

Original Research Article

Utility of scrape cytology in the diagnosis of ovarian masses

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ABSTRACT

Background: Cytology is a useful adjunct to frozen section for rapid diagnosis of neoplastic pathology. However frozen section facility is available in limited centres. Therefore, we undertook this study to find out role of scrape cytology for diagnosis of ovarian masses.

Methods: It is an observational study done in a medical college. One hundred ovarian masses were collected for a period of eighteen months. Cut surface of ovarian masses were scraped with edge of a glass slide. Smears were prepared and stained with H and E stain, examined and a presumptive diagnosis was given. The verification of cytological diagnosis was done by histopathological report. All the data were recorded, tabulated and analyzed with the help of standard statistical methods using Microsoft XL.

Results: A total of hundred cases were studied. Left ovary was involved in 38 cases, right ovary in 52 cases and bilateral ovaries in 10 cases. Malignant cases mostly yielded hyper cellular smear. On Chi square test, it was significant with value of less than .001. The overall sensitivity and specificity of scrape cytology in diagnosing ovarian neoplasm, considering HPE as gold standard, are 98% and 78% respectively. In Dysgerminoma, Papillary adenocarcinoma, Mucinous Cystadenoma, Benign cystic teratoma, Granulomatous lesion of ovary, Lymphoma and Mucinous adenocarcinoma, scrape diagnosis corroborated with the histological diagnosis. Notable discrepancy was seen in cases of Endometrioid carcinoma.

Conclusions: Scrape cytology can serve as a powerful tool for early diagnosis of ovarian masses in close cooperation of the clinician, radiologist and pathologist. It has a potential for widespread use as knowledge and experience of interpreting cytopathologists increase.

Keywords: Cytology, Intra-operative, Masses, Ovary, Scrape, Solid-Cystic

INTRODUCTION

Ovarian cancer is significant as it is most common cause of death due to gynaecological cancers in women. They have excellent prognosis when detected early. Ultrasound and serological markers such as Ca-125 can be helpful as a screening tool in a few types such as serous carcinoma but no other types. Clinical and gross characteristics alone cannot easily distinguish ovarian tumours from one another. Therefore, cytological interpretation of ovarian

neoplasm is both interesting and challenging. ¹Rapid intra operative diagnosis of the nature of ovarian tumours is advantageous for effective planning of the surgical management of these tumours, particularly in a young woman as it can avoid unnecessary removal of contra lateral ovary and helps preserve fertility. ²

Frozen section is an effective tool to detect sample adequacy, assess margin status, to tell apart benign from malignant and on occasion correct diagnosis.

Cytological evaluation provides a better detail of cell morphology, and in experienced setup compares well with frozen section and subsequent formalin fixed paraffin embedded sections.³ The cytological preparations are also advantageous when sampling of multiple sites is required because this helps to confirm the presence of tumour dissemination without the requirement for additional frozen sections.

But despite excellent technical support, there are occasions in which the frozen section slides are suboptimal because of necrosis, haemorrhage, calcification, no representative sampling, or other technical factors, and in these cases, the cytology preparations frequently provide better cellular detail for diagnosis.⁴ Cell cytology in intra-operative setting can be studied by imprint or scrape preparations. Yield of material in scrape cytology is superior to imprint or touch preparation and offers a practical solution in the institutes where frozen section facility is not available. In addition, cytology has the advantage of being much less time consuming, easy to adopt, reliable and does not require special instruments.⁵ Therefore we undertook present study is to evaluate diagnostic role of intraoperative scrape cytology in the diagnosis of ovarian tumours.

