Original Article

Study of fine needle aspiration cytology in the diagnosis of ovarian masses

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Abstract

Background: Earlier the technique of aspirating ovarian masses was mostly unguided imaging technique. The ovarian masses were located by palpation and were approached transrectally, transvaginally and transcutaneously for fine needle aspiration cytology. The advancement of imaging technique has enabled many workers to undertake fine needle aspiration cytology of ovarian masses as it helped in correct localization and sampling from suspected area of cancerous and noncancerous lesions. **Objectives:** To study cytomorphological features of benign and malignant conditions of ovarian masses obtained at ultrasound guided fine needle aspiration cytology. To determine sensitivity and specificity at ultrasound guided fine needle aspiration cytology in diagnosis of ovarian masses. To draw value of comparison between cytodiagnosis and histomorphological diagnosis; rate of accuracy, false positive, false negative, positive predictive value and negative predictive value. **Material and Methods**: The present prospective study was carried out in the Department of Pathology, Jawaharlal Nehru Medical College, Sawangi (M), Wardha during two years duration from July 2009 to June 2011.FNAC was performed on cases with suspected ovarian masses with plan for surgical treatment. The material obtained at aspiration was wet fixed in 95 % ethyl alcohol and stained with papanicolaou stain while few were dry fixed and stained with May Grunwald Giemsa stain. **Result:** The false positive rate was 0 and false negative rate was 4.34%. The sensitivity and specificity of FNAC in diagnosis of ovarian masses was found to be 95.65% and 100% respectively. Negative predictive value was 96.77% and positive predictive value was 100% of FNAC in diagnosis of ovarian masses. Overall rate of accuracy of FNAC in diagnosis of ovarian masses was 98.11% in present study. **Conclusion**: FNAC over lesion of ovary carried out under USG guidance is a safe preoperative diagnostic modality. USG guided FNAC in the ovarian lumps has a definite ability to distinguish between a non neoplastic and neoplastic lesions of ovary with confidence.

Keywords: FNAC, Cytology, Ovarian Masses, USG.

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INTRODUCTION

The ovary is a complex organ in which various pathologic lesions may occur. Non neoplastic and neoplastic masses can occur in the ovaries and some of these lesions represent normal hormonal activity in the organ.[1] Due to anatomic location of ovary early clinical detection of lesion is not possible in many cases. Most of the initial diagnoses of ovarian malignancy are made at later stage.[2] Therefore for early diagnosis of lesion the technique of aspirating ovarian masses was started by many workers. Earlier the technique of aspirating ovarian masses was mostly unguided. The ovarian masses were located by palpation and were approached transrectally, transvaginally and transcutaneously for fine needle aspiration cytology (FNAC).[3,4] This has enabled many workers to undertake the study of fine needle aspiration cytology in diagnosis of the ovarian masses.[1,4,5] The results of fine needle aspiration cytology were encouraging as it resolved the dilemma of preoperative diagnosis as well as in planning the surgical treatment of ovarian masses. Like many others modalities of aspiration, FNAC has also met the resistance of acceptance as a tool for diagnosis of ovarian masses in its early years. This was due to suggested implantation of

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malignant cells at needle tract of fine needle aspiration cytology and the risk of sepsis and perforation.[2,6] The advantages of representative cytomorphology of epithelial and nonepithelial tumor of ovary, high rate of accuracy and low rate of false positive diagnosis has made image guided percutaneous FNAC of ovarian masses a key preoperative diagnostic tool.[7]

