ORIGINAL ARTICLE

ROLE OF ULTRASOUND GUIDED FINE NEEDLE ASPIRATION CYTOLOGY IN DIAGNOSIS OF SPACE OCCUPYING LESIONS OF LIVER

Abdul Sattar, Abdul Majeed Khan*, Sadia Anjum, Abbas Naqvi**

Department of Radiology, **Department of Pathology, Nishtar Medical College & Hospital, Multan, *Department of Radiology, Mohtarama Benazir Bhutto Shaheed, Medical College, Mir Pur, Azad Kashmir, Pakistan

Background: Ultrasound guided fine needle aspiration cytology (FNAC) is a valuable technique for diagnosing benign and malignant space occupying masses of liver. It is a cost effective and safe method that can differentiate benign and malignant lesions accurately. The objective of this study was to analyse cases of radiologically guided fine needle aspiration cytology of space occupying lesions of liver. **Methods:** Ultrasound guided FNAC of liver masses was carried out on 450 admitted patients with focal lesions liver on ultrasound. Patients of all ages and both sexes were included. The study was conducted in department of Diagnostic radiology in collaboration with the Pathology Department at Nishtar Medical College & Hospital, Multan over a period of two years from August, 2009 to August, 2011. The aspirates were done by senior radiologist in Radiology Department. **Results:** Most of the aspirates were from males. Ten cases were considered inadequate. There were more malignant cases (320 cases) as compared to benign lesions (120 cases). Metastatic lesions were more common as compared to hepatocellular carcinoma (HCC); however the ratio of metastatic adenocarcinoma and primary HCC was almost equal. **Conclusion:** Ultrasound guided FNAC is a simple, quick and complication free procedure for diagnosing space occupying lesions of liver.

Keywords: FNAC, HCC, Histopathology, liver, metastasis

J Ayub Med Coll Abbottabad 2014;26(3):334–6

INTRODUCTION

Fine needle aspiration (FNA) has proven to be a very effective means of obtaining tissue from many different body sites for diagnosis. This diagnostic method was first applied to the liver as early as 1895.[1] Nowadays, this procedure is widely practised and is a cost-effective and safe method that can be employed to differentiate benign from malignant processes with accuracy rate as high as 96%.[2]

Fine needle aspiration cytology (FNAC) is used predominantly for diagnosing mass lesions when there is a question of a neoplastic process, either primary or metastatic. Occasionally, inflammatory lesions or diffuse liver disease may mimic mass-like lesions or appear as non-homogeneous regions on radiographs; such lesions also are sampled by FNA to rule out neoplasms from the differential diagnosis. The procedure, however, has not been successful in identifying diffuse liver disorders, such as hepatitis or cirrhosis.[3,4]

In most cases, the diagnosis presents no significant challenges to the pathologist. Problems tend to occur when the lesion is a very well differentiated hepatocellular process, which the pathologist must identify as benign or malignant a poorly differentiated neoplasm that arises in a patient without any other known malignancy, for which the pathologist must determine if it is a primary or metastatic lesion; or an unusual primary tumour type that could be mistaken for metastasis or hepatocellular carcinoma (HCC). [1–3]

MATERIAL AND METHODS

In this cross-sectional study, ultrasound guided FNAC of liver masses was carried out on 450 admitted patients at Nishtar Medical College and Hospital, Multan with focal liver lesions on ultrasound. Patients of all ages and both sexes were included. The consent was taken and procedure was explained to the patient

The shortest distance to target was usually selected to improve the accuracy of the needle placement. After aseptic measures and local anaesthesia 21–23 gauge lumbar puncture needle was placed in the lesion under ultrasound guidance and visualized. The needle was introduced deep until the consistency of mass was felt. Location of needle in lesion was confirmed by ultrasound. Then the stylet was removed and 10 ml syringe was attached to the needle. Negative pressure was created by retracting the piston. The needle was then moved to and fro and in various directions of the lesion to get enough material while still keeping the negative pressure. The suction was then released to prevent aspiration of specimen into the syringe and avoiding fragmentation of the cells.

The needle with the syringe was then removed; moderate amount of fresh blood, along with tissue fragments suitable for micro-histological evaluation after formalin fixation was obtained, thereby increasing the diagnostic yield.

When the aspiration was completed, the patient was reassured. 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. The residual material was secured for clot preparation. It was transferred into 10% formalin 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 analysed.

RESULTS

The total number of patients included in the study was 450 with 320 male and 130 female. Age range was between 6–80 years. Out of 450 cases, ten cases were inadequate, 120 cases were reported as benign lesions while 320 cases turned out to be malignant (Table-1).

