

Original Research Article

Role of guided fine needle aspiration cytology (FNAC) in the diagnosis of abdominal masses

Manoj Kumar Dokania¹, Devadatta Poddar^{1*}, Milind Alokjee¹, Rushikesh Rathod¹, Sushmita Kumari¹

¹Dept. of General Surgery, ABVIMS & Dr. RML Hospital, New Delhi, India

Abstract

Introduction: FNAC after getting popularity in Scandinavia in early 1970, spread to the world. It is a safe and effective technique for diagnosis of intra-abdominal mass before definitive treatment. When added with image guided techniques (CT/USG), its efficacy increases manifold.

Material and Methods: This prospective study was conducted in medical college and hospital over one and half years, fifty subjects with clinically or sonologically detected intra-abdominal lumps were included in the study. Ultrasound guided FNAC was performed on each of them and finally results were compared with Histopathological results of the specimen.

Results: Total 50 patients with abdominal mass/lump were included in the study. 32% patients were in 51 – 60 years age and 60% were female patients. Right hypochondrium (44%) was the most common site of lump followed by epigastric region. Satisfactory smears could be made in 43(86%) cases after FNAC. 64% lump turned out to be malignant and 36% were benign. The complications of FNAC were pain and discomfort (14%), post aspiration bleeding (4%), and transient hypotension noted in 2% of cases. The sensitivity and specificity for malignant lesion was 90.32% and 100% respectively. For benign lesion sensitivity was 83.33% and specificity was 100%. Accuracy of cytological diagnosis by FNAC was 86% when compared to histopathological diagnosis.

Conclusion: FNAC when guided by imaging modality is a useful investigation for diagnosis. Its specificity is 100% for benign as well as malignant lesion. Its Sensitivity for malignant lesion is 90.32%, whereas for benign lesion was 83.3%. FNAC is found to be safe and simple.

Keywords: USG, FNAC, Intra-abdominal mass.

Received: 20-12-2024; **Accepted:** 04-11-2025; **Available Online:** 11-12-2025

This is an Open Access (OA) journal, and articles are distributed under the terms of the [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/) which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprint@ipinnovative.com

1. Introduction

Abdomen is a Pandora's box, hidden inside which are an array of pathologies. It's common in OPD that patients present with abdominal lump, the nature of which is not known till we achieve tissue diagnosis. On many occasions, patients present with abdominal symptoms and intra-abdominal masses are detected during course of imaging. These lesions are not clinically palpable. To plan the treatment; to understand the origin and nature of the lump - benign or malignant; tissue diagnosis is imminent.

Fine Needle Aspiration Cytology (FNAC), traces its invention in 1970 in Scandinavia and has proved to be a blessing for such patients, especially when done under imaging guidance (USG) or CT wherein its sensitivity and

specificity increases manifold. A better diagnosis and proper treatment plan can hence be made for such patients.

FNAC is a safe and effective technique and can fetch cyto-histological diagnosis. Image guided FNAC is an ideal combination of two procedures. USG as imaging modality is a quick, cost-effective and free of radiation hazards, and FNA provides cellular smear for cyto-histological diagnosis. This study is taken up with intent to see if USG guided FNAC can be adapted as a routine method for tissue diagnosis without causing any morbidity/ risk to the patient.

2. Aims and Objectives

Aim of the study is to see the sensitivity and specificity of USG guided FNAC in the diagnosis of abdominal lump (palpable and non-palpable) and to compare the result with

*Corresponding author: Devadatta Poddar
 Email: devadattap@gmail.com

Histopathological diagnosis. Also, to see the demographic profile, location, and nature of the lumps (benign/malignant/inflammatory).

Secondary objectives of the study are to see feasibility and complications of the procedure.

3. Materials and Methods

This study was conducted in a tertiary care centre, Medical college & hospital at Patna for a period of 18 months. A total of fifty subjects were included in this study.

All patients presenting with doubtful diagnosis for intra-abdominal palpable lumps or imaging detected intra-abdominal mass were included in this study. The aim was to get a tissue diagnosis for further treatment planning of the patient. Whenever possible the result of the FNAC was compared with the tissue diagnosis if definitive surgery completed.

Patient with known or suspected pheochromocytoma and hemophiliac pseudo tumor were excluded from the study. The study design was evaluated and passed by ethical committee of the institute. Proper consent is taken before the procedure.

