

**Original article**

**Evaluation of Role of Ultra Sound Guided Fine Needle Aspiration Cytology for Diagnosis of Ovarian Lesions with Particular References to Diagnostic Pitfalls.**

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**Abstract:**

**Background:** Ovarian lesions are quite common among females of all age groups. Ovarian cancers account for 6% of female malignancy. ULTRASONOGRAPHY(USG) can help in proper identification and categorization of these lesions. Fine needle aspiration cytology (FNAC) under USG guidance can be an effective modality for early diagnosis of ovarian masses. **Aims And Objectives:** To evaluate the role of USG guided FNAC over ovarian space occupying lesions (SOLs) for proper categorization into non-neoplastic, benign & malignant variants and to identify possible underlying causes of cytological misdiagnosis, if any, in comparison to histopathological diagnosis. **Materials and Methods:** FNAC under USG guidance were performed over one hundred and sixteen cases with radiologically proved ovarian SOLs during a period of five years. Aspirated materials were interpreted as non- neoplastic, benign or malignant lesions. Histopathological study was possible in 47 of these cases. **Results:** Out of 116 aspirations, non neoplastic, benign and malignant diagnosis were given in 51, 42 & 23 cases, respectively. During histopathological correlation 41 out of 47 cases(87.2%) show exact cyto-histological parity. Rest six cases with cytological misdiagnosis were discussed in detail. **Conclusion:** USG guided FNAC can effectively diagnose ovarian lesions in more than 87% cases. Scrutiny about failed diagnosis will help to improve accuracy in future.

**Key Words:** FNAC, USG guidance, ovarian lesions, diagnostic pitfalls

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**Introduction:**

Cytology is a simple and reliable method for diagnosis of a variety of female genital tract lesions<sup>1</sup>. Previous workers also successfully utilized FNAC for assessment of ovarian SOLs<sup>2-3</sup>. Still gynaecologists all over the world are reluctant to accept this procedure for diagnosis of malignant ovarian lesions due to potential risk of intra- peritoneal tumor implantation<sup>4</sup>. However a lot of studies have clearly documented that risk of tumor spreading by needle tract is negligible in comparison to the potential benefits of this simple, quick and effective modality of diagnosis<sup>5,6</sup>. Geier and Strecker<sup>7</sup> strongly

recommended cytology for diagnosis of non-malignant ovarian lesions as well as inoperable, recurrent or metastatic ovarian malignancies.

Aspiration of ovarian lesions can be done under the guidance of USG or computed tomography(CT)<sup>8</sup>. MRI is considered to be the best method for pre operative assessment of possible nature of ovarian masses<sup>9</sup>. Higher cost limits its use in routine cases and it is also unsuitable for guiding purposes. CT is better regarding assessment of stage of tumors but is not only costly but also associated with significant risk of radiation<sup>8,10</sup>. USG is relatively cheap, easy to perform and as a guiding method free from radiation

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hazards. It provides real time guidance and multiple attempts can easily be made. FNAC under USG guidance effectively enhances the chance of aspirating adequate material from ovarian SOLs without any hazardous effects and at a reasonable expense<sup>8,11</sup>. In the present study, USG guided FNAC has been utilized for primary assessment of ovarian lesions.

#### **Aims and Objectives:**

Aims and Objectives of the present study are –

- 1.To evaluate the role of USG guided FNAC for diagnosis of ovarian mass lesions.
- 2.To compare the cytological evaluation with final confirmatory histopathological diagnosis of available biopsied samples and to discuss possible causes of cytological misdiagnosis in cases with cytohistological diagnostic inconsistency.

#### **Materials and Methods:**

This study was done in the Department of Pathology, Bankura Sammilani Medical College, Bankura, WB, for a period of five years (1<sup>st</sup> January 2007 to 31<sup>st</sup> December 2012) in collaboration with department of Radiodiagnosis of the same institute. All patients with USG proved ovarian lesions were included in the study group, only after receiving proper consent. Aspirations were done by 22-23 gauge needles fitted to 10ml disposable syringes. Lumber puncture needles we utilized for deep seated lesions according to standard recommendation<sup>8</sup>. Multiple passes were attempted in all cases. Smears or aspirated fluids were dealt following recommendations of other workers<sup>8</sup> and examined under microscope for cytological diagnosis.

