Prevalence of *Chlamydia trachomatis* Infection in Pregnant Patients

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Synopsis

Chlamydia is a sexually transmitted disease of epidemic proportions, infecting an estimated 4 million people a year. It results not only in infertility and ectopic pregnancy but also in infant morbidity and mortality. Ectopic pregnancy is responsible for 11 percent of maternal deaths. About 60 percent of infected women can transmit the bacteria at birth to their infants. Early detection and treatment of chlamydia in both men and women, especially prenatal women, is critical.

Chlamydia trachomatis *infection of the cervix was found in 8.1 percent of a group of 1,004 pregnant women at a hospital prenatal clinic by means of a direct fluorescent antibody test. The prevalence of* C. trachomatis *was only 0.7 percent in 277 pregnant women receiving prenatal care from private practitioners. All patients between 27 and 30 weeks gestation who tested positive were treated with oral erythromycin. Their partners were treated with tetracycline.*

The outcome of pregnancy in patients treated for chlamydial infection was compared with a control group of noninfected mothers from the same population. The frequency of premature rupture of the membranes, prematurity, and low Apgar scores among the treated women were not significantly different from those in the control group. There was a significant difference, however, between the two groups in the incidence of low mean birth weight infants and the presence of meconium.

Children can acquire a chlamydial infection at birth from contact with infected cervico-vaginal secretions. If not detected and treated, these infected infants may develop conjunctivitis, bronchiolitis, and pneumonia. It is suggested, therefore, that all patients at prenatal clinics be screened for chlamydial cervicitis. Those testing positive and their partners should be treated.

INFECTIONS CAUSED by *Chlamydia trachomatis* (CT) are now recognized as one of the most prevalent and damaging of all sexually transmitted diseases (STD) in the United States (*1*). Men, women, and infants can be infected. Since anywhere from 2 to 37 percent of female cervices are infected before the delivery of children, women bear the additional burden of adverse reproductive consequences from CT (*2–4*).

CT infection is a serious problem in obstetrics. It can result in pelvic inflammatory disease and endometritis with a subsequent higher risk of ectopic pregnancy and infertility (*5,6*). CT infection during pregnancy is also a leading cause of infant morbidity. Each year more than 155,000 infants are born with chlamydia. These newborns are at high risk of developing inclusion conjunctivitis and pneumonia and are at a slightly elevated risk of having otitis media and bronchiolitis. CT is the most common cause of neonatal eye infections and of afebrile interstitial pneumonia in infants less than 6 months of age (*7*).

The purpose of our study was to determine the prevalence of chlamydial infection among women undergoing prenatal care at a hospital obstetrical clinic and among those undergoing care from private practitioners. In addition, we compared the pregnancy outcome of previously infected, successfully treated mothers with that of noninfected mothers as to premature rupture of the membranes, prematurity, birth weight, the presence of meconium, and the infants' Apgar scores. Based on the results, we have made suggestions concerning early detection and treatment.

Materials and Methods

Detection of *C. trachomatis*. A total of 1,004 obstetric patients attending the prenatal clinic at Allentown Hospital in Allentown, PA, between

Comparing the age and pregnancy outcome of women treated for chlamydial infection with women in a noninfected control group

Age and outcome	Treated group (N = 61)	Noninfected group (N = 580)	P
Mean age (years)[1]	[2]21.5 ± 0.52	23.3 ± 0.21	N.S.
Mean gestational age (weeks)[1]	39 ± 0.40	39 ± 0.10	N.S.
Mean birth weight (grams)[1]	2,966 ± 78.52	3,135 ± 28.12	<.05
Mean Apgar score[3] at 1 minute:			
4–10	53 (93 percent)	561 (97 percent)	N.S.
0–3	4 (7 percent)	19 (3 percent)	N.S.
Mean Apgar score[3] at 5 minutes:			
7–10	55 (97 percent)	562 (97 percent)	N.S.
0–6	2 (4 percent)	18 (3 percent)	N.S.
Low birth weight (less than 2,500 grams)	12 (20 percent)	67 (12 percent)	N.S.
Premature rupture of the membranes	4 (7 percent)	35 (6 percent)	N.S.
Meconium (percent)	10 (16 percent)	23 (4 percent)	<.001

[1] *t*-test, all others are chi-square. [2] Standard error of mean (SEM). [3] Apgar scores available for only 57 infants in treated group.

July 1986 and July 1988 were screened routinely for the presence of CT. At the same time, 277 obstetric patients undergoing care from one group of private physicians were included in the study for comparison. All patients were consecutively enrolled and sampled during the same 2-year period. Specimens were collected by obstetricians, and all laboratory work was performed uniformly by the same technician who did not know whether the specimen was from the clinic or the private practice. All cervical specimens were tested for the presence of CT with the Microtrak direct fluorescent monoclonal antibody procedure (*A*). Several studies have shown this antigen detection assay to be highly specific and even more sensitive in comparison to the culture method (*8*). The traditional method of diagnosis, culture in cycloheximide-treated McCoy cells, is expensive and slow, requiring 1 to 2 weeks for diagnosis.

Treatment. All patients who tested positive were treated with 500 milligrams of oral erythromycin 4 times a day for 7 days, according to Centers for Disease Control guidelines. Their sexual partners were treated with 500 milligrams of tetracycline 4 times a day for 7 days. The treatment was administered to women between 27 and 30 weeks gestation, and then the CT test was repeated between 34 and 36 weeks gestation. If the retest result was positive, the patient was treated with the same regimen again.

Statistical analysis. The pregnancy outcomes of the infected women were compared with those in the noninfected group. The statistical significance of differences was evaluated using the Chi-square test or the Student's *t*-test. Probability values less than .05 were regarded as statistically significant.

