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Diagnostic Efficacy of Endometrial Aspiration Cytology with Histopathological Correlation - A Prospective Study

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Abstract

Introduction: Endometrial cytopathology is a powerful tool for the detection of a wide variety of benign atypias, inflammatory changes, and infectious organisms. It is also helpful for the cyto-hormonal evaluation of patients and the detection of endometrial malignancies.

Materials and Methods: Endometrial aspiration was performed using Karman's cannula in 100 cases who presented with abnormal uterine bleed, infertility and postmenopausal bleed. The endometrial specimens obtained by D&C were processed and evaluated histologically. The endometrial aspirated smears were reviewed for cytomorphological findings and were correlated with histopathological findings for diagnostic accuracy.

Results: The study cases included 70 patients in reproductive age group and 30 patients in the perimenopausal and postmenopausal age groups. The diagnostic accuracy on cytology was 90% when compared to histology. Adequate material was obtained in 86% of cases on aspiration. Proliferative endometrium was the most common pattern (50%) observed. There was an overall 100% correlation in case of proliferative endometrium, atypical hyperplasia and endometrial carcinoma and 93.75% correlation in case of secretory endometrium between cytological and histopathological findings. The sensitivity and specificity of endometrial aspiration was 84.54% and 98.89% respectively**.**

Conclusion: Endometrial aspiration technique with is simple, safe, cost effective and well tolerated outpatient procedure. The endometrial aspiration cytology proved to be effective diagnostic modality in the interpretation of normal and abnormal endometrium. The present study emphasizes the need for early screening to diagnose pre-invasive lesions and endometrial malignancies in peri-menopausal and post-menopausal patients.

Keywords: Endometrial aspiration cytology, Cyclic endometrium, Dilatation and Curettage, Endometrial malignancy, Karman's cannula.

Introduction

The diagnostic modality for endometrial lesions is mainly endometrial biopsy or curettage, which is an invasive and time-consuming procedure. The routine Pap smear is not adequate for the detection of endometrial cancer as the rate of positivity is only 50%[1].

Papanicolaou and Marchetli described the ′sample aspiration method′ in the diagnosis of cancer and other conditions of the uterus, which involved the use of a metal cannula which was developed by Cary in 1943[1].

Aspiration cytology is a safe, simple and reliable technique without any complication and can be used as a

safe out-patient procedure with minimum discomfort to the patient.[2]

Hysteroscopy directed endometrial biopsy of suspicious lesions is the gold standard investigation but is invasive, needs specialized equipment and is operator dependent.[3] It also involves the cost of hospitalization and operation theaters, bed shortages and risk of anesthesia and operative complications which can be avoided by aspiration cytology.[4]

So we conduct a study to assess the diagnostic accuracy of endometrial aspiration technique and to compare the cyto-morphology of aspirated smears with histopathology

Material & Methods

The present study was conducted from July 2018 at R.N.T. Medical College and attached hospital, Udaipur; in the department of pathology and obstetrics and gynecology. The study included 100 cases in the reproductive, menopausal and postmenopausal age groups, who presented with complaints of abnormal uterine bleeding, infertility and post-menopausal bleeding. Thorough clinical history, general brief systemic and local examination was done for each case. Consent of the patient was obtained before the diagnostic procedures.

Endometrial aspiration was done using a plastic disposable Karman's cannula measuring 4mm. This was inserted into the endometrial cavity and connected to 20cc disposable syringe. Negative pressure was created and maintained, while the entire mucosa was uniformly aspirated. Endometrial aspiration material was smeared directly onto three clean glass slides. Two air-dried smears were stained using Field stain. One of the slides was immediately fixed in 95% ethyl alcohol and then stained with Papanicolaou stain.

The endometrial specimens obtained by D&C were processed and evaluated histologically. The endometrial aspirated smears were reviewed for cytomorphological findings and were correlated with histopathological findings for diagnostic accuracy.

Exclusion Criteria – Acute inflammatory disorders of the genital tract

Pregnancy

Gross evidence of cervical malignancy.

Observations / Results

Among 100 patients examined, age of the patients ranged from 22-69 year with the mean age being 41.76 years, the maximum number of cases noted were in perimenopausal and postmenopausal age group i.e. 5^{th} (33%) & 4^{th} (28%) decade of life. Majority of patients presented with menstrual abnormalities like menorrhagia (37%) followed by polymenorrhoea (19%), oligomenorrhoea, menometrorrhagia, postmenopausal bleeding and blood mixed discharge. While 18% of them presented with primary or secondary infertility.

