**ORIGINAL ARTICLE** 



# Ultrasound Guided Fine Needle Aspiration Biopsy of Abdominal Masses

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#### Abstract

Ultrasound guided fine needle aspiration biopsy of abdominal masses. Material Methods: 200 patients with abdominal lump were subjected to fine needle aspiration biopsy by a 20-22 G needle and smears prepared were stained with H & E and Papanicolaou stains. Histopathological specimens were processed and stained with H & E stain and a cytohistological correlative study performed. 128 (74%) were females and 72 (36%) were males. 83 cases (41.5%) had a mass in the hepatobiliary region, out of which 53 (63.9%) had a mass in the gall bladder. Malignant lesion constituted the commonest cytologic diagnostic category 115 cases (57.5%). Adenocarcinoma gall bladder was found in 31 cases (37.3%) followed by metastatic adenocarcinoma liver in 12 cases (14.5%) and hepatocellular carcinoma in 8 cases (9.6%). Adenocarcinoma stomach 8 cases (18.6%) was the commonest GI malignancy followed by adenocarcinoma intestine 7 cases (16.3%). Serous cystadenocarcinoma, 2 cases (5.1%). Overall sensitivity of 94.11%, specificity of 100% and diagnostic accuracy of 95.7% was found in the present cytohistological correlative study.

### Key words

FNAB, liver cancer, ovarian cancer, GI cancer

#### Introduction

Ultrasound guided fine needle aspiration biopsy of abdominal masses is an increasingly common diagnostic procedure in oncology. Various imaging modalities like lymphography, fluoroscopy and computerized tomography (CT) have been utilized in the evaluation of abdominal masses. The advantages of ultrasono-graphy is that it is rapid, inexpensive, versatile, no ionizing radiation is applied, does not require injection of contrast medium and can be easily repeated when necessary (1).

Ultrasound guided fine needle aspiration cytology (FNAC) is a safe diagnostic procedure in which any structure visualized can be reached quickly and precisely by a fine needle in any desired plane with constant visualization of the needle tip during insertion. The non availability of CT, coupled with the higher incidence of advanced malignancy due to public awareness, over burdened surgical units with meager resources, requires this procedure for cancer management in developing countries (2). This study plans to correlate cytological morphology with the histopathological findings in tissues from abdomen obtained by ultrasound guided fine needle aspiration biopsy.

#### **Material and Methods**

The present study was conducted in the Department of Pathology in collaboration with Department of Radiodiagnosis of Jawaharlal Nehru Medical College, AMU, Aligarh in 200 patients with abdominal masses. After thorough clinical examination, ultrasonographic examination was performed with Sonoline 500 (Seimen's) ultrasound machine having 3.5 MHz sector (Mechanical) probe; and those found to have a mass were subjected to fine needle aspiration biopsy by a 20-22 G needle attached to a 10 ml syringe for superficial masses and a 9 cm, 20-22 G spinal needle for deep seated masses. Smears prepared were fixed in 95% ethyl alcohol and stained with H & E stain and Papanicolaou stains.

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Histopathological (post surgical) specimens were processed, cut into 4-5m thickness and stained with Haematoxylin and Eosin stain.

#### Results

Most of the 200 patients included in the study presented with an abdominal mass or with pain in abdomen and ultrasonographic examination revealed masses in various abdominal sites. 128 (74%) were females and 72 (36%) males. The percentage of females was much higher mainly because of the inclusion of uterine and adnexal masses in this study and most of the cases with gall bladder masses were females, 40 (77.3%).

31 males and 52 females presented with hepatobiliary masses. Most of the male patients with hepatobiliary masses were in the 4th decade, 9 cases (29.3%), followed by 5 cases (16.1%) in the 5th decade whereas females accounted for maximum number of cases 18 (34.7%) in the 5th decade followed by 17 cases (32.7%) in the 4th decade. Eighty-three cases (41.5%) had a mass in the hepatobiliary region; out of which 53 cases (63.9%) had a mass in the gall bladder or common bile duct with or without secondaries in the liver and 30 cases (36.1%) had a mass in liver only. A total of 20 males (47.6%) and 22 females (52.4%) were diagnosed with gastrointestinal masses. Most of the males, 6 cases (30%) and females 13 cases (59%) presented in the 3rd decade. 39 patients presented with masses in female genital tract; with most of the cases found in the 4th decade, 11 cases (28.1%).