All procedures were carried out in imaging room with pathologist standing by to collect the smear and stain it. Spinal needle 22-24 gauge used. A "Free hand" technique (Bret et al 1982, Livraghi 1984) was used for collecting sample.^{1,2}

Patient is asked to hold the breath and under USG guidance needle is passed in the lesion. Patient was allowed to breathe normally thereafter. Patient is requested for short breath hold when 5-6 punctures along with suction over the plunger used to collect the material. After taking sample over the needle smear is made quickly, checked and transferred to the department of pathology for processing and final results. After FNA all patients were observed for six hours to look for any complications. The result of FNA was used for planning of treatment and whenever possible the results of the FNA were compared with final tissue HPE reports.

Statistical analysis was done to look for overall accuracy, sensitivity and specificity and predictive value of positive and negative results. Demography of the patient population, nature of pathology (Benign, malignant, infective), organ or tissue of origin etc. noted. Patients were followed up during their course of treatment.

4. Results

Study consists of observations made on 50 patients of intra-abdominal masses on whom US/CT guided FNA was performed for subsequent HPE and diagnosis.

Out of total 50 patients 30 patients were female and 20 were male. **Table 1** shows distribution of the patients with intra - abdominal mass in male and female groups.

Table 1: Sex distribution in different age groups

Age groups in years	Male		Female	
	No. of Cases	Percentage	No. of Cases	Percentage
Upto 10	1	2	1	2
11-20	2	4	2	4
21-30	2	4	3	6
31-40	3	6	5	10
41-50	3	6	7	14
51-60	7	14	9	18
61 & above	2	4	3	6
Total	20	40	30	60

Among total observed age groups, 51-60 yrs age group showed maximum number of cases, 7cases (14%) in male and 9 cases (18%) in females this is followed by 41-50 yrs age group with 3 cases in male (6%) and 7 cases in female (14%).

Table 2, shows sites of abdominal masses in different quadrants of abdomen in which aspiration were done.

Table 2: Sites of abdominal masses in different quadrants of abdomen in which aspiration were done

Quadrants	No. of Masses Aspirated	Percentage (%)
Right hypochondrium	22	44
Epigastrium	12	24
Right iliac fossa	5	10
Hypogastrum	3	6
Left iliac fossa	2	4
Umbilical	3	6
Right lumbar	1	2
Left lumbar	1	2
Left hypochondrium	1	2
Total	50	100

As shown, maximum lesions were present in the right hypochondrium region i.e. 22 cases (44%) followed by epigastrium 12 cases (24%). This result is in direct association with the organ of origin of the lesion which is recorded in our study; with maximum cases having pathologies associated with liver – 19 cases; followed by Gall bladder which accounted for 14 cases. Yield of FNAC from different organ origin which is calculated by number of usable aspirates from total number of procedures performed is mentioned in **Table 3**.

Table 3: Yield of FNAC from different organs of origin

Sites	No. of Procedure	No.(%) of usable
Liver	19	17
Gall bladder	15	13
Pancreas	4	4
Stomach	1	1
Renal	3	3
Retroperitoneal	2	2
Mesenteric nodes	1	1
Large intestine	2	2
Ovary	3	3
Total	50	46

Maximum lesions have a hard consistency (58%) as recorded by USG. **Figure 1** shows result for the same. The accuracy of FNAC in the diagnosis of intraabdominal

masses is 86%. Exploratory laparotomy done in 7 cases in whom Cytological diagnosis could not be done. **Table 4**, shows the comparative study of Cytological and Histological diagnosis for malignant and benign intra-abdominal lesions.

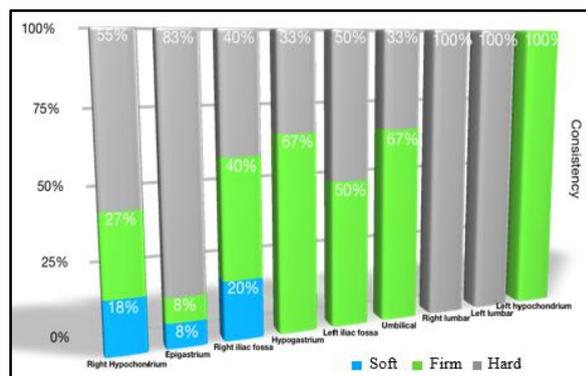


Figure 1: Consistency of different Lesions on USG

Table 4: Yield of FNAC from different organs of origin

Nature of lumps	Histological diagnosis	Cytological Diagnosis		Percentage accuracy of cytological diagnosis
		No. of cases diagnosed by Cytology	No. of cases could not be diagnosed by Cytology	
Malignant	32	28	4	87.5%
Benign and others	18	15	3	83.33%
Total	50	43	7	86

Table 5: Shows complications associated with FNAC.

