

Evaluating the role of imprint cytology compared to histopathology in the diagnosis of ovarian tumors

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Received: 30-11-2021 / Revised: 29-12-2021 / Accepted: 01-01-2022

Abstract

Background: Imprint cytology is one of the techniques to evaluate intraoperative pathological diagnosis. It gives quick results and is very cost effective. The morphology is well preserved, and it is very useful for differentiating between benign and malignant lesions intraoperatively. **Objective:** To evaluate the diagnosis of ovarian tumors in imprint cytology and to correlate it with histopathology and assess its diagnostic accuracy for its future potential application. **Materials and Methods:** Imprint smears for cytology were made immediately after the gross specimen was received in the department in normal saline. Then the specimen was fixed in 10% buffered formalin and grossed for histopathological examination following standard protocols. After histopathology diagnosis, its correlation was done with the diagnosis of imprint cytology. **Results:** A total of 50 cases of ovarian lesions were studied. Out of these 50 cases the accuracy for benign lesions was found to be 88.6%, 25% for borderline cases and 100% for malignant ones. **Conclusion:** Imprint cytology gives a rapid diagnosis and the high accuracy for benign and malignant lesions. Considering the findings of the index study, it can be concluded that imprint cytology may be used intraoperatively in doubtful cases for a better surgical outcome in patients.

Keywords: Imprint cytology, histopathology, accuracy, ovarian lesions.

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Introduction

Ovarian cancer is the 4th common cause of death due to cancer in females and accounts for 5% death of all the cancers [1]. Ovarian neoplasm consists of benign and malignant tumors. They are further divided into epithelial, germ cell and stromal origin. Most of the ovarian cancers are diagnosed when they have already infiltrated beyond the ovary. Various types of ovarian tumors are difficult to differentiate based on their gross characteristics and clinical presentation alone. Therefore, the role of intraoperative imprint cytology in cases of ovarian neoplasms has gradually gained importance. Fine Needle Aspiration Cytology is usually discouraged, because of its deep location and difficult accessibility [2].

Imprint cytology is a technique which is used intraoperative, and it was first introduced by Patrick and Dudgeon in 1927. It was a great achievement in the field of cytological diagnosis. Despite its simplicity, speed, excellence and good cellular morphology, imprint cytology is still not implemented in many centers [3,4]. In our centre also, the facilities for intraoperative specimen collection were not feasible. Therefore, we have taken smears from freshly received specimen, stained it and diagnosed it according to the cytological morphology. Thereafter we have correlated it with the histopathology.

The study was designed with the following aims and objectives:

1. To study the cytomorphology of imprint smears of ovarian masses
2. To correlate imprint cytology with histopathology and evaluate its diagnostic accuracy

Materials and methods

This is a prospective study done from January 2020 to November

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Fifty cases of ovarian lesions were included in the study by considering the following criteria:

Inclusion criteria

1. All the specimen of ovarian tumors measuring more than 5 cm
2. Patient more than 20 years of age

Exclusion criteria

1. Patient younger than 20 years of age
2. Small cystic lesion less than 5cm

All ovarian tissues were received in normal saline. The procedure of imprint cytology was done by taking fresh ovarian tissue on clean plain slide and then the two smears were stained with Leishman stain and two smears stained with Papanicolaou stain, after which the specimen was fixed in 10% buffered formalin and processed for histopathological evaluation as per standard protocols.

After receiving the H&E-stained histopathology slide, the final diagnosis was made and then compared with that of imprint cytology findings.

Results

In the present study, 50 cases of ovarian lesions were studied. The age of the patients ranged from 23 years to 77 years. But most of the patients were in their 4th decade.

After histopathology, 44 cases were reported as benign ovarian tumor, other 4 were borderline and 2 were malignant. The histopathological results and its correlation with imprint cytology is done and it is shown in Table 1.