All the patients were subjected to fine needle aspiration cytology of their masses under ultrasound guidance. Inadequate smear constituted 13 cases (6.5%) and were those in which either no diagnostic cellularity was present or the sample was too contaminated/ degenerated for evaluation. Suspicious smears, 11 cases (5.5%) only partially fulfilled the criteria observed for malignancy. Malignant lesions constituted the commonest cytologic diagnostic category, 115 cases (57.5%) (Table-1).

Specific diagnosis formed on cytologic evaluation of smears from hepatobiliary masses were analyzed. 60 smears (72.3%) were found to be malignant and the most common malignancy was adenocarcinoma gall bladder, 31 cases (37.3%), followed by metastatic adenocarcinoma liver, 12 cases (14.5%) and hepatocellular carcinoma in 8 cases (9.6%) with smears showing hepatocytes, arranged in papillary clusters, with extreme anisonucleosis, hyperchromasia and intranuclear vacuoles (Fig-1). Malignant lesions formed the most common cytologic diagnostic category in cases with gastrointestinal masses, 21 cases (48.8%) and adenocarcinoma stomach was the commonest cancer, 8 cases (18.6%) with smears showing pleomorphic cells in clusters and sheets with anisonucleosis and moderate hyperchromasia with prominent nucleoli, followed by adenocarcinoma intestine 7 cases (16.3%) with cell morphology cytologically similar to gastric carcinoma.

Out of a total of 17 patients having enlargement of abdominal lymph nodes, 10 (58.8%) were males and 7 (41.2%) were females. Maximum number of cases, 35.2% were in the age group of 21-30 years. The cytologic diagnosis from aspirates of abdominal lymph nodes showed mostly inflammatory cause of lymphadenopathy, 10 cases (58.9%). Among the 7 cases (41.1%) of malignant lymphadenitis, lymphoma comprised 4 cases (23.5%) and metastatic adenocarcinoma 3 cases (17.6%). Of the 39 cases presenting with uterine and adnexal masses, 19 cases (48.7%) were found to be inflammatory/ benign and 12 cases (30.8%) malignant (Table 2). Serous cystadenocarcinoma comprised the major malignant ovarian cancer, 5 cases (12.5%) with gross specimen showing solid and cystic areas and smear showing papillary aggregate of malignant cells with marked pleomorphism and hyperchromasia.(Fig 2, 3). Maximum number of cases with masses in female genital tract was 28.1% in the fourth decade, followed by 25.5% in the fifth decade. The average age of benign lesions was 37 years and 47 years for malignant lesions. 38 cases had an adnexal mass and a single case of fibromyoma uterus was suspected to be solid ovarian tumor on ultrasonography.

A correlative study was done between the benign cytomorphological and histopathological diagnosis. 1 case diagnosed cytologically as mucinous cystadenoma was found to be mucinous cystadenocarcinoma on histopathology. Also a single case of an inflammatory gall bladder smear turned out to be adenocarcinoma. All the cases diagnosed as malignant on cytology had a concordant histopathotogical diagnosis.

The study revealed an overall sensitivity of 94.11% (calculated as percentage of true positive cases from the sum total of true positives and false negatives). Specificity of 100% (calculated as percentage of true negative from the sum total of false positives and true negatives) and diagnostic accuracy of 95.7% (calculated as percentage of sum total of true positive and true negative cases from the total number of cases) in the 70 out of 200 cases where a cytohistological correlative study was performed.



Table I Distribution of cases according to cytologic diagnostic category

Diagnostic category	No. of cases	Percentage
Inadequate	13	6.5
Inflammatory + Benign	61	30.5
Suspicious	11	5.5
Malignant	115	57.5
Total	200	100

Table II Cytological distribution of cases with uterine and adnexal mass

Diagnostic category	No. of cases	Percentage
Inadequate	07	17.9
Inflammatory + Benign	19	48.7
Inflammatory cyst	11	28.2
Non-neoplastic ovarian cyst	02	5.1
Tuberculosis ovary	01	2.5
Dermoid cyst ovary	02	5.1
Mucinous cystadenoma ovary	02	5.1
Leiomyoma uterus	01	2.1
Suspicious	01	2.6
Malignant	12	30.8
Serous cystadenocarcinoma	05	12.8
Mucinous cystadenocarcinoma	02	5.1
Granulosa cell tumor	01	2.5
Metastatic adenocarcinoma	04	10.3
Total	39	100



Fig-1. Hepatocellular carcinoma: Smear showing hepatocytes, arranged in papillary clusters, with extreme anisonulceosis, hyperchromasia and intranuclear vacuoles (Pap stain x 250).



