Deep-seated thoracic and abdominal lesions: usefulness of ultrasound guided fine needle aspiration cytology, a 3 year experience

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ABSTRACT

Three hundred twenty patients were subjected to ultrasound guided fine needle aspiration cytology (FNAC) over a 3 year period (April 2006 – March 2009). These included liver (125 cases), lung (81 cases), abdominal and mediastinal lymph nodes (29 cases), ovary (14 cases), omentum (12 cases), pancreas (10 cases), kidney (10 cases), mediastinum (8 cases), gall bladder (8 cases) etc. The aim of this study was to evaluate the overall utility of ultrasonographic guided FNAC in the diagnosis of abdominal and thoracic lesions. In 264 cases (82.5%), FNAC was diagnostic with commonest diagnosis being malignant neoplasm (70.0%). 14 cases (4.4%) were suspicious of malignancy and remaining 42 (13.1%) cases either didn't reveal diagnostic material or they were inconclusive. In liver, Metastatic adenocarcinoma is the commonest tumor, while in lung; the commonest lesion is non-small cell carcinoma. Benign neoplasm (3.1%) and non neoplastic lesion (9.4%) were also diagnosed by FNAC. Rare sites like oesophagus and duodenum were also aspirated. Complication rate was too low (0.9%) in this study. USG guided FNAC, in conjunction with clinico-radiological parameters are accurate and safe in diagnosing deep-seated mass lesions in the thorax and abdomen.

Keywords: Deep seated lesions, USG-guidance, FNAC.

INTRODUCTION

Fine needle aspiration cytology (FNAC) is nowadays widely used tool for the diagnosis of superficially palpable lesions as well as lesions of deep-seated thorax and abdomen. The technique is relatively painless and reliable, produces speedy result and is cheap.[1] Ultrasonographic, computed tomographic or fluoroscopic guidance is required for the aspiration of deep-seated thoracic and abdominal masses. Single or multiple space occupying lesions demonstrated by ultrasonography, CT scan, and MRI constitute the main indication for FNAC. Imaging techniques such as ultrasonography, CT scan and MRI may fail to allow malignant and benign lesions to be distinguished on the basis of morphological features.[2] On the other hand, a firm pathologic diagnosis is essential both for treatment and staging of cancer.

Because of high accuracy and low complication rate, fine needle aspiration cytology has been considered to be the initial evaluation method of choice for abdominal and thoracic lesions including liver.[3] Nevertheless, its associated risk should not be underestimated, particularly needle tract tumor seedling, hemorrhage, peritonitis, pneumothorax etc. Although needle tract tumor implantation after FNAC has been reported,[4-6] the survival outcome of patients has not been studied in detail.

FNAC is used in evaluation of non-neoplastic lesion, both benign and malignant conditions. This study was undertaken with the aim of evaluating the overall utility of ultrasonographic guided FNAC in the diagnosis of abdominal and thoracic lesions.

MATERIALS AND METHODS

This study was retrospective analysis of FNAC of abdominal and thoracic lesions from the record of department of Pathology, Om Hospital and Research Centre, Chabahil, Kathmandu, Nepal from April 2006 to March 2009 (period of 3 years). All aspirations were done from different organs of thoracic and abdominal cavity, jointly by pathologist and radiologist. Aspirates for cytology were obtained by suction with a 21 gauze needle attached to a 20 ml disposable syringe. Both dry and wet smears were prepared for Giemsa and Papanicolaou stains.

RESULTS

1380 aspirations were performed from April 2006 to March 2009. Out of these, 320 were done under ultrasonographic guidance (Table-1). Aspirations were done from various anatomic sites such as liver, lung, lymphnode, gastrointestinal tract, pancreas, kidney, mediastinum, ovary, omentum, gall bladder, mesentery, peritoneal cavity etc.

