

## USG Guided FNAC of Palpable and Non-Palpable Lesions

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### Abstract:

**Background:** Fine needle aspiration cytology (FNAC) has gained tremendous popularity, since it majorly impacts the management of the patients and prevents unnecessary surgical interventions. This study was undertaken to critically analyse the usefulness of USG guided FNAC in the diagnosis of palpable and non-palpable lesions.

**Methods:** This was a prospective study from June 2015-June 2017 on 62 patients who came to the outpatient department or were admitted in a tertiary hospital in western Rajasthan. Out of 62 cases studied, majority of the cases were in the age group of 41-50 years i.e. 5th decade having 21 cases (33.87%), followed by 51-60 years having 12 cases (19.35%). The lesion was categorised into benign, suspicious for malignancy and malignant lesions.

**Results:** The maximum number of aspirates were aspirated from right hypochondrium (16 cases 25.80%) followed by left iliac fossa (12 cases 19.35%), other sites (11 cases 17.74%), right hypogastrium (3 cases 4.83%), right lumbar (4 cases 6.45%) and left hypochondroma (3 cases 4.83%) and least cases were from left umbilical region (1 case 1.61%). Sensitivity calculated was 91.49%, specificity was 100%, PPV was 100% and NPV was 73.33%. The disease prevalence was 81.03% and accuracy was 93.10%.

**Conclusions:** Ultrasonography guided FNAC is a relatively simple, safe, quick, economical and reliable procedure in obtaining a pathologic diagnosis of intra-abdominal masses. It can be considered as a standard technique of pre-operative evaluation, which lets the practitioner to tailor appropriate stitches of management for deep seated lesions.

**Keywords:** Fine needle aspiration cytology (FNAC), Histopathological diagnosis, Palpable Lesions, Non-Palpable lesion

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### Introduction

Fine needle aspiration cytology (FNAC) has gained tremendous popularity, since it majorly impacts

the management of the patients and prevents unnecessary surgical interventions. FNAC has gained

popularity over the years and the procedure is being used frequently for superficial & palpable lesions. The combination of FNAC with image guided technique is important to improvise the diagnosis of lesion that are small sized, non-palpable and deep seated. Also if the lesion is located adjacent to vital organs or neurovascular structures [1-4]. Ultrasound (USG) guided FNAC can be utilized for any palpable or non-palpable mass especially abdominal and pelvic.

FNAC differentiates between a benign and malignant lesion and is applicable to lesions that are easily palpable. New radiological techniques for internal imaging of organs have opened vast opportunities for FNAC of deeper structures.

There is no doubt in what Koss LG<sup>5</sup> said "Thin needle aspiration biopsy is a procedure whose time has come" and that pathologists not already versed in the technique will come under increasing and compelling pressure to provide it.

This study was undertaken to critically analyse the usefulness of USG guided FNAC in the diagnosis of palpable and non-palpable lesions. Aims and objectives of this study: 1. To categorize the lesion into benign, suspicious for malignancy and malignant lesions 2. To correlate FNAC observations with histopathological diagnosis wherever possible.

### Material & Methods

This was a prospective study from June 2015- June 2017 (2 years) on 62 patients who came to the outpatient department or were admitted in a tertiary hospital in western Rajasthan.

**Inclusion criteria:** The patients undergoing USG guided FNAC with clinical and radiological findings. Intra-abdominal organs including the liver, pancreas, stomach, gall bladder,

omentum, mesentery, retroperitoneum, kidneys, lymph nodes, soft tissues and ovary were included in the study, along with few cases of mediastinal organs (lung).

**Exclusion criteria:** Patients with haemorrhagic diathesis, patients with skin infection at the site of aspiration and non-cooperative patients. Parietal swellings arising from the skin and abdominal wall, the uterus, the cervix, the prostate and the bone were excluded.

After taking a written consent, the procedure was performed by a senior radiologist with presence of pathologist in the department of Radiology. Air dried smears were stained with *May Grunwald Giemsa stain (MGG)* and alcohol fixed smears were stained with Pap or H&E.

The smears obtained by the above method were interpreted by a cytopathologist and the results were categorized as inflammatory, benign, malignant and inconclusive. Histopathological correlation was done wherever possible. Histopathology was considered as gold standard and sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) were calculated. Statistical analysis of the same was done and p value <0.5 was considered statistically significant.

