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Original Research Article

Liquid based Cytology and Conventional PAP Smear: A Comparative Study

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Abstract

Objective: A comparative study of liquid based cytology and conventional pap smear in cervical screening.

Material and Methods: 100samples of cervicovaginal smears prepared by standard conventional and LBC technique were interpreted as per Bethesda system of reporting cervico-vaginal smears. Smear were studied, compared and statistically analyzed. A p-value < 0.05 is considered statistically significant.

Results: After conversion to LBC the percentage of unsatisfactory smear is decreased. The epithelial abnormalities found in CPS and LBC are in frequency of normal (7%), Chronic cervicitis and infection (44%), mild dysplasia and LSIL (20%), HSIL (23%), AGUS (1%), Ca Cervix (4%), Adenocarcinoma (8%). Inflammatory organisms were almost equally identified in both techniques.

Conclusion: Although a shorter screening time, cleaner background and decreased unsatisfactory smear are the major advantages of LBC, CPS is not inferior to LBC. The data suggests that there is increased detection rate of cervical pre cancerous lesions with LBC. The specificity of the two tests seems similar because of the fact that follow up of negative cases is unavailable.

Keywords: Conventional Pap Smear; Liquid Based Cytology.

Introduction

Cervical carcinoma is the most comman malignancy among women worldwide [1-3].Epidemiological and molecular biological studies have shown that persistent infection with high risk human papilloma virus (HPV) is necessary in the pathogenesis of cervical cancer [4]. At present most cervical carcinomas are considered to harbor oncogenic types of HPV [5] types 16, 18, 45, 31 and 33 being the most frequently identified viruses in these lesions [6]. Early detection of cervical cellular changes and cervical intraepithelial neoplasia(CIN) followed by appropriate treatment will reduce the risk of developing cancer .

This was made possible in the early 1940s by the introductionof the papanicolaou (pap) smear. Since the early sixties, population based screening with pap smear has been used to detect precancerous lesions. Despite recent concern about the demise of papanicolaou test, as it gradually yields its role as a primary cervical cancer screening test to HPV and other biomarker testing , cervical cytology remains the most successful cancer prevention program ever devised. Its specificity will remain the cornerstone of future screening regimens, including those in women who have received HPV vaccination.

As we are aware that in USA, screening for cervical cancer has brought down the incidence of mortality by

many folds. Similarly, in India, if we have a simple, economical and easily available method for screening of cervical cancer, then we may also reduce the mortality related to this cancer. In conventional pap smear the sample is taken from cervix, cells are spread on glass slide and then preserved. At the laboratory the cells are stained and observed under microscope. In liquid based cytology the smear sample is taken from cervix and placed into a liquid solution that preserves the cell. The sample is then mixed with a separator and centrifuged which removes the excess blood, mucous and inflammatory cells and produce a pallet. This pallet is used to make a thin cell layer on glass slide. The cells are then stained and observed under microscope.

Hence, the present study is conducted as a comparision of liquid based cytology and conventional pap smear in cervical screening.

Material and Methods

This study was carried out during January 2016 to April 2017 at Index Medical college hospital and research centre Indore. Cervicovaginal smears were collected from patients attending outpatient department of Obstetrics and Gynaecology for various gynaecological problems.

All females between age group 25-65yrs were included in the study however all pregnant females and females undergoing for any treatment for cervical pathology were excluded.

Materials and Methods

LBC processing kit consists of Cervical sample preservative solution, Cell fixative andCell separator used for LBC smear preparation. An Alcohol fixed routine smears for conventional preparation. Both the smears were stained with standard staining techniques.

