

**Significance of Ultrasound Guided FNAC of Mass Lesions for Rapid Diagnosis**Naseema Sultana<sup>1</sup>, Jagadeeswari S<sup>2</sup>, Satish Kumar S<sup>3</sup>, Chandralekha J<sup>4</sup>, Vijaya Bharathi I<sup>5</sup><sup>1,2,3,4,5</sup>Department of Pathology, Government Medical College, Srikakulam, Andhra Pradesh, India

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Conflict of interest: Nil

**Abstract:****Introduction:** Ultrasound guided FNAC is a safe, simple, cost-effective procedure for the lesions which are deep seated, small swellings and the lesions which yield less material on routine FNAC.**Aim:** To assess the utility of USG guided FNAC in rapid diagnosis of mass lesions.**Materials and Methods:** It was a prospective study done over a period of 17 months. 75 USG guided FNAC were done in deep seated, small and unapproachable lesions. The smears were processed and evaluated for the cytological diagnosis.**Results:** Total of 75 samples were collected using ultrasound guided FNAC. The most common site was Lymph node (26.6%) followed by thyroid (22.6%) and breast (21.3%). Most of the cases were Inflammatory and Benign (32%) followed by malignant (25%) either primary or metastatic, inconclusive (8%) and suspicious of malignancy (2.6%). Cytohistological correlation was made for few cases.**Conclusion:** FNAC combined with Ultrasound can improve the diagnostic yield and is very safe and minimally invasive procedure. It can be used as a pre-operative diagnostic procedure.**Keywords:** Benign, Malignant, FNAC.This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

Fine needle aspiration cytology (FNAC) is a primary modality for evaluation of all palpable lumps. It is a relatively painless, fast, safe minimally invasive, cost effective.[1] This application is limited in case of deep seated, smaller sized lesions and while performing routine FNAC chances of missing the malignant foci and the sample withdrawn may not be adequate for diagnosis.[2]

To overcome these limitations image guided FNAC was introduced, Ultrasound guided FNAC can be used as one of the imaging techniques because it is radiation free, non-invasive and can be easily repeated.

The main advantage of USG guided FNAC is the real time visualization of the needle localization in the lesion.[3] Image guidance permits planning and implementation of FNAC approach that minimizes the injury to adjacent organs and vessels preventing bleeding and Pneumothorax like complications.[4] It also helps in targeting the lesions containing viable tissue and avoiding the areas of necrosis in the aspiration.

**Materials and Methods:**

**Study Design:** This is a hospital-based prospective study of ultrasound guided FNAC for non-palpable or deep seated, small lesions, lesions with less yield on routine FNAC and lesions with variable consistency.

The study was carried out in cytology section of pathology department along with the help of the radiology department in Government medical college, Srikakulam for a period of 17 months from June 2022 to December 2023.

**Study Subjects:** A total of 75 aspirations were made under ultrasound guidance, which included various compartments and organs including head and neck, abdomen and retroperitoneum region, lymph nodes, thyroid, breast, liver, lung duodenum, pancreas, psoas muscle, inguinal region were made.

After taking informed consent from the patient, the patients were radiologically evaluated. Then the radiologist determine the anatomical location and mark the puncture site, the depth of lesion is noted and 22-23 gauge disposable needle with attached 5cc or 10cc syringe taken and for very deep seated lesions 26 gauge Lumbar puncture needle is used for aspiration.

Under the USG guidance and aseptic precautions aspiration is done with to and fro movements and negative pressure was applied. At least 2-3 passes were done to get adequate material.

Then the material was expressed in labelled glass slide and smears were made by opposition technique. The slides were fixed in 95% alcohol for 15-20 minutes and then stained.

The most common stain used was Haematoxylin and Eosin. The processed slides are examined under microscope by the Pathologist. The FNAC diagnosis was correlated with clinical and radiological findings.

The lesions were divided into the following categories: inconclusive, inflammatory, benign, suspicious of malignancy, and malignancy.

Statistical analysis done by the Microsoft excels sheets and data was expressed in percentages.