METHODS

It was observational study done in the department of Pathology in a post graduate medical college. Ovarian masses from patients undergoing operation were

collected for a period of eighteen months. Purely cystic tumours were excluded from study. A total of 100 samples were included. Preoperative history, imaging and serological findings were noted for all patients. After removal of the specimen, it was received in the laboratory. Gross findings were noted in detail. Specimen was carefully opened, and the cut surface scraped with edge of a glass slide. In solid cystic tumours scraping was done from both solid and cystic areas. Multiple smears were prepared from different areas of tumour. Each smear was stained with H and E stain, examined under the microscope and a presumptive diagnosis was given. The verification of cytological diagnosis was done by final histopathological report. All the data were recorded, tabulated and analyzed with the help of standard statistical methods using Microsoft XL.

RESULTS

A total of hundred cases were studied. Most common age group was 3rd to 4th decade. Left ovary was involved in 38 cases, right ovary in 52 cases and in 10 cases bilateral ovaries were enlarged. Grossly, 9 specimens were solid and 91 solids cystic on macroscopic appearance. Authors studied individual scrape smears based on cellularity, pattern and cell morphology.

Table 1 shows nature of cellularity in scrape and category of the ovarian masses. Author observed that malignant cases mostly yield the hyper cellular smear. On Chi square test, it showed p value of less than 0.001.

Table 1: Cellularity in scrape smears and category of the ovarian masses.

Category	Hypercellular	Moderately cellular	Low cellular	Total
Benign	8	24	19	51
Borderline	3	3	0	6
Malignant	24	18	1	43
Total	35	45	20	100

P value: <0.001

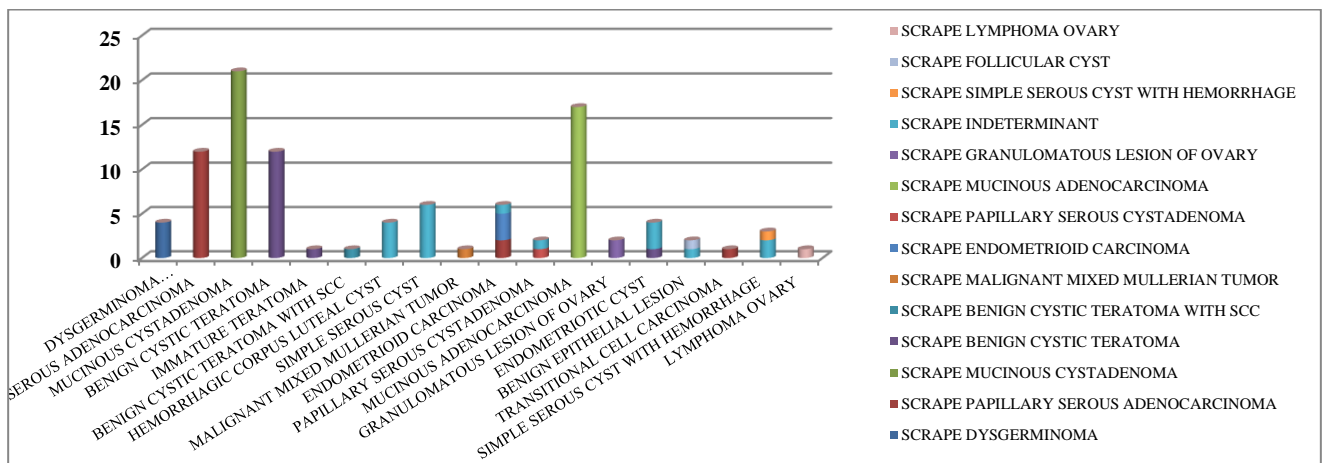


Figure 1: Cross tabulation of scrape and histopathological diagnosis of ovarian masses.

Table 2: Cytological features of individual diagnoses on scrape smears based on cellularity, pattern and cell morphology.

