

Key Role of Image Guided Fine Needle Aspiration Cytology in Diagnosing Intra-Abdominal Lesions

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ABSTRACT

Background: Masses in the abdominal cavity are often deep, non-palpable and palpable at times which can be inflammatory, benign or malignant. With increased sophistication of radiologic imaging techniques these deep seated lesions are detected more frequently and confirmed tissue diagnosis is essential for both planning of treatment and staging in case of malignant lesions. Image guided aspiration is an effective way to obtain diagnostic material and avoid diagnostic laparotomy. This study was conducted to categorize various intra-abdominal lesions according to their site of involvement, study their cytomorphological features, and classify them as benign, malignant and inflammatory and assess the utility of image-guided cytology in the diagnosis of intra-abdominal lesions.

Methods: This cross sectional study approved was done on image guided fine needle aspiration cytology smears of intra-abdominal masses. Age, sex and site details were retrieved from the archives. Hematoxylin and Eosin stained smears were reviewed by the Cytopathologist and diagnosis was arrived at after correlating with clinical and radiological data. Core biopsy or excision biopsy of the available cases were also reviewed and checked for correlation.

Result: A total of 120 cases were studied with age ranging from 18-81years, 30% of patients were in the 61-70 years age group, followed by 27% cases in 51-60 years age group and 20% cases in 41-50 years age group. The male to female ratio was 1.03:1. 62.5% of cases were from hepatobiliary region, followed by 17.5% cases from pancreatic masses and 11 cases (9.16%) from ovarian masses. 80% cases were malignant, 10% were inflammatory cases, 9.2% cases were inconclusive and 1 (0.8%) benign lesion. Among the malignant lesions primary malignancies (Hepatocellular carcinomas and Adenocarcinomas) were more common than secondary deposits. This study showed 88.9% sensitivity, 83.3% specificity and 87.5% of diagnostic accuracy.

Conclusion: Image guided aspiration of intra-abdominal lesion is a simple, economical, less complicated and less time consuming procedure that differentiates between malignant and non malignant conditions with high accuracy and can be used as pre-operative diagnostic procedure for planning further management of patient.

Keywords: *Intra-Abdominal, Image Guided Aspiration, Hepatocellular Carcinoma, Pancreatic Masses, Ovarian Masses*

Introduction

Fine needle aspiration cytology (FNAC) is a simple, rapid, and cost effective method of investigating a superficial palpable mass which requires little additional resources and carries insignificant morbidity.¹ Masses arising in the abdominal cavity are often deep, non-palpable and palpable at times. These lesions can be inflammatory, benign or malignant.^{2,3}

With increased sophistication of radiologic imaging techniques these deep seated lesions are detected more frequently, but imaging techniques does not always distinguish between malignant and benign lesions morphologically. A confirmed tissue diagnosis is essential for both planning of treatment and staging in case of malignant lesions. Image guided, either ultrasound (USG) or Computed tomography (CT) guided FNAC is an effective way to obtain diagnostic material.⁴

At times it may not be possible to give a specific diagnosis, but cytological patterns will suggest some clue and help in further planning for the benefit of patients.¹

This study was conducted to categorize various intra-abdominal lesions according to their site of involvement, study their cytomorphological features, and classify them as benign, malignant and inflammatory and assess the utility of image-guided cytology in the diagnosis of intra-abdominal lesions.

Materials and Methods

This is a cross sectional study approved by institutional ethical committee on image guided fine needle aspiration cytology smears of intra-abdominal masses received during the period of July 2015 to July 2019 at Department of Pathology.

Age, sex and site details were retrieved from the FNAC requisition forms. FNAC smears were stained with hematoxylin and eosin, reviewed by the pathologist and diagnosis was arrived at after correlating with clinical and radiological data. Core biopsy or excision biopsy of the available cases were also reviewed and checked for correlation.

Hemorrhagic aspirates or smears where yield was not enough to arrive at a diagnosis were considered inconclusive cases.

