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Analysis of 210 Cases of Radiologically Guided FNAC of Intraabdominal Masses

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SUMMARY

Two hundred and ten cases of intraabdominal masses were aspirated under ultrasound and CT scan guidance. These aspirates were done by senior radiology staff at Sheikh Zayed Postgraduate Medical Institute Lahore. The smears and cell blocks were studied by consultant pathologists and final diagnosis was obtained .Seven cases were considered as inadequate, these were excluded from study. The remaining 203 cases included in the study consisted of 147 cases of liver masses,29 cases of nodal masses ,16 cases of retropeitoneal masses, 10 cases of GIT masses and one case of ovarian mass. Most of the malignant aspirates were from liver followed by nodal masses and retroperitoneal masses. The diagnostic yield was 97.4% and diagnostic yield of malignancy was 69.9%. In liver masses. HCC was the commonest lesion found followed by lesions from GIT metastatic to liver. In nodal masses, NHL was the commonest malignancy found. We successfully aspirated retroperitoneal masses and diagnosed these lesions cytologically with clinical correlation. The accuracy rate for diagnosing GIT lesions was 100%. Thus radiologically guided FNAC is simple, quick accurate and essentially risk free procedure for diagnosis of intraabdominal masses.

INTRODUCTION

Aspiration biopsy can be defined as a procedure in which negative pressure is created in a syringe and as a result of pressure difference, small bits of cellular material is drawn from the tissue into the needle[1]. Radiologically guided percutaneous needle biopsy is widely used in radiology partice. It has emerged as one of the important advances in radiology during the last fifteen years[2].

The fine needle aspiration cytology has become quite popular diagnostic modality now a days. Its advantages are being easy, simple, inexpensive, rapid and amenable to repeat procedures without significant complications. This has made it as first and the foremost out patient procedure in evaluation of masses world wide[3]. It has distinct advantages over open trucut and core biopsy[4].

Ultrasound imaging of abdomen is mile stone in history of imaging technique and is extensively used all over the world for guided FNAC[5].

It is an extremely accurate test when it involves, a clinician, pathologist and a radiologist[6]. This technique is specially valuable in the diagnostic workup of enlarged intra abdominal lymph nodes[7] as well as space occupying lesion of kidneys pancreas and liver[8]. Ever since Lundquist[9] used a fine needle aspiration biopsy of liver, Johansen[10], Mathew[11] and other authors have presented many views on the usefulness and pitfalls of the technique of fine needle aspiration cytology of liver.

Liver FNAC plays a major role in the diagnosis of primary and metastatic tumours of liver. Deep seated lesions and lesions of the left lobe which are generally inaccessible to needle biopsy on ultrasound can be sampled by CT guided FNA, Diffuse non neoplastic liver disease however does not lend itself to diagnosis by this method . Complications are rare. The sensitivity varies from

92-96% in recent literature and with experience there are few false positive results.

The highest accuracy with hepatic aspiration is attained with malignant disease.

FNAC of the lymph nodes is a reliable technique for diagnosis of metastatic carcinoma, melanoma, lymphoma, granulomatous and suppurative inflammatory disease and reactive hyperplasia. Patients with reactive cytological picture and no clinically suspicious symptoms could be spared unnecessary surgery and reviewed through follow up[12]. Generally metastatic carcinoma and melanoma are easily diagnosed and are readily separated from Hodgkin and Non-Hodgkin lymphomas and reactive hyperplasia. However there is uncertainty about the value of FNA in subtyping of Hodgkin disease. For a definite diagnosis and further typing of lymphoma, biopsy is required[13].

Both percutaneous CT guided and ultrasound guided FNAC has become a reliable method of diagnosing adenocarcinoma of pancreas.

The component of retroperitoneal space are adrenal gland, kidney, ureter, aorta and its branches, inferior venacava and numerous lymph nodes embedded in loose connective tissue .It is a huge space where masses can grow silently untill diagnosed. FNAC has revolutionized the assessment of lesions in these cases and CT is necessary to provide the exact guidance required. However the size of a retroperitoneal lesion is a major limitation on FNA biopsy.