**Inclusion criteria:** Patients with deep seated or non-palpable swellings, small and swellings which yield less material on routine FNAC.

**Exclusion Criteria:** Non willing patients, known cancer patients, bleeding tendency defined by INR > 1.7, other coagulopathies.

### Results

Out of 75 ultrasound guided FNAC males were 22(29.3%) and females were 53(70.6%). The younger patient was 13 years old and the older patient was 87 years old.

Maximum number of cases was seen in age group of 41-50 years i.e 22 cases (29.3%). (Table 1)

**Table 1: Age & sex wise distribution**

Age	Male	Female
11-20	2	3
21-30	4	8
31-40	1	13
<b>41-50</b>	9	13
51-60	3	10
61-70	2	3
>70	1	3
<b>Total</b>	<b>22</b>	<b>53</b>

In the present study out of 75 cases, most common site of aspiration were lymph nodes -20cases(26.6%) followed by Thyroid-17 cases (22.6%) and Breast-16 cases (21.3%). It also included deep seated organs such as ovary (2.66%), lung, pancreas, liver (1.33%). (Table 2).

**Table 2: Site wise distribution**

Site of FNAC	No of cases	Percentage (%)
Lymph Node	20	26.6
Thyroid	17	22.6
Breast	16	21.3
Salivary gland	4	5.33
Duodenum	2	2.66
Ovary	2	2.66
Thigh	2	2.66
Abdominal swelling	2	2.66
Psoas muscle	2	2.66
Chest wall mass	1	1.33
Lung	1	1.33
pancreas	1	1.33
Liver	1	1.33
Testis	1	1.33
Gluteal region	1	1.33
Parietal wall swelling	1	1.33
Right iliac mass	1	1.33
<b>Total</b>	<b>75</b>	<b>100</b>

Majority of lesions were inflammatory (32%) and benign (32%) followed by malignant (25%) which includes primary and metastatic deposits. Inconclusive were 8% and suspicious of malignancy were 2.6%. (Table 3)

**Table 3: Cytological diagnosis**

Cytological diagnosis	No of cases (Total 75)	% of cases
Benign	24	32
Malignant	19	25
Inflammatory	24	32
Inconclusive	6	8
Suspicious of Malignancy	2	2.6
Total	75	100

In the present study, the spectrum of cytological lesions in the aspirated lesions are as follows (Table 4): Out of the 20 Lymph node aspirated included cervical, axillary and inguinal region -5 cases (25%) were carcinomatous deposits, 3 were ductal cell carcinoma deposits of breast (fig 1), 1 was papillary carcinoma thyroid deposits in cervical node and one was squamous cell deposits in the inguinal node in case of prostate cancer.

In the present study, out of 17 thyroid aspirations 4 cases (23.5%) were malignant papillary carcinoma (fig 2), 11 cases (64%) were benign entities including colloid goitre, Nodular goitre, Adenomatous and multinodular goitre. Inconclusive were 2cases (11.7%). In the present study out of 16 breast lesions aspirated, benign were 8 (50%) including fibroadenoma and benign cystic disease. 5 cases (31%) were of duct cell carcinoma (fig 3), 2 cases (12.5%) were inflammatory lesions including abscess and fat

necrosis and one case was suspicious of malignancy fibroadenosis with atypical ductal hyperplasia. In the present study out of 4 cases of salivary gland aspirations 50% were inflammatory and 50% were inconclusive. Duodenum aspirations included one cystic and one stromal tumour (fig 4). Aspirations from ovary included one benign cystic lesion and one was inconclusive. Aspirations done from thigh, out of 2 cases both were malignant which included malignant mesenchymal lesion and other lymphoproliferative.