MATERIALS AND METHODS

The present prospective study was carried out in the division of cytology, Department of Pathology during two years duration from July 2009 to June 2011. Ninety two cases were evaluated by transabdominal percutaneous approach under USG and CT guidance as a part of the institutional protocol. Any pelvic mass, clinically or radiologically suspected as ovarian mass in the outpatient department of Obstetrics and Gynecology, was selected. FNAC was done in patients when imaging findings suggested non-functional complex ovarian cysts. Ovarian tumors that needed exclusion of borderline tumors or malignant tumors by the clinician and that were sent to the Department of Pathology for image-guided FNAC were also included in the study. Any patient with coagulopathy was excluded from this study. The study includes cases with suspected ovarian masses with plan for surgical management primarily due to ovarian lesion and cases with wide metastatic disease and suspected ectopic pregnancy were excluded from the study. Proper consent was taken for the procedure. The patient was prepared with antiseptic dressings. The mass was localized under the guidance of an expert radiologist by USG or CT. Aspiration was done from the appropriate site by commercially available 22-G, 88-mm long spinal needle attached to a 10-mL disposable syringe. The procedure of fine needle aspiration cytology of ovarian masses was performed under ultrasonographic guidance in radiodiagnosis department. The material obtained at aspiration was observed for typical character such as hemorrhagic, sticky, gelatinous, serous and serous fluidy or particulate. With USG guidance, we could visualize the structure of the lesion and reach precisely the desired site in any plane. But we faced difficulty in the presence of significant ascetic when the aspirate was not satisfactory in the face of advanced malignancy. Poor patient tolerance also caused difficulty in some cases. Specimens were immediately smeared on glass slides and air dried for Leishman-Giemsa stain. Few smears were wet fixed in 95 % ethyl alcohol and stained with papanicolaou stain.

The patients included in the study for undergoing fine needle aspiration cytology with aim of preoperative diagnosis of suspected ovarian tumors and the results were compared with final histological diagnosis.

OBSERVATIONS AND RESULTS

The present study comprised of 92 patients presented clinically as abdominal and/or pelvic lump. The abdominal examination of the lump and pre FNAC sonography of the lump showed that 48 were right ovarian masses, 40 were left ovarian masses and 4 were bilateral ovarian masses. The smallest lump was measuring 3 cm x 3 cm in size and largest measuring more than 40 cm x 40 cm. The cystic echotexture was noted in 86 cases of which single cystic lesion in 41 cases and multicystic with solid component were noted in 45 cases. The non cystic echotexture was noted in 6 cases. The sonographic findings of liver, kidney, spleen and pancreas were normal in all cases except 3 cases were subsequent cytodiagnosis was serous cystadenocarcinoma which showed the metastasis in the liver at USG examination. Calcification within the lump was noted in 4 cases which cytodiagnosed subsequently as serous cystadenocarcinoma. Peritoneal and mesenteric metastasis was seen in 5 cases on sonography and lymph nodes were enlarged in 2 cases and 2 were suspected as metastasis on sonography examination. Minimal ascites was noted in 20 cases. In 47 cases uterus could be visualized by USG and were negative for abnormality. Age wise broad cytodiagnostic group is tabulated in table 1.

Table 1: Age and broad cytodiagnostic entities (n=92)

Age(years)	Non neoplastic cysts	Benign Lesion	Atypical Lesion	Malignant lesion	Inadequate Sample
11-20	4	2		1	
21-30	7	8		1	1
31-40	4	11		4	
41-50	1	13	1	10	
51-60	-	3		9	
61-70	-	6		4	
71-80	-	1		1	
Total	**16**	**44**	**1**	**30**	**1**

Out of total 92 cases aspirated of ovarian lump cytodiagnosis was possible in 91 cases and 1 case had an inadequate cellularity. Inadequate for opinion cases had serous fluidic aspirate but its centrifugation revealed no recognizable sediments. The youngest patient was of 12 years old and the oldest was 76 years. Both were cytodiagnosed as a malignant neoplasm of ovary in the subsequent work up. The maximum patient with ovarian masses were in age range of 41 to 50 years (25 cases) followed by 31 to 40 years (19 cases). The age break up and broad cytodiagnostic entities reveled that maximum cases cytodiagnosed as malignant neoplasm of ovary were in age range of 41 to 50 years (10cases) followed by 51 to 60 years (9 cases). Specific cytodiagnosis done in present study is shown in table 2