Biopsy samples were obtained in all possible cases and processed routinely. Finally, comparison between cyto and histological diagnosis were made and cases with disparity were identified and evaluated for probable causes of misinterpretations.

#### **Observation:**

Table no.1 shows that, out of 125 total cases undergoing USG guided aspiration of ovarian SOLs, adequate materials were obtained in 116 cases (92.8%). Cases with inadequate aspirates (7.2%) were not included in final study. Maximum no of cases with adequate aspirates belonged to 21 to 40 years age groups (59 out of 116 i.e 50.86%) followed by 41 to 60 years age groups (36/116 i.e 31.03%).

Cytological categorization of 116 adequate aspirates yielded 51 (43.96%) non-neoplastic cysts, 42 (36.2%)

benign neoplasms and 23 (19.84%) malignant tumours. Attempts were made to further classify 65 neoplastic lesions according to cell of origin – surface epithelial, germ cell or sex cord stromal cells. Surface epithelial tumours were most commonly diagnosed (43 out of 65 i.e 66.1%), followed by tumours of germ cell origin (26.1%) and sex cord stromal cell neoplasms (7.8%), (Table no -2).

Majority of tumours (67 out of 116 i.e 57.8%) produced one or more sign or symptoms with approximately two-fifth asymptomatic cases. Overwhelming majority of the malignant tumours and most of the benign neoplasms were symptom producing with few non-neoplastic cysts as well. Pain abdomen was the most frequent complaint in all categories followed by menstrual irregularities and abdominal palpable lump as seen in the table no 3. Biopsy samples were available in 47 out of 116 cytodiagnosed cases. In 41 cases (87.2%) final histopathological diagnosis were consistent with cytological categorization. But 6 cases (12.8%) failed to show correlation. In the non neoplastic group, out of 12 cytodiagnosed cases two cases were proved to be benign neoplasms on histology. Three cases of cytodiagnosed benign lesions were confirmed as malignant tumours on histopathology. Among malignant cases, one case was identified as benign neoplasm during histological evaluation (Table no 4).

Table no.5 describes 6 cases with cytohistological diagnostic disparity. 2 cases of cytodiagnosed follicular cysts proved to be serous cystadenomas on histology. Two cases of serous cystadenomas as diagnosed on cytology, were proved to be serous cystadenocarcinoma or border line serous tumour. One case of mucinous cystadenocarcinoma was wrongly interpreted as mucinous cystadenoma on cytology. On the other hand, another case with cytological diagnosis of mucinous cyst adenocarcinoma was diagnosed to be benign mucinous neoplasm after histopathological evaluation. So in the present study 1 false positive and 3 false negative cases were reported regarding cytodetection of malignancy. Sensitivity and specificity of cytodiagnosis for diagnosis of malignancy, as evidenced in our study were 85.71% and 96.55%, respectively.

#### **Discussion:**

In the present study, 7.2% cases were excluded due to inadequate aspirates. Even after repeated aspirations under guidance, no diagnosis could be offered in those cases. Failure rate of upto 20% for similar

cause is reported by various workers<sup>12</sup>. More than half the cases in our series, belonged to 21 to 40 years age group, as also the experience of other researchers<sup>12</sup>.

**Table 1: Age distribution of cases.**

No of cases undergoing aspiration	No & % of inadequate aspiration	No & % of adequate aspiration	Age of adequate aspiration(n=116)			
			0-20yr	21-40yr	41-60yr	60yr+
125	9(7.2%)	116(92.8%)	13 (11.22%)	59 (50.86%)	36 (31.03%)	8 (6.89%)

Non-neoplastic and benign lesions were much frequent than malignant neoplasms, as evidenced during cytological evaluations. Among the neoplastic lesions surface epithelial tumours were commonest, quite consistent with the findings of other workers<sup>12,13</sup>.

**Table 2: Cytodiagnosis.**

No of adequate aspirate	Cytological diagnosis	No & % of cases	Categorization of neoplastic cases according to cell of origin (n=65)		
			Surface epithelial	Germ cell	Sex cord stromal cell
116(100%)	Non-neoplastic	51(43.96%)	x	x	x
	Benign	42(36.2%)	31	9	2
	Malignant	23(19.84%)	12	8	3
Total and %			43/65(66.1%)	17/65(26.1%)	5/65(7.8%)

Almost two-fifth of the cases of ovarian SOLs were asymptomatic, as also reported by previous workers<sup>8,12-13</sup>. Among the symptomatic cases, pain abdomen was the commonest symptom (91.04%) followed by menstrual irregularities(23.9%) and abdominal palpable lump(20.9%). Similar experiences were also published previously<sup>8,12,13</sup>.