Table-1: No. of USG guided FNAC

Year	No. of USG guided FNAC (%)	No. of total FNAC (%)
April 2006 – March 2007	75 (19.0)	400 (100)
April 2007 – March 2008	117 (25.0)	470 (100)
April 2008 – March 2009	128 (25.0)	510 (100)
Total	**320 (23.0)**	**1380 (100)**

Liver is commonest site, constituting 39.0% of all USG guided aspirations, followed by lung, constituting 25.0% and lymphnodes constituting 9.0% (Table-2). Lymphnodes aspirated were retroperitoneal, mesenteric, periportal and mediastinal. Complication was encountered only in 3 cases (0.9%). One case of lung FNAC developed pneumothorax, a case of liver FNAC was complicated by hemorrhage and peritonitis was seen in a case of pancreatic FNAC.

Age range of these patients was 17 – 90 years with male to female ratio of 1:1.

Out of 320 cases, cytological diagnosis was made in 264 cases (82.5%) and 14 cases (4.4%) were suspicious for malignancy. In 22 cases (6.8%), smears didn't consist of any material and 20 cases (6.3%) were inadequate or inconclusive (Table-3). The most common cytological diagnosis is malignant neoplasm (70.0%), followed by non-neoplastic lesion (9.4%).

Malignant neoplasm included adenocarcinoma, squamous cell carcinoma, ductal carcinoma, hepatocellular carcinoma, thymic carcinoma, small cell carcinoma, renal cell carcinoma, sarcomatoid carcinoma, large cell carcinoma, malignant mesothelioma, acinic cell carcinoma, anaplastic carcinoma, cholangiocarcinoma, poorly differentiated carcinoma, Non-Hodgkin's lymphoma, atypical carcinoid tumor, malignant germ cell tumor, malignant gastrointestinal stromal tumor, leiomyosarcoma and pseudomyxoma peritonei, commonest being adenocarcinoma.

Benign neoplasm included serous cystadenoma, schwannoma and thymoma.

Table-2: Site wise frequency of FNAC

Site of FNAC	No. of cases (%)
Liver	125 (39.0)
Lung	81 (25.3)
Lymph nodes	29 (9.0)
Ovary	14 (4.4)
Omentum	12 (3.8)
Pancreas	10 (3.2)
Kidney	10 (3.2)
Gall bladder	8 (2.5)
Mediastinum	8 (2.5)
Pelvic region	5 (1.6)
Iliac fossa	4 (1.3)
Duodenum	3 (0.9)
Esophagus	2 (0.6)
Colon	2 (0.6)
Suprarenal gland	2 (0.6)
Mesentery	1 (0.3)
Peritoneal cavity	1 (0.3)
Pleura	1 (0.3)
Retroperitoneum	1 (0.3)
Urinary bladder	1 (0.3)
Total	**320 (100)**

Non-neoplastic lesions were abscess, tuberculosis, cirrhosis, hydatid cyst, inflammatory pseudotumor and reactive lymphadenitis.

Organ wise cytological diagnoses were tabulated in Table-4 to Table-11.

DISCUSSION

USG guided fine needle aspirations have facilitated easy collections of cellular material increasing accuracy rate.[7] Ultrasound assistance for fine needle aspiration is useful

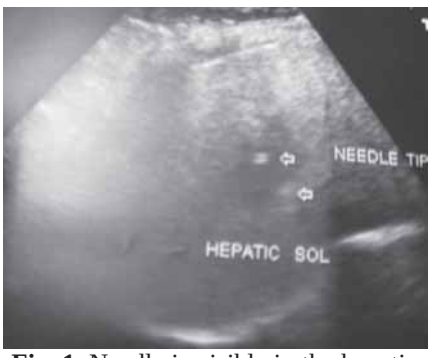

Fig. 1. Needle is visible in the hepatic space occupying lesion (arrow)

Fig. 2. Needle is visible in the lung mass lesion (arrow)

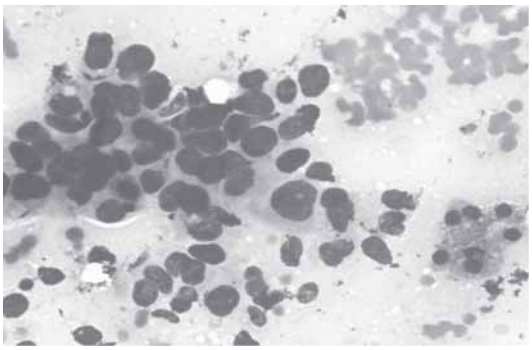

Fig. 3. Metastatic adenocarcinoma of liver, FNAC, Giemsa stain, X 400 magnification. At right corner below, normal hepatocytes are present