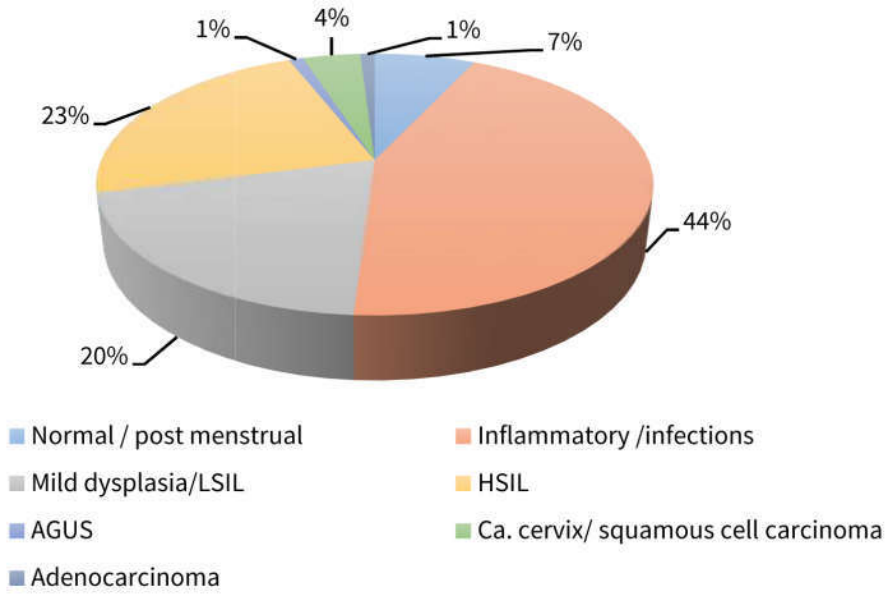
Observations and Result

Hundred cervicovaginal smears prepared by conventional and liquid based cytology showed the following epithelial abnormalities in frequency of normal/ post menstrual (7%), inflammatory conditions/ infections (44%), mild dysplasia/ LSIL (20%), HSIL (23%), AGUS (1%), carcinoma cervix/ sq. cell carcinoma (4%), adenocarcinoma (1%). Inflammatory organisms were almost equally identified in both techniques.

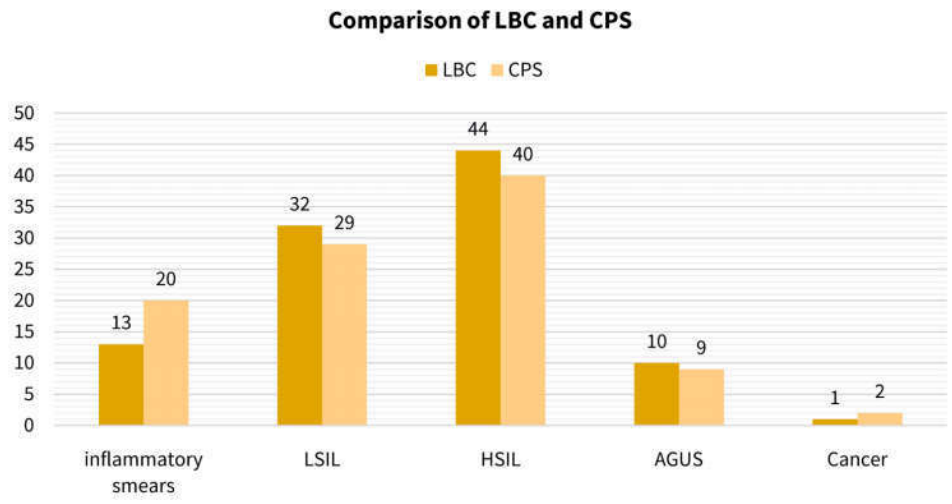
LBC was more accurate for the diagnosis of HSIL and LSIL. LBC showed 95% satisfactory smear and 5% unsatisfactory smear, whereas CPS showed 35% satisfactory and 65% unsatisfactory smear. This proved the decrease in number of unsatisfactory smear when prepared by LBC technique.

The reasons for unsatisfactory smears was either due to lack of material, mucus trap, neutrophils, RBC's or haemorrhagic background, which were more in CPS, whereas these problems were overcome in the LBC smear. LBC has shorter screening time and better representative material than CPS. Nuclear and cellular preservation was same in both the technique. The specificity of the two technique seems equal. The true specificity of the two technique cannot be ascertained exactly in this study because of the fact that it is based upon screening population where follow up of negative cases is not available.