Table 2: Cytodiagnosis of ovarian lesions (n=91)

Cytodiagnosis of ovarian lesions										TOTAL
Nonneoplastic		Neoplastic								
		Benign				Atypical	Malignant			
Follicular Cyst	Simple Serous Cyst	Serous Cystadenoma	Mucinous Cystadenoma	Bemign Cystic Teratoma	Granulosa cell Tumor	Serous Cystadenoma with Atypia	Serous Cystadenocarcinoma	Mucinous Cystadenocarcinoma	Embryonal Carcinoma	
1	15	26	12	5	1	1	26	2	2	91

The surgically resected specimen ovarian masses were obtained in 53 cases. Their histological diagnoses were compared with cytodiagnosis in 53 cases. The distribution of histological diagnosis is placed in table 3.

Table 3: Histological diagnosis (n=53)

Histological diagnosis of ovarian lesions									
Nonneoplastic		Neoplastic							
		Benign			Malignant				TOTAL
Follicular Cyst	Simple Serous Cyst	Serous Cystadenoma	Muc inous Cystadenoma	Cystic Teratoma	Granulosa cell Tumor	Serous Cystadenocarcinoma	Mucinous Cystadenocarcinoma	Embryonal Carcinoma	
0	5	10	9	5	1	19	2	2	53

There was no false positive diagnosis in the present study. There was a single case which was reported as false negative ie serous cystadenoma with atypia which was sebsequently confirmed on histology as serous cystadenocarcinoma. The reason for false negative is observed in the present study was non representative aspiration for cytology so also under interpretation of cytologic atypia. The false positive rate was 0 and false negative rate was 4.34%. The sensitivity and specificity of FNAC in diagnosis of ovarian masses was found to be 95.65% and 100% respectively. Negative predictive value was 96.77% and positive predictive value was 100% of FNAC in diagnosis of ovarian masses. Overall rate of accuracy of FNAC in diagnosis of ovarian masses was 98.11% in present study.

DISCUSSION

The minimum size ovarian lump which was frequently symptomatic and presented as pelvic lump was reported to be 4cm x 4cm that resulted in seeking the clinical advice in presently reviewed literature.[8,9] The present study made the similar observation regarding symptomatic attention of ovarian lump as most of ovarian lump which underwent FNAC were over 4cm x 4cm in size. The ovarian lump attending the size as big as it reaches the chest wall has been reported by Allias *et al*.[9] The present study too has observed the large ovarian lump with measurement of 40cm x 40 cm. Pre FNAC evaluation of the ovarian lump to know its echotexture has been advocated by, Fabienne *et al* Larsen *et al*, Mehdi *et al*, Khan etal and Lahri *et al*.[9-13] These authors have chiefly found that USG of ovarian masses can categorize ovarian lump in single cystic, multicystic with solid component and solid noncystic echo texture. These findings along with the thickness of the cyst wall, irregularity, vascular flow and calcification enabled them to categorize ovarian lump as benign or malignant by Fabienne *et al*, Mehdi *et al*, Khan *et al*, Lahiri *et al*, Ganjei *et al*.[9,11-14] The present study too found pre-procedural USG of ovarian lump advantages as it provides valuable information at interpretation of cytomorphology. The occurrence of ovarian lumps more after 3rd decade of life has been reported by Khan *et al*, Mulvany.[12,15] The present study endorses the observation made in above study as the maximum number of patients recorded within present study was in the age range of 31 to 50 years and above it. The younger patient within the age of 11 to 20 years presented with ovarian lump and undergone FNAC in its cytology has been reported by Mehdi *et al*, Khan *et al*, Dey *et al*.[11,12,16] In present study too there were 7 patients within the age range of 11 to 20 years of which youngest was of 12 years old. The most common age range cited for malignant ovarian tumor as reported in various studies reviewed for present work was 4th decade and onwards.[3,9,11,12,15] The present study made the similar observation with above mentioned study regarding the age of malignant ovarian lesions as the malignant ovarian tumor observed were in age range of 31 to 50 years and 61 to 70 years. The younger patient too has been infrequently reported as having malignant lesion