Complications	No of cases	Percentage
Pain and Discomfort	7	14
Post aspiration bleeding	2	4
Transient hypotension	1	2
Needle tract implantation	Nil	0
Infection/ Sepsis/ peritonitis	1	2
Inadvertent injury to adjacent structure	Nil	0
Any other major complications	Nil	0
Total	11	22

Table 6: Shows sensitivity of FNA in malignant and benign masses as 90.32% and 83.33% with specificity of 100% in both the masses

	Malignant Masses	Benign Masses
Sensitivity	90.32%	83.33%
Specificity	100%	100%

Table 7: Outcome variables for guided FNA

Results of FNAC procedure		No. of cases	Percentage
Correct Diagnosis	Total		86
	True positive (malignant)	28	56
	True negative (non- malignant)	15	30
Incorrect Diagnosis	Total		14
	False negative	3	6
	False positive	-	-
	No opinion (cytologically)	4	8
		50	100

No major complications are encountered during or post procedure. 7 patients (14%) had mild discomfort and pain. Post aspiration bleeding was present in 2 cases (4%).

5. Discussion

FNAC, currently, is routinely used as a preoperative diagnostic tool. The use of USG guidance for needle placement allows aspiration of representative specimen for precise Cytological diagnosis. Opinions vary from almost total rejection to enthusiastic acceptance depending upon correct use of technique and Cytological examination by experienced cytopathologist. USG / CT guided FNA procedure involves the presence of both radiologist and pathologist thereby facilitating clinical correlation and appropriate handling and allocation of aspiration material for routine and ancillary tests.

The present study was carried out on 50 patients of intra-abdominal masses to ascertain diagnosis of different lesions by aspiration cytology under CT/ USG guidance. The results of Histocytological study were compared with Cytological diagnosis to ascertain clinical diagnosis and to determine its accuracy.

In our study FNAC was done in all age groups. Patient in 6th decade had higher incidence of intra-abdominal mass (32%) as compared to young patients (4% in 1st decade of life). This results are similar to study conducted by Zornoza et al in 1977 over 109 patients, a study conducted by Porter et al in 1981 in FNA was done in 145 patients and Montal et al 1982 which included study on 126 patients, which is in conformity with that of the observation made in present study.^{3,4}

Intra-abdominal masses may be found in any of the 9 quadrants of abdomen. In our study maximum of (44%) masses were in right hypochondrium followed by epigastrium (24%). Thus cumulative 68% masses located in RHC and epigastric region. This corresponds to the maximum number of cases having liver (19 cases) followed by gall bladder (15 cases) and pancreas (4 cases) as an organ of origin. The results were similar to study conducted by Ennis et al (1980), aspiration from over 38 cases of intra-abdominal masses showed liver (18 cases), pancreas (5 cases), and gall bladder (1 case) as an organ of origin.⁵ A study by Porter et al (1981) aspirated 145 lumps organ of origin as liver (40), Pancreas (57) and Kidney (28).⁴

In this study, maximum number of intra-abdominal lump subjected to FNAC, were arising from the liver 14 cases (28%); of which 4 (28.6%) were hepatomas and 10 (71.4%) were secondary deposits. This was followed by gall bladder carcinoma 6 cases (12%), Pancreatic carcinoma 3 (6%), Carcinoma ovary 2 (4%), Wilm's tumour 2 (4%); carcinoma colon, Hypernephroma, lymphoma, carcinoma of stomach and liposarcoma (2% in each case). More than half of the malignant abdominal lumps

were due to carcinoma of liver (14) and carcinoma gallbladder (6). The maximum number of benign lump subjected to FNAC were that of benign lesion of liver and mucocele of gall bladder (5 cases each), empyema of gall bladder 4 cases (8%), and one case each of Pancreatic Pseudocyst, Benign cyst in ovary, Ileocaecal TB. These findings are similar to study conducted by Swaroop et al (1982), Singh et al (1987), Ashok et al (1986) in which Liver malignancy followed by gall bladder malignancy were the most common intra-abdominal masses in which FNAC was done.⁶