Graph 1:



Graph 1:



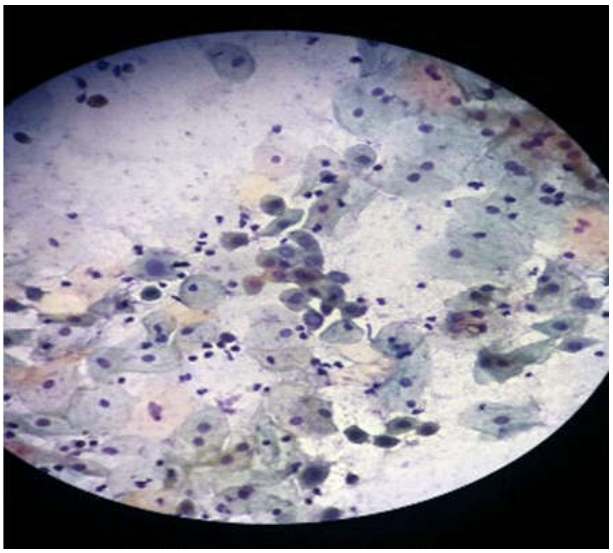


Fig. 1: 40X,pap stain, CPS showing intermediate & endocervical cells in dirty background

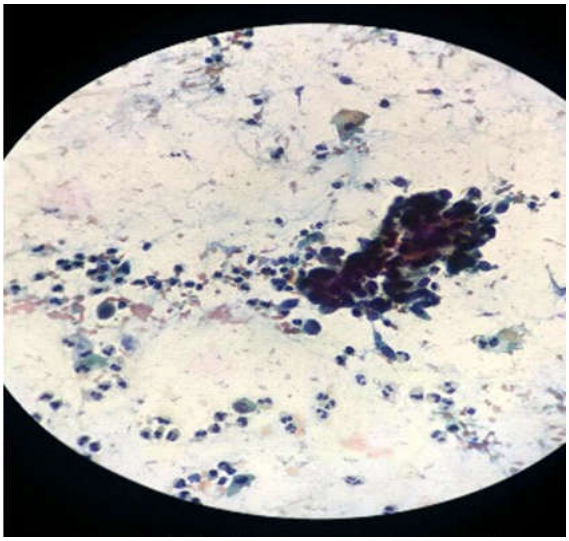


Fig. 3: 40X, pap stain, CPS showing endocervical cells

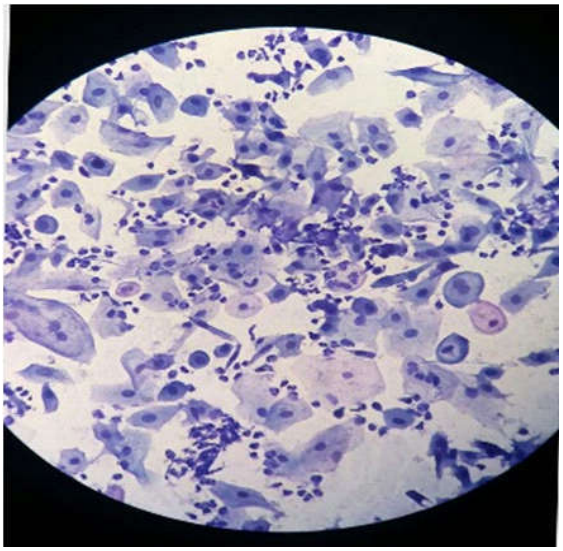


Fig. 2: 40X,pap stain LBC smear showing cellular elements in relatively clear background

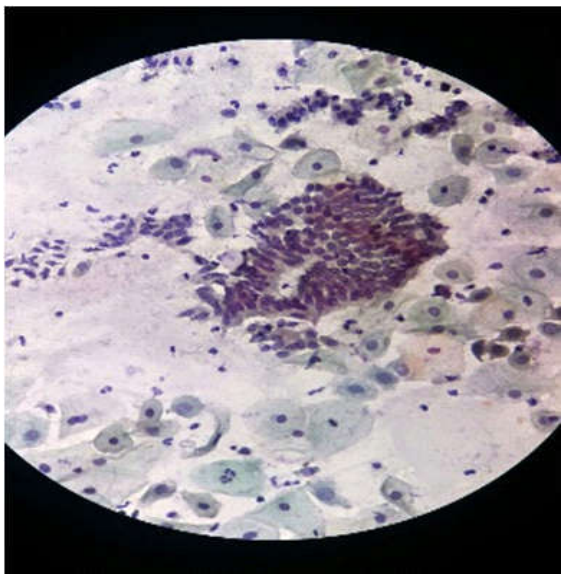


Fig. 4: 40X, pap stain, LBC showing end on and side on appearence of endocervical cells

