The Postpartum Papanicolaou Smear

Barry D. Weiss, M.D., Janet H. Senf, Ph.D., and Wendy Udall

Abstract: This study was performed to evaluate the importance of obtaining postpartum Papanicolaou (Pap) smears routinely. Four hundred eighty-nine patients receiving pregnancy care had a normal prenatal Pap smear and a repeat Pap smear at their postpartum visit. Twenty-four (4.9 percent) had an abnormal postpartum Pap smear (95 percent confidence interval: 3.1–6.9 percent). Twenty-one (87.5 percent) of the abnormal smears showed squamous dysplasia; three (12.5 percent) showed squamous atypia. No specific risk factors were identified that predicted the occurrence of an abnormal postpartum Pap following a normal prenatal Pap except for age. Women more than 30 years of age were less likely to have an abnormal postpartum Pap smear ($P = 0.008$). The results of this study support the practice of performing Pap smears during prenatal care and again at postpartum examination, even when the prenatal Pap smear is normal. (J Am Bd Fam Pract 1989; 2:4-9.)

Cervical cytology screening with Papanicolaou (Pap) smears has become a standard part of preventive medical care.[1] The procedure is considered by many to have been an important factor in decreasing mortality from cervical cancer over the past several decades.[2]

Traditionally, Pap smears have been recommended annually. In the early 1970s, however, epidemiologic evidence indicated that serious cytologic abnormalities on cervical Pap smears developed slowly. The average length of time between first development of mild dysplastic changes and subsequent development of cervical carcinoma was estimated to be as long as 7 to 10 years.[3] This knowledge led the American Cancer Society (ACS) to recommend, in 1980, that all women (except those at high risk for cervical cancer) should have a cervical Pap smear every 3 years (rather than annually) after initially having normal smears for 2 years.[4]

More recent evidence, however, has indicted that the time period between initial development of mild cytologic abnormalities and subsequent progression to carcinoma may be shorter than when the American Cancer Society[4] made its 1980 recommendations. Genital infections with human papillomavirus (HPV), the probable etiologic agent of cervical cancer, are increasing in frequency,[5] and certain strains of HPV appear to be accelerating the rate at which cervical neoplasia develops; in some cases, the interval can be as short as 1 year.[6]

In recognition of this apparent change in the epidemiology of cervical neoplasia, the American Cancer Society and six other health professional organizations* recently revised their recommendations about Pap smear screening.[7]

The new ACS guidelines state that all women who are, or who have been, sexually active, or have reached 18 years, should have an annual Pap test and pelvic examination. After a woman has had three or more consecutive normal annual examinations, the Pap test may be performed less frequently at the discretion of her physician.[7]

Despite widespread dissemination and general acceptance of these ACS guidelines, it is not clear how physicians apply the guidelines to pregnant women. Many physicians perform two Pap smears during the course of routine pregnancy care. One Pap smear is performed at the beginning of prenatal care and another at the postpartum visit, even though the postpartum visit occurs less than 1 year later. Postpartum Pap screening commonly occurs even when the prenatal Pap smear is normal and even when the woman is not at increased risk for cervical cancer. This practice is supported by the only standard textbook that specifically discusses details of the postpartum examination.[8]

From the Section of Family Medicine, Department of Family and Community Medicine, University of Arizona College of Medicine, Tucson, AZ 85719.

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Abnormal Pap smears are infrequent during pregnancy. Research published in the 1970s, before the recent increase in HPV infections, suggested that the frequency of a cytologic abnormality on prenatal Pap smears was low (1–2 percent) and that the frequency of carcinoma was very small (0.19–0.53 percent).[9-11] In addition, although the issue has not been studied since 1981, among women with abnormal prenatal Pap smears, pregnancy has not been thought to accelerate or worsen dysplastic and malignant cytologic changes.[12-14]

It is not clear, therefore, whether pregnant women who have normal prenatal Pap smears require routine postpartum Pap smear testing to detect whether cervical neoplasia developed during the course of pregnancy. The risk from not doing postpartum Pap smears would seem to be quite low, and the cost savings could be about $55,500,000 (3,700,000 births annually[15] multiplied by $15 per Pap smear).

This study, therefore, was designed to evaluate the necessity and usefulness of performing routinely a postpartum Pap smear on women whose prenatal Pap smear was normal. The hypothesis was that no woman with a normal Pap smear during prenatal care would be found to have an abnormal Pap smear at postpartum examination.

Methods

The Study Population

The potential sample included 909 women who presented for prenatal care at the Family Practice Clinic (FPC), University of Arizona College of Medicine, between 1979 and 1987. The FPC is a large ambulatory health facility with approximately 22,000 patients per year. Prenatal care and delivery are provided by family practice residents and faculty physicians.