Results

In the present study, a total of 120 patients who underwent image guided FNAC for intra-abdominal lesions were studied. Age ranged from 18-81 years and 36 cases (30%) of patients were in the age group of 61-70 years followed by 33 cases (27%) in 51-60 years age group and 23 cases (20%) were in 41-50 years age group. There was a slight male predominance with male to female ratio of 1.03:1.

Of 120 cases, a majority of 75 cases (62.5%) were from hepatobiliary region, followed by 21 cases (17.5%) of pancreatic masses and 9.16% cases of ovarian masses (Table 1).

According to cytomorphology, most of the lesions i.e, 96 cases (80%) were malignant, followed by 12 (10%) inflammatory cases, 11 (9.2%) inconclusive and 0.8% was benign lesion (Table 2).

Among the total 96 malignant lesions, 62 cases showed lesion in the hepatobiliary region, of which, 34 cases were primary carcinomas (figure 1) and 28 cases were secondary metastatic deposits. Secondary deposits included adenocarcinoma (figure 2), squamous cell carcinoma (figure 3) and neuroendocrine carcinoma from known cases of malignancy in digestive tract and lungs. Malignant lesions in liver were more common in males.

Among the 12 cases of inflammatory lesions, 7 cases were of hepatic abscesses, 2 cases were renal abscess, 1 case was empyema of gallbladder, 1 case was abscess in iliac fossa and 1 case in epigastric fossa was reported as nonspecific inflammation.

Among the 4 gallbladder FNAC cases, 3 were Mucin secreting Adenocarcinoma, 1 non mucin secreting adenocarcinoma (figure 4) and 1 case was empyema of gall bladder.

Among the 21 pancreatic FNAC cases, adenocarcinoma (figure 5) was the most common lesion. Among the 11 ovarian aspirations, 3 cases were papillary adenocarcinomas (figure 6), 3 cases were germ cell tumours, 1 case of Krukenberg tumor and 1 case was a benign neoplasm.

11 cases of intra-abdominal masses FNACs were inconclusive, 5 from liver, 3 from ovary, 2 from lymphnodes and 1 from pancreas.

Histopathological correlation was present in 24 cases out of 120 with sensitivity of 88.9%, specificity 83.3% and diagnostic accuracy of 87.5%.

Table 1: Site wise distribution of Image guided FNAC of Intra-abdominal lesions.

Site	Number of cases	Percentage(%)
Liver & Gall bladder	75	62.5
Pancreas	21	17.5
Ovary	11	9.2
Kidney	3	2.5
Lymphnodes	3	2.5
Omentum	2	1.7
Iliac Fossa	2	1.7
GIT	1	0.8
Retroperitoneum	1	0.8
Epigastric region	1	0.8
Total	120	100

Table 2: Nature of lesions of Image guided FNAC of Intra-abdominal Masses:

Nature	No.of patients	Percentage
Inflammatory	12	10
Neoplastic		
1. Benign	1	0.8
2. Malignant	96	80
a. Primary	63	52.5
b. Secondary	33	27.5
Inconclusive	11	9.2
Total	120	100