In the present study Cytological diagnosis was possible in 86% of cases which is comparable to series of Haneke et al (1975), Goldstein et al (1977), Mcloughlin et al (1978), Zornoza et al (1980), Swaroop et al (1982) and Singh et al (1987).⁶⁻¹¹

In present study as shown in table 5, diagnostic accuracy of aspiration cytology was 87.5%, 28 out of 32 in case of malignant intra-abdominal masses which includes 78.5% accuracy for liver malignancy 83.3% for GB malignancy and 100% for pancreatic carcinoma, ovarian carcinoma, Wilms tumour, carcinoma colon.

The cumulative accuracy rate in our study correlates with the findings of other workers like Ferruci & Wittenberg (1978) - 85%, and Bret et al (1982) -85%.^{1,12} For benign abdominal lump's diagnostic accuracy of aspiration cytology was 83.33% which includes the pathologies like mucocele and empyema of gall bladder, benign liver lesions, Pancreatic Pseudocyst and benign cyst of ovary.

In Present series as shown in Table - 6, 14% cases felt mild discomfort and pain which was relieved without analgesic in 1-2 days. Post aspiration bleeding at puncture site was found in 4% cases & it was minor and stopped by manual pressure. 2% cases were having transient hypotension. Only 2% cases developed infection after the procedure. There was no reported seeding of tumor post procedure in follow up of cases. No complications of FNAC in intra-abdominal lump was discerned by Oscarson et al (1972), Smith et al (1975), Zornoza et al (1977).^{3,13,14} Engzsell et al (1971) noted that no dissemination of tumor occurred after aspiration cytology which is similar to our study.¹⁵

Ferruci et al (1980) reported 1st malignant seeding of tract after FNAC of Pancreatic Carcinoma.¹² The contraindication for FNAC includes bleeding diathesis, suspected vascular neoplasm. Singh et al (1987) observed that 8 patients out of 50 patients (16%) felt pain during and after aspiration, (24%) got oozing at puncture site without seeding of tract in any cases.⁷

As shown in **Table 8**, correct diagnosis by guided FNAC is possible in 86% cases & incorrect diagnosis in 14 cases [False negative (6%) + false positive (0%) + No opinion 8%].

The sensitivity is 93.32% in malignant masses and 83.33% in benign masses. Specificity was 100% for both malignant and benign lesion. The comparative analysis is mentioned in table below:

Table 8:

Study	Sensitivity	Specificity
Swaroop et al (1982) ⁶	78%	95%
Santos G da c et al (1997) ¹⁶	80.4%	100%
Bentz JS et al (1998) ¹⁷	90%	100%

6. Conclusion

FNAC under USG/CT guidance is useful diagnostic investigation for most of the intra-abdominal masses. FNAC under USG/CT guidance was found to be safe, simple, and less expensive with excellent patient compliance and quick procedure, which can be performed without general anesthesia and was not associated with any serious complications. It could be performed as a prerequisite investigation in all types of intra-abdominal lump by which one can avoid many surgeries for entirety of benign lesions and can provide Cytological diagnosis to take radiotherapy and chemotherapy for inoperable and Neo Adjuvant Chemotherapy for locally advanced cases. The incidence of exploratory laparotomy for purpose of diagnosis can be greatly minimised.

7. Source of Funding

None.

8. Conflict of Interest

None.

References

- Bret PM, Fond A, Bretagnolle M, Barral F, Labadie M. Percutaneous fine needle biopsy (P.F.N.B.) of intra-abdominal lesions. *Eur J Radiol.* 1982;2(4):322-8.
- Livraghi T, Damascelli B, Lombardi C, Spagnoli I. Risk in fine-needle abdominal biopsy. *J Clin Ultrasound.* 1983;11(2):77-81. <https://doi.org/10.1002/jcu.1870110205>.
- Zornoza J, Wallace S, Goldstein HM, Lukeman JM, Jing B. Transperitoneal percutaneous retroperitoneal lymph node aspiration biopsy. *Radiology.* 1977;122(1):111-5. <https://doi.org/10.1148/122.1.111>
- Porter B, Karp W, Forsberg L. Percutaneous cytodiagnosis of abdominal masses by ultrasound guided fine needle aspiration

biopsy. *Acta radiologica: diagnosis.* 1981;22(6):663-8. <https://doi.org/10.1177/028418518102200607>