Table1: Comparison between histopathology and imprint cytology

Sl. No	Diagnosis	Number of cases as per histopathological diagnosis	Diagnostic concordance by imprint cytology	Correlation (%)
1	Benign	44	39	88.63
a.	Serous cystadenoma	20	20	100
b.	Mucinous cystadenoma	15	15	100
c.	Brenner tumor	5	3	60
d.	Mature Teratoma	4	1	25
2.	Borderline mucinous cystadenoma	4	1	25
3.	Malignant: Mucinous carcinoma	2	2	100
	TOTAL	50	42	84

Comparison of imprint cytology with the histopathology diagnosis in Table 1 showed that 42 out of 50 cases (84 %) were correlating i.e. diagnostic accuracy of imprint cytology was found to be 84 %. Out of these 50 cases the accuracy for benign lesions was found to be 88.6%, 25% for borderline cases and 100% for malignant ones. The discordance of imprint cytology with histopathology in borderline cases is the main pitfall of the present study.

However, the efficacy of the study for benign lesion as well as malignant is satisfactory. Therefore, imprint cytology can be used intraoperatively and the surgical management of the patient based on benign and malignant diagnosis can be done. Imprint cytology takes only 15 to 20 minutes for the diagnosis which is very rapid as compared to histopathological reports. It also gives a good cytological detail which makes it a good intraoperative diagnostic tool.

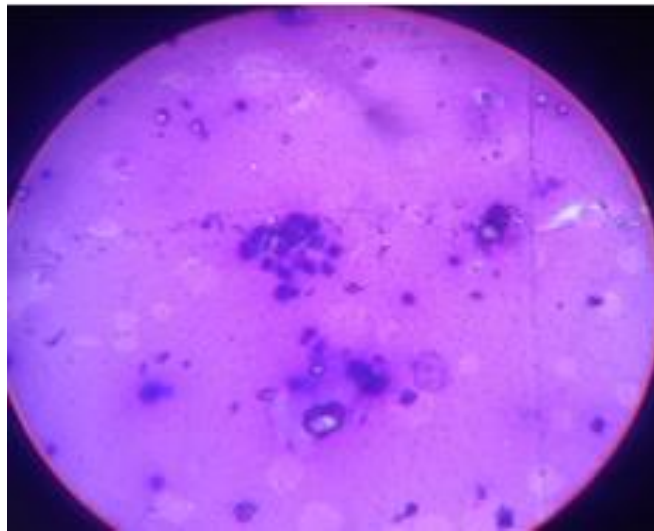


Figure 1: Imprint cytology of serous cystadenoma (LG, 100x)

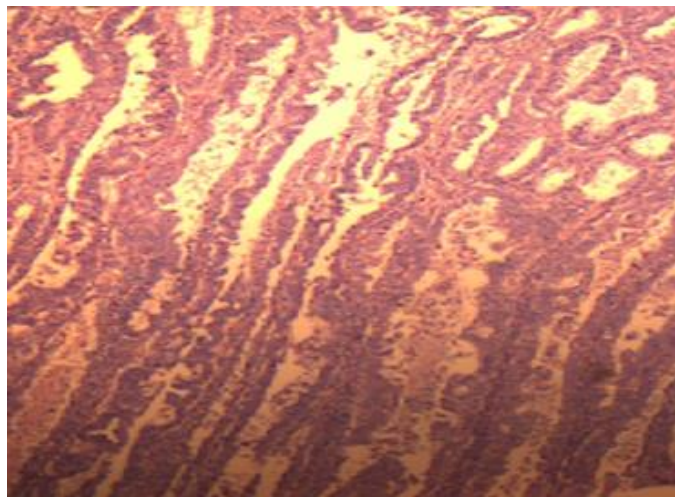


Figure 2: Histopathology picture of serous cystadenoma (H&E, 100x)