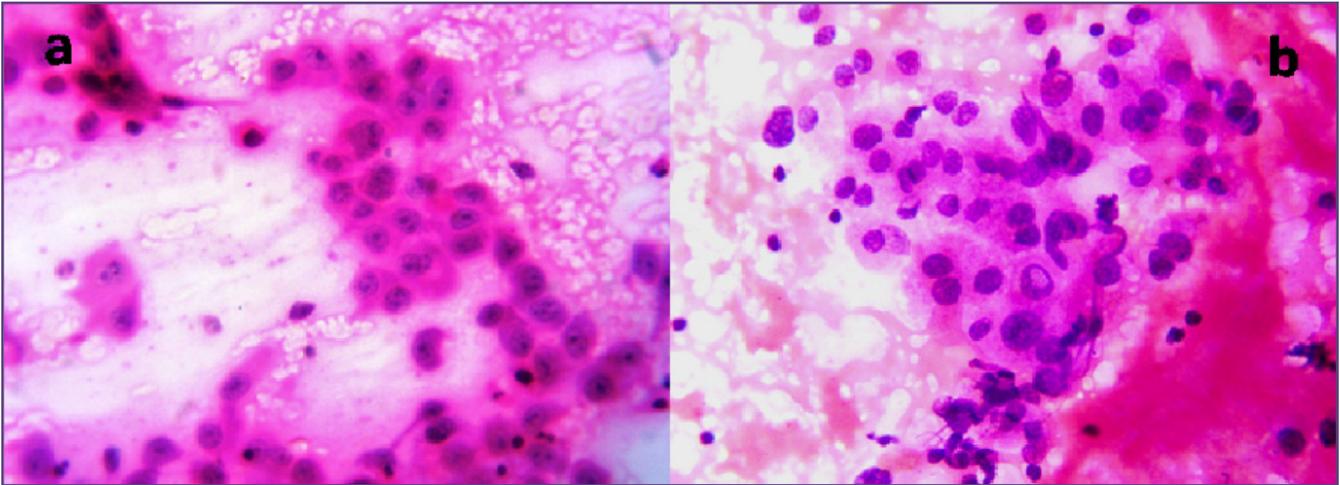


Fig. 1: Hepatocellular carcinoma: Sheets and trabeculae of malignant cells with abundant eosinophilic cytoplasm, increased nucleocytoplasmic ratio, prominent nucleoli and intranuclear inclusions, Hematoxylin & eosin, a. x100, b. x400.

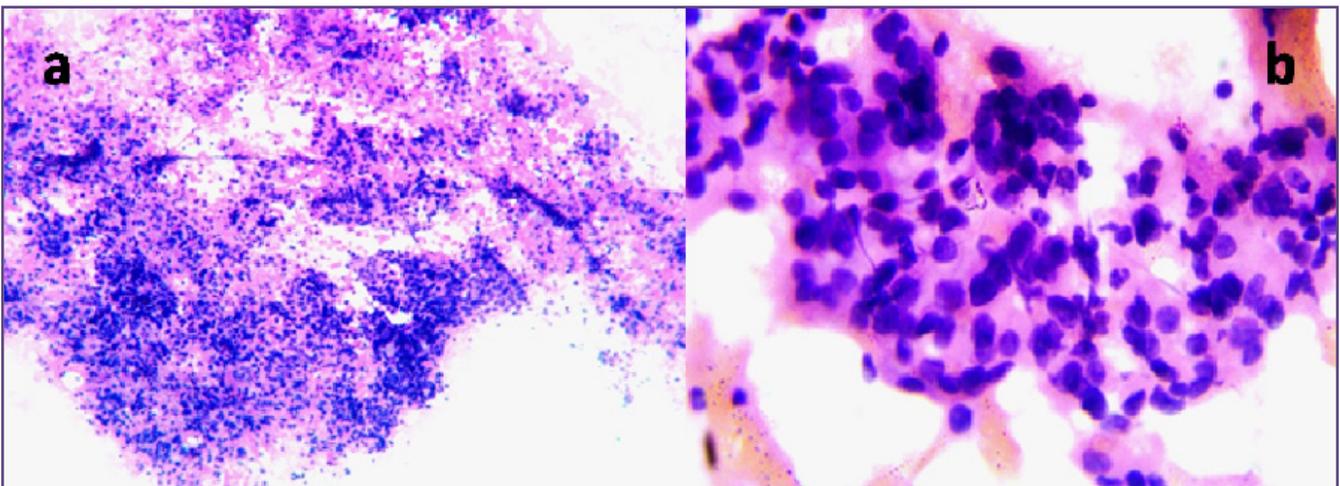


Fig. 2: Adenocarcinoma deposits: Sheets of malignant epithelial cells in gland pattern, Hematoxylin & eosin, a. x100, b. x400.

