

ORIGINAL ARTICLE

Diagnostic Accuracy of Ultrasonography Correlated with Cytopathology by Direct Real Time Ultrasonography GuidanceM Tajul Islam¹, Farooque Ahmad², Hasanuzzaman³, Sharif Mahmud Rumeed⁴**Abstract:**

Ultrasonographically (USG) guided fine needle aspiration cytology (FNAC) is simple, quick, and almost accurate and essentially risk free procedure for the diagnosis of intra-abdominal lesions including small lumps in some superficial small body parts like thyroid, breast etc. In the present study, USG guided FNAC in intra-abdominal lumps as well as lump in some small body parts was performed. USG findings prior to FNAC procedure was recorded with a possible ultrasonographic diagnosis for each of the case with relevant clinical and associated USG correlation. FNAC for each of the cases was then carried out. Samples were sent for cytopathology. Finally, USG findings were correlated with cytopathology reports. A total of 111 cases was studied of which 53 were of liver, 17 gall bladder, seven lymph nodes, four stomach, four bowel, three common bile duct (CBD), three kidney, two suprarenal, two breast, two thyroid, two pancreas, three uterus and three cases of ovary. Successful cytopathological correlation was made in 106 cases. The sensitivity was 100%, specificity 96.77% and diagnostic accuracy rate was 99.099%. Hepatic malignancy was found in 41 cases out of 53 cases and was the most common abdominal lesion followed by lesions from gall bladder, abdominal lymphadenopathies, GI tract, kidneys and others.

Introduction:

Fine needle aspiration cytology (FNAC) is a valuable investigatory tool for the diagnosis of neoplastic and non-neoplastic lesions¹⁻³.

FNAC technique with use of Ultrasonography (USG) as a newer modality helps in exactly locating lesions in majority of cases of intra-abdominal lumps^{4,5}. Ultrasound imaging of abdomen is a milestone in history of imaging techniques and is used extensively all over the world for guided FNAC⁶. The study was conducted to correlate the USG findings with cytopathology to determine the diagnostic accuracy of USG.

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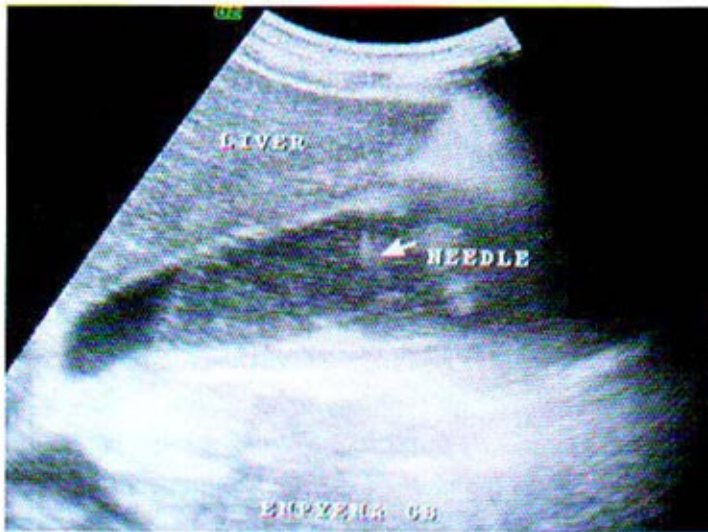


Figure-1



Figure-2



Figure-3



Figure-4

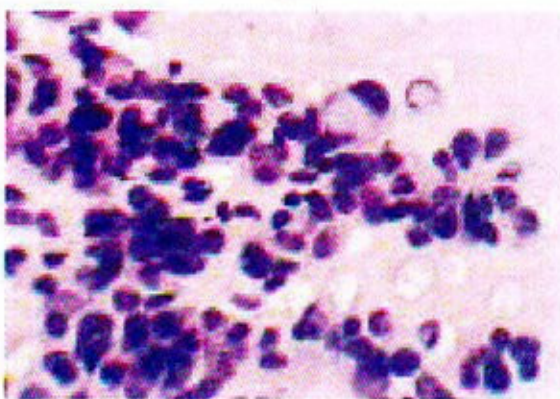


Figure-5

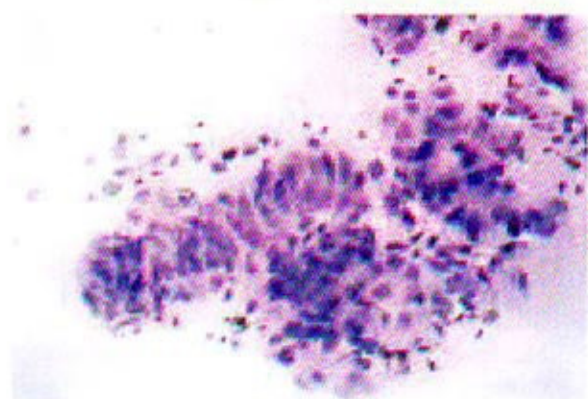


Figure-6

Fig-1: GB empyema, Fig-2: Pus after aspiration, Fig-3: Colonic mass needle at the centre of the mass, Fig-4: Hepatic mass in segment 5. Fig-5: FNAC colon showing adenocarcinoma (H&E, high power), Fig-6: FNAC liver- Hepatocellular carcinoma showing clusters of malignant cells with pleomorphic nuclei (H&E, high power).