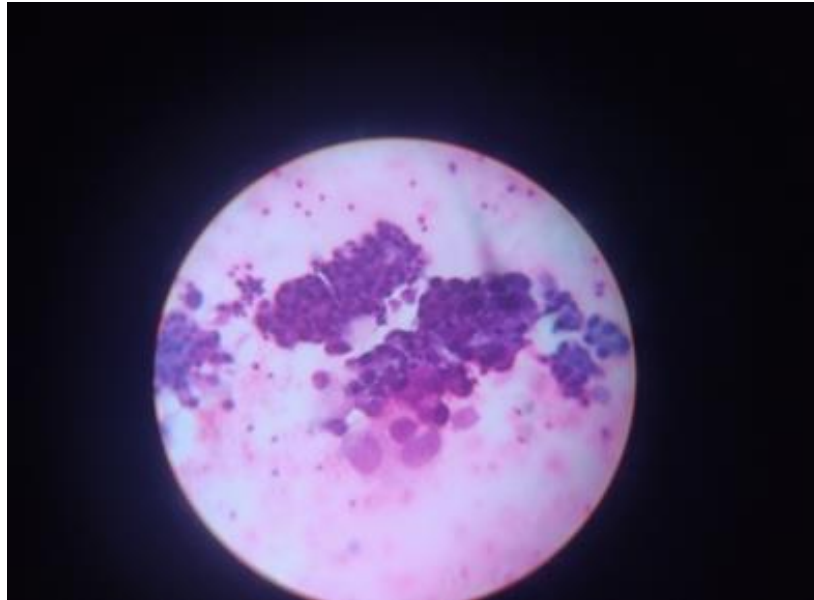


Figure 3: Imprint Cytology of Mucinous Carcinoma (LG, 100x)

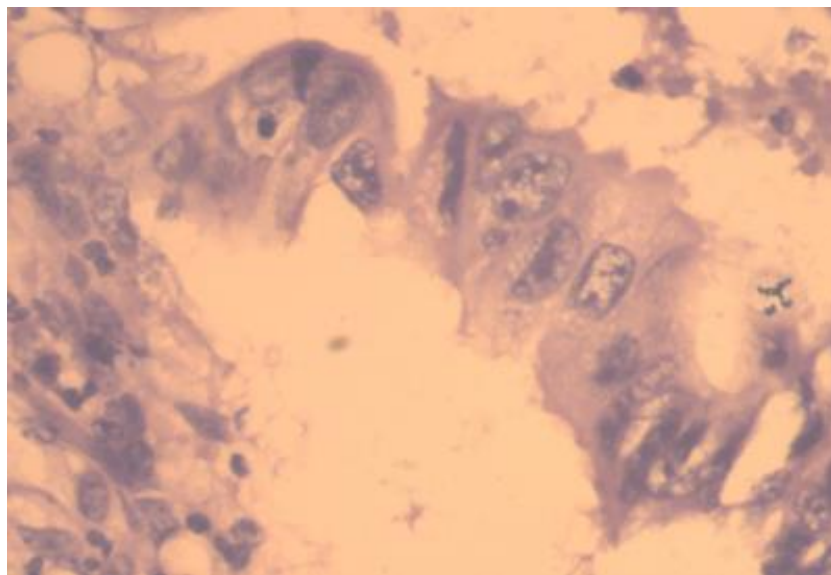


Figure 4: Histopathology of Mucinous Carcinoma (H&E, 400x)

Discussion

In the present study we had taken imprint cytology of 50 cases of ovarian lesions and correlated it with the histopathology. We could diagnose most of the benign and malignant lesions by imprint cytology and they mostly correlated with the histopathology findings. In our study the accuracy of diagnosis of imprint cytology is 88.6% in benign lesions, 25% in borderline and 100% in malignant cases, which is similar to the study of Nagai et al who examined 354 cases of imprint cytology of surgical specimens and diagnosed the correlation of imprint cytology with histopathology which was 87.1% for benign, 30% for borderline and 83.6% for malignant tumors [5]. Khunamornpong and Siriaunkgul studied the imprint cytology of ovarian lesion in 131 cases in which they have included non-neoplastic lesions as well as ovarian tumors, and the accuracy of cases were 95% for benign, 47% for borderline, and 98% for malignant lesions [7]. These findings also more or less correlated with the index study.