Fig-2. Serous cystadenocarcinoma ovary: Gross specimen showing solid and cystic areas.



Fig-3. Serous cystadenocarcinoma ovary: Smear showing papillary aggregates of malignant cells with marked pleomorphism and hyperchromasia. H & E stain x 250.

#### Discussion

On the basis of ultrasonographic findings, the patients were divided into those having: hepatobiliary masses, gastrointestinal masses, uterine or adnexal masses and abdominal lymphadenopathy.

Gall bladder mass was common in females than in males with a male-female ratio of 1:3.8; a finding similar to Akosa *et al* (3) who reported a male-female ratio of 1: 3. The average age of cases with gall bladder carcinoma was 44.1 years in our study, which was in accordance to mean age of 53 years as reported by Zargar *et al* (4).

On cytologic evaluation of gall bladder aspirate smears; 31 cases (37.3%) were found to have adenocarcinoma. 7 cases each (13.2%) inflammatory and suspicious for malignancy and 2 cases (3.8%) were acellular. Suspicious smears were those in which there was suggestion of malignancy due to cellular atypia, but an unequivocal fulfillment of cytologic criteria for malignancy were not present. Quite similarly, Shukla *et al.* (5) on ultrasound guided aspiration of gall bladder



masses found 52.5% cases to be adenocarcinoma, 23.3% to be suspicious for malignancy, 16.6% inflammatory and 6.6% acellular.

The average age of 30 cases with liver disease was 43.5 years. Metastatic adenocarcinoma was the commonest malignancy detected, 12 cases (60%), closely followed by hepatocellular carcinoma in 8 cases (40%); a finding in accordance to that reported by Whitlach *et al.* (6) and Wilson *et al.* (7).

A single case of gall bladder mass suspected to be malignant on ultrasound was found to be inflammatory on cytology and confirmed as empyema gall bladder on histopathology. Kedar *et al.* (8) have also reported a similar case. Another case of a 3 year old male, suspected to be hepatoblastoma on ultrasonography was found to be an abscess. So in tumors undergoing necrosis or in organized abscesses; ultrasound may give false negative or positive diagnosis respectively for malignancy and here FNAB plays a definite role in giving an accurate diagnosis.

Similarly we found two cases of suspected secondaries liver on ultrasonography which turned out to be hepatocellular carcinoma, as has been reported by Kedar *et al.* (8). The exclusion of metastasis in liver by cytology in both these cases prevented further search for a primary, saving the patient from needless investigations.

Out of the total of 83 cases from hepatobiliary masses, 60 (72.3%) were malignant, where the diagnosis of malignancy obviated the need for diagnostic laparotomy and majority were sent directly for radiation or chemotherapy. Zargar *et al.* (4) states that the most common indication for fine needle aspiration biopsy is to confirm carcinoma gall bladder or liver.

Cyto-histological correlation of hepatobiliary masses could be done in only 14 cases as rest of them were sent directly for radiation and or chemotherapy. Out of these, 12 cases were true positive for malignancy and 1 each true negative and false negative. The false negative case was of an adenocarcinoma gall bladder with necrosis in which the aspirate showed inflammatory cells and necrotic material only, thus giving a false negative diagnosis of an empyema gall bladder on cytology. We obtained a sensitivity and specificity of 92.3% and 100% of respectively, closest to that of 91% and 100% given by Pinto *et al.* (9). The diagnostic accuracy of 92.8% in our study was very similar to that of Esteve *et al.* (10), who obtained a value of 91.0%.

On cytological evaluation of gastrointestinal masses, 20 cases (47.6%) were found to be malignant, 18 (42.8%)

inflammatory/ benign and 3 (7.1%) were suspicious for malignancy. Adenocarcinoma was the most common malignancy 18 cases (85.0%); similar to the results of Das and Pant (1994)11. Among the inflammatory and benign cases, the maximum number of cases were tuberculosis, 15 cases (83.3%) followed by appendicitis, 1 case (5.5%).