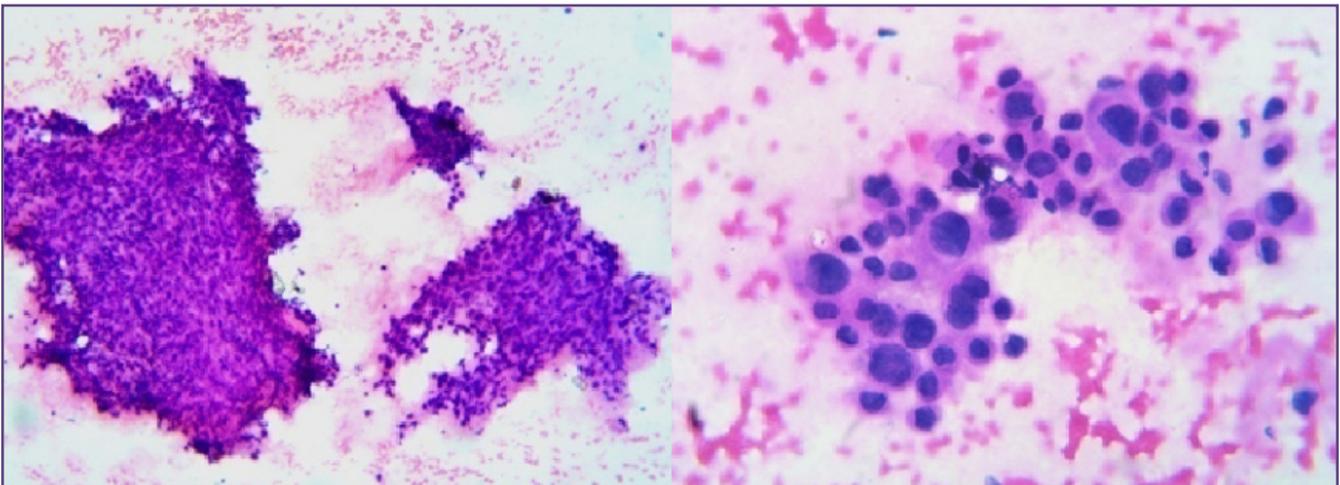


Fig. 3: Squamous cell carcinoma deposits: Sheets of malignant squamoid cells against necrohemorrhagic background, Hematoxylin & eosin, a. x100, b. x400.

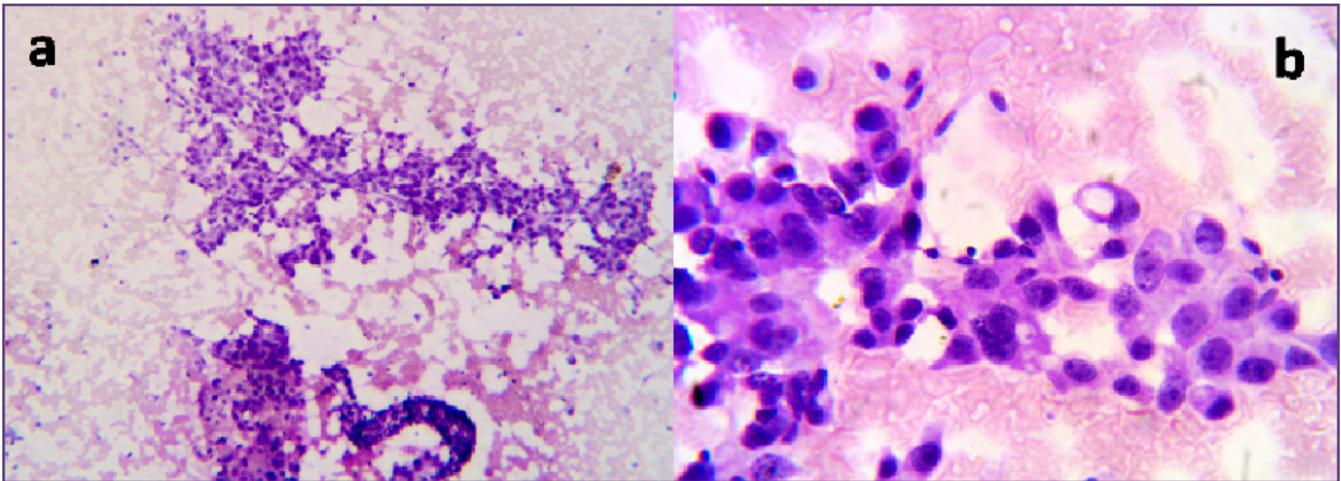


Fig. 4: Adenocarcinoma of gallbladder: Sheets of malignant epithelial cells in papillary and glandular pattern with atypical glandular cells showing large hyperchromatic nuclei; prominent nucleoli, Hematoxylin & eosin, a. x100, b. x400.