Out of the malignant aspirates 137 cases were diagnosed as primary hepatocellular carcinoma (HCC) while 183 cases were labelled as metastatic deposits. A diagnosis of metastatic adenocarcinoma was made in 136 cases. The rest of the metastasis were primarily from malignant spindle cell tumours (9 cases), undifferentiated tumours and oat cell tumour from lung being 5 cases each in addition to some cases from other sites (Table-3). Most of the malignant lesions were found in males. Out of 120 benign aspirates majority of the cases were reported as non-specific abscess (40). The remaining cases were from liver with fatty change 33 cases, benign hepatocytes negative for malignant cells 22 cases, liver with age changes 12 cases, granulomatous and haemangioma and benign cysts 2 cases each, and one case each of hydatid cyst and adenoma with old haemorrhage

Table-1: Total number of aspirates (n=450)

Inadequate	10	2.2%
Benign	120	26.6%
Malignant	320	71.1%
Total	450	100

Table-2: Distribution of benign lesions (n=120)

Liver abscess	40	33.3%
Age related changes	12	10.0%
Fatty change	35	29.1%
Benign cysts	2	1.6%
Adenoma with old haemorrhage	1	0.8%
Granulomatous	2	1.6%
Hydatid cyst	1	0.8%
Haemangioma	2	1.6%
Benign Hepatocytes	25	20.8
Total	120	100

Table-3: Distribution of malignant lesions (n=320)

HCC	137	42.8%
Adenocarcinoma	136	42.5%
Non Hodgkin lymphoma	5	1.5%
Metastatic tumour from breast	3	0.9%
Metastatic Undifferentiated carcinoma	7	2.1%
Metastatic Sq cell carcinoma	5	1.5%
Metastatic Spindle cell tumour	9	2.8%
Metastatic Small round cell tumour	3	0.9%
Metastasis from lung	5	1.5%
Metastatic Malignant melanoma	3	0.9%
Metastatic Germ cell tumour	5	1.5%
Metastatic Liposarcoma	2	0.6%
Total	320	100

DISCUSSION

In the diagnostic workup of liver pathology the role of tissue examination is definite while the radiological and other laboratory investigations remain supportive.[5]

Fine needle aspiration cytology is economical, less invasive and fast method for diagnosis as compared to open biopsy or needle core biopsy. In addition to other advantages this ultrasound guided technique takes only half an hour and can be employed as an outpatient procedure.[6,7]

In our study ultrasound guided FNAC revealed good yield, only 10 cases were non diagnostic or inadequate. 120 cases were benign. Majority of the cases were liver abscesses. Similar results were obtained from other studies.[8,9] Fatty change was found in 31 cases and clot preparation was very helpful in making the final diagnosis. In 23 cases only benign hepatocytes were found. Cirrhotic nodules also pose a problem as differentiation of a well differentiated HCC may be difficult from cirrhotic nodule. In these cases it becomes essential to give a correct diagnosis for better patient management.

In 9 cases, age changes were found and included degenerative changes but chromatin pattern was benign although N/C ratio was altered. Other benign lesions aspirated were benign cysts, adenoma with haemorrhage, chronic granulomatous inflammation and hydatid cyst. Literature reveals metastatic disease to be more common than primary cancers of liver and liver is one of the most frequent sites of metastasis.[9,10]

In our series the incidence of metastatic disease was more common as compared to HCC similar to previous studies,[2,12] however incidence of HCC is likely to increase due to increased incidence of Hepatitis B and Hepatitis C infection in our country with or without cirrhosis.

The incidence of malignancy is more common in males as compared to females; this can be probably due to males having easy access to medical care due to our social setup.

Differentiation between metastatic adenocarcinoma and HCC was possible on the basis of

following morphological features. HCC was diagnosed on the basis of sheets of polygonal cells with dense or granular cytoplasm, scattered intra-nuclear vacuoles and prominent pink nucleoli. Presence of endothelial cells and atypical bare nuclei and tumour giant cells were supportive diagnostic features. However in making the diagnosis of metastatic adenocarcinoma, presence of acinar pattern and papillary sheets was helpful. The individual cells were less pleomorphic contained regular nuclear membrane and thin vacuolated cytoplasm. The key features are columnar cells with polar nuclei, and acinar formation. Mucin production favours metastatic adenocarcinoma but does not exclude HCC.[13,14]

Yolk sac tumour is common among the germ cell tumours of paediatric age group which presents a spectrum of cyto-morphologic features having important differences with other germ cell neoplasm, e.g., embryonal carcinoma.[15]

The neoplastic cells of ductal carcinoma of breast are generally round or oval of varying sizes and are seen singly or in clusters. The carcinoma cells possess fair amount of cytoplasm resembling HCC.