Results

Prevalence of CT infection in clinic and private patients. A total of 1,004 consecutive patients at the clinic were tested for chlamydial infection of the cervix. Of the total, 81, or 8.1 percent, were found to be positive. In comparison, only 2, or 0.7 percent, of the 277 private patients were CT positive.

A breakdown of the prevalence of *C. trachomatis* in the two groups of prenatal women shows

Patients	Number tested	Number positive	Percent positive
Clinic	1,004	81	8.1
Private	277	2	0.7
Total	1,281	83	6.5

Outcome of pregnancy. Pregnant women who had chlamydial infection and were then successfully treated were compared with noninfected women from the same population. Not all of the 81 CT positive women were included in this comparison, since some had either miscarried or delivered at another institution and could not be followed. Treated mothers were similar to noninfected mothers with respect to gestation time, infant Apgar scores, and the incidence of premature rupture of the membranes, but they had babies of lower birth weight and showed the presence of meconium at the time of delivery. The incidence of low birth weight infants in the infected group (19.7 percent) was higher than that of the noninfected group (11.6 percent), but this difference was not statistically significant. The mean birth weight of infants born to infected mothers, however, was significantly lower than that of infants born to noninfected mothers. There was a statistically higher incidence

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of meconium passage in the infected group as compared with the noninfected group. The meconium was not aspirated by the fetus and no further complications resulted. There was no relationship between birth weight and the presence of meconium (see table).

Discussion

Our results indicate that patients at the prenatal clinic were at higher risk for contracting CT than patients under private care. The two CT-positive specimens from the 277 private patients may not be truly positive. Nonculture methods to detect CT, such as the one we employed, have a sensitivity rate of 95.2 percent (*8*). It is possible that the two patients were false-positive. The less than 1 percent prevalence of CT among the private patients could also reflect the characteristics of the population. These women were between the ages of 20 and 30 years, predominantly white, and married. Previous studies (*7,9,10*) have linked CT infection of the cervix to women who are younger in age, lower in socioeconomic status, nonwhite, and have greater and earlier sexual activity. These latter characteristics describe our clinic population.

The 8-percent prevalence of CT infection of the cervix of prenatal clinic women detected in this study is within the 2 to 37-percent range found by other investigators (*2–4*). Our prevalence rate is relatively low, since the patients sampled were from a small, stable community and not a typical inner-city population.

Studies on the effect of CT infection on pregnancy outcome have yielded different results. Martin and colleagues (*9*) showed a significant increase in the rates of prematurity, low birth weight, and perinatal deaths associated with cervical chlamydial infection when compared with a noninfected control group. These adverse pregnancy outcomes, however, were unconfirmed by other studies (*2,3,11–14*). None of the previously mentioned studies included a group of patients whose CT infection was successfully treated.

In our study, we compared the pregnancy outcome of women whose cervical CT infection was eradicated using erythromycin with the outcome of noninfected women in the control group. The treated group did not differ significantly from the control group in the incidence of premature rupture of membranes, prematurity, gestation time, and the Apgar scores of their infants. Two recent studies (*15,16*) also included pregnant women treated for cervical chlamydial infection. Both studies showed no statistical difference in certain pregnancy outcomes when comparing treated women with those in the noninfected control group.

We did find that treated women had infants that were of significantly lower mean birth weight and showed the presence of meconium compared with the noninfected control group. Cohen and coworkers (*15*) present different findings. They showed that the infants of the noninfected control group had a significantly higher frequency of prematurity, lower gestational age, and a lower birth weight compared with the treated mothers' infants. They did not look for the passage of meconium. They speculate that antibiotic treatment not only removed CT but also other microorganisms that could result in certain adverse pregnancy outcomes. We suggest that the treated women in our study represent a subpopulation of pregnant women with a behavioral pattern that would impact negatively on their pregnancy whether they were treated or not. Such a behavior pattern might include a high risk of STDs, smoking, and poor nutritional prenatal care. It is also possible that treated women in our study became reinfected with CT and that women found to be negative for CT early in pregnancy became infected later in pregnancy. Both possibilities could have influenced the results and suggest the need for repeated chlamydia testing.

Conclusion

Infection with *C. trachomatis* is considered the fastest growing STD in the United States. Infants born to women who have a cervical infection with CT are at risk of acquiring a chlamydial infection. Studies have shown that 30 to 70 percent of infants born to infected mothers may be colonized (*10,13,17–20*). In untreated infants, 18 to 50 percent will develop conjunctivitis and 3 to 18 percent will develop pneumonia due to CT (*21*). These sequelae seem disastrous when cheap and effective treatment is available.

As the true prevalence of *C. trachomatis* in this obstetric population is known, the importance of screening and treating these patients becomes evident. A rapid and reliable method for testing and early treatment would impact on the number of neonatal infections. Using an average of the percentages previously mentioned, testing and treatment should prevent 40 cases a year of CT-infected newborns. Of these, 14 cases of conjunctivitis and 4 cases of neonatal pneumonia could be prevented in our clinic population alone. It has been shown that testing nonpregnant sexually active women of reproductive age for CT will result in a reduction of costs when the prevalence of CT infection is greater than 7 percent (*22*). It has been shown that repeated prenatal chlamydia testing plus successful erythromycin treatment can reduce certain adverse effects on pregnancy outcome significantly (*15,16*). It also has been shown that diagnosis and treatment of cervical chlamydial infection during the third trimester of pregnancy provides a practical approach to the prevention of infection in the newborn (*23,24*). Based on the data in this study and related studies, we recommend repeated prenatal chlamydial testing of clinic patients and successful treatment of all positive patients and their contacts. Such early detection and treatment would not only be cost effective and significantly reduce certain adverse effects of pregnancy but, more importantly, would prevent the needless morbidity of infected neonates.

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Equipment

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