The main indication of FNAC of the kidney, includes diagnosis of renal masses, classification of neoplasms, confirmation of advanced lesions where surgery is not indicated and grading of tumours. Ultrasonography is preferred imaging modality in the diagnostic workup of a renal mass. It can be diagnosed with confidence, but if all criteria for diagnosis of a benign renal cyst are not met, CT may be a useful adjunct for this purpose. Failure to identify a renal lesion as a benign simple cyst by radiographic means requires further investigation, which may include FNA for cytologic examination

FNAC is also helpful in diagnosis of ovarian masses, periampullary growths epigastric masses and gall bladder masses.

MATERIALS AND METHODS

Radiologically guided FNA of abdominal masses was carried out on 210 admitted patients at Shaikh Zayed Hospital, Lahore with clinically suspected abdominal masses and those detected earlier on sonographic and other screening techniques. Patients of all ages and both sexes were included. Those patients were also considered who had suspicion of abdominal masses and patients with known malignancy to confirm metastasis/ recurrences. Relevant clinical information regarding size of lesion, number of lesions, serologic studies e.g. alpha fetoprotein levels were obtained. Before carrying out the aspiration bleeding profile was assessed in every patient. This included platelet count, prothrombin time (PT),and activated partial thromboplastin time (APTT).Those patients with significantly abnormal values and feared of being more prone to bleed were given fresh frozen plasma few hours before the procedure. Therefore, every patient included in this study had platelet count, PT and APTT almost within normal range, when the aspiration was done[14]. The consent was taken and procedure was explained to patient.

Most procedures were done in lateral lying position and some with supine position. The shortest distance to target was usually selected to improve the accuracy of the needle placement. The skin was prepared with an iodine solution and allowed to dry. The infiltration of the skin and subcutaneous tissue including organ capsule with local anesthetic was then performed. The transducer was covered with sterile gel for localizing the lesion. Ultrasound was performed. The needle was visualized. The patient was asked to hold the breath during needle placement and then was asked to take shallow breaths. The needle was introduced deep until the hard consistency of mass was felt. When the needle entered the mass/tumor, there was usually some resistance, or a feeling of grittiness[15]. Simultaneous rotation back and forth movement of the needle under real time guidance was required to ensure that the needle retained entirely in the lesion[16]. Then the stylet was removed and 10 ml syringe was attached to needle. Negative pressure was created by retracting the piston. The needle was

Table 1: Organ wise distribution (n-203)

Site	Total	Benign	%age	Malignant	%age
Liver	147	41	27.9%	106	72.1%
Nodal masses	29	13	44.9%	16	55.1%
Retroperitonium	16	3	18.8%	13	81.2%
Gall bladder	5	2	40 %	3	60 %
Pancreas	3	2	66.7%	1	33.3%
Epigastric mass	1	0	0 %	1	100%
Periampullary mass	1	0	0 %	1	100%
Ovarian mass	1	0	0 %	1	100%

then moved to and fro and in various directions of the lesion to get enough material. Suction was then released to prevent aspiration of specimen into the syringe and avoiding fragmentation of the cells.

The needle with the syringe was removed, moderate amount of fresh blood, along with tissue fragments suitable for micro-histological evaluation after formaline fixation was obtained, there by increasing the diagnostic yield[17].

When the aspiration was completed the patient was reassured, the needle site was covered with gauze piece and gentle pressure was applied to minimize any bleeding risk. Smears were prepared immediately The number of slides prepared ranged from four to eight in most of the cases One smear for PAP staining and another smear for H & E staining were fixed in 95% ethyl alcohol[18]. The residual material was secured for clot preparation. It was transferred into 10% formaline[19] and was processed as a biopsy material at the same time. The adequacy of aspirate was judged by looking for tiny tissue fragments on the unstained spread smears. If there was a fear of inadequate aspirate, a second pass in the lesion was made to obtain adequate material.