Abdominal wall aspirations include one benign lipoma and one abscess. Psoas muscle aspiration case was diagnosed as inflammatory Tuberculosis. One chest wall swelling in a 13 year old boy came out to be Ewings sarcoma (fig 5). One of the lung mass aspirated was metastatic deposit (fig 6) and another aspiration from the pancreas was cystic lesion. (fig 7)

**Table 4: Spectrum of cytological lesions**

Site	n	Benign	Malignant	Inflammatory	Suspicious Malignancy	Inconclusive
Lymph Node	20		Carcinomatous deposits-5	Nonspecific lymphadenitis-7 TB-5 Reactive-1 Necrotizing lymphadenitis-1		1
Thyroid	17	Colloid goitre-4 Nodular goitre-3 Adenomatous goitre-3 MNG-2	Papillary carcinoma Thyroid-4			2
Breast	16	Fibroadenoma-4 Benign cystic -4	Duct cell carcinoma-4	Abscess-1 Fat necrosis-1	Fibro adeno- sis With ADH-1	
Salivary gland	4			Sialadenitis-2		2
Duodenum	2	Cystic lesion-1	Stromal tumour-1			
Ovary	2	Cystic lesion -1				1
Thigh	2		Malignant mesenchymal tumour-1 Lympho proliferative-1			
Abdominal swelling	2	Lipoma-1		Abscess-1		
Psoas muscle	2			(2) TB-1, Abscess-1		
Chest wall mass	1		Ewings sarcoma-1			

Lung	1		Metastasis-1			
pancreas	1	Cystic lesion				
Liver	1			Abscess-1		
Testis	1		Germ cell tumour-1			
Gluteal region	1			Fat necrosis-1		
Parietal wall swelling	1			Abscess-1		
Right iliac mass	1			Abscess-1		

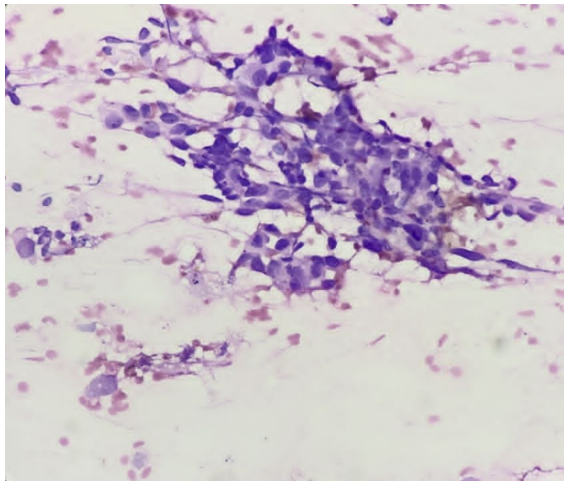


Figure 1: Axillary lymph node metastases of duct cell carcinoma breast (40X, H&E)

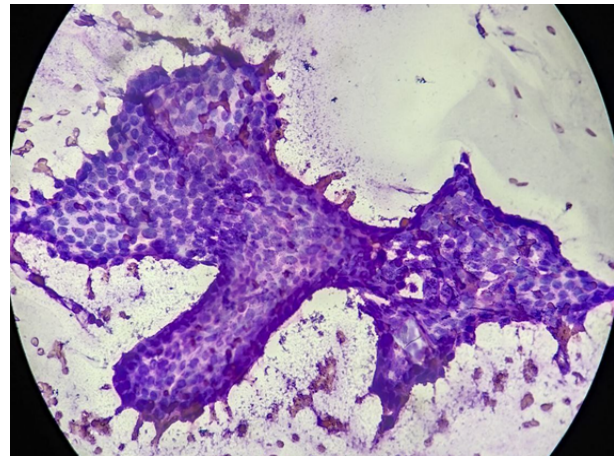


Figure 2: Papillary thyroid carcinoma showing papillary structures with anatomical border (40X, H&E)

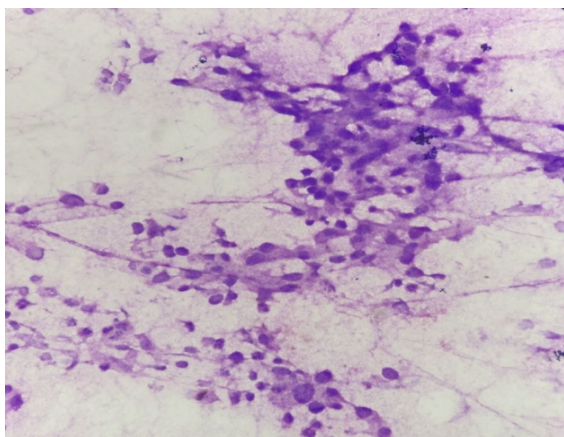


Figure 3: Ductal carcinoma Breast showing – dyscohesive sheets, atypical ductal epithelial cells. (40X, H&E)