CONCLUSION

FNAC can avoid a major surgical procedure and can be done as an outpatient procedure. It is mostly complication free, fairly quick and cost effective procedure. As HCC is the most common malignancy found, clinical history, serological results and radiological findings plus FNAC along with clot preparation if available is very helpful in differentiating metastatic disease from primary HCC.

REFERENCES

1. Hassan SH, Ahmed R. Percutaneous fine needle aspiration biopsy cytology of liver. A review of 236 cases. Pak J Pathol 1991;2(1):13–5.
2. Greene CA, Suen KC. Some cytologic features of hepatocellular carcinoma as seen in fine needle aspirates. Acta Cytol 1984;28:713–8.
3. Pedio G, Landolt U, Zobeli L, Gut D. Fine needle aspiration of liver. Significance of hepatocytic naked nuclei in the diagnosis of hepatocellular carcinoma. Acta Cytol 1988;32:437–42.
4. HO CS, McLoughlin MJ, Tao LC, Blendis L, Evans WK. Guided percutaneous fine needle aspiration biopsy of liver. Cancer 1981;47:1781–5.
5. Pinto, MM, Avila NA, Hellr CL, Criscuolo EM. Fine needle aspiration of liver. Acta Cytol 1988;32:15–21.
6. Suen KC. Diagnosis of primary hepatic neoplasms by fine needle aspiration cytology. Diagn Cytopathol 1986;2:99–109.
7. Gatphoh ED, Gaytri S, Babina S, Singh AM. Fine needle aspiration of liver: a study of 202 cases. Indian J Med Sci.2003;57:22–5.
8. Rehman A, Murad S. Hepatocellular carcinoma A retrospective analysis of 118 cases. J Coll Physicians Surg Pak 2002;12:108–9
9. Afroz N, Khan N, Chana RS. Cytodiagnosis of yolk sac tumour. Indian J Pediatr 2004;71:939–42.
10. Suleman BA, Atif N, Ahmed S, Chughtai N. Analysis of 210 cases of radiologically guided FNAC of intraabdominal masses. Prceedings Shaikh Zayed Postgrad Med Inst 2004;18:35–44.
11. Hajdu SI, D'Ambrosio FG, Fields V, Lightdale CJ. Aspiration and brush cytology of the liver. Semin Diag pathol 1986;3:227–38.
12. Suleman BA, Latif A, Chughtai N, Ahmed S, Saeed M. Evaluation of ultrasound guided fine needle aspiration cytology in diagnosis of space occupying lesions of liver. Professional Med J 1995;2:276–88.
13. Ma TK, Tse MK, Tsui WM, Yuen KT. Fine needle aspiration diagnosis of angiomyolipoma of the liver using a cell block with immunohistochemical study. Acta Cytol 1994;38:257–60.
14. Tsui WM, Yuen RW, Chow LT, Tse CC. Solitary necrotic nodule of the liver: support for a parasitic origin. J Clin Pathol 1992;45:975–8.
15. Cohen MB, Haber MM, Holly EA, Ahn DK, Bottles K, Stoloff AC. Cytologic criteria to distinguish hepatocellular carcinoma from nonneoplastic liver. Am J Clin Pathol 1991;95:125–30.
16. Suen KC, Magee JF, Halparin LS, Chan NH, Greene CA. Fine needle aspiration cytology of fibrolamellar hepatocellular carcinoma. Acta Cytol 1985;29:867–72.
17. Sola Pérez J, Pérez-Guillermo M, Bas Bernal A, Mercader JM. Hepatoblastoma. An attempt to apply histologic classification to aspirates obtained by fine needle aspiration cytology. Acta Cytol 1994;38:175–82.
18. Bottles K, Cohen MB, Holly EA, Chiu SH, Abele JS, Cello JP, *et al.* A step-wise logistic regression analysis of hepatocellular carcinoma. An aspiration biopsy study. Cancer 1988;62:558–63.
19. Leong AS, Sormunen RT, Tsui WMS, Liew CT. Hep Par 1 and selected antibodies in the immunohistochemical distinction of hepatocellular carcinoma from cholangiocarcinoma, combined tumours and metastatic carcinoma. Histopathology 1998;33:318–24.

Address for Correspondence:

Dr Abdul Sattar, Associate Professor, Department of Radiology, Nishtar Medical College and Hospital, Multan, Pakistan.
Cell: +92-333-4354512
Email: drasanjum@gmail.com