

# Ovarian mass lesions: evaluation of ultrasound guided fine needle aspiration cytology with histopathological correlation

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## Abstract

**Background:** Ovarian masses are frequent finding in females of reproductive age group. Image-guided fine-needle aspiration cytology (FNAC) of ovarian lumps is being increasingly used for the successful diagnosis of ovarian tumors, although borderline cases may be difficult to diagnose by this method. **Objective:** The present study was performed to evaluate the role of US-guided FNAC in pre-operative cytological diagnosis of ovarian masses in comparison with histopathology and to assess the pitfalls and limitations of cytological interpretation. **Materials and Methods:** The study was conducted on 160 female patients. Diagnosis was established by FNAC performed under image guidance (ultrasonography/computed tomography) followed by histopathological examination. Cytologic diagnoses were compared with the histopathological diagnosis. **Results:** On cytology and histopathology comparison, concordance was found to be 90.4% in case of malignancy, 94% in cases of suspicious for malignancy, 100% in cases of inflammatory lesions, 50% in cases of metastasis. Chi-square test was performed and p value was statistically significant ( $p < 0.0001$ ). **Conclusion:** USG-guided FNAC seems to be a relatively safe, simple, fast and cost-effective procedure where most ovarian malignancies either present late in their course or no screening method is available. In addition this procedure may be useful in deciding management guidelines prior to any surgical intervention.

**Keywords:** Fine-needle aspiration cytology, Ovarian mass, Histopathology

## Introduction

Ovaries are paired pelvic female reproductive organ, frequently encountered by neoplastic lesions either benign or malignant. The complex anatomy of ovary and its peculiar physiology within the constant cyclical changes from puberty to menopause give rise to number of cell types each of which is capable of giving rise to tumors [1]. This morphological diversity of ovarian tumors poses many challenges in diagnosis for both gynecologists and pathologists. Ovarian cancers account for about 6% of all cancers in females [2].

The incidence of ovarian carcinoma has steadily increased over the past 20 years. Ovarian neoplasms are a heterogenous group of benign and malignant tumors of epithelial, stromal and germ cell origin [3]. The clinico-pathological evaluation of ovarian masses is a challenging field. The ovarian tumors manifest with wide spectrum of clinical, morphological and

histological features. Screening for ovarian epithelial cancer are improved by various diagnostic modalities, Doppler color flow ultrasonography and transvaginal ultrasonography, measurement of tumor markers such as Serum HCG, serum CA125, serum alpha-fetoprotein placental alkaline phosphatase and numerous, but their accessibility to the practicing gynecologist for rural based poor population remains very limited even today [4].

Difficulty in gaining access to the tumor site is itself a major obstacle and the wide spectrum of lesions presents a difficult picture to the pathologist. Cytology has been underutilized as a modality for the diagnosis of ovarian tumors. With the advent of accurate imaging techniques like ultrasonography (USG) and computed tomography (CT) scan in detecting the ovarian lesions guided fine needle aspiration cytology (FNAC) has assumed a definite role in diagnosis and management [5]. The clinico-pathological evaluation of ovarian masses is a challenging field. Difficulty in gaining

Manuscript received: 20<sup>th</sup> November 2018

Reviewed: 30<sup>th</sup> November 2018

Author Corrected: 7<sup>th</sup> December 2018

Accepted for Publication: 13<sup>th</sup> December 2018

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access to the tumor site is itself a major obstacle and the wide spectrum of lesions presents a difficult picture to the pathologist. Despite the advantages, the frequent use of image-guided FNAC for routine investigation and diagnosis of ovarian neoplasms is a controversial field and has been the subject of much debate. This study was carried out to assess the diagnostic accuracy of ultrasound guided FNAC with histopathological as well as to evaluate the role of cytology as a rapid and inexpensive means of diagnosing ovarian tumors.

### Material and Methods

**Place of Study-** Cytology section of the department of pathology, Gujarat Cancer Research Institute, Ahmedabad, Gujarat

**Type of Study-** This is a retrospective study which included 160 cases reported in cytology section over a period of 1 year from May 2016 to May 2017.

**Sampling Methods-** Abdominal/pelvic USG-or CT-guided FNAC

**Sample Collection-** After clinical workup, the patients were subjected to FNAC. The mass was localized and aspiration was performed using a 22-to 23-gauge needle attached to a 10 mL syringe. For deep-seated lesions, a

lumbar puncture needle was used. Several passes were made when the needle was visualized within the lesion. Smears were prepared from the aspirate, fixed in 95% alcohol and stained using Papanicolaou and Giemsa stains. Smears were evaluated for cellularity, arrangement of cells, type of Epithelial cells, foamy or hemosiderin laden macrophages, calcified or necrotic material and proteinaceous, granular, greasy or mucoid background. Routine histology techniques were followed for histopathology specimens. Sections were stained with H&E stain.