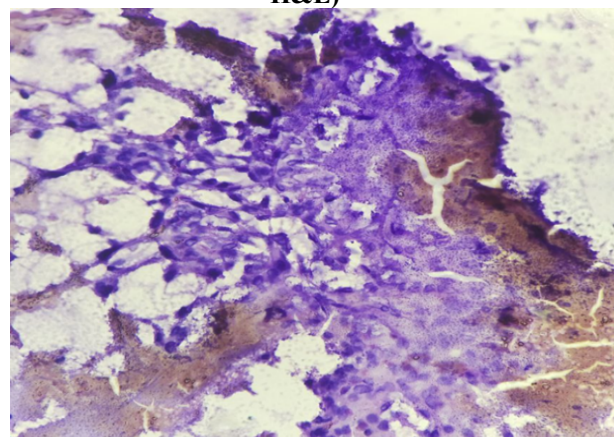
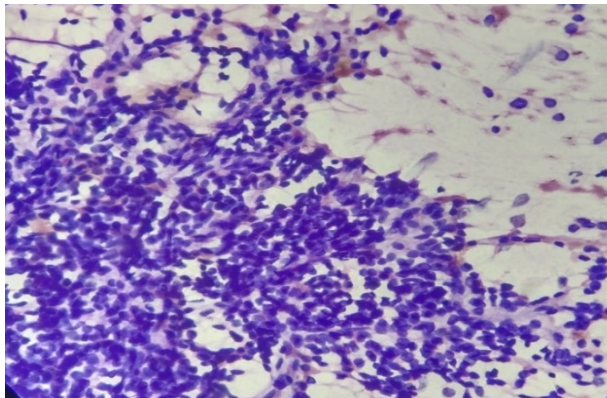
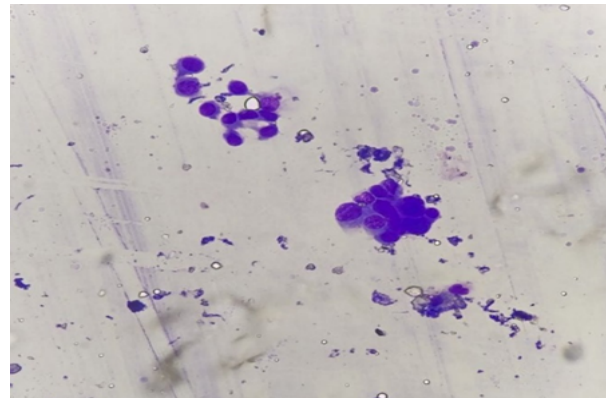


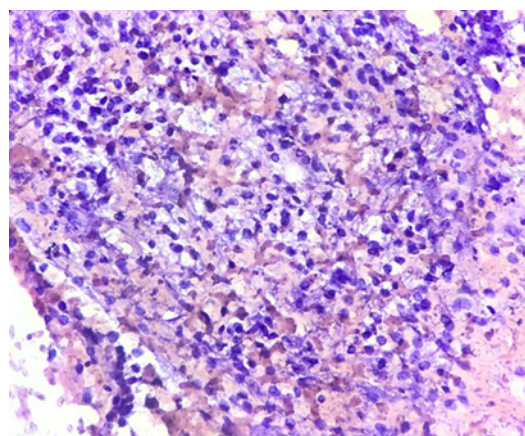
Figure 4: Stromal tumor of duodenum -Microscopy shows Round to oval, spindle cells in sheets with eosinophilic cytoplasm and round to oval nucleus. (40X, H & E)