Out of 100 cases satisfactory endometrial samples for evaluation were obtained in 86 cases. In 6 cases no material was obtained while in 4 cases only blood was seen, 2 cases showed only mucinous material and 2 cases had less than optimal cellularity. Most (91.42%) of the smears from patients of reproductive age group were adequate. Inadequate samples were more frequent in perimenopausal and menopausal age group (08/14).

Cytological Analysis: On cytology smears analysis, typing of endometrial hyperplasia was also possible. Different patterns observed as Proliferative endometrium - 43 cases (most common pattern)

Secretory phase - 15 cases

Menstrual phase - 13 cases

Mixed reaction - 2 cases

Endometrial hyperplasia – Simple - 4 cases

Complex - 1 case

Atypical - 1 case

Endometrial carcinoma - 2 cases

Metastatic squamous cell carcinoma - 1 case

Histopathological analysis

Histopathological examination was done for all cases of aspiration cytology smears. Only the samples which were adequate on cytology were included in the study which revealed

Proliferative endometrium - 39 cases

Secretory phase - 16 cases

Menstrual phase - 12 cases

Mixed reaction - 3 cases

Endometrial hyperplasia – Simple - 5 cases

Complex - 2 cases

Atypical - 1 case

Endometrial carcinoma - 2 cases

Metastatic squamous cell carcinoma - 1 case

However, no significant abnormality went undetected by cytological study.

On comparing aspiration cytology with histopathological diagnosis 39 cases out of 43 consistently showed proliferative phase on both HPE and cytology while 2 of them were simple hyperplasia, 1 case of mixed reaction and 1 case of secretory phase on HPE was diagnosed as proliferative phase on cytology. 15 cases were consistently secretory phase on both HPE and cytology smears. 1 case of complex hyperplasia was missed on cytology smears and was diagnosed as simple hyperplasia. There was 1 case of atypical hyperplasia, 1 case of metastatic squamous cell carcinoma and 2 cases of endometrial carcinoma on HPE as well as on cytology. While 2 cases of simple hyperplasia were misdiagnosed as proliferative endometrium on cytology. 1 case of chronic nonspecific endometritis is diagnosed as a menstrual phase on cytology. There was 93.02% correlation between cytologic and histologic findings.

Table 1: Comparison of Cytological and Histopathological findings on the Present Study

Cytology findings	No. of Cases in Cytology	Histopathological findings	
		Consistent	Inconsistent
Proliferative phase	43	39	04
Secretory phase	15	15	00
Menstrual phase	13	12	01
Mixed reaction	02	02	00
Simple hyperplasia	4	3	01
Complex hyperplasia	1	1	00
Atypical hyperplasia	1	1	00
Acute endometritis	1	1	0
Chronic nonspecific endometritis	3	3	0
Endometrial Carcinoma	2	2	0
Metastatic squamous cell carcinoma	1	1	0

Correlation of cytology with histopathological findings was evaluated by applying the screening tests of sensitivity (Sn), Specificity (Sp), Positive predictive value (PPV), Negative predictive value (NPV) and Accuracy.

In our study overall sensitivity was 84.54%, Specificity was 98.89%, PPV of 95.79%, NPV 99.26%, and Accuracy was 98.61%. Statistical values for atypical hyperplasia and endometrial carcinoma may not reflect the true values because of less number of cases. Apart from them Aspiration cytology was most sensitive in detecting proliferative phase (100%) and most specific (100%) for secretory phase and mixed reaction in our study.

Table 2: Statistical Evaluation of Cytology Diagnosis in the Present Study

Cytology diagnosis	Total no of cases	Histopathologically confirmed cases		Sn (%)	SP (%)	PPV (%)	NPV (%)	Accuracy (%)
		Consistent	Inconsistent					
Proliferative phase	43	39	04	100	91.48	90.69	100	95.35
Secretory phase	15	15	00	93.75	100	100	98.59	98.85
Menstrual phase	13	12	01	100	98.64	92.30	100	98.83
Mixed reaction	02	02	00	66.66	100	100	98.80	98.84
Acute endometritis	1	1	0	100	100	100	100	100
Chronic nonspecific endometritis	3	3	0	75	100	100	98.79	98.83
Simple hyperplasia	4	3	01	60	98.78	75	97.59	96.55
Complex hyperplasia	1	1	00	50	100	100	98.82	98.83
Atypical hyperplasia	1	1	00	100	100	100	100	100
Carcinoma	3	3	0	100	100	100	100	100

Table 3 shows that according to the present study aspiration cytology is more specific for diagnosing malignant lesions (100%) while it is more sensitive for the benign conditions (85.06%) as compared to borderline lesions (complex and atypical hyperplasia), cytology also has higher NPV, PPV and Accuracy for malignant conditions as compared to the benign conditions.