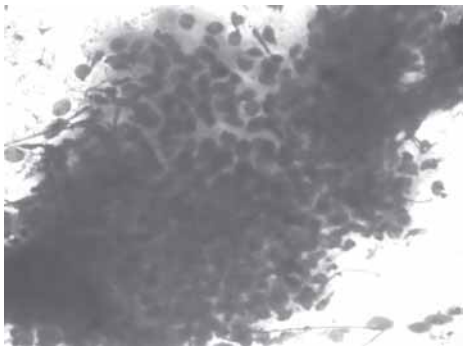

Fig. 4. Squamous cell carcinoma of lung, FNAC, Giemsa stain, X 400 magnification. This is a fragment of squamoid cells exhibiting cellular atypia.

Table-3: Cytological diagnosis

Cytological diagnosis	No. of cases (%)
Acellular smear (blood only)	22 (6.8
Inconclusive	20 (6.3)
Non-neoplastic lesion	30 (9.4)
Suspicious of malignancy	14 (4.4)
Benign neoplasm	10 (3.1)
Malignant neoplasm	224 (70)
Total	**320 (100)**

in deep-seated thoracic and abdominal lesions to yield cellular material. It would be further effective when it is done jointly by pathologist and radiologist. It is an opportunity for a pathologist to know the clinical status including radiological finding of patient, which is very useful to make a conclusion while assessing the cytological findings.

In this study, aspirate was conclusive and definite diagnosis was made in 82.5% cases indicating high adequacy rate. In 13.1% cases no opinion could be made due to inadequate material or absence of material. Adequacy depends on the size, location, consistency of lesion, histologic tumor type, number of blood vessels present within the lesion and amount of necrosis present. The material aspirated was usually adequate in malignant tumor, in comparison to benign and non-neoplastic lesions. So, ultrasound guided FNAC should routinely be done in abdominal and thoracic lesions due to high adequacy rate and very low complication rate. Likewise, Barrios *et al* [8] recommended that FNAC should be used as a routine procedure in the study of abdominal tumors due to high sensitivity and specificity. Many authors have concluded that US-assisted FNAC proved to be more sensitive and useful than needle core biopsy in the diagnosis of radiologically detected abdominal lesions [9-11] and pulmonary lesions[12] due to high diagnostic yield and reduced complication rate. Many studies described utility of FNAC of liver,[13,14] lungs[15] and other deep-seated thoracic and abdominal masses.[16] Nevertheless, the complications of the procedure should never be undermined, although they are very rare. Rarely the complication may be life threatening especially in case of lung FNAC (rapidly developing pneumothorax).

Liver and lungs are common sites for FNA in this study. Similarly, in a study of Sheikh *et al*,[16] liver and lungs are common sites for USG guided FNAC.

Table-4: Cytological diagnosis in hepatic space occupying lesion

Cytological diagnosis	No. of cases (%)
Metastatic adenocarcinoma	35 (28)
Hepatocellular carcinoma	31 (24.8)
Poorly differentiated carcinoma	10 (8)
Inconclusive	8 (6.4)
Acellular smear (blood only)	6 (4.8)
Non-Hodgkin's lymphoma	5 (4)
Cholangiocarcinoma	4 (3.2)
Metastatic small cell carcinoma	4 (3.2)
Metastatic ductal carcinoma	4 (3.2)
Suspicious of malignancy	4 (3.2)
Metastatic squamous cell carcinoma	3 (2.4)
Abscess	3 (2.4)
Cirrhotic regenerative nodule	2 (1.6)
Metastatic GIST	1 (0.8)
Metastatic leiomyosarcoma	1 (0.8)
Mesenchymal tumor	1 (0.8)
Focal nodular hyperplasia	1 (0.8)
Hydatid cyst	1 (0.8)
Liver cell adenoma	1 (0.8)
Total	**125 (100)**