Ovarian neoplasm	Cellularity	Pattern	Cell morphology
Papillary serous carcinoma	High	Papillae, cohesive clusters and sheets, necrosis	Pleomorphic cells, high N:C ratio, nucleoli, dense eosinophilic cytoplasm
Borderline Mucinous	Low to Moderate	Flat sheet with anatomical border, plenty of mucin in background	Oval to round cells, mild pleomorphism, clear to light eosinophilic cytoplasm
Malignant mucinous	High	Cohesive clusters and sheets, mucinous background	Round to oval pleomorphic cells, high N:C ratio, clear cytoplasm
Endometrioid carcinoma	Moderate	Predominantly sheets, cribriform pattern	Pleomorphic cells, vesicular nuclei, distinct nucleoli
Dysgerminoma	High	Loose aggregates, lymphocytes	Cells with round vesicular nucleus, prominent multiple nucleoli, fragmented cytoplasm, many lymphocytes
Teratoma	Low to moderate	Aggregates and dispersed, amorphous debris in background	Anucleate squames, some sebaceous cells, bland spindle cells in mesenchyme
Malignant Mixed Mullerian Tumour	High	Cohesive clusters in necrotic background	Round, oval and spindle cells, open chromatin, Distinct nucleoli, moderate eosinophilic cytoplasm.

On histopathological examination of formalin fixed paraffin embedded sections, among a total of hundred cases fifty one cases were benign; six borderline and forty three cases were found to be malignant. While on scrape cytology; 42 cases were diagnosed as malignant. Rest were put in benign category. One malignant case was misdiagnosed as benign on scrape smear. It was a case of grade 1 immature teratoma.

Dysgerminoma, Papillary adenocarcinoma, Mucinous Cystadenoma, Benign cystic teratoma, Granulomatous lesion of ovary, Lymphoma and Mucinous adenocarcinoma, corroborated the Scrape diagnosis with the HPE diagnosis.

Notable discrepancy was seen in cases of Endometrioid carcinoma, where among 6 cases; 3 cases corroborated with the HPE diagnosis. Figure 1 shows cross tabulation of scrape and histopathological diagnosis of ovarian masses. Cellularity, pattern and cell morphology were studied in each of the individual case after final histological diagnosis which is represented in Table 2.

DISCUSSION

Scrape cytology have its role as a potential tool in intra-operative rapid diagnosis especially in institutions lacking with frozen section facility. In addition, material obtained by this technique can be utilized for further flow cytometry and cytogenetic studies if needed. In spite of the various applications, its use has not been widely recognized in diagnosis of ovarian tumours.⁶

Many studies have demonstrated that the diagnostic efficacy of intra operative cytology in experienced hands

is comparable to that of frozen section.⁷ According to Stewart et al., several factors can affect the accuracy of frozen section diagnosis, including sampling error, quality of frozen section (technical factor), and experience of pathologists.⁶

This study was undertaken to know the utility of scrape cytology in the immediate postoperative diagnosis of ovarian tumours. Authors obtained very good results while using scrape cytology. The overall sensitivity and specificity of scrape cytology in diagnosing ovarian neoplasm, considering HPE as gold standard, are 98% and 78% respectively. The sensitivity, specificity, positive predictive value, negative predictive value and accuracy of scraping technique in the diagnosis of benign ovarian masses were 98%, 88%, 96.7%, 98% and 98% respectively in our study. In the study of imprint cytology of ovarian neoplasms done by Kar Tushar et al, the sensitivity and specificity were 93% and 92% respectively.⁸ The overall diagnostic accuracy of scrape cytology was 92% of cases correlating with histopathological diagnosis according to Shalinee et al, with specificity of 96.4% and 92% respectively.⁹ The sensitivity, specificity, PPV and NPV are all 100% while diagnosing dysgerminoma, papillary serous adenocarcinoma, mucinous cystadenoma, mucinous adenocarcinoma, granulomatous lesion of ovary, teratoma with squamous cell carcinoma, malignant mixed mullerian tumour and lymphoma of ovary. Authors reported four cases of germ cell tumours and all 4 were correctly diagnosed on scrape cytology. Khunamornpong and Siriaunkgul also found an accuracy of 100% in the diagnosis of germ cell tumours.¹⁰ Figure 2 shows cytology and histology of mature teratomas.

