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ORIGINAL ARTICLE

An Audit of Pap Smear Cytology

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ABSTRACT

Introduction: Cervicovaginal cytology (Pap test) is the commonly used tool for screening of cervical cancers. Its accurate interpretation depends on obtaining adequately cellular samples prepared to a high standard. Its accuracy and cost-effectiveness can be seriously compromised by inadequate samples.

Aim: To audit the adequacy of Pap smears in diagnosing cervical cancer.

Study design: Pap smears reported were retrieved from the hospital records and data were analyzed. Histopathology correlation done for abnormal pap smears.

Results: A total of 1,531 cases were reported; 1,157 (75.57%) cases were adequate and 374 (24.42%) inadequate. Qualitative inadequacy included inadequate fixation and poor quality of staining 10 (2.67%), drying artefacts 15 (4.10%), broken slides five (1.33%). Quantitative inadequacy was sampling errors – lack of junctional component 186 (49.73%), presence of inflammation 138 (36.89%) and blood 20 (5.34%). 998 (86.25%) were labeled as negative. About 159 (13.74%) cases showed epithelial cell abnormalities. Cytohistological correlation revealed significant discrepancy. The majority of these were carcinomas that were misdiagnosed as atypical cells.

Conclusion: Cytopathologists or clinicians must be adequately trained, experienced and subject to regular audit. Reporting of atypical cells needs to be addressed with more stringent training of cytopathologists.

Keywords: Audit, Cervical cytology, Screening, Inadequacy.

INTRODUCTION

Cervical cancer continues to be a major cause of morbidity and mortality among the female population in India and accounts for 17.5% of all female cancers in Kolar, India, according to hospital-based cancer registries.[1]

In the recent years, the diagnostic utility of cervicovaginal cytology (Pap test) as a first line of investigation has assumed importance in screening of cervical cancers.

Pap smear is a simple, safe, cost-effective and reliable technique, its accurate interpretation depends on obtaining adequately cellular samples prepared to a high standard. Inadequate specimens in particular waste valuable resources and add unnecessarily to patient stress.

Aims

1. To assess the specimen adequacy and quality indicators in diagnosing cervical cancer
2. To evaluate the discrepant cases on cytohistological correlation.

Study Design

Cervical screening at our institution is offered to patients who present to gynecology clinics with various gynecological problems as well as to patients who attend annual health screenings. We also conduct cancer detection camps.

Cervicovaginal specimens are prepared conventionally in our center, fixed in alcohol and sent to cytology laboratory. Pap stained smears are examined by at least two pathologists using The Bethesda System 2001 guidelines.[2]

All Pap smears reported from September 2009 to August 2010 (1 year) were retrieved from the hospital records. The numbers and percentages of unsatisfactory smears, atypical squamous cells of undetermined significance (ASCUS), atypical glandular cells (AGC), low and high grade squamous intraepithelial lesions (LSIL and HSIL), squamous cell carcinoma and adenocarcinoma were compiled.

Follow-up histological findings extracted from medical records (comprising of colposcopy-directed punch biopsies, cervical biopsies, cone biopsies and hysterectomies) were

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recorded for one year and cytohistological correlation was performed for all the cases with abnormal findings.

RESULTS

A total of 1,531 cases were reported in one year. Age group of women screened ranged from 30 to 80 years with varied clinical histories. 1,157 (75.57%) cases were satisfactory and 374 (24.42%) unsatisfactory. Categories of satisfactory smears (Fig. 1 and Table 1), unsatisfactory smears (Table 2) and general categorization of Pap smears (Table 3) are shown.

Follow-up Data

Of the 159 cases with positive cytology, 119 (74.8%) cases had histological follow-up at our center. 25% of ASCUS (12/48) (Fig. 2), 33.3% of AGC (10/30), 9.37% of LSIL (3/32) (Fig. 3), 27% of HSIL (8/30) (Fig. 4) and 37% of squamous

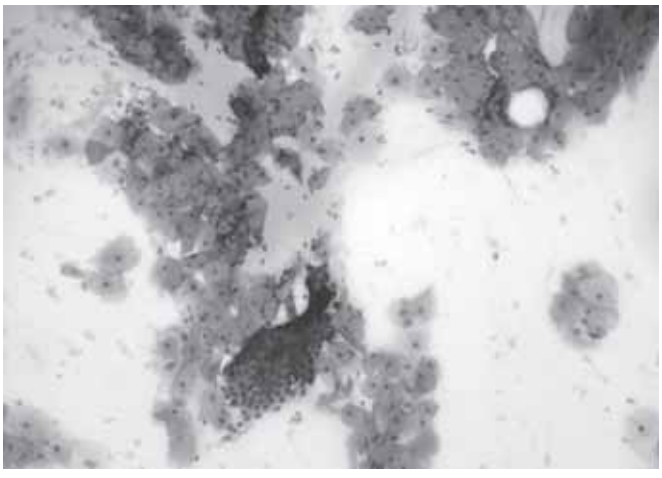

Fig. 1: Microphotograph of normal Pap smear showing superficial and intermediate squamous cells along with cluster of endocervical cells (Pap, ×100)