### Results

The present study was conducted on 62 patients over a period of 2 years (2015 - 2017), who were undergoing USG guided FNAC. Out of the total 62 cases studied, majority of the patients were in the age group of 41-50 years i.e. 5<sup>th</sup> decade having 21 cases (33.87%), followed by 51-60 years having 12 cases (19.35%). Out of 62 cases, 29 (46.77%) were males and 33 (53.22%) were females.

**Table 1: Age and sex distribution of cases.**

Age (in years)	No. of Patients	Male	Female
0-10	02	01	01
11-20	04	02	02
21-30	04	02	02
31-40	05	02	03
41-50	21	12	09
51-60	12	05	07
61-70	10	03	07
>70	04	02	02
Total	62	29	33

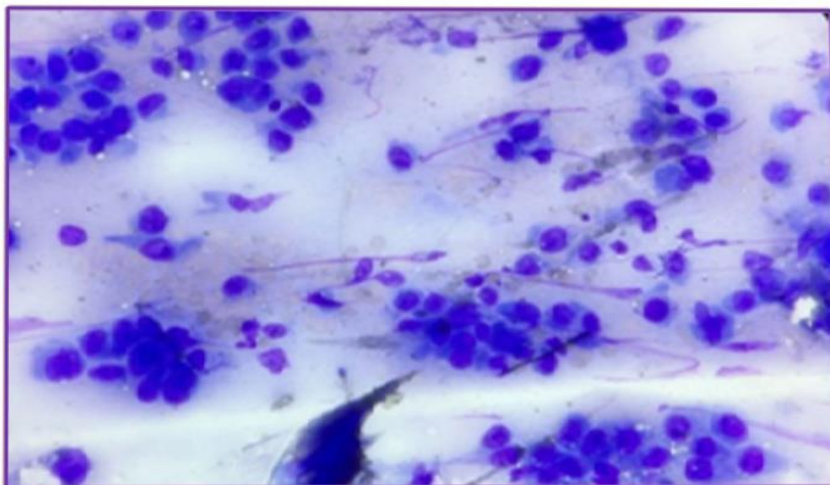
Among 62 cases, maximum number of FNACs were aspirated from right hypochondrium (16 cases 25.80%) followed by left iliac fossa (12cases 19.35%), other sites (11cases 17.74%), right iliac fossa (9 cases 14.51%), epigastrium (4 cases 6.45%) and left hypochondrium (3 cases 4.83%), right lumbar, hypogastrum and umbilical region (2 cases 3.22% each) and least cases were from left lumbar region (1 case 1.61%).

Out of 62 organs / sites aspirated, the maximum number of aspirates were from liver (18 cases 29.03%), intra-abdominal lymph nodes majorly retroperitoneal (16 cases 25.80%), other retro-peritoneal lesions (12 cases 19.35%), ovaries (5 cases 8.06%), kidney (4 cases 6.45%), gall-bladder (3 cases 4.83%) and lung (2 cases 3.22%). Other least commonly aspirated organs were pancreas and stomach, colon (1 case 1.61% each).

**Table 2: FNAC diagnosis with consequent histopathological diagnosis**

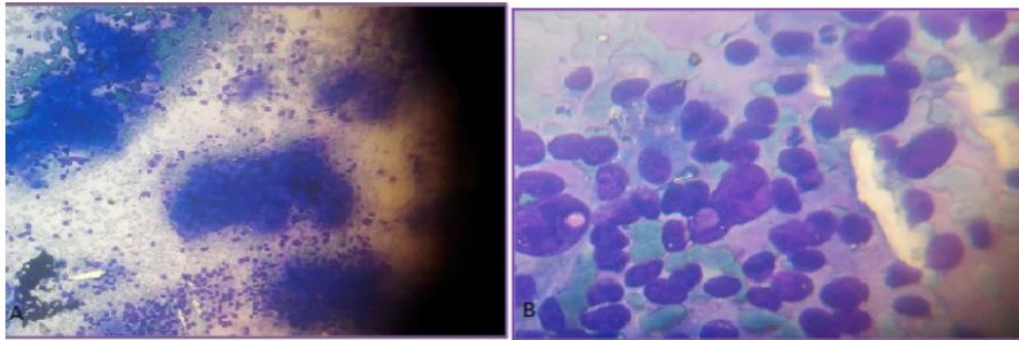
FNAC diagnosis	No. of cases	Histopathological diagnosis	No. of cases
<b>INCONCLUSIVE</b>	<b>1</b>		
<b>INFLAMMATORY</b>	<b>9</b>		<b>9</b>
Reactive hyperplasia lymph node	4	Reactive sinus hyperplasia Chronic non-specific lymphadenitis	2 2
Acute inflammatory pathology	2	Pyogenic abscess	2
Inflammatory pathology	2	Inflammatory pathology Colonic adenocarcinoma	1 1
Tubercular lymphadenitis	1	Tubercular lymphadenitis	1
<b>BENIGN</b>	<b>6</b>		<b>6</b>
Mesenchymal benign lesion	2	Myxoma Benign fibrohistiocytic lesion	1 1
Lipoma	1	Lipoma	1
Nodular hyperplasia	1	Hepatocellular carcinoma	1