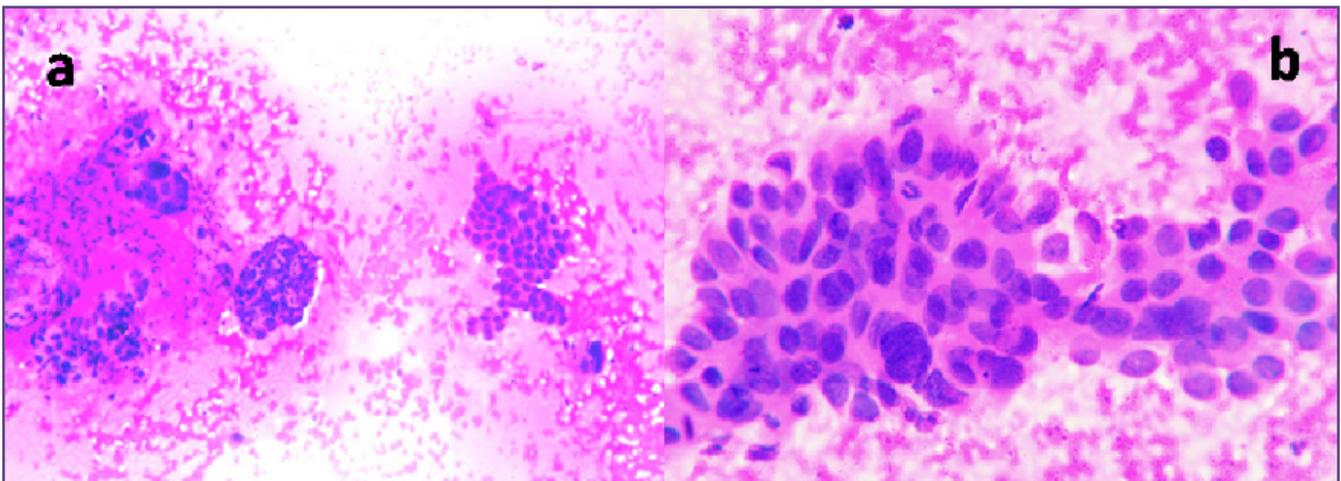


Fig. 5: Pancreatic adenocarcinoma: Sheets of malignant epithelial cells in ductal pattern with hyperchromasia, anisonucleosis against necrohemorrhagic background, Hematoxylin & eosin, a. x100, b. x400.