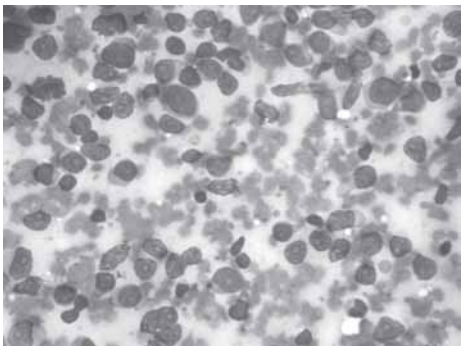

Fig. 5. Non-Hodgkin's lymphoma, retroperitoneal lymphnode, FNAC, Giemsa stain, X 400 magnification. There are singly dispersed large atypical lymphoid cells with lymphoid globules on the background.

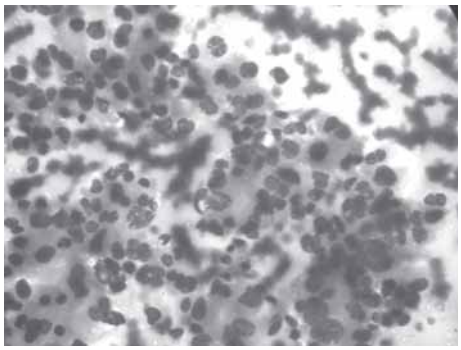

Fig. 6. Renal cell carcinoma, FNAC, Giemsa stain, X 400 magnification

Table-5: Cytological diagnosis in lung mass lesion

Cytological diagnosis	No. of cases (%)
Non small cell carcinoma, poorly diff.	21 (26.0)
Squamous cell carcinoma	18 (22.2)
Adenocarcinoma	12 (14.9)
Acellular smear (blood only)	9 (11.9)
Inconclusive	3 (3.7)
Large cell carcinoma	3 (3.7)
Small cell carcinoma	3 (3.7)
Suspicious of malignancy	3 (3.7)
Atypical carcinoid tumor	2 (2.5)
Abscess	2 (2.5)
Sarcomatoid carcinoma	1 (1.2)
Metastatic hepatocellular carcinoma	1 (1.2)
Non-Hodgkin's lymphoma	1 (1.2)
Inflammatory pseudotumor	1 (1.2)
Tuberculosis	1 (1.2)
Total	**81 (100)**

In this study, cytological diagnosis of malignancy with tissue differentiation was made in 70.0% cases, which is slightly higher than the finding of Sheikh *et al* (63.7%). The tissue differentiation was possible in 80.0% of benign neoplasm in this study, while it was only 53.8% in other study.[16]

Clinical and imaging findings were always taken into consideration while evaluating the cytological smears. Clinicoradiological parameters themselves have certain limitations in diagnosing benign versus malignant lesions.

In liver, Metastatic tumor was commonest one constituting 38.4% of all space occupying lesions. Among primary tumors, hepatocellular carcinoma was commonest constituting 24.8% of all space occupying lesions. In lung, non-small cell carcinomas constituted main bulk of lung mass lesions. Aspiration was done from unusual sites like oesophagus, duodenum and urinary bladder. 2 cases of esophageal mass were diagnosed as squamous cell carcinoma, 2 duodenal masses were diagnosed as Non-Hodgkin's lymphoma

Table-6: Cytological diagnosis in lymphadenopathy

Cytological diagnosis	No. of cases (%)
Tuberculous lymphadenitis	10 (34.5)
Metastatic adenocarcinoma	5 (17.2)
Non-Hodgkin's lymphoma	4 (13.8)
Acellular smear (blood only)	4 (13.8)
Metastatic squamous cell carcinoma	3 (10.3)
Reactive lymphadenitis	2 (6.9)
Metastatic small cell carcinoma	1 (3.5)
Total	**29 (100)**

Table-7: Cytological diagnosis of ovarian lesions

Cytological diagnosis	No. of cases (%)
Adenocarcinoma	5 (35.7)
Inconclusive	4 (28.6)
Suspicious of malignancy	3 (21.4)
Serous cystadenoma	2 (14.3)
Total	**14 (100)**