Benign cystic lesion	1	Serous cystadenocarcinoma ovary	1
Benign haemorrhagic cystic lesion	1	Serous cystadenocarcinoma ovary	1
<b>MALIGNANT</b>	<b>46</b>		<b>43</b>
Metastatic adenocarcinoma (Figure 1)	12	Metastatic adenocarcinoma	12
Hepatocellular carcinoma (Figure 2 A,B)	5	Hepatocellular carcinoma	5
Metastatic squamous cell carcinoma (SCC)	3	Metastatic SCC	3
Non Hodgkin's lymphoma (NHL) (Figure 3A)	3	NHL	3
Ovarian malignancy	3	Carcinoma ovary (germ cell tumor) Serous cystadenocarcinoma	1 2
Poorly differentiated carcinoma	3	Poorly differentiated carcinoma -	2 -
Malignant round cell tumour	3	Retroperitoneal neuroblastoma Non-small cell carcinoma	1 2
Seminoma testis	2	Seminoma testis	2
Keratinizing SCC	2	Well differentiated SCC	2
Metastatic carcinoma	2	Metastatic adenocarcinoma	2
Renal cell carcinoma (RCC)	2	Clear cell type RCC	2
Wilm's tumour	1	Wilms tumor	1
Malignant melanoma	1	Malignant melanoma	1
Adenocarcinoma	1	Adenocarcinoma of pancreas	1
Hodgkin's lymphoma (Figure 3B)	1	Hodgkins lymphoma	1
Malignant mesothelial neoplasm	1	-	-
Ovarian metastatic malignancy	1	-	-



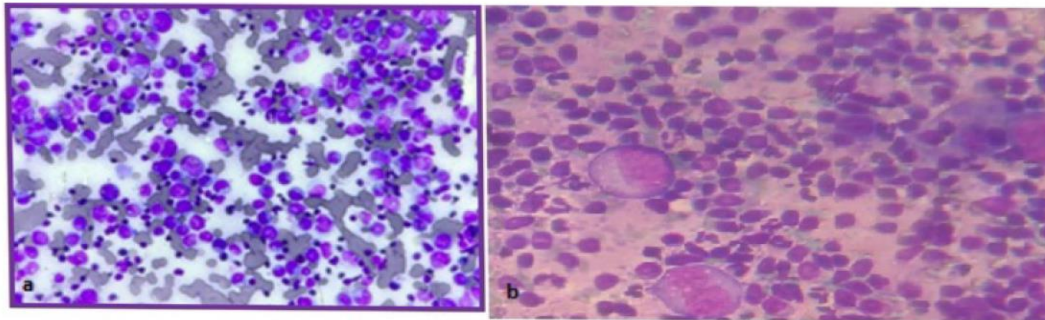
METASTATIC ADENOCARCINOMA LIVER (GIEMSA STAIN, x40) smear shows metastatic clusters of malignant epithelial cells

**Figure 1**



A. HEPATOCELLULAR CARCINOMA (Giemsa, 10X) smear shows thickened trabeculae and acini composed of malignant hepatocytes.  
 B. HEPATOCELLULAR CARCINOMA (Giemsa, 40X) smear showing nucleomegaly nuclear crowding, irregular nuclear membrane with prominent nucleoli in moderately differentiated Hepatocellular carcinoma