Table 1 Categories of satisfactory smears

Categories of satisfactory smears	*Number (percentage)*
Normal	187 (16.16%)
Inflammation with infection	214 (18.47%)
Only inflammation	552 (47.7%)
Non-neoplastic lesions	45 (3.8%)
Neoplastic lesions	159 (13.7%)
Total	1157 (75.57%)

Table 3 General Categorization of Pap smears

Category	*Number (%)*
Negative of intraepithelial lesion or malignancy	**998 (86.25%)**
1. Organisms	
a. Bacterial vaginosis	208 (17.97%)
b. Trichomonas vaginalis	45 (3.8%)
c. Candida	36 (3.11%)
d. Herpes simplex	4 (0.34%)
e. Leptothrix	13 (1.12%)
f. Aspergillus	1 (0.08%)
2. Non-neoplastic lesions	
a. Ectropion	8 (0.69%)
b. Atrophic	31 (2.67%)
c. Granulomatous lesion	3 (0.25%)
d. Chemotherapy changes	1 (0.08%)
e. Regenerative changes	1 (0.08%)
f. Follicular cervicitis	1 (0.08%)
Epithelial cell abnormalities	**159 (13.74%)**
1. Squamous cells	
a. ASCUS	48 (4.14%)
b. LSIL	32 (2.7%)
c. HSIL	30 (2.5%)
d. Squamous cell carcinoma	19 (1.64%)
2. Glandular cells	
a. AGC	30 (2.5%)
ASCUS:SIL = 0.7	

ASCUS: Atypical squamous cells of undetermined significance; AGC: Atypical glandular cells; HSIL: High grade squamous intraepithelial lesion; LSIL: Low grade squamous intraepithelial lesion

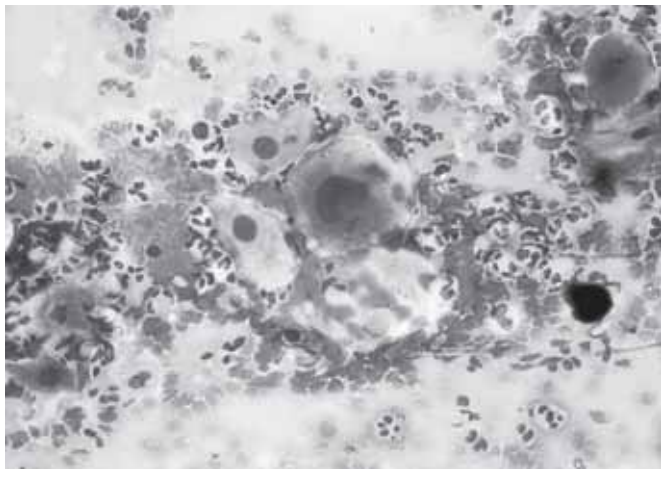

Fig. 2: Microphotograph showing atypical squamous cells of undetermined significance (ASCUS) (Pap ×1000)

Table 2 Categories of unsatisfactory smears

Qualitative inadequacy		*Quantitative inadequacy*	
Inadequate fixation and poor quality of staining	10 (2.67%)	Lack of junctional component	186 (49.73%)
Drying artefacts	15 (4.10%)	Presence of inflammation	138 (36.89%)
Broken slides	5 (1.33%)	Presence of blood	20 (5.34%)
Total	30 (8%)		344 (92%)

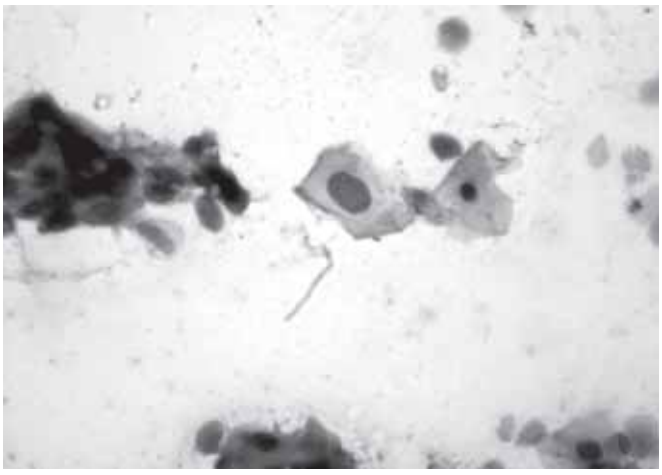

Fig. 3: Microphotograph showing low grade squamous intraepithelial lesion (LSIL) (Pap, ×1000)

