Communications

Patient Characteristics and Endocervical Cell Recovery on Papanicolaou Smears

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Screening programs for cervical carcinoma centered on the Papanicolaou smear have been very successful. However, initial substantial declines in mortality have, as expected, begun leveling off.[1] Two sources of this residual problem are the at-risk population not being screened and false-negative screening results. Considerable difficulty exists in producing any widely applicable estimates of false-negative rates for Papanicolaou smears.[2] Estimates in various studies of false-negative rates with in situ carcinoma documented have suggested figures as high as 69 percent for vaginal pool material, and up to 18 percent for external os aspiration and cervical scraping.[2,3] Estimates of false-negative rates are even higher for documented dysplasia than for carcinoma.[2]

There are many possible reasons for the generation of a false-negative cytology report, the most important of which include inappropriate sampling and slide-preparation technique by the clinician and erroneous reading of the prepared slide by the cytologist. Rarely have clinicians been in a position to judge the skill of the cytologist reading their slides. Feedback to clinicians about their expertise in sample preparation has been limited in most instances to comments made by cytologists on the Papanicolaou smear report. These comments have typically been limited to two items: adequacy of the number of cells on the slide and the presence or absence of endocervical cells. The utility of comment on the adequacy of the number of cells available for study on a slide is self-evident. Considerable controversy continues to exist, however, surrounding the utility of comment on the presence or absence of endocervical cells on the smear.

The logical argument in favor of documenting the presence or absence of endocervical cells on cervical Papanicolaou smears may be summarized as follows. The transformation zone between the external cervical squamous epithelium and the internal columnar or endocervical area is known to be the site of most initial pathology. The original Papanicolaou smear was prepared under the concept of exfoliative cytology. The sample was prepared from the vaginal pool alone, under the assumption that sought-after cells would be shed from pathology sites in sufficient numbers to be found.

Later studies demonstrated the greater efficacy of attempts to approach directly the presumed pathology site by way of surface biopsy.[3] While controversy remains about the relative merits of various surface biopsy instruments (Ayre and other spatulas, endocervical swabs[3]), there is general acceptance that the lowest false-negative results will occur with attempts to sample the transformation zone as outlined above. As endocervical cells make up the internal portion of this target zone, it seems logical to look for their presence on a Papanicolaou smear slide as evidence of successful sampling. Unfortunately, endocervical cells are reported on only about 50 percent of slides submitted in previous studies, with an increase to 70 percent using a special spatula.[4] While one study has

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suggested the possibility of a 90 percent return under ideal circumstances,[5] for the practicing clinician the reality is that about 50 percent of the time or more he or she will find on a Papanicolaou-smear report that endocervical cells were not seen.

The clinical problem then becomes one of deciding whether to repeat the smear or to ignore the possibility that an inadequate sample was submitted. Recall of all women without endocervical cells documented on their reports would not be practicable in most settings. Indeed, there is no assurance that a second or a third attempt would yield endocervical-cell documentation. What would be useful clinically is the ability to differentiate among those reports, to separate those representing inadequate sampling from those representing erroneous reading by cytologists or those taken from women who would not be expected to show endocervical cells on their smears on a priori considerations. This study outlines an attempt to explore this possibility.

The Study

Documentation of endocervical cells on Papanicolaou smear reports was hypothesized to be (1) inversely related to age of the woman, (2) directly related to parity, (3) reduced in the presence of inflammation, (4) directly related to midcycle timing of the smear, and (5) variably reported by individual cytologists.

Physiological migration of the squamocolumnar junction up the cervical canal is expected to reduce the yield of endocervical cells with older women, particularly for those aged over 45 years.

The parturition process is expected to provide a more readily accessible transition zone for sampling. No previous studies have examined this hypothesis.

Although not recorded in the literature, an inflammatory process would be expected to produce substantial cytolysis, and otherwise produce an obscured visual field, thus reducing the likelihood of spotting endocervical cells.

Recommendation of midcycle timing for Papanicolaou smears is common practice. The fluid dynamics of the menstrual cycle would be ex-

pected to carry more endocervical cells down the canal at midcycle than in either early or late cycle, thus increasing the yield. This possibility has not been previously explored. Data recorded on the Papanicolaou smear reports permitted the calculation of the cycle phase at the time the smear was prepared.

Individual cytologists are expected to show some diversity in their propensity to spot and record endocervical cells. This has not been previously explored in the literature.