Giemsa, H&E and Pap stained smears from each case were examined carefully and a diagnosis was made on these slides. Where available an H & E stained section of the prepared clot was also examined for reaching a final diagnosis. Different lesions, diagnosed in these cases were then analyzed.

RESULTS

FNAC was done in 210 cases These 210 cases included 151 cases of liver masses, 32 cases of abdominal lymph nodes, 16 cases of retroperitoneal masses, 5 cases of gall bladder masses, three cases of pancreatic masses and one case each from periampullary growth, ovarian mass and epigastric mass. All these lesions were primarily divided as benign and malignant Only seven cases were non-diagnostic. These cases were excluded from the study (Table-1).

In the present study the diagnostic yield was 97.4% and diagnostic yield of malignancy was 69.9%.

Out of 151 liver masses, 106 cases were diagnosed as malignant, 41 cases were benign and 4 cases were inadequate for diagnosis. The malignant ones comprised of 52 cases of HCC (Figs. 1, 2, 3) and 44 cases of metastatic adenocarcinoma with primary from GIT (Fig. 4) and 10 cases of metastatic carcinoma other than primary from GIT (Table-2).

Table 2: Metastatic tumours other than primary from GIT (n-10)

Type of tumour	Number	Percent
Squamous cell carcinoma	1	10%
Malignant spindle cell tumours	4	40%
Undifferentiated carcinoma	1	10%
Small round cell tumour	1	10%
Metastatic carcinoma with primary from lung	1	10%
Non Hodgkin lymphoma	1	10%
Malignant melanoma	1	10%

Out of 32 nodal masses 16 cases were positive for malignancy. Non Hodgkin Lymphoma was the commonest malignant lesion (Figs. 5, 6)

(Table-3), 13 cases were benign (Table-4) and 3 cases were non diagnostic.

Table 3: Malignant nodal masses (n-16)

Type of tumour	Number	Percent
Metastatic adenocarcinoma	3	18.9%
Non Hodgkin lymphoma	8	50%
Metastatic Malignant germ cell tumour	1	6.2%
Metastatic liposarcoma	1	6.2%
Metastatic undifferentiated carcinoma	2	12.5%
Metastatic squamous cell carcinoma	1	6.2%

Table 4: benign nodal masses (n-13)

Type of tumour	Number	Percent
Granulomatous	8	61.5%
Negative for malignancy	5	38.5%

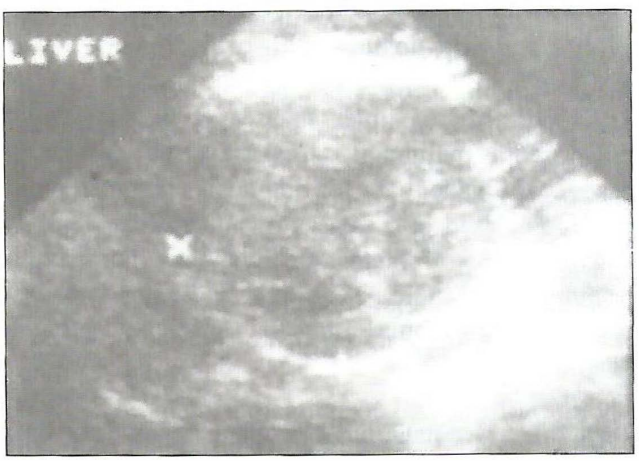

Fig. 1. Focal mass-liver (USG).

16 cases of retroperitoneal masses included 13 cases of malignancy and 3 cases were benign (Tables-5-6). Renal mass was successfully diagnosed as RCC.

Among 5 cases of gallbladder masses,3 cases were malignant and 2 cases were benign. Out of pancreatic masses, one case was malignant and 2 cases were benign. Periampullary growth and epigastric mass was proved to be malignant. Ovarian mass was diagnosed as Yolk sac tumour (Figs. 7-9).