Patients were included in this study if they met the following criteria: received initial prenatal care at the FPC; had a Pap smear obtained during prenatal care, and the results were available; had a Pap smear at the postpartum examination, and the results were available. We included patients who might have been referred to the University's high-risk obstetrical clinic and whose postpartum Pap smears were obtained there.

Data Collection

A research assistant reviewed the 909 medical records. In addition to identifying eligible patients, the following additional information was used: (1) results of prenatal Pap smear; (2) results of postpartum Pap smear; (3) demographic data, including age, race, marital status, education level, and type of payment; and (4) medical information, including gravidity, parity, and history of various sexually transmitted diseases (genital herpes simplex infections, syphilis, and gonorrhea). Information about infection with human papillomavirus was not routinely obtained because its relation to cervical cancer was not widely known during the early years of data collection.

Definition of Normal and Abnormal Pap Smears

All Pap smears were obtained, using standard techniques, by faculty physicians or by residents and medical students under their supervision. An endocervical specimen was obtained by inserting a cotton-tipped applicator into the endocervical canal, rotating the applicator, and then transferring the specimen to a glass microscope slide. An exocervical specimen was obtained by scraping the exocervix with a standard Pap smear scraper and transferring the specimen to a separate microscope slide. Specimens were fixed immediately using standard commercial fixatives (containing 2-propanol, 2-propanone, and polyethylene glycol) and sent to the University of Arizona Medical Center clinical laboratory for interpretation by a trained cytotechnician. All specimens interpreted as abnormal by a cytotechnician were reviewed by a cytopathologist.

The following cytologic interpretations were considered normal: "normal," "squamous metaplasia," "inflammatory atypia," and "inflammation" (if no squamous atypia or dysplasia were noted). Interpretations were considered abnormal if any of the following degrees of cervical intraepithelial neoplasia (CIN) were reported: "squamous atypia," "squamous dysplasia" (either mild, moderate, or severe), or "carcinoma."

Statistical Analysis

The chi-square statistic and analysis of variance were used to evaluate data for significant differences between patients with normal versus abnormal postpartum Pap smears for the various demographic and medical variables listed previously. Significance was defined as a P value of less than 0.05.

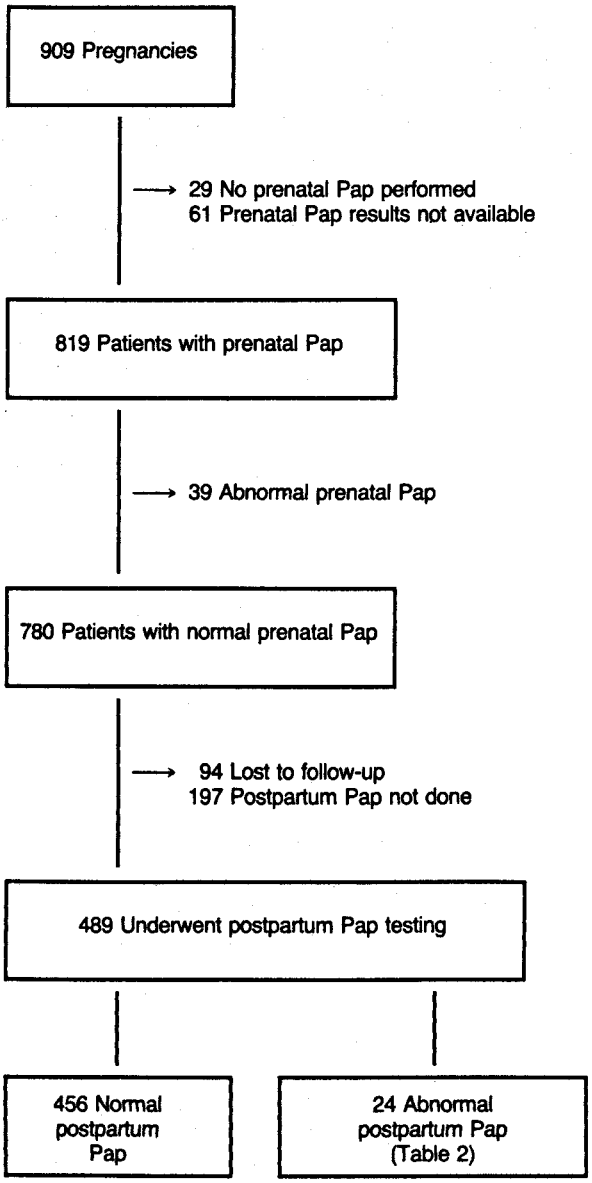

Figure 1. Schematic representation of patient exclusion.