Table 3: Statistical Evaluation of Cytology Diagnosis for Benign and Malignant Lesions in the Present Study

Cytology diagnosis	Sensitivity %	Specificity %	PPV %	NPV %	ACCURACY %
Benign	85.06%	98.41%	93.98%	99.11%	98.18%
Malignant	100%	100%	100%	100%	100%

Discussion

Diagnostic dilatation and curettage is a commonly performed Gynecological surgery. It requires hospitalization, anesthesia and cost is significant. Some complications are faced by the patients. For these reasons, a wide variety of appliances have been used for the purpose of endometrial aspiration by various authors like intrauterine aspiration cannula, Isaacs endometrial cell sampler, Vabra aspirator, Uterobrush, Endocyte, Pipelle, Karman's cannula etc.

In our study endometrial aspiration was done using a 4mm Karman's cannula and 20ml syringe, the adequacy rate is 86% which was nearly consistent with the study of Singh

P et al (86%) and Handa U et al (89%). Inadequacy rates reported in the literature varied from 6.6% to 36.60%.

Table 4: Comparison of Adequacy of material on endometrial aspiration cytology in various studies

Studies done	Technique used	Adequacy of material
Malik et al, 2008	Insemination cannula	93.4%
Jadhav M et al, 2016	Infant feeding tube	90%
Mardi K et al, 2017	Infant feeding tube	90%
K. Shashikala, 2017	Karman cannula	92%
Singh P et al, 2018	Pipette (Medgyn)	86%
Handa U et al, 2018	Karman cannula	89%
Present study, 2018	Karman's cannula	86%

In the present study, the sensitivity and specificity of aspiration cytological diagnosis was 84.54% and 98.89% respectively. These findings were similar with observations carried out by Malik et al but differed from the findings of K Shashikala et al. However, the specificity in our study was nearly consistent with the findings of Ashraf S et al and Saika J B et al (Table 5).

Table 5: Comparison of sensitivity and specificity of aspiration cytology in different studies

Study	Sensitivity (%)	Specificity (%)
Bistoletti et al, 1993	97	84
Liza et al, 1999	81.62	83.33
Malik R et al, 2008	83.3	95.4
Samina Ashraf et al, 2014	91.9	100
Jadhav M et al, 2016	91.66	88.23
K. Shashikala et al, 2017	93	85.7
Saika J B, 2017	83.31	100
Present study, 2018	84.54	98.89

In the present study, 3 cases of malignancy were diagnosed on cytology and were confirmed by histology. The correlation was 100% and the results are similar to findings of other authors. [6,12,14]

Conclusion

Endometrial aspiration is a well-tolerated, safe, simple outpatient procedure. It is a cheap and efficient diagnostic technique for reporting endometrium of patients of all ages. It is an efficient technique for screening postmenopausal patients in diagnosing uterine as well as extra-uterine metastatic malignancies.