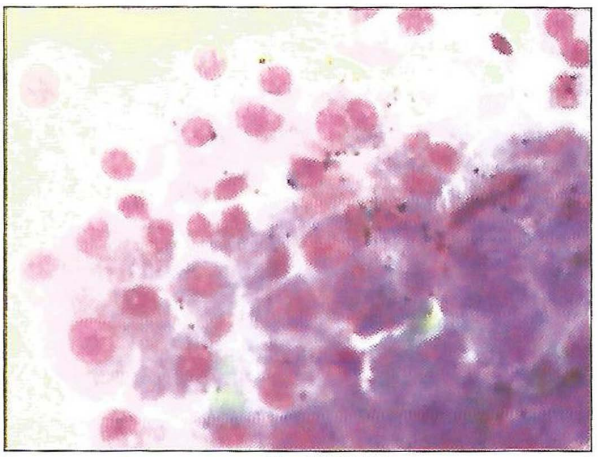

Fig. 2. FNAC hepatocellular carcinoma. Giemsa stain x 40.

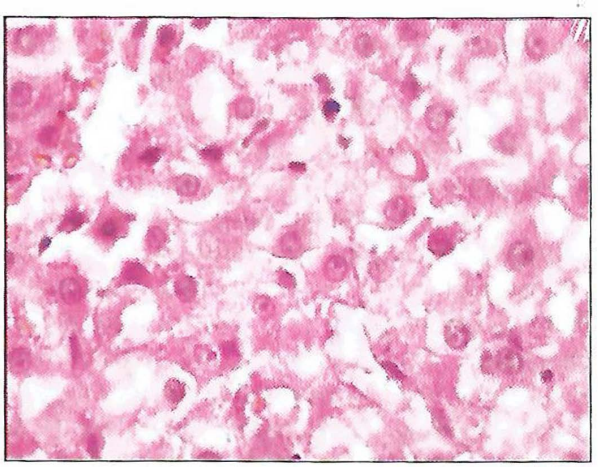

Fig. 3. Clot histology. HCC. H&E x 40.

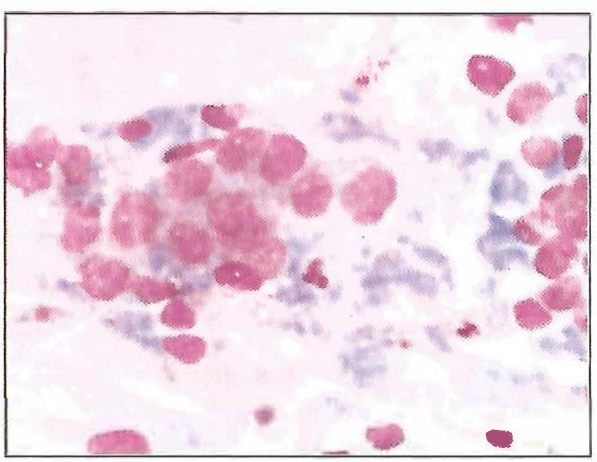

Fig. 4. Metastatic adenocarcinoma. FNAC Giemsa stain x40

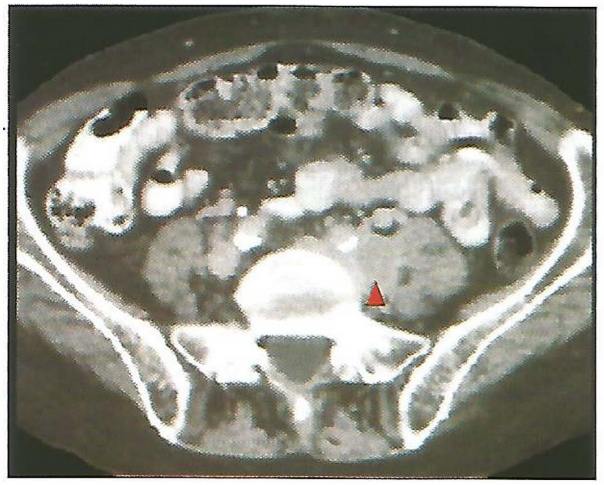

Fig. 6. Retroperitoneal lymph nodes. CT-scan.