Results

There were 909 patients who were potentially eligible for the study. Four hundred twenty were excluded because they did not meet all inclusion criteria. Figure 1 illustrates the following exclusion of patients:

1. Twenty-nine (3.2 percent) were excluded because they did not have a Pap smear obtained during prenatal care.
2. Sixty-one (6.7 percent) were excluded because no record of the prenatal Pap smear could be found. (These women received care early in the study period and their medical records were destroyed after portions were converted to microfilm.)
3. Of the 819 patients who had a prenatal Pap smear, 780 (95.2 percent) had a normal result. The remaining 39 (4.8 percent) had an abnormal prenatal Pap smear and were excluded. (These 39 patients included 9 [1.0 percent] with squamous atypia, 14 [1.7 percent] with squamous dysplasia, 13 [1.6 percent] with moderate squamous dysplasia, 2 [0.2 percent] with severe dysplasia, and 1 [0.1 percent] with carcinoma.)
4. Ninety-four (12.1 percent) of the 780 patients were excluded because they did not complete pregnancy care within the University Medical Center system and were lost to follow-up.
5. One hundred ninety-seven (25.3 percent of the 780 patients) had a postpartum examination, but no Pap smear was done; these women were also excluded.

The number of patients remaining with a normal prenatal Pap smear who subsequently had a postpartum Pap smear was 489. Their demographic and medical characteristics are shown in Table 1. Complete demographic and medical data were not available for some patients, but they were included in the overall analysis if they met the inclusion criteria listed previously.

Abnormal Postpartum Pap Smears

Twenty-four (4.9 percent) had an abnormal postpartum Pap (95 percent confidence interval: 3.1–6.9 percent). The abnormalities are shown in Table 2. Patients were referred for colposcopy and biopsy, and abnormal cytology was confirmed.

If the 197 patients who were excluded because their physician chose not to perform a postpartum Pap smear were included in the calculations and assumed to have had a normal postpartum Pap smear, the rate of abnormal postpartum smears would have been 3.5 percent (24/686, 95 percent confidence interval: 1.8–4.2 percent). Statistical analyses (not shown) revealed no significant differences in any of the variables listed in Table 1 between the 489 patients included in the study group and the remaining 197 patients who were excluded because they did not have a postpartum Pap smear.

The 24 patients whose postpartum Pap smears were abnormal were compared with the 465 who

Table 1. *Characteristics of Patients.*

Age (Mean)	26.98±5.53 years
Gravidity (Mean)	2.47±1.45
Parity (Mean)	0.99±1.18
Race	(Percent)
White	172 (35.2)
Hispanic	170 (34.8)
Black	35 (7.2)
Oriental	7 (1.4)
Native American	6 (1.2)
Other or not recorded	99 (20.2)
Marital status	
Single	226 (46.2)
Married	184 (37.6)
Divorced	30 (6.1)
Separated	23 (4.7)
Other or not recorded	26 (5.3)
Educational level	
Less than high school	144 (29.4)
Completed high school	174 (35.6)
Some college	74 (15.1)
Completed college	21 (4.3)
More than college	6 (1.2)
Other or not recorded	70 (14.3)
Payment Status	
Medicaid or equivalent	365 (74.6)
Insurance	63 (12.9)
Self pay	35 (7.2)
Other or not recorded	26 (5.3)

had a normal postpartum Pap smear to determine if there were differences between the two groups for any of the variables shown in Table 1. A significant difference was noted only for age. Abnormal Pap smears occurred with approximately equal frequency in all age groups from age 17 years to 30 years. No abnormal postpartum Paps, however, were detected among women more than 30 years of age. The difference in the rates of abnormal Pap smears among 360 patients who were 30 years of age and less (6.7 percent) versus 118 women who were more than 30 (0 percent) was highly significant ($\chi^2 = 6.94$, df = 1, $P = 0.008$).

Discussion

Nearly 1 out of every 20 patients (4.9 percent) who had a normal Pap smear during prenatal care subsequently had an abnormal Pap smear at the time of their postpartum visit. This was a higher percentage than had been predicted by the hypothesis that led to the study.

It is not certain why such a high rate of Pap smear conversions occurred. It is possible that the high rate can be attributed to the effects of pregnancy, per se; however, the literature suggests that this may not be an adequate explanation.[12-14] There are other factors that may explain the findings.

First, women in our study might have been at unusually high risk for cervical neoplasia. This is supported by the fact that our patients had a high (4.8 percent) rate of abnormal prenatal Pap smears. Our sample population included a large percentage of Hispanic women (Table 1) who have been shown to have a higher rate of cervical neoplasia than the general population, even after adjustments for socioeconomic status and other confounding variables.[16,17] However, the frequency of abnormal Pap smears among Hispanic women was no different than the rate among non-Hispanics (Table 3).

