

Comparative role of ultrasound guided aspiration cytology and histopathology regarding evaluation of intra-abdominal lesions – A five years' experience with special emphasis on cases with discordant diagnoses

Parveen Pauline Ara¹, Minz Raison Shail², Dasgupta Debi Prasad³, Bera Himel², Sengupta Sanjay⁴

¹ Senior Resident, Department of Pathology, B. S. Medical College, Bankura, WB, India

² Assistant Professor, Department of Pathology, B. S. Medical College, Bankura, WB, India

³ Associate Professor, Department of Pathology, M. G. M. Medical College, Kishanganj, Bihar, India

⁴ Professor, Department of Pathology, B. S. Medical College, Bankura, WB, India

Corresponding Author: Dr. Himel Bera, 234/1/11, MB Road, PO- Santragachi, PIN- 711104, WB, India.

Abstract:

Background: Ultrasound guided fine needle aspiration cytology has fast becoming the investigation of choice for preliminary assessment of intra-abdominal lesions. Present study was undertaken to assess the utility of this investigation method in comparison to histopathology and to find out possible flaws behind cytological misdiagnosis.

Materials and Methods: Total 447 cases with reportable aspirations from intra-abdominal lesions were cytologically categorized into malignant, benign and non-neoplastic groups. Histopathological samples were available in 309 cases. 94.5% of cases presented with cytohistological correlation and in only 17 cases discrepancies were found.

Results: Findings of this study were comparable with other series and ascertained the beneficial role of USG guided FNAC regarding assessment of intra-abdominal lesions. Possible causes of misdiagnosis in discordant cases were discussed with apparent remedies if achievable.

Conclusion: Further research in this field is necessary and it will surely help to augment the efficacy of the procedure.

Keywords: FNAC, ultrasound guidance, intra-abdominal, diagnostic pitfalls.

Date of Submission: 30-07-2020

Date of Acceptance: 15-08-2020

I. Introduction

Abdomen is a magical box which may not reveal its mystery even during laparotomy. So, diagnosis of intra-abdominal lesions is one of the extremely challenging fields of medical science. Even with modern sophisticated equipments, radiology often fails to pinpoint exact pathology. Exploratory laparotomy followed by histopathological assessment still remains the gold standard for final diagnosis.

Corresponding author: Dr. Himel Bera, 234/1/11, Mahendra Bhattacharya Road, Post- Santragachi, Howrah- 711104, West Bengal, India. Email id- himel.cnmc@gmail.com

Conventional fine needle aspiration cytology (FNAC) is far from satisfactory owing to failure of aspiration of adequate samples from deep seated impalpable lesions.^{1,2}

But different workers have shown that aspiration under guidance can effectively overcome this hindrance of conventional method.^{3,4} Ultrasound (USG) guidance, though much inferior to computerized tomographic (CT) guidance regarding accurate localization of target site, has got several advantages like cheap, easy availability, no radiation hazard, lesser rate of other complications like hemorrhage and real time guidance etc. It is also very much suitable for targeting intra-abdominal lesions with reasonable success rate. So, USG guided FNAC is widely utilized for initial assessment of intra-abdominal lesions with more than 90% accuracy regarding identification of malignant lesions, in comparison to histopathology.^{3,4}

Still this modality is far from adequate for accurate assessment of intra-abdominal lesions. A discordant histopathological diagnosis, varying from 3% to 30%, is reported by various researchers.^{3,5,6}

In the present study we have given more stress for identification of causes leading to cytohistological diagnostic discrepancies and our aim and objectives were:

1. To study the usefulness of USG guided FNAC for diagnosis of intra-abdominal lesions in comparison to histopathology.
2. To find out the flaws leading to cytological misdiagnosis.

II. Materials & Methods

All patients attending surgical outdoor of Bankura Sammilani Medical College, Bankura, West Bengal during study period (01.01.2015 to 31.12.2019; Five years) with suspected and radiologically proved intra-abdominal lesions and willing to take part in the study and also not suffering from hemorrhagic tendencies were included in our study.