- Ennis MG, MacErlean DP. Biopsy of bowel wall pathology under ultrasound control. *Gastrointest Radiol.* 1981;6:17-20. <https://doi.org/10.1007/BF01890215>
- Swaroop VS, Gupta SK, Dilawari JB. Fine needle aspiration [1] cytology in the diagnosis of abdominal lumps. *Indian J Med Res.* 1982;76(2):265-71.
- Singh MM, Gupta RK, Das DK, Pant S. Ultrasonically guided Fine needle aspiration cytology (FNAC) of intrathoracic lesions. *Indian J Chest Dis All Sci.* 1987;29:82-9.
- Hancke S, Holm HH, Koch F. Ultrasonically guided percutaneous fine needle biopsy of the pancreas. *Surg Gynecol Obstet.* 1975;140(3):361-4.
- Goldstein HM, Zornoza J, Wallace S, Anderson JH, Bree RL, Samuels BI, Lukeman J. Percutaneous fine needle aspiration biopsy of pancreatic and other abdominal masses. *Radiology.* 1977;123(2):319-22. <https://doi.org/10.1148/123.2.319>.
- McLoughlin MJ, Ho CS, Langer B, McHattie J, Tao LC. Fine needle aspiration biopsy of malignant lesions in and around the pancreas. *Cancer.* 1978;41(6):2413-9. [https://doi.org/10.1002/1097-0142\(197806\)41:6<2413::aid-cnrcr2820410647>3.0.co;2-g](https://doi.org/10.1002/1097-0142(197806)41:6<2413::aid-cnrcr2820410647>3.0.co;2-g).
- Zornoza J, Wallace S, Ordonez N, Lukeman J. Fine-needle aspiration biopsy of the liver. *AJR Am J Roentgenol.* 1980;134(2):331-4. <https://doi.org/10.2214/ajr.134.2.331>.
- Ferrucci-Jr JT, Wittenberg J, Mueller PR, Simeone JF, Harbin WP, Kirkpatrick RH, et al. Diagnosis of abdominal malignancy by radiologic fine-needle aspiration biopsy. *AJR Am J Roentgenol.* 1980 Feb;134(2):323-30. <https://doi.org/10.2214/ajr.134.2.323>.
- Oscarson J, Stormby N, Sundgren R. Selective angiography in fine-needle aspiration cytodagnosis of gastric and pancreatic tumours. *Acta Radiologica Diagn.* 1972;12(6):737-50. <https://doi.org/10.1177/028418517201200607>
- Smith EH, Bartrum-Jr RJ, Chang YC, D'Orsi CJ, Lokich J, Abbruzzese A, et al. (Percutaneous aspiration biopsy of the pancreas under ultrasonic guidance. *New Eng J Med.* 1975;292(16):825-8. <https://doi.org/10.1056/NEJM197504172921603>
- Engzell U, Esposti PL, Rubio C, Sigurdson A, Zajicek J. Investigation on tumour spread in connection with aspiration biopsy. *Acta Radiologica: Therapy Physics Biol.* 1971;10(4):385-98. <https://doi.org/10.3109/02841867109130784>
- Santos Gda C, Morini SR, Granero LCS, Chojniak R, Longatto Filho A. Computed tomography-guided fine-needle aspiration biopsy. *Sao Paulo Med J.* 1997;115(1):1343-8. <https://doi.org/10.1590/s1516-31801997000100005>
- Bentz JS, Kochman ML, Faigel DO, Ginsberg GG, Smith DB, Gupta PK. Endoscopic ultrasound-guided real-time fine-needle aspiration: clinicopathologic features of 60 patients. *Diagn Cytopathol.* 1998;18(2):98-109. [https://doi.org/10.1002/\(sici\)1097-0339\(199802\)18:2<98::aid-dc4>3.0.co;2-p](https://doi.org/10.1002/(sici)1097-0339(199802)18:2<98::aid-dc4>3.0.co;2-p).

Cite this article: Dokania MK, Poddar D, Alokjee M, Rathod R, Kumari S. Role of guided fine needle aspiration cytology (FNAC) in the diagnosis of abdominal masses. *Panacea J Med Sci.* 2025;15(3):586-590.