**Table 3: Common clinical presentation of various categories.**

No. of adequate aspirate	Cytological diagnosis	Clinical presentation						
		Asymptomatic		Symptomatic				
		Total	Total	Sign & Symptom				
				Pain abdomen	Lump abdomen	Ascitis	Menstrual irregularities	Post menopausal bleeding
116	Non-neoplastic	34	17	16	-	-	3	-
	Benign	13	29	25	2	-	5	-
	Malignant	02	21	20	12	5	8	3
Total & %		49 (42.2%)	67 (57.8%)	61	14	5	16	3

During cytohistological correlation, we achieved 87.2% consistent result. Higgin RV et al<sup>14</sup> and Goel S et al<sup>12</sup> reported 90% specificity of cytoagnosis during assessment of ovarian lesions.

6 cases with faulty cytological interpretation are now discussed in detail.

**Table 4: Cytohistological correlation.**

Total no cases with histological evaluation	Cytological diagnosis		Histological diagnosis			Consistent	Inconsistent
	Category	No of cases	Non neoplastic	Benign	Malignant		
47	Non neoplastic	12	10	2	-	10	2
	Benign	16	-	13	3	13	3
	Malignant	19	-	1	18	18	1
Total			10	16	21	41(87.2%)	6(12.8%)

Case No-1: 38 year female presented with a small [2cm in diameter] cystic uniloculated lesion of left ovary.

Case No-2: 29 year female with a 1.5 cm diameter small uniloculated cyst involving right ovary.

Aspirates from both cases were scanty fluid containing macrophages, degenerated cells and few round cells in small clusters having scanty to moderate cytoplasm in a clear background. The smears were interpreted as non-neoplastic cysts-possibly follicular cyst, according to criteria reported by Nunez et al<sup>15</sup>. Histopathological examination of both the cysts established diagnosis of serous cystadenoma. Possible cause of cytological misdiagnosis was scanty cellular materials from degenerated atrophic lining epithelium. Similar experiences were reported by a lot of other workers<sup>13,16-17</sup>.

Case No-3: 39 year female with a right ovarian cyst measuring 6cm in diameter.

Case No-4: 43 year female with a small cyst of 4cm in diameter in right ovary.

Aspirates were straw coloured fluids. Smears were moderately cellular containing loose clusters of epithelial cells with minimum dysplastic changes mixed with histiocytes and foamy macrophages. Cytodignosis in both cases were serous cystadenoma, as recommended by Ramzy et al<sup>3</sup>. Histopathologically, lesions were interpreted as low grade serous cystadenocarcinoma and borderline serous tumors, respectively. Sampling errors leading to aspiration from areas of cysts lined by degenerated epithelium were responsible for relatively low cellularity and absence of obvious malignant features. Similar type of misdiagnosis were also reported by various workers<sup>8,12</sup>.

Case No-5: 48 year female presented with a moderately large cystic swelling (6cm in diameter) of left ovary. A drop of mucoid fluid was aspirated. Smears show abundant mucinous background with few clusters of columnar cells with cytoplasmic vacuoles and basally pushed bland appearing nuclei. A diagnosis of mucinous cystadenoma was offered following standard recommendation<sup>12</sup>. But histological diagnosis came out as mucinous cystadenocarcinoma. Aspiration of thick, abundant mucoid material obscuring cellular anaplasia is the possible cause of failure in this case, as also reported by Higgins et al<sup>14</sup>.