Table-8: Cytological diagnosis of omental lesions

Cytological diagnosis	No. of cases (%)
Metastatic adenocarcinoma	6 (50.0)
Malignant mesothelioma	2 (16.7)
Inconclusive	2 (16.7)
Metastatic hepatocellular carcinoma	1 (8.3)
Suspicious of malignancy	1 (8.3)
Total	**12 (100)**

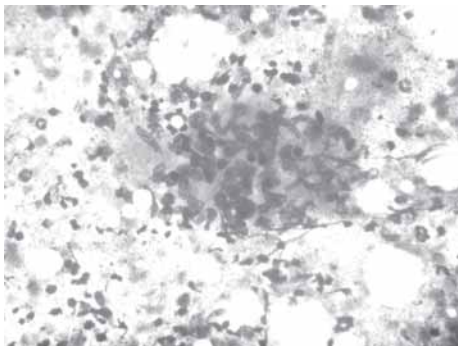

Fig. 7. Tuberculous lymphadenitis, retroperitoneal lymphnode, FNAC, Giemsa stain, X 400 magnification. This microphotograph demonstrates aggregates of epithelioid cells.

Table-9: Cytological diagnosis of pancreatic lesions

Cytological diagnosis	No. of cases (%)
Adenocarcinoma	5 (50.0)
Acinic cell carcinoma	1 (10.0)
Anaplastic carcinoma	1 (10.0)
Benign cystic neoplasm	1 (10.0)
Abscess	1 (10.0)
Acellular smear (blood only)	1 (10.0)
Total	**10 (100)**

and 1 duodenal mass was as adenocarcinoma in this study.

In this study, FNAC has diagnosed not only benign and malignant neoplasm, but also non-neoplastic diseases like tuberculosis, hydatid cyst, abscess etc.

Abdominal and mediastinal lymphnodes, mass lesions of gall bladder, colon, pancreas, omentum, mesentery, kidney, retroperitoneum etc were also aspirated under ultrasonographic guidance. So, any deep-seated mass lesion can be aspirated and cytological diagnosis can be made correlating with clinico-radiological features.

We thus conclude that ultrasound guided FNAC yielding a cellular material plays an important role in diagnosing deep-seated mass lesions in the thorax and in the abdomen. It is equally useful in diagnosing non-neoplastic and benign lesions as well as in classification of malignancies.

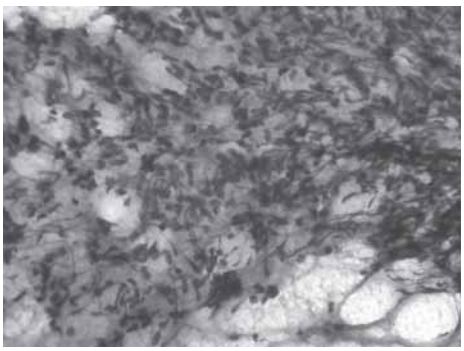

Fig. 9. Thymoma, FNAC, H&E stain, X 200 magnification. This figure depicts a fragment of spindle epithelial cells

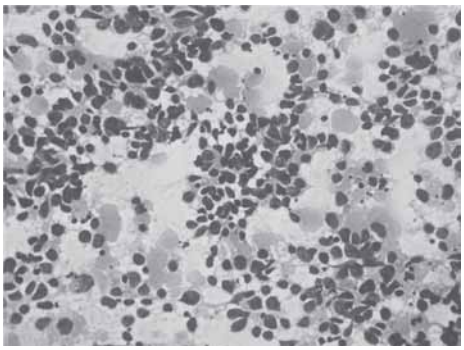

Fig. 8. Small cell carcinoma, Lung, FNAC, H&E stain, X 400 magnification

Table-10: Cytological diagnosis of renal lesions

Cytological diagnosis	No. of cases (%)
Renal cell carcinoma	5 (50)
Inconclusive	2 (20)
Acellular smear (blood only)	1 (10)
Suspicious of malignancy	1 (10)
Abscess	1 (10)
Total	**10 (100)**

Table-11: Cytological diagnosis of mediastinal lesions

Cytological diagnosis	No. of cases (%)
Thymoma	4 (50.0)
Thymic squamous cell carcinoma	2 (25.0)
Schwannoma	1 (12.5)
Metastatic small cell carcinoma	1 (12.5)
Total	**8 (100)**

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