USG guided FNAs were done over all patients using thin gauge spinocaine needle fitted to a 10 cc. disposable syringe in the Radiology department of the same institute. Aspirated smears were processed in the Pathology department following standard protocol. Evaluation of smears were done in the context of clinico-radiological findings. Histopathological correlations were made in all possible cases.

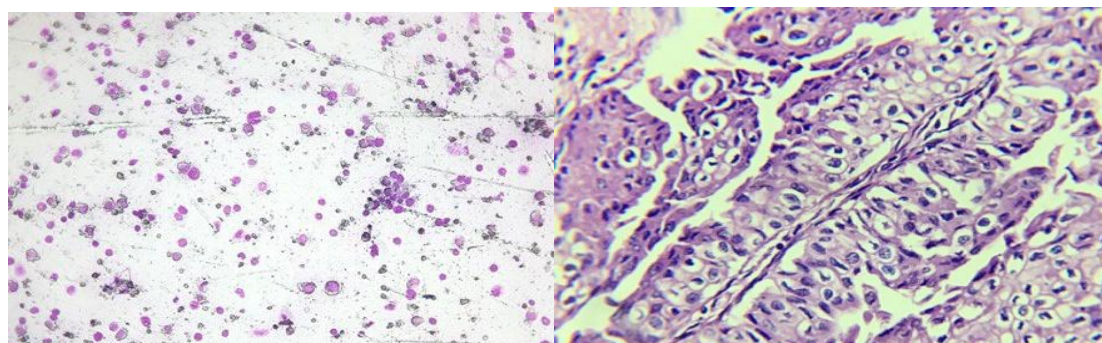


Figure 1: Photomicrograph showing cytological aspirates from Renal Cyst (Leishman Giemsa; x100) **Figure 2: Photomicrograph showing histological section from Renal cell Carcinoma (H & E; x400)**

III. Result

During study period of five years total 459 cases with intra-abdominal lesions were aspirated under USG guidance. Adequate reportable materials were available in 447 cases (97.4%). In 2.6% cases (12 out of 459) even repeat aspirations failed to achieve satisfactory samples. Out of these 447 cases, number of females was slightly more (F:M=1.15:1). Majority of the cases belonged to 40 to 60 years age group in both sexes followed by above 60 years (Table No.1).

Table no: 1 – Age sex distribution

Total no. of aspirations	No. of adequate aspirations	Sex	Number	Age group			
				0-20	21-40	41-60	60 & above
469	447 (100%)	Male	208	5	23	96	84
		Female	239	31	82	90	36
		Total	447	36	105	186	120

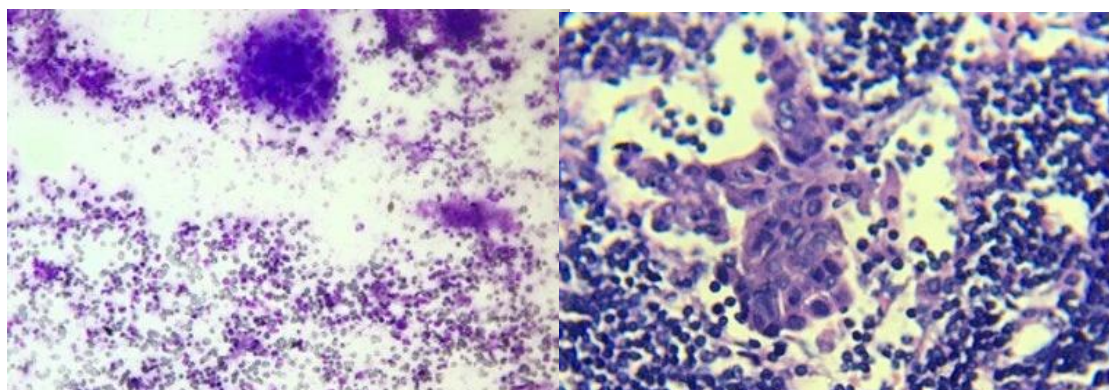


Figure 3: Photomicrograph showing cytological aspirates from Lymphadenitis (Leishman Giemsa; x100) **Figure 4: Photomicrograph showing histological section of Lymph Node with metastatic deposit (H&E; x400)**