**Table 5: Inconsistent cases [categories of error: non neoplastic to benign ;non neoplastic to malignant (false-ve);benign to malignant(false-ve);benign to nonneoplastic; malignant to benign or nonneoplastic(false positive).]**

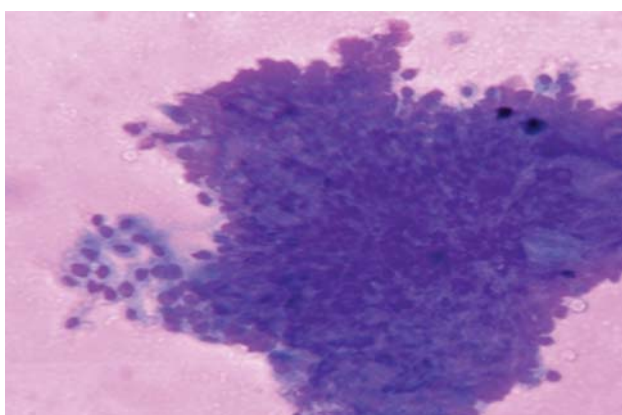
Total no of cases undergoing histological evaluation	Inconsistent diagnosis		Cytodiagnosis		Histological diagnosis	Category of error
	No	%	Sl no	Diagnosis		
47	6	12.8	1	Follicular cyst	Serous cystadenoma	Non neoplastic to benign
			2	Follicular cyst	Serous cystadenoma	Non neoplastic to benign
			3	Serous cyst adenoma	Serous cystadeno carcinoma	False -ve malignant
			4	Serous cyst adenoma	Borderline serous tumour	False -ve malignant
			5	Mucinous cyst adenoma	Mucinous cyst adeno carcinoma	False -ve malignant
			6	Mucinous cystadeno carcinoma	Mucinous cyst adenoma	False +ve malignant

Case No-6: 52 year female presented with a large multiloculated cyst (7.5cm in diameter) of left ovary. Mucoid material was aspirated. Smears were moderately cellular containing numerous columnar cell clusters and vague glandular structures often with multilayering in a background of thick mucinous material. Few cells show nuclear hyperchromasia. Smears were interpreted as mucinous cystadenocarcinoma.

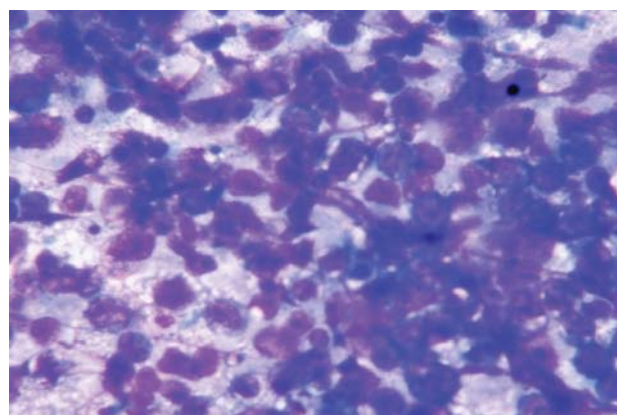
cinoma. But subsequent histopathology confirmed the lesion as mucinous cystadenoma. Suggestive clinical presentation and presence of small glandular clusters and cell balls, giving impression of multilayering , as seen in smears were the causes behind over diagnosis of malignancy as also observed by Roy et al<sup>18</sup>.

**Conclusion:**

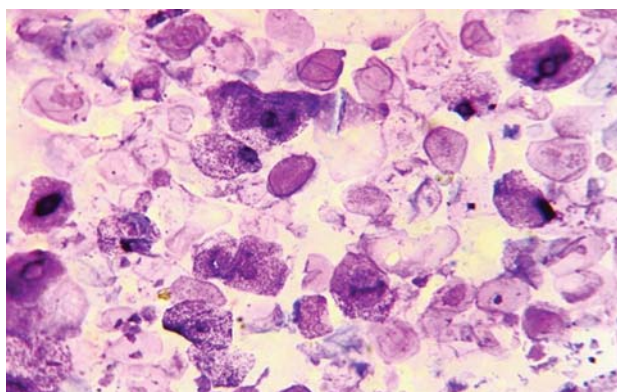
USG guided FNAC is a quick, inexpensive and safe procedure for preliminary assessment of ovarian lesions. Present study also proved the effectivity of this diagnostic tool, achieving almost 90% accuracy in comparison to histopathology. Cases of misdiagnosis were dealt in detail and attempts were made to identify possible underlying causes. We sincerely hope that future workers will try their best for correction of those possible causes of failures. Thus, our knowledge will be enriched and cytology will become more and more effective for evaluation of ovarian lesions.