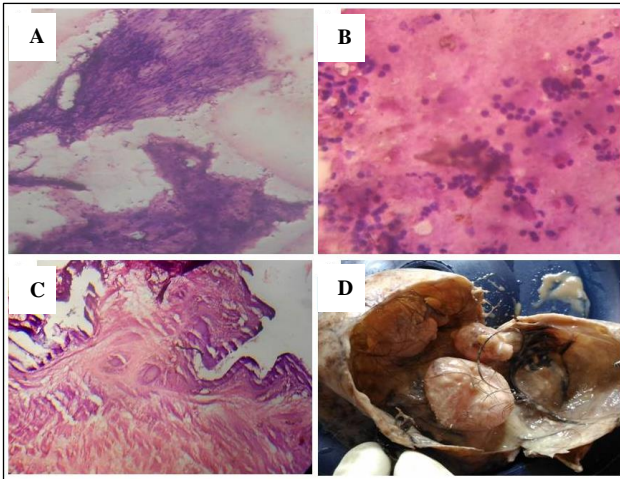


Figure 2: A) and B): Scrape cytology of mature teratoma, C) and D): histology and gross of mature teratoma.

Incidence of serous tumours was 14% in our study and all were correctly diagnosed. There was difficulty in categorization of borderline tumours and all were interpreted as benign in our study. Frozen section takes an upper role in these types. However, on closer inspection of borderline tumours, though sparsely cellular; mild cytological atypia was appreciated which was absent in benign tumours. In one previous study it has been stated that epithelial borderline tumours were difficult to distinguish from both benign and malignant epithelial tumours due to overlapping cytological features.¹⁰ Figure 3 shows cytological and histological picture of benign and malignant mucinous tumours.

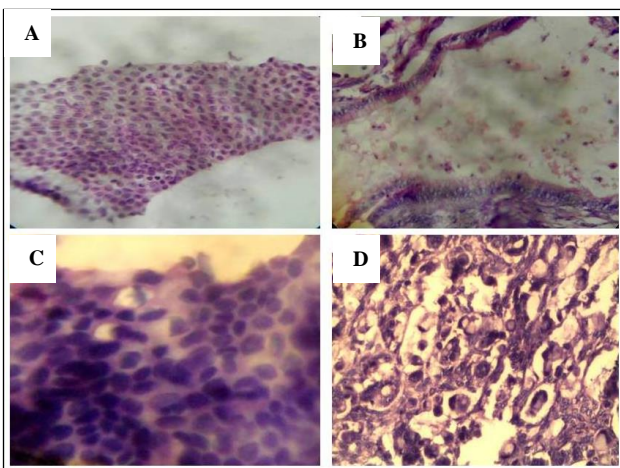


Figure 3: A) and B): Scrape cytology and histology of benign mucinous tumour, C) and D): Scrape cytology and histology of mucinous adenocarcinoma

Only 3 out of 6 cases of Endometrioid carcinoma were diagnosed correctly by scrape smear examination with sensitivity, specificity, PPV, and NPV of 50%, 100%, 100% and 97% respectively.

Endometrioid carcinomas have overlapping features with serous carcinomas as per one previous study on scrape smear study of ovarian tumour.¹¹

Mature teratomas were diagnosed correctly by scrape cytology but immature neuroepithelium was overlooked which was found on subsequent evaluation after HP diagnosis. Scraping solid areas and carefully searching for neuroepithelium in suspicious paediatric ovarian tumours will resolve this difficulty.

CONCLUSION

Scrape cytology can serve as a powerful tool for early diagnosis of ovarian masses. Multiple areas can be sampled, and quick diagnosis rendered. High accuracy can be achieved with the close cooperation of the clinician, radiologist and pathologist. Further studies will refine the diagnostic criteria and has a potential role to be widely practiced as knowledge and experience of interpreting cytopathologists increase.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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