**Inclusion Criteria-** All Female patients who presented in the outpatient section of the Department of Obstetrics and Gynaecology and were subsequently found to have an ovarian mass on clinical and radiological evaluation. Ovarian lesions were classified according to WHO classification.

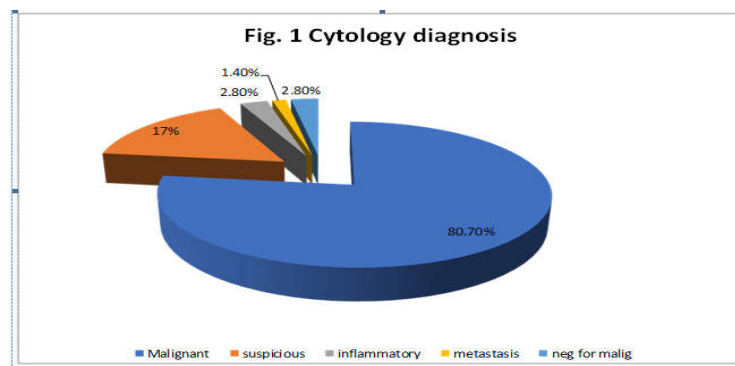
**Exclusion Criteria-** Patients who were diagnosed outside and patients with inadequate data were not included in this study.

**Statistical Methods-** Ovarian lesions were classified according to WHO classification. Chi square test was applied to the final data.

### Results

During the period of one year, 160 cases of ovarian lesions were evaluated by cytopathological smears and followed by histopathological sections.

Amongst these 160 cases, evaluated cytopathologically, 20 cases were inconclusive due to inadequate sampling. Out of 140 cases where cytological diagnosis was given 113 (80.7 %) cases were malignant (99 cases of adenocarcinoma, 8 cases of mucinous adenocarcinoma and 6 cases of granulosa cell tumor). In remaining 27 cases, 17 (12.14%) cases were diagnosed as suspicious for malignancy, 4 (2.8 %) cases were inflammatory lesions (2 cases of abscess, 1 case of tuberculosis and 1 case of actinomycosis), 2 (1.4 %) cases of metastasis and 4 (2.8 %) cases were diagnosed as negative for malignancy (fig.1)



These 160 cases were followed by histopathological examination, where 10 cases were inconclusive due to inadequate sampling. In remaining 150 cases diagnosis was given as malignant in 125 (83.3%) cases, benign in 3 (2%) cases, borderline in 1(0.67%), metastasis in 12(8%) cases, inflammatory lesion in 4 (2.6%) cases, negative for malignancy in 3 (2%) cases and suspicious in 1 (0.67%) case. (fig.2)

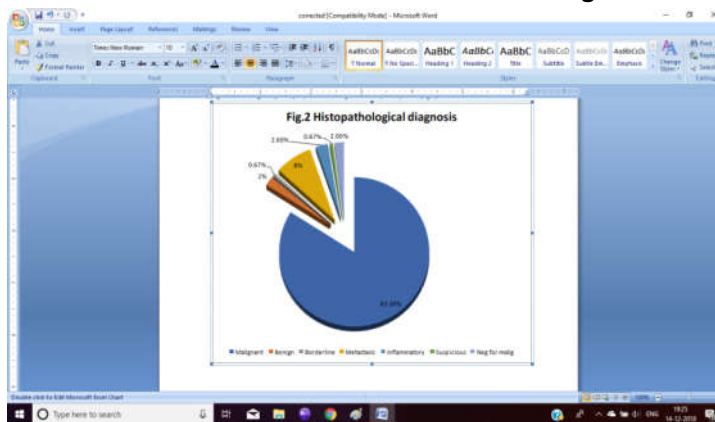


Table -1: Cytology and histopathology concordance and discordance

Final histopathology Diagnosis	No. of cases Histology	No. of cases Cytology	Concordant	Discordant
Inconclusive	10	20	50%	10
Neg for malign.	3	4	75%	1
Inflammatory	4	4	100%	-
Benign	3	-	-	100%
Borderline	1	-	-	100%
Malignant	125	113	90.4%	9.6%
Metastasis	1	2	50%	50%
Suspicious	16	17	94%	6%

Table-2: Summary of cytology and histopathological co-relation of ovarian masses.