**Fig. 1 : Photomicrograph showing cytological aspirates from Papillary mucinous cyst adenocarcinoma of ovary (400x Leishman-Giemsa stain)**



**Fig. 2 : Photomicrograph showing cytological aspirates from Dysgerminoma of ovary (400x Leishman-Giemsa stain)**



**Fig. 3 : Photomicrograph showing cytological aspirates from Benign cystic teratoma of ovary (400x Leishman-Giemsa stain)**

**References:**

1. Sevin BU, Greening SE, Nadji M, Ng AB, Averette HL, Nordquist SR. Fine needle aspiration cytology in gynecologic oncology: I: Clinical aspects. *Acta Cytol* 1979;**29**:277-81.
2. Selvaggi SM. Cytology of non-neoplastic cysts of the ovary. *Diagn Cytopathol* 1990;**6**:77-85. <http://dx.doi.org/10.1002/dc.2840060202>
3. Ramzy I, Martinez SC, Schantz HD. Ovarian cysts and masses: Diagnosis using fine needle aspirations. *Cancer Detect Prev* 1981;**4**:493-502.
4. Hajdu SI, Melamed MR. Limitations of aspiration cytology in the diagnosis of primary neoplasms. *Acta Cytol* 1984;**28**:337-45.
5. Sevelde P. Prognostic influence of intraoperative rupture of malignant ovarian tumors. Presented at the First European Congress of Gynecologic Endoscopy, France: *Clermont-Ferrand*; September 9-11, 1992.
6. Wojcik EM, Selvaggi SM. Fine needle aspiration cytology of cystic ovarian lesions. *Diagn Cytopathol* 1994;**11**:9-14. <http://dx.doi.org/10.1002/dc.2840110104>
7. Geier GR, Strecker JR. Aspiration Cytology and E2 content in ovarian tumors. *Acta Cytol* 1981;**25**:400-
8. Ghazala Mehdi, Veena Maheshwari, Sheerin Afzal, Hena A Ansari, Maryem Ansari. Image-guided fine-needle aspiration cytology of ovarian tumors: An assessment of diagnostic efficacy. *Indian Journal Of Cytology* 2010;**27**:91-95. <http://dx.doi.org/10.4103/0970-9371.71872>
9. Kurtz AB, Tsimikas JV, Tempany CMC, Hamper UM, Arger PH, Bree RL, et al. Diagnosis and staging of ovarian cancer: comparative values of Doppler and conventional US, CT, and MR imaging correlated with surgery and histopathologic analysis - report of the radiology diagnostic oncology group. *Radiology* 1999;**212**:19-27. <http://dx.doi.org/10.1148/radiology.212.1.r99j13619>
10. Spencer JA. A multidisciplinary approach to ovarian cancer at diagnosis. *Br J Radiol* 2005;**78**:S94-S102. <http://dx.doi.org/10.1259/bjr/29280555>
11. Porter B, Karp W, Forsberg L. Percutaneous cytodagnosis of abdominal masses by USG guided FNAB. *Acta Radiol* 1981;**22**:663-8.
12. Seema Goel, Deepti Agarwal, Narendra Goel, Mohd. Naim, Tamkin Khan, 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 ISSN: 1528-8307.
13. Nazoora Khan, Nishat Afroz, Barina Aqil, Tamkin Khan, Ibne Ahmad. Neoplastic and nonneoplastic ovarian masses: Diagnosis on cytology. *Indian Journal Of Cytology* 2009;**26**:129-133. <http://dx.doi.org/10.4103/0970-9371.62180>
14. Higgins RV, Matkins JF, Marroum MC. Comparison of fine-needle aspiration cytologic findings of ovarian cysts with ovarian histologic findings. *Am J Obstet Gynecol.* 1999;**180**(3Pt1):550-3. [http://dx.doi.org/10.1016/S0002-9378\(99\)70252-8](http://dx.doi.org/10.1016/S0002-9378(99)70252-8)
15. Nunez C, Diaz JI. Ovarian follicular cysts: A potential source of false - positive diagnoses in ovarian cytology. *Diagn Cytopathol* 1992;**8**:532-7. <http://dx.doi.org/10.1002/dc.2840080515>
16. Ganjei P, Dickinson B, Harrison TA, Nassiri M, Lu Y. Aspiration cytology of neoplastic and non-neoplastic ovarian cysts: Is it accurate? *Int J Pathol* 1996;**15**:94-101.
17. Kruezer GE, Paradowski T, Wurche KD, Flenker H. Neoplastic or non-neoplastic ovarian cyst? The role of cytology. *Acta Cytol* 1995;**39**:882-6.
18. 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.