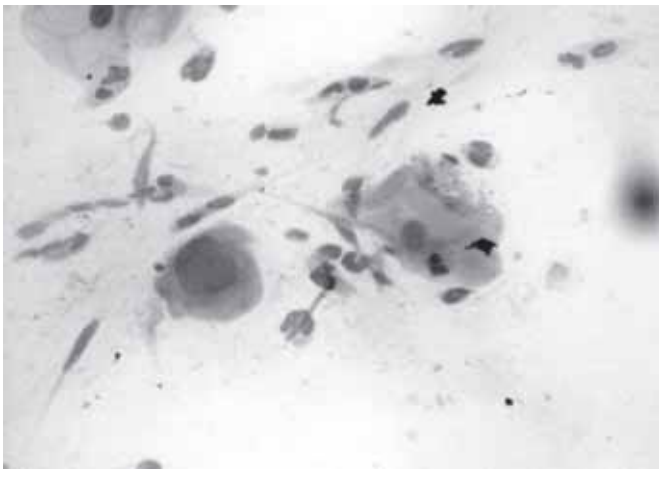

Fig. 4: Microphotograph showing high grade squamous intraepithelial lesion (HSIL) (Pap, ×1000)

cell carcinoma had subsequent histological follow-up. These cases were analyzed as the cases that were negative for dysplasia along with unsatisfactory cases that had a subsequent positive histology. Out of 374 unsatisfactory cases, 250 (66.8%) were followed up. Of these 245 cases (98%) were negative, three cases had CIN I, two cases had squamous cell carcinoma.

Cytohistological Correlation

Out of 12 cases of ASCUS, four were squamous cell carcinomas, four were CIN I and one was CIN II. Out of 10 cases of AGC, eight were normal, one was squamous cell carcinoma and one adenocarcinoma. Two cases of LSIL showed squamous cell carcinoma and one showed CIN II. Five cases of HSIL showed squamous cell carcinoma. All cases diagnosed as squamous cell carcinoma and adenocarcinoma had confirmed diagnosis on histology. Three cases of ASCUS, one case of AGC and three cases of HSIL showed discrepancies. Four cases reported as negative for dysplasia show squamous cell carcinoma on histology and one case of AGC showed adenocarcinoma.

Review of Discrepant Cases

A total of 11 cases had a significant discrepancy between cytology and subsequent histological diagnoses. These cases were subjected to a blind review by two pathologists who were blinded to the diagnoses and a consensus diagnosis was arrived at. The results of the review are outlined in Table 4. The reason for the discrepancy was either due to sample error at cytology or histology and interpretive error.

DISCUSSION

The cervical cancer screening is offered to all patients who attend the gynecology clinic at our hospital as well as to women who come for annual health check-ups. We also conduct regular cancer screening camps in villages, in and around Kolar district. The relative percentages of various diagnoses are compared in Table 5.

Our data is close to the benchmark data collected by the College of American Pathologists (CAP) Cytopathology Resource Committee,[3] but higher than Crasta et al,[4] as our study was conducted on high-risk population with lower socioeconomic status. However, our figures were significantly lower than National Health Service Cervical Screening Programme (NHSCSP) guidelines[5] and other Indian study[6] as some of our cases are a part of routine annual health check-ups, and women are not actively called for screening in a systematic

Table 4 Review of discrepant cases

Original cytology	*Original histology*	*Consensus cytology*	*Consensus histology*	*Comments*
HSIL	Negative	HSIL	Negative	Sampling error at histology
HSIL	Negative	ASC-H	Microinvasive carcinoma	Interpretive error
HSIL	Negative	ASCUS	CIN II	Interpretive error
ASCUS	Negative	LSIL	Negative	Sampling error at histology
ASCUS	Negative	ASCUS	Microinvasive carcinoma	Interpretive error
ASCUS	Negative	ASCUS	CIN III	Interpretive error
NILM	SCC	ASC-H	SCC	Interpretive error
NILM	SCC	HSIL	SCC	Interpretive error
NILM	SCC	NILM	SCC	Sampling error at cytology
NILM	SCC	NILM	SCC	Sampling error at cytology
AGC	CIN III	SCC	SCC	Interpretive error

ASCUS: Atypical squamous cells of undetermined significance; AGC: Atypical glandular cells; LSIL: Low grade squamous intraepithelial lesion; HSIL: High grade squamous intraepithelial lesion; NILM: Negative for intraepithelial malignancy

Table 5 Comparison of present study with other figures

Diagnoses	*Present study*	*CAP*[3]	*Crasta et al*[4]	*NHSCSP*[5]	*Sankaranarayana et al*[6]
Unsatisfactory	24.42%	0.5%	1.36%	7.0%	4.1%
ASCUS	4.14%	4.0%	0.37%	5.5%	8.8%
LSIL	2.7%	2.5%	0.19%	5.5%	6.2%
HSIL	2.5%	0.6%	0.61%	1.6%	1.60%
ASCUS/SIL ratio	0.7	1.8	0.5	Not stated	0.9

ASCUS: Atypical squamous cells of undetermined significance; LSIL: Low grade squamous intraepithelial lesion; HSIL: High grade squamous intraepithelial lesion; SIL: squamous intraepithelial lesion; CAP: College of American Pathologists; NHSCSP: National Health Service Cervical Screening Programme

manner, hence there is a higher rate of negative smears in the cohort.