**Figure 2**



A. Non Hodgkin lymphoma (Giemsa, 10X) smear showing dispersed medium to large sized cells. Nuclei have coarse chromatin, evident membrane irregularity and small nucleoli.  
 B. Hodgkin lymphoma (Giemsa, 40X) smear shows large mononuclear cells and bilobated nuclei resembling Reed Sternberg cell against the background of reactive lymphocytes

**Figure 3**

On FNAC among the 62 cases, 1 case was inconclusive, 9 cases were inflammatory, 6 cases were benign and 46 cases were malignant. We had histopathology diagnosis for 58/62 cases. Histopathology diagnosis was available for 9 inflammatory cases among which 1 turned to be malignant on histopathology, 6 benign

cases, among which 3 cases were concordant while 3 cases were discordant and were malignant on histopathology. 43/46 malignant cases had histopathological correlation and all 43 cases were concordant with the FNAC diagnosis.

**Table 3: Correlation between FNAC and histopathological diagnosis**

FNAC diagnosis	Histopathological diagnosis		Total
	Malignant	Benign	
<b>Malignant (43)</b>	43 (true positive)	0 (false positive)	43
<b>Inflammatory + Benign (15)</b>	4 (false negative)	11 (true negative)	15

<b>Total</b>	47	11	58
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Sensitivity calculated was 91.49%, specificity was 100%, PPV was 100% and NPV was 73.33%. The disease prevalence was 81.03% and accuracy was 93.10%.

## Discussion

The age incidence in the present study ranged from 2 years to 86 years. The most common age group in which USG guided FNAC was performed were from 41-50 years-21 cases (33.87%) followed by 51-60 years-12 cases (19.35%), similar observations were also seen in Ahmad SS et al [6], and Sidhalingreddy AS et al [7].

In present study out of total 62 patients 29 (46.77%) were males and 33(53.22%) were females. The M:F ratio was found to be 1:1.2 in our study with female predominance and these findings were in concordance with Sobha Rani G et al [8], Ahmad SS et al [6] and Sidhalingreddy AS et al [7]; where as in other studies done by Suri R et al [9] and Krishna SR et al [10] showed male predominance.

In the present study, maximum number of lesions were found to be in right hypochondria (25.80%) followed by left iliac fossa (19.35%) and other sites (17.74%) ; as seen in studies by Nautiyal S et al [11]and Ahmad SS et al [6].

Almost all the cases in right hypochondrium were liver masses and most of them turned to be malignant. Out of the 62 cases studied in this study, 60 were intra-abdominal masses and 2 cases were from lung (mediastinum). Maximum lesions were in liver (29.03%), followed by intra-abdominal lymph nodes majorly retroperitoneal (25.80%) and other retroperitoneal lesions (19.35%). Liver is one of the most favored sites for metastatic disease and because of its superficial location and ease of palpation it is also a favourable site for FNAC for surgeons and pathologists. These findings were comparable to the studies done by Stewart

CJ et al [12], Nautiyal S et al [11] and Sobha Rani G et al [8]

In the present study among 18 cases of liver, majority were metastatic adenocarcinoma (9 cases), followed by Hepatocellular carcinoma (5 cases). In 2 cases we could not differentiated primary Hepatocellular carcinoma from metastatic adenocarcinoma, so these cases were then labelled as poorly differentiated carcinoma. The maximum numbers of cases were in the 5<sup>th</sup> decade with female (12 cases) more than males (4 cases). Hepatocellular carcinoma was found to be the predominant primary lesion with cytological findings of intranuclear inclusions. Well differentiated tumour was the predominant lesion. Benign lesions included 2 cases of pyogenic abscess. Similar observation was made by Nobrega J et al [13], Stewart CJ et al [12], Nautiyal S et al [11], Adhikari RC et al [1]&Sidhalingreddy AS et al [7].

There were 16 lesions aspirated from lymph node in which the most common lesion diagnosed was squamous cell carcinoma (4 cases) with equal distribution in both males and females, metastatic adenocarcinoma (2 case), (3 cases) of Non-Hodgkin's lymphoma, (1 case) of Hodgkin's lymphoma and (1 case) Malignant Melanoma. Benign lesions of lymph node include 4 cases of reactive hyperplasia and 1 case of tubercular pathology.