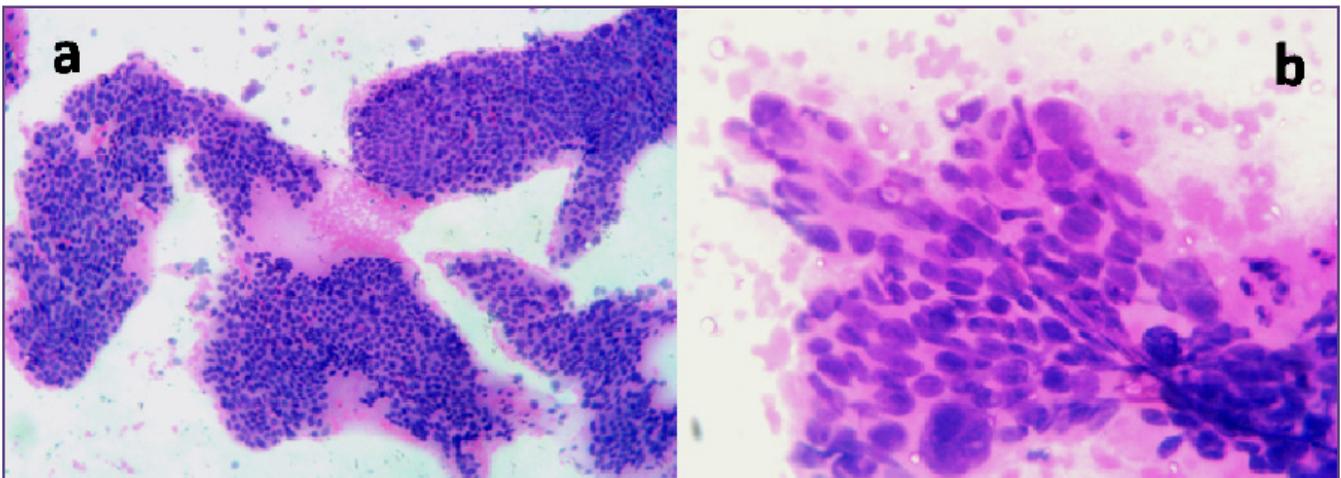


Fig. 6: Serous papillary adenocarcinoma of ovary: Sheets of malignant epithelial cells in papillary pattern with atypical glandular cells showing large overlapping nuclei; prominent Nucleoli, Hematoxylin & eosin, a. x100, b. x400.

Discussion

Abdominal masses are a clinical enigma and have always been a dilemma for the surgeon. Differentiation between non-malignant and malignant lesions is vital to plan management, especially in advanced unresectable malignant cases where exploratory laparotomy has to be avoided.⁵

Image guided FNAC of intra-abdominal lesions has facilitated easy collection of cellular material for rapid and accurate diagnosis in deep seated lesions with low complication rate.⁴

In the present study, out of 120 cases, satisfactory yield to arrive at a probable cytological diagnosis was seen in 109 cases and in 11 cases (9.16%), yield was inadequate to arrive at any diagnosis resulting in diagnostic yield of 90.84% similar to Tasleem et al⁶ and Chetal et al¹. In contrast, a slight lower diagnostic yield of 84.5% was reported by Dosi et al³.

In the present study of 120 cases, age ranged from 18-81 years with a mean of 59.7 years slightly higher than studies done by Dosi et al (52years)³, Rahul et al (48.4years)², Tasleem et al (51.05years)⁶ and Sidhalingreddy et al (45.16years)⁷. A majority of 36 cases (30%) were noted in 61-70 year age group followed by 33 cases (27%) in 51-60 years and 23 cases (20%) in 41-50 years age group. Similarly, studies done by B S Sumana et al⁵, Tasleem et al⁶ and Momota et al⁸ reported most common age group as 41-60 years. In contrast to the present study, Dosi et al³ reported maximum number of patients in 51-60 year age group followed by 61-70 years.

The male to female ratio was 1.03:1 similar to study done by Dosi et al³, Rahul et al² and Momota et al⁸. In contrast, a study done by Chetal et al¹ reported female predominance.

In this study, Hepatobiliary system, Liver and gall bladder were the most common sites (62.5%) similar to studies done by Dosi et al³, Chetal et al¹, Rahul et al² and Tasleem et al⁶. In contrast, a study done by Hemalatha et al⁹ reported uterus and ovary to be the most common site of image guided FNAC.

In the present study, next common sites of guided FNAC were pancreas 17.5% and ovary 9.16% similar to Parajuli et al⁴. In contrast, ovary followed by pancreas was reported by Dosi et al³ and Chetal et al¹. The second most common site following hepatobiliary system was intestines in a study done by Rahul et al².

Of the total 120 cases, a maximum of 96 cases (80%) were malignant followed by inflammatory 12 cases

(10%). Similar to the present study, malignant lesions were reported to be more common than inflammatory and benign lesions in studies done by Tasleem et al⁶, Dosi et al³, Chetal et al¹, Bolde et al¹⁰ and Ahmed et al¹¹.

Among the 96 malignant lesions, primary malignant lesions (63/120 cases, 52.5%) were more common than secondary metastatic tumors (33/120, 27.5%) similar to Sidhalingreddy et al⁷, Parajuli et al⁴ and Tasleem et al⁶, but in contrast Chetal et al¹ and Dosi et al³ reported secondary malignant lesions to be more common than primary malignant lesions.