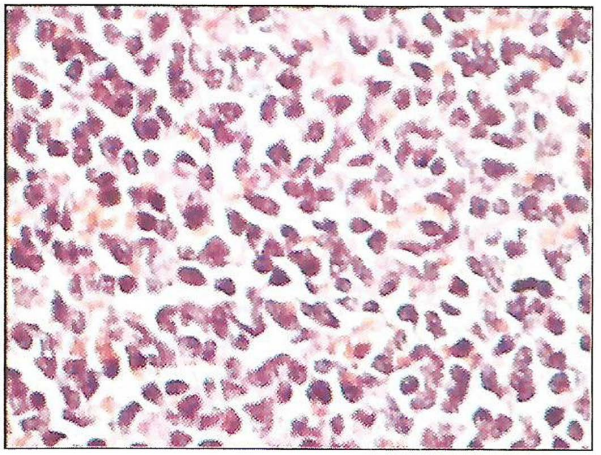

Fig. 6. Clot histology. Non-Hodgkin lymphoma. H&E. X40.

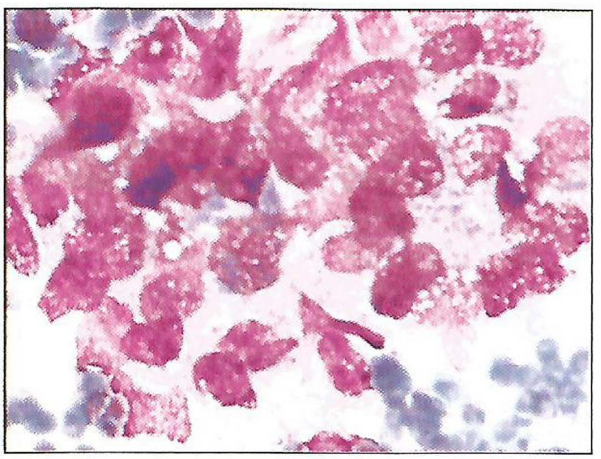

Fig. 7. FNAC ovarian mass Yolk sac tumor. Giemsa x40.

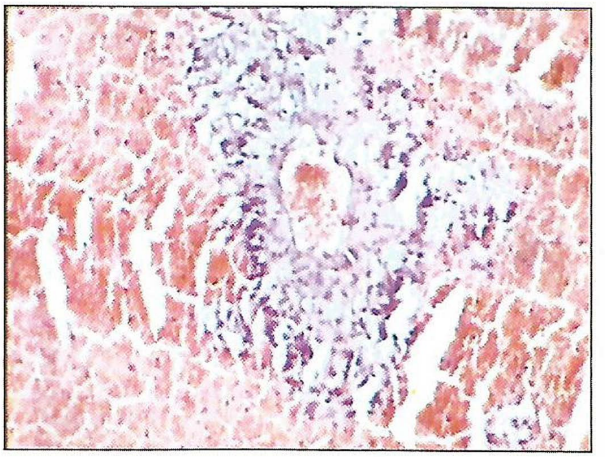

Fig. 8. Clot histology Yolk sac tumor ovary.

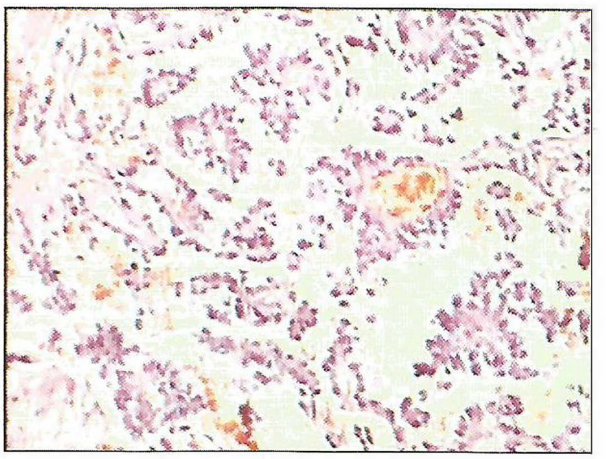

Fig. 9. Excisional biopsy Yolk sac tumour ovary.