Other less common lesions found were serous cyst adenocarcinoma of ovary (4 cases, 8.88%) in females of 5<sup>th</sup> decade and germ cell tumour (3 cases, 6.66% each) 2 cases in males of 3<sup>rd</sup> decade lesion was

located in abdominal undescended testis and 1 case in female of 5<sup>th</sup> decade.

Non small cell carcinoma of lung (2 cases, 4.44%) predominantly found in males of 5<sup>th</sup> decade and renal cell carcinoma in kidney (2 cases, 4.44%) with equal distribution in both males and females, (1 case, 2.22%) of Wilms tumour in female child of 2years. 2 retroperitoneal lesions

found as neuroblastoma (round cell tumour) and other squamous cell carcinoma (1case, 2.22% each). Other lesions lagging in study were colonic and pancreatic adenocarcinoma 1case each (2.22%) more common in males of 4<sup>th</sup> - 5<sup>th</sup>decade. These observations were very close to those studies done by Adhikari RC et al [1] and Shobha Rani G et al [8]

**Table 4: Categorization of deep seated lesions in various studies**

Type of Lesion	Shobha Rani G et al <sup>8</sup>	Namshiker AA et al [14]	Madhav N, Meenai FJ [15]	Present study
Inflammatory	7%	-	22.56%	14.5%
Benign	5%	28.3%	1.89%	9.7%
Malignant	78%	71.7%	71.95%	74.2%
Inconclusive	10%	-	3.65%	1.6%

In 58/62 cases histopathology diagnosis were available, 9/58 cases were inflammatory, 6/58 were benign and 47/58 were malignant. It was seen that diagnostic was accurate in inflammatory and benign lesions as compared to malignant lesions. 1 case diagnosed as inflammatory and 3 cases diagnosed as benign on cytology were false negative and ultimately turned out to be malignant by histopathological studies. Over all diagnostic accuracy of Usg guided FNAC in the study is 93.10% i.e. 54 out of total 58 cases. In one case the FNAC result was inconclusive due to technical failure i.e. inadequate aspiration. False negative results were obtained in all the studies. Many causes are attributed such as small tumor < 2 cm, tumor necrosis, failure of cytological interpretation, inadequate sampling and misinterpretation of lesion. In the present study there were four false negative results which were mainly due to inadequate sampling and failure of cytological interpretation. [13-15]

Several remedies are proposed to reduce false negative aspiration such as 1) Several aspirates of the mass should be performed with the needle being inserted at different depths and into different sites of the mass. 2) A smear of the aspirate should be immediately stained and examined by the cytologist to determine if a diagnostic specimen has been obtained. 3) Unrecognized errors in needle placement can result from change in position of the mass due to varying degree of respiratory effort could be eliminated by performing the biopsy with real time ultrasound scanners. [16, 17]

It was seen that diagnostic accuracy of ultrasound guided FNAC in various studies ranged from 75 to 95%. Thus the results of this study which showed diagnostic accuracy of 93.10% corresponded with other studies as discussed below.

**Table 5: Statistical results – comparative analysis**

Study	No. of FNACs	Sensitivity %	Specificity %	Diagnostic Accuracy %
Krishna SR et al <sup>10</sup>	500	71.4	55.6	77.5
Nobrega J et al <sup>13</sup>	236	87	100	90
Ahmad SS et al <sup>6</sup>	200	94.11	100	95.7
Mehdi G et al <sup>16</sup>	78	85	100	93.88
Sidhalingreddy AS et al <sup>7</sup>	245	94.1	100	96.5
Sobha Rani G et al <sup>8</sup>	100	90	100	92
Namshiker AA et al <sup>14</sup>	660	83	88	85
Present study	62	91.49	100	93.10

### Conclusion

Our study on comparing with other studies reaffirms that ultrasound guided FNAC is a relatively simple, safe, quick, economical and reliable procedure in obtaining a pathologic diagnosis of intra-abdominal lesions. Even though a final accurate diagnosis cannot be obtained in some of the lesions, most cases are easily categorized as inflammatory, benign or malignant and in malignant cases they can be further classified. Keeping in view, its high value of sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy it can be considered as a standard technique of pre-operative evaluation, which lets the practitioner to tailor appropriate stitches of management for deep seated lesions.

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