Histopathology Diagnosis	Cytology Diagnosis								
	Inconclusive	Neg for malignancy	Inflammatory	Benign	Borderline	Malignant	Metastasis	Suspicious	Total
Inconclusive	10	-	-	-	-	-	-	-	10
Negative for malignancy	1	3	-	-	-	-	-	-	4
Inflammatory	-	-	4	-	-	-	-	-	4
Benign	2	-	-	-	-	-	-	1	3
Borderline	-	-	-	-	-	1	-	-	1
Malignant	4	1	-	-	-	105	1	14	125
Metastasis	2	-	-	-	-	7	1	2	12
Suspicious	1	-	-	-	-	-	-	-	1
<b>Total</b>	<b>20</b>	<b>4</b>	<b>4</b>	<b>-</b>	<b>-</b>	<b>113</b>	<b>2</b>	<b>17</b>	<b>160</b>

Chi- square test was performed to correlate between cytopathological and histopathological diagnosis and was highly significant (p < 0.0001). Chi square- 355 and p value <0.0001.

Cytological evaluation of 160 cases revealed inconclusive diagnosis in 20 cases due to inadequate material. Out of these 20 cases, 50% cases i.e 10 cases were concordant (Table 1) with histopathology while in remaining 10 cases final histopathology diagnosis was given as malignant in 4 cases (2 cases of adenocarcinoma and 2 cases of granulosa cell tumor), benign in 2 cases (leiomyoma, mucinous cystadenoma), metastatic adenocarcinoma in 2 cases, suspicious for malignancy in 1 and negative for malignancy in 1 case i.e. endometriosis (Table 2).

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Out of 17 cases which were diagnosed as suspicious for malignancy in cytology due to paucicellularity, on final histopathology examination 16 cases were found to be malignant i.e. **94% concordance** (Table 1) out of which 14 cases were found to be primary ovarian malignancy (11 cases of adenocarcinoma, 1 case of squamous cell carcinoma, 1 case of carcinosarcoma and 1 case of dysgerminoma), 2 cases of metastasis and 1 case was diagnosed as benign adenofibroma. (Table 2)

On cytopathology examination 2 cases were given as metastatic carcinoma out of which 1 case was diagnosed as metastatic carcinoma while 1 case was diagnosed as primary ovarian adenocarcinoma (Table 2). Here concordance was found to be **50 %** (Table 1).

4 cases which were diagnosed as negative for malignancy on cytology, on final histopathology examination 3 cases were given as negative for malignancy i.e. **75% concordance** (Table 1) while 1 case was diagnosed as poorly differentiated carcinoma of ovary (Table 2).

On cytological evaluation 113 cases were diagnosed as malignant out of which 99 cases were of adenocarcinoma (87.6%), 8 cases of mucinous adenocarcinoma (7.1%) and 6 cases of sex cord tumor (5.3%) while on histopathology 91 cases were found to be adenocarcinoma (80.5%), 8 cases of mucinous adenocarcinoma (7.1%) (Fig 4), 6 cases of granulosa cell tumor (5.3%), 7 cases of metastatic adenocarcinoma (7.1%) and 1 case of borderline malignancy (0.8%) (Table 2). Here concordance was found to be **90.4%**. (Table 1)

In case of inflammatory lesions there was **100 % concordance** between cytology and histopathology (Table 1).

## Discussion

Adnexal mass lesions are very frequent in women. Age, nulliparity, high fat diet, early menarche, late menopause, use of infertility drugs, family history of ovarian, breast or bowel cancer, smoking, lack of breast feeding, hormone replacement therapy and genetic make-up of the individual are some of the risk factors for ovarian tumors [6,7]. These may be symptomatic or asymptomatic. Ovarian cancer produces no distinctive symptoms as a result; most tumors metastasize, or spread, to other abdominal organs before they are diagnosed.