Finally, a multivariate model was constructed utilizing the above-mentioned variables in an attempt to maximize the prediction of which women theoretically would be expected to have endocervical cells documented and which would not.

Methods

Basic data for this study were drawn from filed Papanicolaou smear reports. The reports contained clinical data as supplied by the physicians as well as the cytologist's evaluation. Copies of all such reports done in a major referral center are filed in archives. The center reviews over 8,500 cervical slides annually submitted by both family physicians and obstetricians-gynecologists. The slides are reported on by five certified cytotechnicians under the supervision of a pathologist. The months of September and November 1983 were selected. Within these months, a systematic sample of every third report was drawn, the first being chosen by random number. This process yielded a representative sample of 459 reports.

Results

A statistically significant relationship was found between the age group of the patients and documentation of endocervical cells. The yields for those women aged less than 35 years, 35 to 49 years, and 50 years or more were 31 percent, 42 percent, and 19 percent, respectively.

Table 1 shows the significant association of endocervical cell yield with documented presence of red blood cells on the smear. The explanation may well be one of more vigorous forward pressure on the spatula. The study did not support the hypothesis that inflammation was linked to the presence or absence of endocervical cells. In addition, there was no significant association found between parity or timing of the smear within the menstrual cycle and endocervical cell yield.

Table 1. Percentage of Papanicolaou Smear Slides Reported as Showing Endocervical Cells by Noted Presence of Red Blood Cells

Endocervical Cells	Red Blood Cells		
	Absent	Present	No.
Absent	73.8	48.9	186
Present	26.2	51.1	97
Total	191	92	283
Corrected chi-square: P = <.001			

Table 2 shows the significant variation in endocervical cell documentation among the screeners. This finding was not altered after standardizing for age distribution of patients reviewed by each screener.

Finally the three variables relating significantly to endocervical cells, that is, age of patient, presence or absence of red blood cells on the smear, and identification of particular screeners, were entered into the multivariate model provided by discriminant analysis.[6] With these variables it was possible to predict correctly the documentation of endocervical cell presence or absence in 64 percent of the cases.

Comment

The statistical significance of several variables for the documentation of endocervical cells has been established. In the setting studied, a patient aged 50 or more years whose smear was reviewed by cytologist A and on which red blood cells were not seen had the lowest probability of having endocervical cells noted. Conversely, a women

Table 2. Percentage of Papanicolaou Smear Slides Reported as Showing Endocervical Cells by Screener

Endocervical Cells	Screeners A	B	C	D	E	No.
Absent	79.1	67.7	64.6	58.0	52.6	304
Present	20.9	30.3	35.4	42.0	47.4	155
Total	163	31	99	50	166	459
Corrected chi-square: P = .001						

aged 35 to 39 years whose smear was reviewed by cytologist E on which red blood cells were seen had the highest probability of having endocervical cells noted. The predictive power of this type of model would have to be substantially higher, however, to reasonably affect the clinical decision to recall a patient for a repeat smear. Indeed, the considerable variability among screeners in the documentation of endocervical cells casts considerable doubt on the utility of reacting to their absence on any given report.

The pursuit of endocervical cells as the indication of an adequate smear has been inappropriate. Anatomical variability renders the squamocolumnar zone inaccessible by standard smear techniques in a substantial proportion of women.[3,7] In addition, as demonstrated, differences in performance among screeners further reduces the efficacy of pondering documented endocervical cell absence in any report. Finally, while age of the patient and presence of red blood cells may alter expectations somewhat, the level of predictability is too low to be of substantial clinical assistance. Beta-value considerations suggest that some of the variables explored may yet prove to be of statistical significance in further studies based on a larger sample. However, it is unlikely that a model of great predictive value will be forthcoming. One can argue, nevertheless, that there still may be some utility for individual clinicians in recording their individual endocervical score sheet and comparing their rates with peers using the same laboratory facility. Any substantial variation may well suggest inappropriate technique. This exercise may be especially relevant for residency programs.

All clinicians must assess their endocervical cell return rate against the inherent limitations, as outlined, of this parameter as a feedback criterion for smear quality. The pursuit of higher endocervical cell yield as a route to higher yields of pathology has yet to be fairly evaluated. The one substantiated method of reducing false-negative results appears to be pairing cervical smears irrespective of the instrument used.[8]

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