Cytohistological correlation was done in 18 cases of gastrointestinal masses and 15 were found to be true positive for malignancy and 2 true negative. A single false negative case was that of a leiomyosarcoma of the intestine which was diagnosed as leiomyoma on cytology.

On cytological examination of lymph node aspirates, 10 cases (58.9%) were found to be inflammatory, mainly tuberculosis and 7 cases (41.7%) were malignant. 2 out of the 9 cases of tuberculosis were suspected to be lymphoma on ultrasonography and in all these FNAB diagnosis led to conservative management, preventing diagnostic laparotomy. Out of the 7 malignant cases 4 were lymphoma and 3 metastatic adenocarcinoma a finding similar to the studies of Porter *et al.* (1).

Cytology of uterine and adnexal masses revealed 19 cases (48.7%) as benign, 2 cases (30.8%) as malignant and 1 (2.6%) suspicious of malignancy. 7 (17.9%) were inadequate for diagnosis; which turned out to be simple cysts on histopathology, a finding similar to Karlsson and Persson (12) who aspirated 7 ovarian cysts with inadequate material and all of whom turned out to be non-neoplastic cysts on histopathology. Sex cord tumor with annular tubules can also be diagnosed by ultrasound FNAC, which is very rare ovarian tumor (13).

Of the 19 benign lesions, 13 were non-neoplastic inflammatory cysts, 2 each dermoid cysts, and mucinous cystadenomas, 1 each tuberculosis of the ovary and leiomyoma uterus. Since non-neoplastic and inflammatory cysts are among the most common benign lesions of the female pelvis, their correct diagnosis may save the patient from unnecessary laparotomy; a statement in affirmation by Ganjei and Nadji (14).

Serous cyst adenocarcinoma was the commonest of all malignant ovarian tumor, 5 cases (41.7%), followed by 4 cases (33.3%) of mucinous adenocarcinoma. A single case of solid ovarian tumor was suspected to be a fibromyoma uterus on ultrasonography: similar to the findings of Karlsson and Persson (12).

Histopathological correlation was done in 21 of the total 39 cases of uterine and adrenal masses. 9 cases were true positive for malignancy and 11 true negative and 1 false

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negative. A sensitivity and specificity of 90% and 100% respectively was found in our study, which was exactly the same as that obtained by Kjellgren *et al.* (15). The false negative case was that of a mucinous cystadenocarcinoma with borderline malignancy which was diagnosed as mucinous adenoma on cytology. Ganjei and Nadji *et al.* (14) have also reported false negative in tumors with borderline malignancy.

Among the miscellaneous masses, a single case of neuroblastoma in a female infant which has metastasized to the ovary was diagnosed on FNAB and preoperative chemotherapy given to the patient. Since neuroblastoma is the third most common malignancy in children (Miller *et al.* (16), it must be distinguished from other small round cell tumors of childhood especially Wilm's tumor Das *et al.* (17). Histopathology confirmed the diagnosis. One case of a cystic mass abdomen suspected to be pseudomyxoma peritonei on ultrasonography; which on cytology showed only myxoid material and few clusters of columnar cells, suggesting a diagnosis of mucin-secreting adenocarcinoma. But it turned out to be myxoid liposarcoma on histopathology.

Cytohistological correlation was done in 70 out of the 200 cases and 48 were found to be true positive for malignancy, 19 true negative, 3 false negative with no false positives, thus giving an overall sensitivity of 94.1%, specificity of 100% and overall diagnostic accuracy of 95.7%; a finding in accordance to Civardi *et al.*(18) who have reported sensitivity of 95.6% and specificity and diagnostic accuracy of 100% and 97.6% respectively. Even in recent report by Lumachi (19) that ultrasound guided FNAC can be very cost effective in diagnosing and management of incidentally discovered adrenal tumor. **Conclusion** 

Ultrasound imaging can easily and precisely visualize intra-abdominal mass lesions and sonography aided fine needle aspiration biopsy can be regarded as the investigation of choice for early confirmation and exclusion of neoplastic diseases in cases presenting with intra abdominal masses. It allows morphological evaluation of all doubtful lesions without time consuming and costly surgery, but without impairing the diagnostic reliability.

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