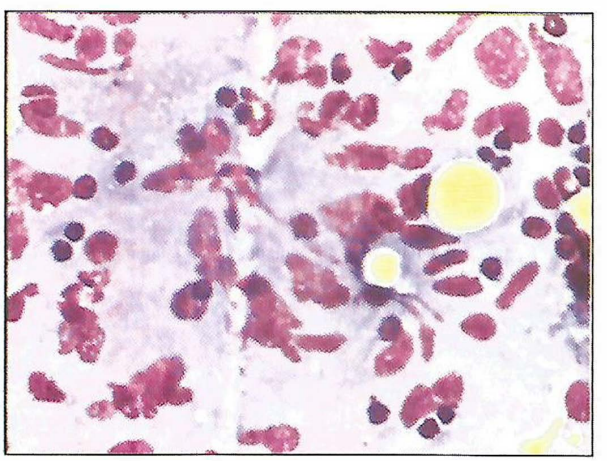

Fig. 10. Lymph node aspirate showing granuloma.

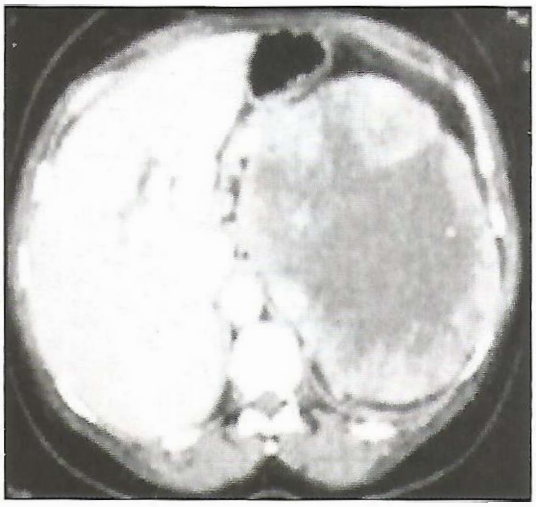

Fig. 11: CT-scan - Retroperitoneal mass.

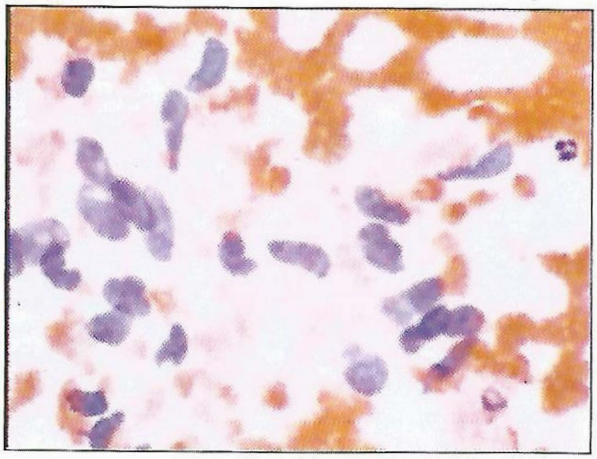

Fig. 12.FNAC Malignant spindle cell lesion. Giemsa x40.

Fig. 13. FNAC Malignant spindle cell lesion. Giemsa x40..