Table no:2 - Cytodiagnosis

Total no. of cases	Site	No. of cases	Category of diagnosis		
			Non-neoplastic	Benign	Malignant
447	Liver	119	35	2	82
	Ovary	96	17	53	26
	Gall bladder	44	0	0	44
	Omentum	28	1	0	27
	Retroperitoneal soft tissue	27	1	2	24
	Lymph node	59	32	0	27
	Pancreas	15	0	0	15
	Kidney	43	7	0	36
	G.I. Tract	16	0	3	13
	Total	447	93	60	294

Table No:2 shows that out of 447 cases with adequate reportable aspirations, most common organ aspirated was liver (119 out of 447; 26.6%), followed by ovary (96 out of 447; 21.5 %). All aspirates were categorized into three groups: non-neoplastic, benign and malignant. Specific diagnosis in individual case was attempted after categorization. Malignant lesions accounted for almost 2/3rd of the total cases (294 out of 447; 65.8%).

Table no:3 – Cytohistological correlation

Total no. of cases	Total no. of cases with available Histopathological study	Cytodiagnosis of biopsied cases	No.	Histopathological category diagnosis		
				Non-neoplastic	Benign	Malignant
447	309	Non-neoplastic	26	19	0	7
		Benign	37	0	32	5
		Malignant	246	02	3	241

As shown in Table no:3, cytohistological comparisons were possible in approximately 3/4th of the cases in our series (309 out of 447; 69.1%). Definitely cytologically diagnosed malignant lesions were more commonly biopsied (246 out of 294; 83.7%). Discordance in cytohistological diagnosis regarding initial categorization of lesions were reported in 17 cases (5.5 %).

Among these 17 cases, number of false positives and false negative cases for cytodiagnosis of malignancy were 5 and 12 respectively. So, in comparison to histopathology, the sensitivity, specificity, positive predictive value, negative predictive value and accuracy of cytodiagnosis regarding identification of malignancy in our study were 95.2 %, 91.1 %, 97.9 %, 80.9 % and 94.5 % respectively.

Table no:4- Cases with discordant diagnosis

Organ/site aspiration of	No. of discordant cases	Cytodiagnosis		H.P diagnosis	
		Diagnosis	No.	Diagnosis	No.
Ovary	6	Serous cystadenoma	2	Serous cystadenocarcinoma	2
		Mucinous cystadenoma	1	Mucinous cystadenocarcinoma	1
		Teratoma	2	Immature teratoma	2
		Mucinous cystadenocarcinoma	1	Mucinous cystadenoma	1
Liver	4	Hepatic abscess	1	Metastatic adenocarcinoma	1
		Hepatocellular carcinoma	2	Cirrhosis of liver	2
		Cirrhosis of liver	1	Well differentiated hepatocellular carcinoma	1
Lymph node	3	Necrotic inflammatory lesion	3	Metastatic squamous cell carcinoma	1
				Non-Hodgkin's lymphoma(High grade)	2
Kidney	2	Renal cyst	2	Clear cell carcinoma with cystic degeneration	2
Retroperitoneal soft tissue	2	Spindle cell sarcoma	2	Cellular schwannoma	2

Majority of the cytological misdiagnosis were made during assessment of ovarian lesions (6 out of 17) followed by hepatic lesions (4 out of 17). Out of 6 ovarian misdiagnosis, five cases were proved to be malignant during HP study despite benign diagnosis on cytopathology. Sixth case showed reverse type of misinterpretation. Out of total 12 false negative cases, seven cases were wrongly interpreted as non-neoplastic (3

cases of lymphadenitis, 2 cases of renal cyst and 1 case each of liver abscess and cirrhosis) and rest 5 as benign lesions (all from ovary; 2 each of serous cystadenomas and teratomas and rest mucinous cystadenoma). Cytological overdiagnosis of malignancy (false positive) was made in five cases. Three cases (1 mucinous cystadenoma of ovary and 2 spindle cell sarcomas of retroperitoneum) were subsequently proved to be benign and two (both hepatocellular carcinomas) non-neoplastic. (Table no:4)