Materials and method:

This study of 111 cases of intra-abdominal lumps and some soft tissue mass was conducted in the departments of pathology and radiology, Anwer Khan Modern Hospital and Diagnostic Centre, Dhaka during the period of June 2005 to May 2007. Detailed clinical history was taken. Physical examination with baseline investigations including bleeding and clotting time were carried out. In all 111 cases USG study was done first and the findings were recorded with probable diagnosis. Then guided FNAC was performed to locate the lump. Real time ultrasonography machine with sector transducers of 3.5 MHz, 5 MHz even 7 MHz frequency were used depending on the depth of the lesion. For FNAC 22- 23 gauge, 30 to 50 mm long disposable needles or for deep-seated lumps lumbar puncture needles of 22 to 23 gauge, 90 mm in length were used.

The slides were fixed in 95% ethyl alcohol. Aspirates were stained with hematoxylin and eosin (H & E) and Papanicolaou stain⁷. Under light microscopy the lesions were reported and categorized as malignant, benign, inflammatory and suspicious for malignancy⁸. Cytological diagnoses were correlated with USG findings/diagnosis.

Results:

This study comprised of 111 patients who presented with intra-abdominal lumps and lumps elsewhere in the body. Diagnosis on USG and FNAC was correlated. Cases from all age groups were included. Maximum number i.e. 36 (32.7%) cases were in the age group of 51-60 years. There was male preponderance, 70 (63.07%) out of 111 were male and 41 (36.93%) were females. Age incidence is given in Table-I. Organ wise incidences of the cases are given in Table-II.

Table-I: Age wise distribution of the cases

Age in years	Number of cases	Male	Female
0-10	01 (0.90%)	00	01
11-20	05 (04.50%)	03	02
21-30	07 (06.30%)	02	05
31-40	16 (14.41%)	09	07
41-50	19 (17.11%)	13	06
51-60	36 (32.43%)	23	13
61-70	16 (14.41%)	10	06
>70	11 (10.00%)	10	01
Total	111 (100%)	70 (63.07%)	41 (36.93%)

Table-II: Organ-wise distribution of cases

Organs	Number	Male	Female
Liver	53	42	11
Gall bladder	17	07	10
Common bile duct	03	02	01
Lymph nodes	07	06	01
Kidneys	03	02	01
Pancreas	02	01	01
Suprarenal gland	02	01	01
Stomach	04	04	00
Bowel	04	01	03
Breast	02		02
Thyroid	02	01	01
Intra-abdominal (non organ specific) mass	02	01	01
Peritoneal fluid	04	02	02
Uterus and adnexae	03	00	03
Adnexae/Ovary	03	00	03
Total	111	70	41

Table-III: Cytopathological correlation with USG findings

Organ	Number	Diagnosis based on USG findings		Cytological findings based on USG guided FNAC	
		Malignant	Non-malignant	Malignant	Non-malignant
Liver	53	43	10	41	12
Gall bladder	17	17	00	17	00
Common bile duct	03	02	01	03	00
Lymph node	07	05	02	06	01
Kidney	03	02	01	02	01
Pancreas	02	01	01	00	02
Supra renal	02	02	00	02	00
Stomach	04	04	00	04	00
Bowel	04	01	03	01	03
Non specific	02	01	01	01	01
Fluids	04	00	04	00	04
Thyroid	02	00	02	00	02
Breast	02	00	02	00	02
Uterus	03	02	01	02	01
Ovary	03	01	02	01	02
Total	111	81	30	80	31

Table-IV: Accuracy of ultrasonography

Total case	True positive	True negative	False positive	False negative	Sensitivity	Specificity	Positive predictive value	Negative predictive value	Diagnostic accuracy
111	80	30	01	00	100%	96.77%	98.77%	100%	99.099%

Discussion:

Each of the cases in this study was evaluated first by USG. Samples were then collected by fine needle under direct USG guidance followed by cytopathology. FNAC results were finally correlated with USG findings.