The rate of unsatisfactory smears is high (CAP median: 0.5%)[3] but follow-up appears to be good. The specimen unsatisfactory rate is an important quality assurance indicator in cervical cytology as it identifies a group of women who are being inadequately screened.[4] On follow-up, only 2% of patients with unsatisfactory smears were found to have SIL or malignancy in our study, underscoring the importance of repeat cytology.

High rate of unsatisfactory smears could be attributed to sampling errors as many of the samples of camp cases are taken by nurses or first year postgraduates who do not have adequate skills to perform the procedure. Hence, regular training and revalidation is essential for our set-up.

In a low-risk population, it was suggested that the rate of ASCUS should be less than 5%.[2] But our study involved high-risk population showing ASCUS rate of 4.14% with a low ASCUS/SIL ratio of 0.7. This can be explained by increased LSIL detection and possibly by using Bethesda 2001 criteria more stringently.[2]

Only 74.8% had histological follow-up. Some of the patients were lost for follow-up. This is attributed to poor patient compliance and lack of cooperation to undergo invasive procedure due to high illiteracy rate. The clinical follow-up of ASCUS is variable; the options being repeat cytology or immediate colposcopy in our hospital. Most of our patients have colposcopically directed biopsy (25%) as the next procedure and 91.6% had a positive yield on subsequent histology. 41.6% (5/12) cases of ASCUS were diagnosed as squamous cell carcinoma on histology.

In our study, 20% of AGC were diagnosed as malignancies on biopsy follow-up, of which 10% were adenocarcinoma. AGC may pose difficulty in diagnosis because of its rarity of occurrence. Squamous, endocervical and endometrial lesions may show AGC on cytology causing diagnostic dilemma. The sensitivity of Pap tests for detection of high grade uterine lesions is low, hence patients with AGCs should undergo colposcopy and endocervical sampling as an initial evaluation.[4]

The biopsy diagnoses of LSIL, HSIL, and squamous carcinomas showed good correlation with the cytological diagnoses. Three cases of HSIL showed discrepancy. A positive cytological diagnosis with a subsequent negative histology, depending on the type of histological specimen and interval from the time of smear may be due to sampling error of the biopsy or regression of the lesion. Four cases of false negatives were reported as malignant on histology, causes attributed to sampling error on cytology or interpretive errors.

Thus, it is essential to review histology of cytology specimen as well as vice versa to arrive at a consensus diagnosis of malignancy.

CONCLUSION

The cervical cytology services at our hospital are well within the accepted standards. Although cytopathologists or clinicians may sample pap smears, they must be adequately trained, experienced and subject to regular audit. Reporting of atypical cells need to be addressed with more stringent training of cytopathologists.

REFERENCES

1. Kalyani R, Das S, Bindra Singh MS, Kumar H. Cancer profile in Kolar: A 10 years study. Indian J Cancer 2010;47:160-65.
2. Solomon D, Davey D, Kurman R, Moriarty A, O'Connor D, Prey M, et al. The 2001 Bethesda system: Terminology for reporting results of cervical cytology. JAMA 2002;287: 2114-19.
3. Davey DD, Nielsen ML, Naryshkin S, Robb JA, Cohen T, Kline TS. Atypical squamous cells of undetermined significance: Current laboratory practices of participants in the College of American Pathologists Interlaboratory Comparison Program in Cervicovaginal Cytology. Arch Pathol Lab Med 1996;120: 440-44.
4. Crasta JA, Chaitra V, Simi CM, Correa M. An audit of cervicovaginal cytology in a teaching hospital: Are atypical glandular cells under-recognised on cytological screening? J Cytol 2009;26:69-73.
5. National Health Service Cervical Screening Programme Publication No.1 (October 1995): Achievable standards, benchmarks for reporting and criteria for evaluating cervical cytopathology. Report of a Working Party set-up by RC Path, BSCC and NHSCSP.
6. Sankaranarayanan R, Thara S, Sharma A, Roy C, Shastri S, Mahe C, et al. Accuracy of conventional cytology: Results from a multicentre screening study in India. J Med Screen 2004; 11:77-84.