RESEARCH COMMUNICATION

Role of Intraoperative Imprint Cytology in Diagnosis of Suspected Ovarian Neoplasms

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Abstract

Background: The present study was conducted to assess whether cytology can help in rapid diagnosis of ovarian neoplasms and thus facilitate individualised treatment. Methods: A prospective investigation was performed on 30 cases of suspected ovarian neoplasms. Imprint smears were made intraperatively from fresh samples from various representative areas, and stained with Leishman Giemsa for air-dried smears, and with hematoxylin and eosin and Papanicolaou for alcohol-fixed smears. A rapid opinion regarding the benign or malignant nature of the lesion and the type of tumour was given. Results: The overall sensitivity was 96.2%, specificity 75%, positive predictive value 96.3%, and diagnostic accuracy of 83.3%. Characteristic cytological patterns were noted in various epithelial and germ cell tumours. Conclusions: Imprint cytology can be used as an adjunct to histopathology for rapid and early diagnosis in the operation theatre, thus helping better management of patients.

Keywords: Intraoperative diagnosis - imprint cytology - ovarian neoplasms

Asian Pacific J Cancer Prev, **11**, 1389-1391

Introduction

Ovaries are paired pelvic female reproductive organs. The deep location makes it relatively inaccessible for fine needle aspiration cytology, except under image guidance. Even that approach is controversial from the safety point of view due to possibility of needle tract seeding and dissemination (Hajdu, 1984; Uguz, 2005). In such a situation intraoperative imprint cytology is relatively safe and beneficial for the patient and the surgeon.

We undertook this study to find out the accuracy of imprint cytology in ovarian neoplasms and correlate it with histopathological diagnosis, taking it to be the gold standard.

Materials and Methods

This prospective study was conducted on 30 cases of suspected ovarian neoplasms. Imprint smears were made peroperatively from the fresh samples from various representative areas, stained with Leishman Giemsa in air dried smears, and with hematoxylin and eosin and Papanicoulaou stain in ethanol fixed smears. A rapid opinion regarding the benign or malignant nature of the lesion and the type of tumour was given. Special stains were employed as and when required. The specimen was then sent for histopathology. Later the cytological diagnosis was compared and correlated with histopathological diagnosis, taking it to be the gold standard.

Results

Imprint cytology was done on 30 cases. Of all the cases, the cytological diagnosis of 28 cases correlated with the histopathological diagnosis. Of the 30 cases, 2 cases were cytologically diagnosed as non neoplastic ovarian cysts, 23 cases as benign lesion and 5 cases as malignant ovarian lesion.

The non neoplastic lesions consisted of 1 case each of follicular and corpus luteal cysts. The benign neoplastic lesions consisted of 15 cases of benign serous lesion, 3 cases of benign mucinous lesion, 3 cases of teratoma ovary and 2 cases of struma ovarii. The malignant ovarian lesion consisted of 2 cases each of malignant serous and Mucinous ovarian lesions and 1 case of dysgerminoma ovary (Table 1).

Non neoplastic lesions

The imprint from corpus luteal cyst showed large round cells with abundant foamy or granular eosinophilic cytoplasm and ill-defined cell borders with small, vesicular nuclei (Figure 1). The imprint from follicular cysts consisted of granulosa cells with round nuclei and scanty cytoplasm against a against a clear proteinaceous background.

Neoplastic lesions

The imprint from benign serous neoplasms revealed loose aggregates of benign epithelial cells with uniform round nuclei. The imprints from borderline serous

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Table 1. Cyto- Histological Correlation of Ovarian Lesions

Cytological diagnosis	Number of cases	Final histological diagnosis	Correlation
Follicular lesion	1	Follicular cyst	1/1
Corpus luteal cyst	1	Corpus luteal cyst	1/1
Benign serous neoplasm	15	Serous cystadenoma	14/15
Malignant serous neoplasm	2	Serous adenocarcinoma	2/2
Benign mucinous neoplasm	3	Mucinous Cystadenoma	2/3
Malignant mucinous neoplasm	2	Mucinous adenocarcinoma	2/2
Teratoma ovary	3	Mature cystic teratoma	3/3
Struma ovarii	2	Struma ovarii	2/2
Dysgerminoma ovary	1	Dysgerminoma ovary	1/1

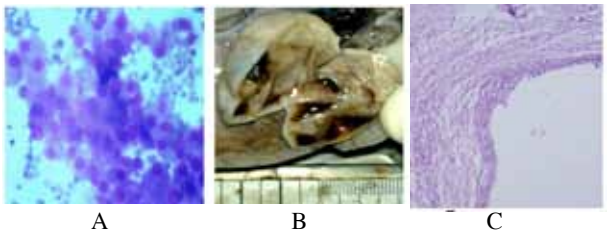

Figure 1. Follicular Cyst. A) Imprint Smear Showing Sheets of Follicular Epithelial Cells with Low Nuclear Cytoplasmic Ratio (MGG x100). B) Follicular Cyst Ovary (H&E x100). C) Histology Showing Cyst Cavity Lined by Corpus Luteal Cells (H&E x400)