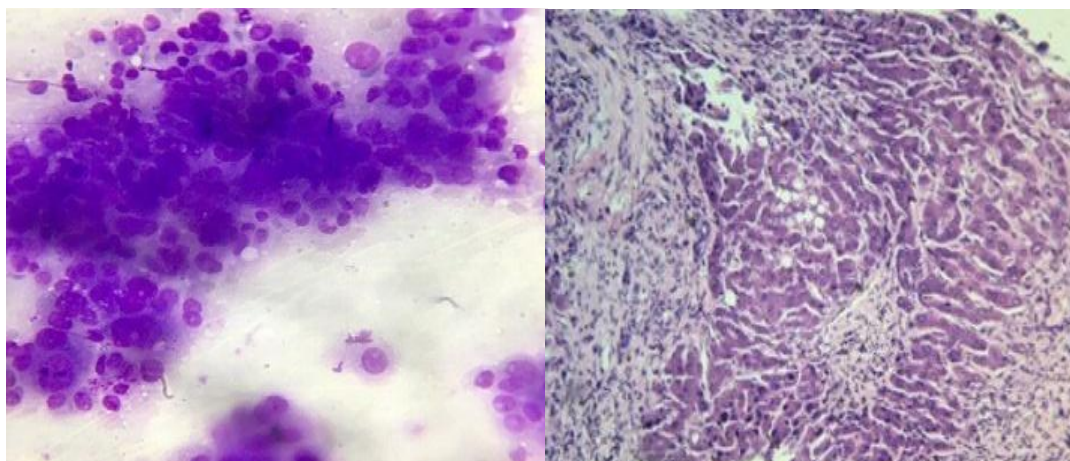


Figure 5: Photomicrograph showing cytological Figure 6: Photomicrograph showing HP aspirates from Hepatocellular section of Cirrhosis of Liver (H & E; x100) Carcinoma (Leishman Giemsa; x400)

IV. Discussion

Present study showed comparable age – sex distribution, site involvement and final statistical outcome with a lot of similar studies. In tandem with findings of those previous researchers, we reached the conclusion that USG guided FNAC is a rapid, economic, safe and effective tool for first line assessment of intra-abdominal lesions.^{5,7,8}

But unlike most of previous workers we put more emphasis on cytological misdiagnosis. We tried to analyze probable causes of failure and searched for possible ways of rectification.

Two cases of ovarian serous cystadenocarcinomas were wrongly interpreted as serous cystadenoma. In both the cases, routine radiology accidentally identified circumscribed small cystic structures without much septation. Little amount of cell admixed with poor clear fluid was aspirated; yielding few well differentiated columnar cells. Cytodiagnosis of serous cystadenomas were made without attempting repeat aspirations as cytoradiological features were consistent. So, the chief cause of misdiagnosis was inadequate aspiration and only repeated attempts could rectify the flaw, as also the recommendation of other researchers.

In another case radiology was not suggestive of ovarian malignancy and scanty mucinous fluid was aspirated showing presence of few partly degenerated columnar cells in a background of mucin. We fell into the trap of underdiagnosing malignancy among degenerative changes and repeat aspirations from solid portions of the lesion could clench the diagnosis of mucinous cystadenocarcinoma instead of mucinous cystadenoma. Similar failures were experienced by others.^{9,10}

In case of misdiagnosis of immature teratomas, failure to aspirate immature components from radiologically described small, circumscribed homogenous, cystic lesions were the possible causes. Again, repeated aspirations could be the solution. In this situation, as also in previous cases more advanced radiological guidance could be fruitful. Similar mistakes were also reported before.¹¹