Metastasis can give rise to ascites and this may be the first symptom. Other vague symptoms are abdominal/pelvic discomfort or pressure, back/leg pain, bloating, changes in bowel function or urinary frequency, fatigue, gastrointestinal symptoms, nausea, loss of appetite and unusual vaginal bleeding. Pelvic examination revealing firmness, fixation, nodularity, lack of tenderness, ascites, or cul-de-sac nodules are indicative of malignancy [8]. In reproductive age, functional cysts i.e. follicular and luteal cysts are more common, while in peri-menopausal age group, benign neoplasms occur more frequently [3]. V

arious diagnostic methods like imaging modalities (USG, CT and MRI) and determination of tumour marker levels (like CA-125, CEA and  $\beta$ -hCG), are used for the diagnostic evaluation of ovarian tumours. However, all of them have a limited role in defining the exact nature (benign vs. malignant) of the lesions. Histopathology is considered the gold standard for the

diagnosis of ovarian masses, but in recent times, USG guided FNAC has become a quick, economic and safe procedure for the early diagnosis and management of ovarian masses. It is extremely useful to diagnose and manage functional cysts in young nulliparous patients, in whom an early diagnosis can help to avoid unnecessary surgery and to retain reproductive capacity. It is also beneficial in the diagnosis of recurrent and metastatic tumours and advanced malignancies, where poor conditions are not suitable for laparotomy.

The differences in the reported accuracy of cytological evaluation of ovarian masses may reflect the differences in the technique used to aspirate the lesion (transvaginal, transabdominal, laparoscopic or during laparotomy) as well as differences in smear preparation. There are many other factors which may explain cyto-histopathological discrepancy. FNAC of an ovary may yield cyst fluid, ovarian cortex, ovarian stroma, or a combination of these structures. Secondary degenerative changes may cause inaccurate diagnosis [2]. Ovarian cyst fluid may have occasional cells only (in a background of fluid) thus making it difficult to diagnose accurately.

Malignant cells in the ovary may not be uniformly distributed in the organ [9] due to tumor heterogeneity and thus add to discrepancy as in histopathology multiple sectioning prevents misdiagnosis.

Primary tumors of ovaries have an incidence of an extensively diverse spectrum; hence, the impression on

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image guided cytology may not always accurately corroborate with the histopathology. Mucinous neoplasms are an important source of difficulties in diagnosis. The main reasons for this are large size of mucinous neoplasms, tumor heterogeneity and limitation of sampling in fnac.

Borderline tumors cannot be diagnosed on fnac as foci of invasion cannot be assessed. This category of ovarian neoplasm constitutes a grey zone. In cases of malignant tumors, FNAC has a definitive role in evaluating patients with suspected recurrence of the tumor and to assess spread of the disease.

The suspicion of malignancy was based on paucicellularity of smears which had few atypical cells but not enough to commit to a diagnosis. This was supported by clinical findings, radiological observations or serum markers in these cases. Image-guided. In all the above cases multiple sampling of sample in histology overcomes these limitations and thus helps in the final diagnosis.

FNAC is justified as it is a relatively quick, economical and patient-friendly procedure for diagnosis of malignancy, with minimum morbidity. It is extremely useful in young patients with benign lesions, such as benign cysts, where an early diagnosis can help in avoiding surgery in some cases. It also helps in minimizing unnecessary surgery in post-menopausal patients and those at high risk for surgery [10,11] and guide further management of the patient.

The major drawback is that FNAC can lead to rupture and spillage of tumor cells into the peritoneal cavity and can potentially cause upstaging of a malignant tumor. However, there is no literature available to support this. Despite the potential disadvantages, image-guided FNAC has an important role to play in the diagnosis and management of most ovarian masses.

**Conclusion**

To conclude, image-guided FNAC is a quick, easy, fairly sensitive, specific and cost-effective modality for the preoperative diagnosis of malignant as well as benign ovarian masses with minimal morbidity, pending histological confirmation.

Accurately identifying borderline tumours and false negative cytological analysis due to low cellularity or secondary degenerative changes may be its limitations. Despite potential disadvantages FNAC can serve as a highly efficient means of early diagnosis of ovarian neoplasms [12].

**Contribution By authors:**

**Dr. Majal Shah,**

**Dr. Trupti Patel-** Diagnostic Work,

**Dr. Nisha Khanna-** Manuscript Preparation,

**Dr. Biren Parikh,**

**Dr. Brinda Chandibhamar-** Statistical Analysis,

**Dr. Dhaval Jetly-** Proof Reading.

**Findings:** Nil; **Conflict of Interest:** None initiated

**Permission from IRB:** Yes

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**How to cite this article?**

Shah M, Khanna N, Patel T, Jetly D, Parikh B, Chandibhamar B. Ovarian mass lesions: evaluation of ultrasound guided fine needle aspiration cytology with histopathological correlation. Trop J Path Micro 2018;4(8):566-571. doi:10.17511/jopm.2018.i08.04.

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