**Figure 5: Small round cell tumour -Microscopy shows sheets and discretely arranged small round cells with focal rosette formation. (40X, H & E)**



**Figure 6: Photomicrograph of metastatic lung deposits (40X, H&E)**



**Figure 7: Cystic lesion of Pancreas - Microscopy shows tumor cells in clusters and focal acinar patterns against proteinaceous background showing cyst macrophages (40X, H&E)**

### Discussion

FNAC has been one of the important diagnostic tool for the diagnosis of the mass lesion. The major problem facing FNAC is bad quality samples impairing proper diagnosis which leads to repeating the procedure to obtain satisfactory samples and causing inconvenience to the patient leading to delay in reporting and starting treatment. With the addition of the radiological tools such as USG has increased the efficacy of FNAC mostly in the deep seated lesions. It helps to make probable diagnosis before the surgery.

In the initial days, USG guided FNAC applied were limited to intra-abdominal lumps. Nowadays, newer locations are being explored.

In this study there was no major risk except for the mild pain. In the present study female preponderance is seen which is similar in other studies of Khaleel mohson et al[5] Shamshad et al[6] and Sidhalingareddy [7] whereas male preponderance have been observed in studies done by Krishna et al[8] Zawar et al[9] In this study maximum patients were age group of 41-50 years which is similar to the findings of Parveen S.et.al [4], Bajantri SR et al.[1],Pujani M.et al.[2] studies.

In the present study, the adequacy of sample is 92% which is similar to Bajantri SR.et al.[1] Incidence of the malignancy is seen more in > 40 years of age which can match with study of the Faheem. et. al.[10]

Hemalatha et al[3] evaluated USG guided FNAC of abdominal and pelvic masses and reported the diagnostic accuracy as 100%, 96%, and 94.4%, respectively for benign, malignant, and non neoplastic lesions. In the present study, the diagnostic efficacy of USG guided FNAC was found to be 92% which was in concurrence to Bajantri SR [1] study of 85%, and also similar to the findings observed in various studies carried out by Sidhalingareddy et al [7] and Nautiyal et al[11] Adequacy depends on the size, location, vascularity, lesion consistency, type of histological tumor, and presence of necrosis. In comparison to inflammatory and benign lesions, the material aspirated was usually adequate in malignant lesion. This suggested that guided FNAC should be done more routinely in deep seated lesions due to high adequacy rate and very low complication rate.

In the present study, from the FNAC obtained from lymph nodes, majority show inflammatory

changes( 65%, n= 14) which is similar to Bajantri SR et al.[1] and Adhikari et al[12] In breast lesions, FNAC of the present study show 50% are the benign lesion, out of which fibroadenoma is common which is similar to Bajantri SR et al.[1]

In the present study, USG guided thyroid FNAC was performed in 17 cases and yielded a variety of diagnoses ranging from non-neoplastic to neoplastic lesions. Only two cases were inconclusive. Non-guided FNAC was either noncontributory or could not be performed due to small size or deep seated location. It was observed that USG guided FNAC of the thyroid was very helpful in four cases of papillary carcinoma which did not yield diagnostic material on palpation guided FNAC but were subjected to image guided FNAC on account of the radiological suspicion.

In the present study about 13% cases were correlated with histopathological diagnosis. Cytohistological concordance was reached in the five cases where histopathology was available. These cases included 3 cases of papillary carcinoma, and 1 case each of cystic lesion of pancreas and ductal carcinoma of breast. Mass lesions of pancreas, ovary, testes, thigh, psoas, etc were also aspirated. Thus, any deep-seated mass lesion can be aspirated using ultrasound guidance which can then be utilized for cytological diagnosis correlating with clinico-radiological features.

### Conclusion

USG guided FNAC is an outpatient procedure which helps to precisely visualize the swellings. It is simple, cost effective and minimally invasive procedure. It can be used as a pre-operative procedure to distinguish inflammatory, benign and malignant lesions, so that the clinician can plan the mode of treatment. USG guided FNAC reduces the surgical mortality and morbidity as well as hospitalization.

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