The sixth misdiagnosed case of ovary was a woman in her 6th decade with a large multiloculated left ovarian cyst. Aspirated mucinous fluid on smearing showed moderate cellularity, numerous columnar cells in clusters and vague glandular patterns often with multilayering. Focal dysplastic cells were noted in a background of thick mucinous material. Overdiagnosis of malignancy was made owing to clinico-radiological presentation, focal dysplasia and cell clusters imparting impression of multilayering. Similar experiences were reported and can only be avoided by cell block study with immunohistochemical analysis.¹²

In case of liver, three out of four misdiagnosed cases occurred due to failure to differentiate low grade hepatocellular carcinoma from regenerating nodules of cirrhosis cytologically. Both conditions show overlapping cytoradiological features and also can co-exist. Plenty of hepatocytes in clumps with scanty cytoplasm, nuclear pleomorphism and nuclear membrane irregularities can be found in both conditions leading to confusion. For correct diagnosis of cirrhosis more stress should be given on low mitotic count and abundant accompanying spindle cells. Silver staining for reticulin fibers (as may be done over cell block) will show

complete absence in hepatocellular carcinoma and clumped irregular fibers in cirrhosis. Immunohistochemical study over cell block may further help to identify malignancy (Hep-Par1).^{13, 14}

The remaining hepatic lesion and all three lymph node cases were misdiagnosed due to aspiration from necrotic areas of malignant lesions. Failure of radiological guidance to procure materials from relatively cellular portions of the neoplasms were the cause of discrepancy. Repeated aspirations under proper guidance can solve the problem, as recommended by other authors.^{15,16}

In case of two renal lesions, absence of radiological suspicion and inability to aspirate from relatively solid portions of the malignancy were the causes behind cytological erroneous diagnosis of renal cyst as few drops of aspirated clear fluid showed cyst macrophages and occasional benign parenchymal cells. Again, repeat USG/CT guided aspirations could solve the problems, as also the experience of previous researchers.¹⁷

Last two false positive diagnosis of malignancy were made due to misinterpretation of two cellular schwannomas as spindle cell sarcoma. Larger size of retroperitoneal lesions, relatively increased cellularity of aspirated smears with presence of few large bizarre nuclei among plump spindle cells were the causes behind cytological overdiagnosis. For correct interpretation more stress should be given on apparent cohesiveness of cellular fragments, low mitotic rate, absence of tumor giant cells and nuclear pyknosis. Strong immunoreactivity to S-100 protein also could help to establish exact diagnosis. Similar overdiagnosis was also reported previously.¹⁸

V. Conclusion

Present study clearly established the beneficial role of USG guided FNAC for initial assessment of intra-abdominal lesions. Early diagnosis by utilizing this simple, cheap and widely available tool will lead to quick formulation of proper management protocol of varied abdominal lesions. Unnecessary surgery can be avoided as well as wider resection of operable malignant lesions can be approached during initial surgery.

We also discussed about the causes leading to cytological misdiagnosis with possible preventive measures. We hope our sincere approach will encourage further research activities in this field and help future workers to avoid similar diagnostic dilemmas. We want to publish our research work with this humble expectation.

Conflict of interest: None.

Authors' contribution: Dr. Parveen and Dr. Dasgupta conducted the study. Prof. Sanjay Sengupta and Dr. Himel Bera drafted the manuscript and revised it critically for important intellectual content. Dr. RS Minz did the data archiving and analysis.

Dr. Himel Bera also acted as the **Corresponding Author** who took the full responsibility to send the manuscript for publication and its followup.