by Dey *et al*.[16] The present study has confronted the 2 cases of malignant ovarian neoplasm one each from age range of 11 to 20 year and 21 to 30 years. Similar too observed in offer mentioned studies. Classifying cytomorphology obtained at FNAC of ovarian lump into the broad category such as non-neoplastic, benign neoplastic and malignant neoplastic has found to be useful by Allias *et al*, Larsen *et al*, Mehdi *et al*, Khan *et al*, Lahiri et.al, Ganjei *et al* and Sood *et al*.[9-14,17] This broad categeory of cytomorphology has enabled to decide a proper treatment course of ovarian lump. The advantage of broad category even when specific cytodiagnosis could not be achieved had the implication whether to perform surgery or not.[7,11,12] The broad category has enabled the workers to lower down the values of erroneous diagnosis as it suggests benign or malignant nature of lesion. The present study is in agreement with above author with regards to broad category of cytomorphology of ovarian lump obtained at FNAC. The situation where the cytomorphology is not defining for malignancy many workers have chosen to put this cytomorphology in broad category of atypical cytomorphology, suspicious malignant cytomorphology and probable malignant cytomorphology.[5,18] The present study observed a case of showing atypical cytomorphology (serous cystadenoma with atypia) were the nuclear and cytomorphological features were not enough characteristic to suggest malignancy. These observations of ours are in agreement with above mentioned references of inability to classify atypia outright as malignancy. The present study observed the sensitivity of 95.65% which is comparable with the value quoted by Uguz *et al* (95.1%), Sood *et al* (93.9%). The present study observed specificity of 100 % this value is comparable with the value reported by the studies of Sood *et al* (100%).[17,19] False positive rate of FNAC over ovarian lump observed in present study was 0% however the studies of Uguz *et al* (3.2 %), Higgins *et al* (73%) have observed high false positive rate.[19,22] The present study observed false negative rate of 4.34% which is comparable with false negative rate reported in studies of Hemalatha *et al* (4.76%), Uguz *et al* (3.2 %), however few studies have reported high false negative rate.[7,19,20] The present study reported high PPV of 100% which is in concorderence with the studies of Sood *et al* (PPV-100%).[17] NPV in present study of FNAC in ovarian lump was observed to be 96.77% which is similar to the studies of Satin *et al* (98%), however studies of Sood *et al* (90.9%) reported low NPV. [17,21] Total accuracy rate of FNAC over the ovarian lump in present study observed was 98.11% which is similar to TAR reported by Sood *et al* (96.2%), Ganjei (94.5%), Satin *et al* (97%).[17,21,22] A few studies however reported a low TAR.[7,11] The present study encountered single erroneous diagnosis of false negative reporting in a cystic lesion of ovarian lump. This case was reported as serous cystadenoma with atypia on FNAC while on its histopathological diagnosis is revealed it to be serous cystadenocarcinoma. The reason observed for false negative diagnosis is overt malignancy in the tumor and under reporting of nuclear atypia. Similar observation for non representative aspirate of malignancy and underreporting of nuclear malignancy leading to false negative diagnosis has been made by Pauline.[18] The USG of ovarian lump in its capacity as a diagnostic modality to distinguish between benign and malignant ovarian lump have been reported with low sensitivity by Larsen *et al*[10] in the literature reviewed for present study. The sensitivity of USG in distinguishing from benign vs malignant is low as compared to the sensitivity of FNAC in diagnosis of ovarian lump reported in the present study.

CONCLUSION

USG guided FNAC in the ovarian lumps has a definite ability to distinguish between a non neoplastic and neoplastic lesions of ovary with confidence. The guidance of sonography correctly secures the needle position within the lump and thus reduces chances of obtaining inadequate cell yield and thus can help in obtaining representative sample from the lesions.

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