Among the 75 hepatobiliary lesions in the present study, majority were primary Hepatocellular carcinoma followed by metastatic carcinomatous deposits in liver similar to studies done by Adhikari et al¹², Sidhalingreddy et al⁷, Satish et al¹³ and Parajuli et al⁴. In contrast, metastatic deposits in liver were reported to be more common in studies done by Tasleem et al⁶, Dosi et al³, Verma et al¹⁴ and Tailor et al¹⁵.

Both primary and secondary malignant lesions in liver were more common in males similar to results reported by Sidhalingreddy et al⁷ and Tailor et al¹⁵. Majority of primary Hepatocellular carcinoma cases were seen in 61-80 years age group in contrast to Sidhalingreddy et al⁷ who reported 41-60 years age group to be the most common age group.

Among the 4 gallbladder FNAC cases 3 were Mucin secreting Adenocarcinoma, 1 non mucin secreting adenocarcinoma (figure 4) and 1 case was empyema of gall bladder. Similar results were reported by Tasleem et al⁶, Sidhalingreddy et al⁷ and Dosi et al³. Among the 21 pancreatic FNAC cases, adenocarcinoma was the most common lesion concordant to studies done by Sidhalingreddy et al⁷, Dosi et al³ and Parajuli et al⁴. Cystic lesions of pancreas were reported by Tasleem et al⁶ and Momota et al⁸ in their study. No cystic lesions of pancreas were noted in the present study.

Among the 11 ovarian aspirations, 3 cases were papillary adenocarcinomas, 3 cases were germ cell tumours, 1 case of Krukenberg tumor and 1 case was benign neoplasm similar to results reported by Tasleem et al⁶ and Momota et al⁸. Benign cysts were more common in studies done by Dosi et al³ and Sidhalingreddy et al⁷. In the present study, doubtful ovarian tumors with complex architecture on imaging were only aspirated to confirm diagnosis, which explains the increased frequency of malignancy. Krukenberg tumor diagnosis was done in one patient as there was a past history of Gastric carcinoma in the patient and all the radiological features were consistent with the diagnosis.

There were 11 inconclusive cases in this study, 5 in liver, 2 cases turned out to be malignant on core needle biopsies; other 3 cases had no histopathological correlation. 3 cases in ovary were inconclusive, out of which, two were benign mucinous cystadenoma and one was fibroma. 2 inconclusive cases in lymphnodes and 1 case in pancreas were noted where histopathological correlation was not present.

Among all 120 cases, 24 cases had histopathological correlation and the sensitivity for image guided FNAC in the present study was 88.9% and specificity was 83.3%. The sensitivity in other studies ranged from 71.4% to 96.3%.⁷ Specificity has been reported to be as low as 55.6% by Govind et al¹⁶ to 100% in many studies like Rahul et al², Sidhalingreddy et al⁷ and Hemalatha et al⁹. In this study, diagnostic accuracy was 87.5% similar to Nautiyal et al¹⁷ and slightly higher accuracy was reported by Rahul et al (97.14%)², Hemalatha et al (96.3%)⁹, Sidhalingreddy et al (96.5%)⁷, Shamshad et al¹⁸ and Chetal et al (93.75%)¹.

Conclusion

In the present study we found that image guided fine needle aspiration cytology is quite effective in intra-abdominal masses. It is simple, economical, less complicated and less time consuming procedure to differentiate between malignant and non malignant intra-abdominal lesions. FNAC is the diagnostic procedure of choice for hepatic masses, pancreatic masses and ovarian masses, when performed by an experienced radiologist and when interpreted by an experienced cytopathologist, the accuracy is quite high and helps the clinician in planning further management of the patient.