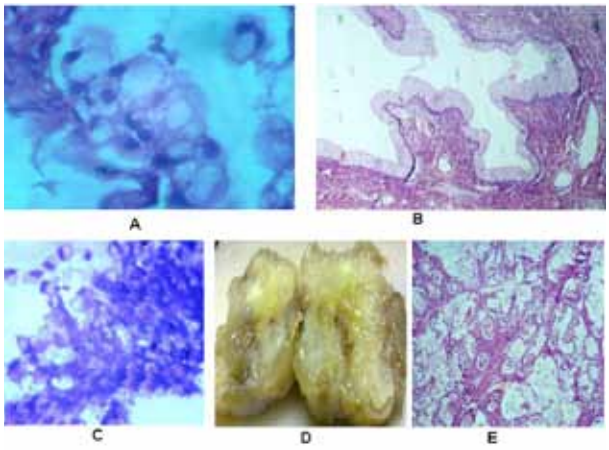

Figure 2. Mucinous Cystadenoma/Cystadenocarcinoma. A) Cystadenoma - Imprint showing sheets of signet ring cells Filled with Mucin in Mucinous Background. (MGG x400). B) Cystadenoma - Histology showing Cysts Lined by Single Layer of Mucinous Epithelium (H&E x400). C) Cystadenocarcinoma - Imprint Showing Clusters of Hyperchromatic Pleomorphic Cells with Eccentric Nuclei and Vacuolated Cytoplasm (MGG x400). D) Gross Appearance of Mucinous Adenocarcinoma. E) Cystadenocarcinoma-Histology Showing Acini Lined by Mucinous Epithelium Containing Hyperchromatic Pleomorphic Cells Invading the Stroma (H&E x 100)

neoplasms showed large flat clusters of well adhering cells with mild hyperchromasia. The imprints from serous cystadenocarcinomas were highly cellular and showed sheets and clusters of hyperchromatic pleomorphic cells with high nuclear cytoplasmic ratio.

Imprint from mucinous cystadenoma ovary showed sheets of signet ring cells filled with mucin in mucinous background (Figure 2A). The imprints prepared from mucinous cystadenocarcinomas were highly cellular and showed aggregates of cells with vacuolated cytoplasm and eccentric hyperchromatic pleomorphic nuclei (Figure 2C). Imprints from dermoid cyst ovary showed squamous cells and follicular cells. Imprint smear from dysgerminoma ovary showed tumour cells admixed with lymphocytes.

A case diagnosed as benign mucinous neoplasm on cytology was finally diagnosed as mucinous carcinoma on histopathology with evidence of stromal invasion. Another case diagnosed as malignant serous neoplasm on cytology with sheets of moderately pleomorphic cells, were later diagnosed as serous cystadenoma with a mucinous component .

The overall sensitivity was 96.2%, positive predictive value of 96.3%, specificity of 75% and diagnostic accuracy of 83.3%.

Discussion

Several studies have been done in the past regarding the use of imprint and touch preparation as a tool for intraoperative tumour diagnosis (Ganjei, 1995).

The cytology from follicular cysts consisted of cells with round nuclei and scanty cytoplasm against a bloody background or may be against a clear proteinaceous background, as also reported by Nunez et al (Nunez 1992) . The cytology from luteal cysts comprised of large round cells with abundant foamy or granular eosinophilic cytoplasm and ill-defined cell borders with small, vesicular nuclei, similar to the observation of Moran et al. (1993) and Ganjei et al. (1996).

In cases of benign serous lesions, cytology revealed loose aggregates of benign epithelial cells with uniform round nuclei, consistent with Ramzy et al. (1981) In cases of benign mucinous lesions, cytology showed sheets of benign cells with vacuoles, pushing the nucleus to the periphery. The imprints of cases of benign cystic teratoma showed keratinized sheets and/or anucleate squames against a thick greasy background similar to the findings of Orell et al. (1999)

There are very few studies regarding the imprint cytology of ovarian neoplasms. In the study of imprint cytology of ovarian neoplasms done by Kar et al. (2005), the sensitivity and specificity were 93% and 92% respectively. Nadji et al. (1979) had a sensitivity and specificity of 96.4% and 92% respectively in their study on fine needle aspiration cytology of ovarian neoplasms. The overall diagnostic accuracy of scrape cytology was satisfactory with 92% of cases correlating with histopathological diagnosis according to Shalinee et al. (2009). The sensitivity and specificity of cytology in the diagnosis of a variety of ovarian masses was

79.2% and 90.6%, respectively. Nazoora Khan et al. (2009). Ganjei et al. (1996) and Roy et al. (2003), in their studieds, described sensitivity and specificity of cytology in diagnosis of ovarian lesions as 94.2%, 91.4% and 75% and 100%, respectively. The overall diagnostic accuracy in this study was 89.9%, compared to an overall diagnostic accuracy of 96% described by Moran et al. (1993).

The ability to deliver an immediate diagnosis by imprint cytology makes it an important part of treatment at places where frozen section facility is not available, which needs an advanced setup (Michael, 1996).

In conclusion, imprint cutology can be used as an adjunct to histopathology for rapid and early diagnosis, even in operation theatres, that may help in individualisation of treatment and thereby better management of patients.

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