Table 5: Malignant retroperitoneal masses (n-13)

Tumour type	Number	Percent
Non-Hodgkin lymphoma	2	15.4%
Malignant round blue cell tumour	1	7.6%
Undifferentiated primary adrenal carcinoma	1	7.6%
Neuroblastoma	2	15.4%
Adenocarcinoma	2	15.4%
Malignant germ cell tumour	1	7.6%
Metastatic clear cell carcinoma kidney	1	7.6%
Malignant spindle cell lesion	2	15.4%
Renal cell carcinoma	1	7.6%

Table 6: Benign retroperitoneal lesions (n-3)

Type	Number	Percent
Abscess	1	33.3%
Benign spindle cell lesion	2	66.7%

DISCUSSION

Fine needle aspiration cytology is being increasingly used for diagnosis of benign and malignant lesions. It is also a valuable technique for diagnosis of solid masses. It basically depends upon obtaining a sufficient amount of material by FNAC and skillful interpretation of these aspirates by a trained pathologist. Ultrasonography and computed tomography greatly increases the yield. In our study only 7 cases were considered inadequate and only blood and blood cells were aspirated. In our series the diagnostic yield was 97.4%. Das & Pant[19] reported 78 cases of GIT lesions including 52 USG guided & 26 unguided FNAs. They concluded that there was a significant difference in the inadequacy rate between ultrasound guided FNA & non-guided FNA.

It is extremely important to diagnose a case of abdominal malignancy for patient management and treatment planning. In present study 151 liver masses were analyzed and 106 were diagnosed as malignant. In hepatic masses the main differentiation is between primary HCC and metastatic tumour. Primary HCC are generally

differentiated from metastatic carcinoma. These cases were diagnosed as malignant using the criteria laid down in a study on 203 cases of hepatic masses in 1995[14]. Features more helpful in diagnosis of HCC were the presence of sheets of malignant polygonal cells with dense or granular cytoplasm. and scattered intranuclear vacuolations. The diagnosis of metastatic adenocarcinoma was based on the presence of acinar pattern and papillary sheets of malignant epithelial cells with nuclear palisading. In present study the diagnostic yield of malignancy in hepatic masses was 72.1%, while in our study done previously in 1995[14], the diagnostic yield of malignancy was 75.8%. This higher diagnostic yield of malignancy is due to the fact that we studied 203 cases previously as compared to 147 cases of hepatic masses in present study. In our series 52 cases were diagnosed as HCC and 44 cases as metastatic adenocarcinoma with primary from GIT. Ten cases belonged to metastatic carcinoma with primary other than GIT. Gatphoh[21] studied 202 cases of liver masses and picked up 102 cases of malignancy. Thirty one cases belonged to primary HCC and 64 cases were of metastatic carcinoma. .The number of primary HCC is more in our series possibly due to higher incidence of Hepatitis B and prevailing incidence of Hepatitis C infection with or without cirrhosis. Metastatic carcinoma with primary from some where else apart from GIT were successfully diagnosed on FNAC on the basis of laid down cytological criteria for each tumour and the site of origin was confirmed by clinical correlation in most of the cases. The remaining cases other than the malignant ones were either abscesses or benign nodules. These cirrhotic nodules also give the same picture of focal mass defect. Sometimes it is difficult to differentiate well differentiated HCC from cirrhotic nodule, In this situation it is the great responsibility of the pathologist to give a correct diagnosis on which the future patient management is based. The diagnosis of non neoplastic liver disease was made by identification of swollen hepatocytes, decreased cytoplasmic basophilia with disturbance of normal regularity of liver cells and pronounced anisocytosis of hepatocytes. Presence of bile duct fragments sinusoidal endothelium and connective fibres was an added finding which if present indicates the presence of cirrhosis. Henriques et al.[22] stated that fine needle liver cytology can be used as discriminating tool in evaluation of jaundice.

Sampling of vascular lesions including hemangioma and hepatomas increase the risk of bleeding The incidence of complications is however very low[23,24]. We successfully aspirated two cases of haemangiomas with no significant complications probably because we strictly watched the policy of checking PT, APTT and platelet counts before FNAC.