References

- [1]. Porter B, Karp W, Forsberg L. Percutaneous cytodiagnosis of abdominal masses by ultrasound guided fine needle aspiration biopsy. *Acta Radiol Diagn* 1981;22:663-8.
- [2]. Geier GR, Strecker JR. Aspiration cytology and E2 content in ovarian tumour. *Acta Cytol* 1981;25:400-5.
- [3]. Sidhalingreddy, Sainath K, Andola. Fine Needle Aspiration Cytology of Intra-Abdominal Lesions. *Journal of Clinical and Diagnostic Research* 2011;5:551-8.
- [4]. Soleman BA, Atif N, Ahmad S, Chughtai N. Analysis of 210 Cases of Radiologically Guided FNAC of Intraabdominal Masses. *Proceeding Shaikh Zayed Post Graduate Medical Institute*.2004;18:35-44.
- [5]. Nautiyal S, Mishra RK, Sharma SP. Routine and ultrasound guided FNAC of intra abdominal lumps - A comparative study. *Journal of Cytology* 2004;21:129-32.
- [6]. Nyman RS, Cappelen-Smith J, Brismar J, Von Sinner W, Kagevi I. Yield and complications in ultrasound-guided biopsy of abdominal lesions. Comparison of fine-needle aspiration biopsy and 1.2-mm needle core biopsy using an automated biopsy gun. *Acta Radiol* 1995;36:485-90.
- [7]. Hemalatha AL, Sumana Sindhuram V, Sushma S, Suma JK, Varna I, Aditya A. Ultrasound Guided fnac of abdominal-pelvic masses-the pathologists' perspective. *J Clin Diagn Res*. 2013;7:273-7.
- [8]. Ahmad SS, Akhtar K, Akhtar SS, Abrari A, Nasir A, Khalid M, Mansoor T. Ultrasound Guided Fine Needle Aspiration Biopsy of Abdominal Masses. *JK science* 2006;8:200-4.
- [9]. Suva CM. 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.
- [10]. Goel S, Agarwal D, Goel N, Naim M, Khan T, Ekramullah. Ultrasound Guided Fine Needle Aspiration Cytology In Ovarian Neoplasms: An Assessment Of Diagnostic Accuracy And Efficacy And Role In Clinical Management. *The Internet Journal of Pathology* 2010;11;No.2.
- [11]. Mehdi G, Maheshwari V, Afzal S, Ansari HA, Ansari M. Image-guided fine-needle aspiration cytology of ovarian tumors: An assessment of diagnostic efficacy. *J Cytol* 2010;27:91-5.
- [12]. Roy M, Bhattacharya A, Roy A, Sanyal S, Sangal MK, Dasgupta S et al. Fine needle aspiration cytology of ovarian neoplasms. *J Cytol* 2003;20:31-5.
- [13]. Scholmerich J. Is ultrasound-guided fine-needle biopsy effective for diagnosis of early HCC in liver cirrhosis? *Nat Rev Gastroenterol Hepatol* 2005;2:16-7.
- [14]. Orell SR, Sterrett GF. *Orell & Sterrett's Fine Needle aspiration cytology*. 4th ed.:Churchill Livingstone;2005:83-4
- [15]. Hafez NH, Tahoun NS. Reliability of fine needle aspiration cytology (FNAC) as a diagnostic tool in cases of cervical lymphadenopathy. *J Egypt Natl Canc Inst*. 2011;23:105-14.

- [16]. Barbhuiya, Bhunia S., Kakkar M., Shrivastava B., Tiwari P.K., Gupta S. Fine needle aspiration cytology of lesions of liver and gallbladder: An analysis of 400 consecutive aspirations. *J Cytol* 2014;31:20–4.
- [17]. Mehar A, Afroz N, Kahkashan E, Ibne A, Mansoor T. Radiologically guided fine needle aspiration cytology of retroperitoneal and spinal lesions. *J Cytol* 2008;25:123-7.
- [18]. Droese M, Altmannsberger M, Kehl A, Lankisch PG, Weiss R, Weber K, Osborn M. Ultrasound guided percutaneous fine needle aspiration biopsy of abdominal and retroperitoneal masses. Accuracy of cytology in the diagnosis of malignancy, cytologic tumor typing and use of antibodies to intermediate filaments in selected cases. *Acta Cytol* 1984;28:368-84.

Dr. Himel Bera, et. al. “Comparative role of ultrasound guided aspiration cytology and histopathology regarding evaluation of intra-abdominal lesions – A five years’ experience with special emphasis on cases with discordant diagnoses.” *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 19(8), 2020, pp. 05-10.