Chhanda et al. have performed intraoperative imprint cytological study in which they have taken 50 cases and they have also correlated it with the histopathology. In the study of Chhanda et al. the most common tumor of epithelial origin was serous cystadenoma 17/50 (34%), similar to the present study. Most common malignant tumor in our study is mucinous cystadenocarcinoma which correlates with the study of Chhanda das et al and study of Kar Tushar et al [3,8].

In our present study which also concluded that the most common benign tumor is serous cystadenoma which is 20/50, followed by mucinous cystadenoma which is 15/50, which correlates with the study of Maingi and Pravakar [9].

Kushima et al have mentioned in their study that clinical workup is important before the diagnosis of mucinous carcinoma to rule out metastasis [10].

Khanamompong et al. have diagnosed ovarian tumors of 40 cases and they have correlated 31 cases with histopathology. According to

Khanamompong et al, 4 malignant and 9 borderline cases were very difficult to smear because of large tumor size[7]. In our present study we have taken smears from thick and thin area in cases of big tumor size and we have not encountered any difficulty in diagnosing the cases.

Kjellgren et al. have also examined fine-needle aspiration biopsy of malignant ovarian tumor and concluded that the sensitivity was 90%, specificity was 85% and diagnostic accuracy was 93–95%.

The study by Kjellgren et al gives better result as compared to the result of Nagai et al [6,11]. A Meta analysis by Meomini et al was done in which they have taken 18 cases of frozen section and they have correlated it with the histopathological results. The sensitivity for benign cases were 65 to 97 % and specificity was 97 to 100 %; the sensitivity for malignant lesions were 71 to 100 percent, and specificity was 98.3 percent to 100 percent [12]. Since the deep aspiration of ovarian tumor is controversial because of chances of dissemination and needle tract seeding, intraoperative method for diagnosis was encouraged [13,14,15].

Traditionally, assessment by frozen sections was the only intraoperative diagnostic method. Dudgeon and Patrick in 1927 introduced cytology as intraoperative pathological method for evaluation [16]. The cytological assessment by the imprint smears taken from fresh gross specimen is the most rapid microscopic diagnosis for tumor assessment [17].

Many authors [18-21] have concluded that intra-operative cytology has several advantages:

1. Less time of preparation with accuracy
2. Simple and cost-effective method
3. No freezing artifact
4. Cellular details are preserved
5. Identification of benign and malignant lesion on limited tissue.
6. Minimal contamination with safe handling.

In our present study we have correlated imprint cytology with the histopathology, whereas different authors have correlated histopathology with scrape cytology as well as frozen sections (Table 2).

Table 2: Comparison of results of other authors with present study

	Nagai et al, 2001 (n=354)	Khunamompong et al, 2003 (n=131)	Chhanda et al, 2014 (n=50)	Index Study, 2022 (n=50)
Benign	87.1%	95%	66.6%	88.6%
Borderline	30%	47%	0%	25%
Malignant	83.6%	98%	78.7%	100%

There are different intraoperative methods to diagnosis tumor cells but most of them give approximately same results.

Conclusion

Imprint cytology is the most rapid, cost effective and feasible method of screening intraoperative lesions to differentiate between benign and malignant ovarian tumors. However, one of the pitfalls of the technique is the low accuracy in the diagnosis of borderline lesions. But the malignant and benign lesions are usually clearly differentiated on imprint cytology and gives a good correlation. Considering the benefits of the technique as indicated in the index study, imprint cytology may be used intraoperatively in cases of doubt for better surgical outcome in patients.

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Conflict of Interest: Nil Source of support: Nil