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Competing Interests

Nil

References

- Chetal. SM. Study of Image Guided FNAC in Intra abdominal Mass Lesions at tertiary care hospital, Jamnagar, Gujarat, India. *Indian Journal of Basic and Applied Medical Research* 2016;6:40-51.
- Satarkar R, Tembhare P, Shastry S. Role of Ultrasound guided fine needle aspiration cytology in the diagnosis of abdominal-pelvic lumps. *Perspectives in Medical Research* 2019;7:49-54.
- Dosi S, Gupta G, Kawatra M, Chakrabarti PR, Agarwal P, Jain M R. Role of radiological assisted cytology in intra abdominal lesions: A 3 years experience in a tertiary care center. *International Journal of Applied an Basic Medical Research* 2016;6:101-105.
- Parajuli S, Tuladhar A, Basnet RB. Ultrasound and computed tomography guided fine needle aspiration cytology in diagnosing intra-abdominal and intra-thoracic lesions. *Journal of Pathology of Nepal* 2011;1:17-21.
- Sumana BS, Muniyappa B. Ultrasound Guided FNAC and Cell Block in diagnosis of Intra-Abdominal Masses. *Journal of Clinical and Diagnostic Research* 2015;9:EC08-EC12.
- Reyaz TA, Summyia F, Isma N, Nazia B, Adil S, Sameena K, Humaira B, Naila N, Ambreen B. USG guided fine needle aspiration cytology of intra-abdominal and pelvic masses in Kashmir: A study at tertiary care hospital. *International journal of medical research & health sciences* 2016.1;5:169-75.
- Sidhalingreddy, Andola SK. Fine Needle Aspiration Cytology of intra abdominal lesions. *Journal of Clinical and Diagnostic Research* 2011;5:551-58.
- Naiding M, Goswami A and Singh S. Role of USG guided fnac in diagnosis of intra-abdominal and intrapelvic masses. *Int. J. Adv. Res* 2017;5:222-233.
- Hemalatha AL, Sumana S V, Sushma S, Suma JK, Varna I, Anubha Aditya. Ultrasound guided fnac of abdominal-pelvic masses-the pathologists' perspective. *J Clin Diagn Res* 2013;7:273-277
- Bolde SA, Pudale SS, Shette SS, Raut A, Kole N. Correlative Study of fine needle aspiration cytology and histopathology in intra abdominal lumps. *International Journal of Recent Trends in Science and Technology* 2014;13:01-04.
- Ahmad SS, Akhtar K, Akthar S, Abrari A, Nasir A, Khalid M ,et al .Ultrasound guided fine needle aspiration biopsy of abdominal masses. *JK Sci* 2006;8:2004.
- Adhikari RC, Tuladhar A, Shreshta S, Sharma SK. Deep seated thoracic and abdominal lesions: Usefulness of ultrasound guided fine needle aspiration cytology, A 3 year experience. *Nepal Med Coll J* 2010;12:20-5.
- Kumar S, Sinha R K, Dwivedi R K, Singh R V N, Bariar N K. Analysis of 100 Cases of USG guided Fine Needle Aspiration Cytology of Intra-abdominal Masses in Bihar: A Study at Tertiary Care Hospital. *IOSR-JDMS* 2019;18:48-54.
- Verma N, Neetu Sharma SP, Singh P, Kumar A. Role of ultrasound guided fine needle aspiration cytology of right hypochondrial masses. *Int J Res Med Sci* 2017;5:5312-5.
- Tailor S B, Kothari D C. Ultrasound guided fine needle aspiration cytology of liver lesions: A prospective study. *International journal of scientific study* 2016;3:249-253.
- Govind Krishna SR., Ananthakrishanan N., Narasimhan R., Veliath AJ. Accuracy of Fine Needle Aspiration Cytology of Abdominal Masses without Radiological Guidance. *Indian J. Pathol. Microbiol.* 1993; 36(4):442-52.

17. Nautiyal S, Mishra RK, Sharma SP. Routine and Ultrasound guided FNAC of intra abdominal lumps- A comparative study. J Cytol 2004;2:129-32.
18. S. Shamshad A, Kafil A, S. Shakeel A et al. Ultrasound guided fine needle aspiration biopsy of abdominal masses. JK Science. 2006; 8 (4): 200-204.

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