Discussion

Pap smear is one of the best available screening methods for early detection of cervical precancerous lesions. CPS is used as the standard technique in most the countries but now LBC is used as an alternate technique for processing the cervical samples collected. There have been divergent opinions about LBC use such as reduced rate of unsatisfactory smear, clarity of microscopy, improved sample processing and small area to be screened.

Furthermore the potential for performing additional test like HPV testing on residual sample. The Australian Health Technology Advisory Committee Report and the Canadian Coordinating office for Health technology Assessment concluded that LBC would increase the detection of cervical abnormalities and decrease the number of unsatisfactory samples, but decided that the relative improvement in sensitivity was not sufficient to mandate universal introduction of technique [8,9].

In the series of samples evaluated during the study it proved to have overcome the limitations of CPS as unsatisfactory smear because of obscuring amount of blood, mucus and inflammation and also air drying. Mount et al concluded that wet fixation and LBC might enhance visualization of nuclear details, permitting improved detection of chromatin abnormalities [10]. So the reduction of unsatisfactory smear in LBC samples is consistent with many previous studies [11,12,13]. LBC leads to complete elimination of most causes of unsatisfactory smear this can also be handled by adequate visualization of cervical os and proper sample collection.

Earlier LBC was performed from residual material from conventional smear, but in the present study LBC samples were made directly from vial. This gives a better picture of adequacy and diagnostic efficacy of LBC for cervical screening. Through this we have experienced an efficacy gain in the results which was similar with the study of Lee et al when they argued that evaluation of LBC is more efficient than CPS due to smaller area that has to be assessed on microscopic slide and due to clarity of specimen [7].

In the study conducted Ayre's spatula was always used together with cytobrush for endocervix and according to Martin Hirsch et al this combination yields an equal or greater percentage of adequate cervical samples and sample with endocervical cells than with cervix brush [14].

As it is well known that endocervical cells are typically found clustered in groups (i.e end on appearance and picket fence pattern) in CPS , whilst often found one at a time in LBC. This could be the reason of decrease in endocervical component in LBC. This has also been noted in earlier publications on LBC [7,15].

In our study the rate of detection for epithelial cell abnormalities was similar in both CPS and LBC. As in a direct comparison study of Taylor et . al. of 5652 cases CPS and LBC performance and accuracy were statistically similar [16].

The preparation of LBC required skilled technical staff and is more time consuming compared to CPS but screening is much easier, faster and accurate. In the present study we have also found that as there was no change in the diagnosis of LBC and CPS so we have concluded that LBC has similar specificity and sensitivity to CPS.

Our study is in agreement with the study of Obwegeser and Brack which concluded that there is no statistically significant difference in sensitivity and specificity of CPS and LBC and that improved detection of cervical abnormalities and better specimen adequacy with LBC is merely a result of improved sampling technique and sampling device [17].

This study was comparable with Myers et al who argued that specificity is a crucial factor for a test that will be applied to a screening population with mostly negative results [18]. The sensitivity for detection of invasive cancer was similar for two sampling technique [19].

Conclusion

Despite the smaller sample size some of the major advantages of LBC noted in our study were significantly reduced number of unsatisfactory samples, cleaner background, better spread of cellular elements, well preserved nuclear and cellular details and lesser screening time which were consistent with previous study. The data above suggest that there is an increased detection rate of cervical lesions with LBC in women with precancerous changes. Although a longer screening time is one of the major drawback of CPS. Considering the lack of any significant difference in the final screening outcome and also the high cost associated with LBC we need to reconsider the cost effectiveness of LBC as compared to CPS, especially in the absence of reflex HPV testing in a majority of centers associated with LBC.

We feel that CPS still remains a better option in context of countries with socioeconomic factors, absence of public funding, resource poor setting but with trained personnel for pap screening.

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