Increased risk could also have been due to a higher-than-expected frequency of other factors generally associated with an increased rate of cervical neoplasia, such as young age at first intercourse,[18-20] number of sexual partners,[19,21] cigarette smoking,[22,23] and contraceptive method.[24,25] Unfortunately, we did not routinely collect data about these factors, so their effects on the frequency of abnormal Pap smears in our study population cannot be determined. In addition, as noted earlier, we did not collect information on the frequency of sexually acquired human papillomavirus infection, the suspected etiologic agent of cervical cancer.[26,27]

However, data were collected on the history and prevalence of other sexually transmitted diseases, which can be used as surrogate indicators for level of sexual activity, a factor that has been associated with cervical neoplasia.[18-20] These infections included genital herpes simplex, syphilis, and gonorrhea. While none of these infections is thought to be etiologic, each has been associated statistically with cervical neoplasia.[28-30]

Table 2. *Results of Postpartum Smears among 489 Patients with Normal Prenatal Smears.*

	Number	Percent
Normal	465	95.1
Atypia	3	0.6
Mild squamous dysplasia	9	1.8
Moderate squamous dysplasia	7	1.4
Severe squamous dysplasia	5	1.0

Table 3. *Comparison of Patients with Abnormal Smears with the Total Study Population.*

Characteristic	Number with Abnormal Smear/ Total Patients*	Percent	*P*
Ethnicity			
Hispanic	8/170	4.7	0.84
Non-Hispanic	13/220	5.9	
Sexually transmitted infections			
Herpesvirus			
yes	0/17	0	0.67
no	24/448	5.4	
Gonorrhea			
yes	0/2	0	0.99
no	24/439	5.5	
Syphilis			
yes	0/5	0	0.99
no	24/479	5.1	
Payment status			
Medicaid†	21/365	5.8	
Other insurance	3/63	4.8	0.34
No insurance	0/35	0	

*Totals are less than total number (489) of patients in the study because complete data were not available for all patients.
†Arizona's Medicaid-equivalent indigent health care program.

Our data, however, do not show a higher frequency of sexually transmitted infections compared with other study populations.[31-33] Moreover, our patients with abnormal postpartum Pap smears were not more likely than those with normal postpartum Pap smears to have a history of genital herpes, a positive gonorrhea culture, or a positive syphilis serology (Table 3).

Information on socioeconomic status, another risk factor that has been related to development of cervical neoplasia,[18,34] was also collected. Socioeconomic status, which was estimated by payment status, was low. Seventy-nine percent of our patients were enrolled in Arizona's Medicaid-equivalent health care plan for the medically indigent; an additional 7.2 percent carried no medical insurance but had an income level too high to be considered for the state's program. Among patients in our study, however, payment status was not associated with the occurrence of an abnormal postpartum Pap smear (Table 3).

Although our data analysis was limited by the retrospective nature of this research, the statistical calculations showed no evidence that the high rate of Pap smear conversions seen among study patients was associated with any of the traditional cervical cancer risk factors.

A second possible explanation for the high rate of postpartum Pap smears is selection bias. The personal physicians of 197 (25 percent) of the initial population of 780 patients who had a normal prenatal Pap smear chose not to obtain a postpartum Pap smear. These women might have been at lower risk for cervical neoplasia and, therefore, only the higher risk patients were sampled at the postpartum visit. However, even when these 197 patients were included in the calculation and assumed to have had normal cervical cytology, the rate of abnormal Pap smears would have been 3.5 percent, a higher rate than was expected, which argues against the possibility that selection bias was a major cause of the high rate of abnormal postpartum Pap smears.

Poor specificity in the prenatal Pap smears, i.e., false-negatives, is a third factor that might account for the apparently higher proportion of positive postpartum smears. We know that false-negative rates approach 20 percent. While specificity was not measured in our study, it could have contributed to our findings and should be taken into account in future studies.

A final factor that might explain the high rate of abnormal postpartum Pap smears is that the natural history of cervical neoplasia is changing. Recent evidence has indicated that infections with human papillomavirus, the etiologic agent of cervical cancer, are occurring with increasing frequency and may be contributing both to an increase in the frequency of cervical neoplasia and to an acceleration of the rate at which neoplastic changes occur.[5,6] Thus, although we did not specifically identify HPV infections in our study, it is possible that our rate of abnormal postpartum Pap smears may be partially explained by HPV infection.

Conclusion

Despite recommendations that some women can have cervical cytology screening at less than annual intervals, the results of our study suggest that these recommendations may not be applicable to women during pregnancy. Women whose prenatal Pap smears are normal are still at risk for an abnormal Pap smear at their postpartum visit.

It is not clear whether development of abnormal Pap smears between the prenatal and postpartum periods is due to a specific effect of pregnancy itself. The high rate of change in our study

might also have been due to the underlying risk profile of the study population, the inherent false-negative rate of Pap smear screening, the changing nature of cervical neoplasia, or a combination of these factors. The retrospective nature of our study makes it impossible to identify women who are particularly likely to change from normal to abnormal during the course of pregnancy. Until other data become available, it seems prudent to perform a Pap smear on all women during both prenatal and postpartum care.

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