figure 6b: Microphotograph of intermediate cell (centroblastic/centrocytic) lymphoma. Histopathology (HandE x 400)
Figure 7a: Microphotograph of large cell lymphoma. Cytology (MGG x 400)
Figure 7b: Microphotograph of large cell lymphoma. Histopathology (HandE x 400)
Figure 8: Microphotograph of malignant squamous cells (secondaries in a lymphnode). Cytology (MGG x 400)
Figure 9: Microphotograph of secondaries of malignant melanoma in lymphnode. Cytology (MGG x 400)
Figure 10a: Microphotograph of secondaries of adenocarcinoma in a lymphnode. Cytology (MGG x 400)
Figure 10b: Microphotograph of secondaries of adenocarcinoma in a lymphnode. Histopathology (HandE x 400)

DISCUSSION

The present study was carried on 200 cases of lymphadenopathy referred to the Department of Pathology, Government Medical College and Hospital. Histopathilogical examination was available in 50 cases. Out of total of 200 aspirates from lymph nodes 114 were of males (57%) and 86 of females (43%) with a male to female ratio of 1.3:1 revealing slight male preponderance. The studies conducted by Patra *et al* (1983) [9] reported a ratio of 3:1 and Sarda *et al* (1990)[10] had a ratio of 1.3:1. So the preponderance of males over females in the lesions of lymph nodes in current study was almost in accordance with the previous studies. Various authors categorized the cytopathologic interpretation differently. Patra *et al*[9] categorized them into non-neoplastic (non-specific/ reactive lymphadenitis, tubercular lymphadenitis and pyogenic/ acute inflammatory lymphadenitis), primary malignancy, metastatic and inadequate aspirates. Pilotti *et al* (1993)[11] classified them into benign (non-neoplastic), suspicious (open biopsy recommended), malignant and inadequate. In the present study, of total of 200 cases, 150 (75%) aspirates were classified as benign, 44 cases (22%) as malignant and 6 cases (3%) were inadequate. In the present study 150 cases (75%) were placed in benign category with histopathology available in 35 cases (17.5%) as compared toPilloti *et al*[11] who reported 21% as benign. 34 cases proved to be benign and 1 case proved to be malignant (false negative 1), thereby making the accuracy in diagnosing benign lesions to be 98% as compared to study by Pilloti *et al* [11] where accuracy was 86.9%. In the present study, 44 cases (22%) were diagnosed cytologically as malignant, out of which histopathology was available in 13 cases and all the 13 cases proved to be malignant and there was one false negative diagnosis providing 98% accuracyas compared

to a study by Pilloti *et al*[11] where accuracy was 82.8% and as malignant cases were 62.8%. In the present study there were 6 inadequate smears (3%). Pilloti *et al*[11] categorized 27 smears (9.4%) as inadequate. Present study had 70 cases (35%) of reactive lymphadenitis diagnosed on cytology which are corroborated by similar studies done by Patra *et al* (38.9%)[9], Bottles *et al*(1988)(50%)[12]andStani *et al* (1987)(23.5%)[13]. Histopathology was available in 20 cases, out of which 17 cases were diagnosed as reactive, 2 cases as tubercular and 1 case as Hodgkin's disease giving accuracy of 98%. This might be due to wrong interpretation of smears or more likely the needle could not reach the exact site of lesion. There were 64 cases (32%) of tubercular lymphadenitis in the present study with histopathology available in 11 cases, which is in concordance with Bal *et al* (2002)(23%)[14],Shobana *et al* (2002) (41%)[15]and Patra *et al* (30%)[9]. On histopathology 13 cases were diagnosed as tubercular lesions. So accuracy in diagnosing tuberculous lymphadenitis was 96% as compared to Patra *et al* [9]wheraccuracy dropped to 87.1%. In the present study, 16 cases (8%) of acute inflammatory lymphadenitis were diagnosed on cytology as compared to 5.3% by Patra *et al*.[9]Histopathology was available in 6 cases and confirmed the diagnosis, accuracy being 100% which is similar to the study conducted by Patra *et al*[9]. In the present study, there were 18 cases (9%) of lymphoma diagnosed cytologically which are compareable to studies by Patra *et al*[9](7.07%), Khan *et al* (1996)(5.2%)[16]andHsu *et al* (1990) (49.3%)[17].Histopathology was available in 10 cases. On histopathology 11 cases were diagnosed as lymphoma. 1 case of HL missed on cytology and diagnosed as reactive, accuracy being 98%. Mixed population of lymphoid cells and plasma cells was the cause of wrong interpretation of Hodgkin's disease as reactive lymphadenitis on cytology 26 cases (13%) of metastatic malignancy were diagnosed cytologically which is in corcordance with studies byPatra *et al* [9] (9.7%), Khan *et al* (9.2%)[16] and Dash *et al* (1996) (7.8%)[18]Histopathology was available in 3 cases which confirmed the diagnosis, cytohistologic correlation was 100%, accuracy being 100% which was similar to Patra *et al* [9](100%), Kline *et al*(1984) (95%)[19], Steel *et al* (1995) (96%)[20] and Gupta *et al* (1975) (94.5%)[21]. Out of a total of 200 cases, 150 cases were diagnosed as benign, 44 cases as malignant and 6 as inadequate smears on comparing with histopathology (wherever available), 1 case was found to be false negative. The overall sensitivity, specificity, positive predictive value, negative predictive value and accuracy was 92.8%, 100%, 100%, 97.2% and 98.0% respectively. The sensitivity in the present study was 92.8% which was comparable to the studies conducted by Frable *et al* (1974)[22]and Russ *et al* (1983) [23](93.5% and 97.8% resp.). The specificity in the present study was 100% which was comparable to the studies conducted by Frable *et al*[22] and Patra[9] (100% each). The positive predictive value of 100% in the present study was comparable to studies by Frable *et al* [22] and Patra *et al* [9] (100% each). The negative predictive value was 97.2% in the present study and was comparable to studies by Russ *et al* [23]and Patra *et al*[9] (93.3%, 95.2% respectively). The accuracy in the present study was 98%. It is comparable to the studies by Frable *et al* [22],Patra *et al* [9]and Yadav *et al* (1991)[24](96.2%, 96.1%, 89.8%) respectively. In the present study there was 1 false negative case (2%), which was due to misinterpretation of 1 case of Hodgkin's lymphoma as reactive as compared to Patra *et al* [9], false negative rate was 3.5% and in a study by Pilloti *et al* [11] it was 5.6%.

CONCLUSION

From the present and previous studies it is concluded that FNAC is a safe investigation procedure in all age groups and is highly suitable in debilitated patients who are poor risk group for surgery. It helps in arriving at a final diagnosis in various lesions without significant complications. It is readily repeatable and useful for multiple lesions. It obtains a pathologic diagnosis of a suspicious mass to guide further diagnostic evaluation and treatment. Further, pre-surgical FNAC can provide material for special studies, including hormone receptors, electron microscopy, gene rearrangement and ploidy studies by flow cytometery or image analysis. Thus, FNAC bridges the gap between clinical evaluation and final pathological diagnosis in majority of the cases.

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