In our study 32 cases of nodal masses were aspirated. Out of malignant lesions seven cases were diagnosed as NHL on the basis of monotonous population of immature lymphoid cells containing hyperchromatic nuclei, immature chromatin and nucleoli. The diagnosis of lymphoma by FNAC can at times be difficult. In case of difficulty in differentiating metastatic undifferentiated carcinoma and lymphoma reticulin stain was done on clot and possible diagnosis was made. We were able to diagnose a rare case of metastatic liposarcoma in enlarged abdominal lymph nodes. Benign lesions were labeled as reactive lymph nodes or granulomatous lymphadenitis (Fig. 10). Tuberculosis was confirmed on the basis of presence of acid fast bacilli.

In fifteen cases of retroperitoneal masses, three cases were diagnosed as malignant round blue cell tumour of childhood. The age range for these tumours was between 3-6 years. The malignant nature of sarcomas is easily picked up on FNAC and it is helpful in differentiating benign lesions from malignant ones, which cannot be readily distinguished radiologically. Out of four spindle cell lesions, two were diagnosed as malignant spindle cell lesions (Figs. 11-13). Immunostains were recommended for further classification, however possibility of leimyosarcoma was raised due to blunt ended nuclei of cells in one case. Malignant nature of spindle cell lesions was also easily picked up in liver as metastatic malignant spindle cell lesion.

Ultrasonography or computed tomography is useful in localizing a space occupying lesion in the pancreas for a biopsy by the FNA technique. FNA

biopsy is most useful in preoperative diagnosis of solid pancreatic neoplasms. Ultrasound localization of pancreatic lesions, particularly if it is small, is hindered by the presence of gas in the bowel, which is not a difficulty for CT.

Pancreatic and gall bladder masses were easily diagnosed on FNAC. In gall bladder masses three cases belonged to primary adenocarcinomas and in pancreatic masses only one case was diagnosed as malignant. These cases were confirmed histologically later on. The other cases were proved as benign. The periampullary growth and epigastric masses on the basis of acinar pattern and cellular features were diagnosed as adenocarcinomas. Further mucin stains were positive for mucin on clot histology.

In our study the accuracy rate of GIT was 100% similar to other studies on intraabdominal lumps. This high accuracy rate is due to guided technique which helps in accurate location of the lesion.

As FNAC of kidney is now a days widely accepted diagnostic technique for renal masses, whether these are cysts, abscesses or tumours[13]. In our study the single case of renal mass was easily diagnosed as renal cell carcinoma and it was confirmed afterwards on histologic examination. Ovarian mass was diagnosed as yolk sac tumour on the basis of characteristic

Schiller-Dual body and was confirmed on histologic sections. If a multidisciplinary approach can be carried out in patients with ovarian lesions, cytopathologic interpretation can provide optimum benefits.

CONCLUSION

FNAC of liver can be used as preliminary test to indicate the presence and severity of disease and will exclude malignancies. The most common indication of hepatic fine needle aspiration is a focal mass lesion, but diffuse diseases can also be diagnosed by this technique with reasonable accuracy.

FNAC has a major well defined role in the investigation of lymphadenopathy used in proper setting ,it provides a definite diagnosis in majority of the cases especially relating to recurrent malignancy or metastatic disease. FNAC can easily pickup granulomatous lesions which can be treated timely. However the usefulness of FNAC for the initial diagnosis of malignant lymphoma is limited. For a definite diagnosis and further classification biopsy is required

Virtually all organs of the retroperitoneum are accessible to fine needle for aspiration biopsy with radiologic guidance, Diagnostic aspiration of a focal mass in the pancreas, kidney, adrenal gland and retroperitoneal lymph node can establish whether the mass is benign or malignant.

In the end we conclude that FNAC is a diagnostic tool that offers minimum risk, least discomfort to patient with added advantage that multiple needle punctures can be done at one sitting at the out patient department. It can be considered as a valuable tool for identification of various intraabdominal lesions . Both ultrasonography and computed tomography can significantly increase the chances of successful aspiration and reduce the likelihood of complications in intra-abdominal procedures.

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