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Legends of Figure

Figure1 : Proliferative & Secretory phase endometrium cytology, PAP stain ,40x

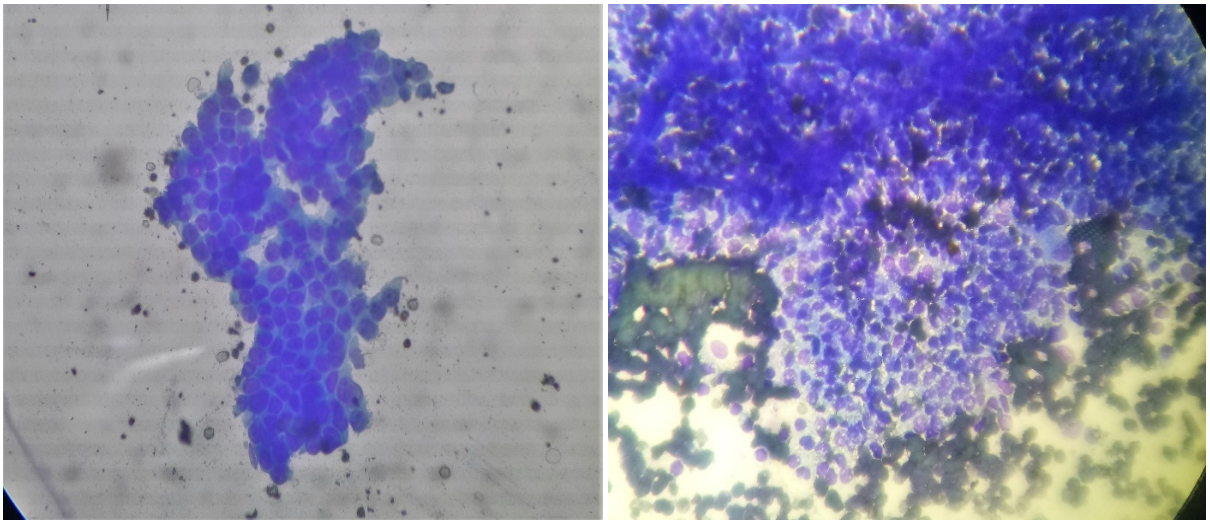

Figure2 : Simple & Complex hyperplasia endometrium cytology, PAP stain ,40x

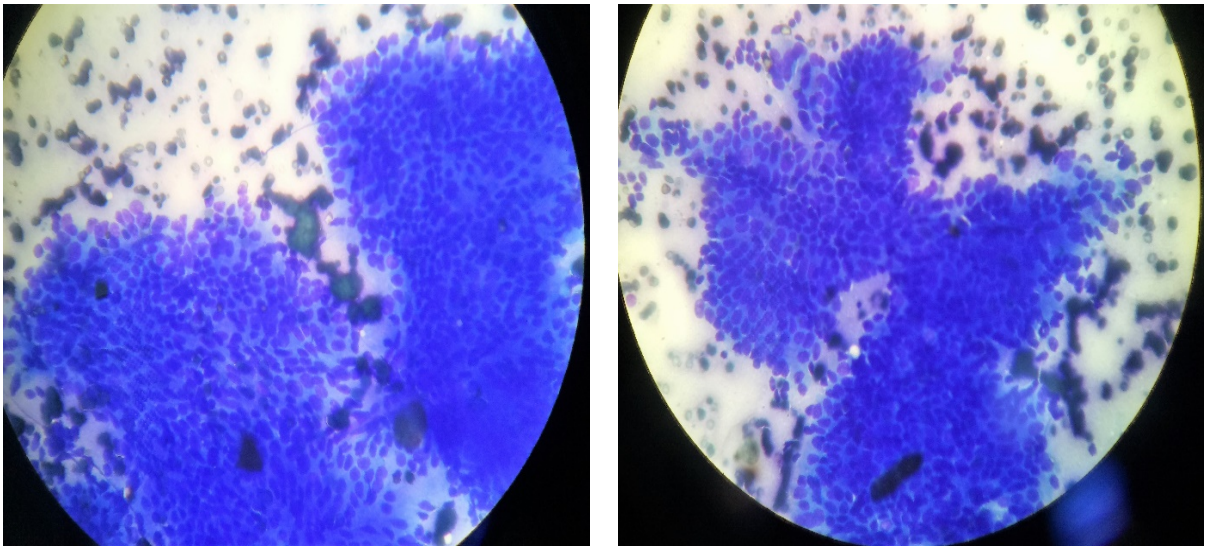

Figure3 : Atypical hyperplaisa endometrium cytology, PAP stain ,40x

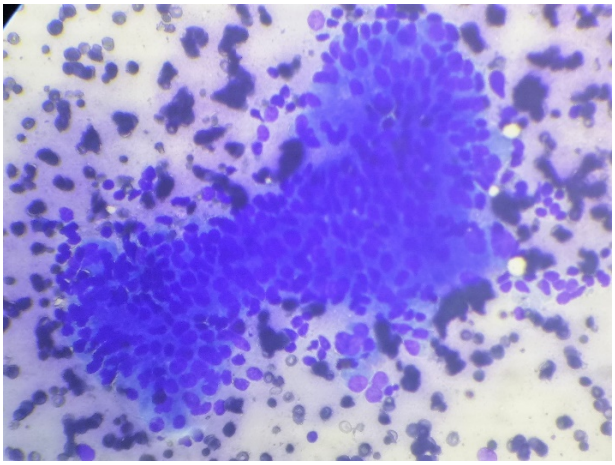

Figure 4 : Endometrial carcinoma & Squamous cell carcinoma cytology, PAP stain ,40x