Liver : In hepatic aspirates, accuracy rate was more than 95%. Forty three cases of the total 53 were diagnosed as carcinoma liver in USG. Of which 23 cases were thought to have primary tumour and 20 cases as metastatic. But in cytology, 41 cases were proven to be positive for malignancy of which 19 cases found to have primary and 22 cases as

metastatic lesions. Ten out of 53 cases were reported as non malignant lesion which included abscess, haemangioma, FNH, hepatic simple/ hydatid cyst and focal fatty liver. In cytology 12 of the 53 cases were reported as non malignant liver lesions. So there is a high concordance of the two studies.

Gall bladder: There is definite female preponderance and 10 out of 17 cases were female patient. In all 17 cases of gall bladder masses malignancy was suspected. USG evaluation and diagnosis was made by locating the mass, measuring the size and echotextural criteria of malignancy. USG

findings were suggestive of malignancy. There were some associated findings like cholelithiasis, mass invading the adjacent liver parenchyma. In some of the cases there were involvement of bile duct invasion and biliary obstruction. Ascites were also detected in some of the cases. FNAC reports confirmed malignant cell (primary) in all 17 cases.

Bile duct: Two of the three cases were thought to be primary carcinoma of CBD and one as cholangitis. Cytology was positive for malignancy in all three cases.

Gastrointestinal tract: In this study accuracy rate for both neoplastic and non-neoplastic lesions of gastrointestinal tract was 100%. A total of eight cases were studied. Four cases were gastric masses. The USG findings of the gastric masses were typical. The masses were solid and heterogeneous echogenic centre was surrounded by hypoechoic neoplastic stomach wall, the so called "pseudokidney sign"(typical for Ca stomach) was present in all four cases. Malignant cells were found in all four cases in cytopathological examination. Rest four cases were mass of bowel origin. One case showed features of solid malignant mass and appeared to be colonic in origin and diagnosis was recorded as Ca colon. Other three cases were diagnosed as inflammatory masses like appendicular lump and iliocolic TB. Clinical correlation and associated USG findings greatly aided the diagnosis^{9,10}. The result of FNAC expectedly matched the USG findings.

In the present study accuracy rate in GI tract lesions was 100%. This high accuracy rate as compared to other studies is due to USG guided technique which helps in accurate location of the lesions.

Abdominal lymphadenopathies: A total of seven cases were studied. Five of them were diagnosed as malignant enlargement including one NHL and four metastatic in USG study. FNAC revealed six cases as malignant lymphadenopathy and one as NHL.

Kidney: Two of the three renal masses were diagnosed as primary carcinoma of the kidney and one as inflammatory in USG. Same was the result in FNAC study.

Suprarenal: There were two cases of suprarenal mass confidently diagnosed as malignant tumour in USG which were later proved to be the primary carcinoma of the suprarenal glands in cytology.

Pancreas: One of the two cases was diagnosed as malignant and the other one as inflammatory mass but cytology found no malignancy in any of the two.

Non-specific intra-abdominal lump: There were only two such cases. One was found in right iliac fossa fixed to the underlying muscle and having heterogeneous echotexture with good vascularity, so it was diagnosed as rhabdomyosarcoma and was subsequently confirmed by cytology. The large left upper quadrant lump having well defined boundary and reticular echotexture was thought to be a benign lesion but could not be properly diagnosed as the tissue origin of the lesion was in doubt. The big lump was finally proven to be a lymphangioma by FNAC.

Fluid aspirates: All four samples were thought to be non-neoplastic in origin. Clinical correlation and associated findings suggested leaking of bile from injured bile duct during operative procedure. Ascites due to renal cause and chronic inflammatory process like intestinal TB were the other suggestive causes. Finally, it came out to be so in cytological examination.

Uterus: Two of the cases of the uterine masses were found to have irregular outline with heterogeneous echotexture and evidence of pelvic involvement, and could be easily diagnosed as malignant lesion. The third case was a well defined homogeneous hypoechoic lesion considered as benign myoma. FNAC yielded the same result.

Ovary: One of the three ovarian lesions was diagnosed as ovarian malignancy due to heterogeneous irregular pattern and presence of ascites as associated finding. The second lesion appeared to be inflammatory (adnexitis) and the third one was purely cystic having well defined outline and anechoic contents and increased through transmission. FNAC had good concordance with the above USG findings and malignant cell was found only in the first case.

It is thus concluded that if properly evaluated and correlated with clinical and other associated USG findings an expert radiologist (sonologist) can diagnose both intra- and extra-abdominal lumps with great accuracy. USG guided FNAC being very reliable, quick, inexpensive and safe diagnostic modality, the correlation should be made whenever there is suspicion about the lesion. In present study, successful USG and cytological correlation was possible in 95% cases.

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