Congenital Syphilis Surveillance in Upstate New York, 1989–1992: Implications for Prevention and Clinical Management

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Descriptive characteristics and clinical information from 322 cases of congenital syphilis were reviewed. The births (318 mothers) included 31 (10%) stillborn and 59 (18%) with clinical evidence of congenital syphilis. Only 60 (19%) had a complete laboratory workup, including radiographs of long bones and spinal fluid analysis. For a subset of 244 women with available information, 218 (89%) had ≥1 risk factors for syphilis; however, residence in an area with high morbidity from syphilis was the only identified risk factor for 83 (34%). Eighty women (25%) were treated for syphilis during pregnancy; only 24 were treated appropriately for their stage of syphilis >30 days before delivery. Five of these pregnancies resulted in infants with clinical signs of syphilis. These findings emphasize the need for expanded prenatal screening of high-risk women, the necessity of screening at delivery, and the need for complete evaluation of infants at risk for congenital syphilis. Further, the data suggest that in some cases therapy in the last trimester of pregnancy may be insufficient to adequately treat the fetus.

In 1987, New York State experienced a dramatic increase in reported cases of early syphilis. A noteworthy characteristic of this new epidemic was that infection was increasingly recognized among women and heterosexual men. In addition, cases in females exceeded those in males for the first time in New York City in 1989 and in the rest of the state in 1990. This epidemic has been associated with a variety of risk factors, including "crack" cocaine use, the exchange of sex for drugs or money, and infection with the human immunodeficiency virus (HIV) [1].

One of the most serious consequences of the syphilis epidemic among women has been the concomitant rise in congenital syphilis, which has been seen mainly among urban poor and ethnic minority populations. Congenital syphilis is associated with women who obtain medical care in sites such as emergency rooms, drug treatment clinics, and jails. These women typically receive inadequate or no prenatal care [1–3].

Here we summarize the descriptive characteristics and clinical findings of pregnant women infected with syphilis and cases of congenital syphilis reported in New York State (excluding New York City) from 1989 to 1992 and discuss the implications of these findings as they relate to disease prevention and case management guidelines.

Materials and Methods

In New York State, health providers and laboratories are required by Public Health Law and by Sanitary Code to report persons diagnosed with syphilis (or laboratory findings indicative of infection) to the local county health department. That department then forwards each report to the New York State Department of Health's Bureau of Sexually Transmitted Disease Control. (Data on New York City residents are reported directly to the city's Department of Health and are not included in the state data base.) Any nontreponemal test titer ≥1:16 or any positive prenatal or delivery test regardless of titer must be reported by telephone within 24 h after the laboratory result is obtained. A positive prenatal or delivery test report triggers a priority field investigation by field staff of the Bureau of Sexually Transmitted Disease Control. Field staff review all pertinent medical records and laboratory reports, interview health care providers and mothers, and complete epidemiology report forms supplied by the Centers for Disease Control and Prevention (CDC). Field staff also work with local providers to assure that diagnosis, therapy, and any necessary follow-up testing meet current standards of care.

Information on all babies with congenital syphilis and their mothers is maintained in a computerized data base. Data include basic demographic information, maternal risk factors and history of syphilis, serologic test results, laboratory and clinical findings for the infant, and treatment information.

Maternal risk information, including a history of drug use, prostitution, incarceration, homelessness, and HIV infection, was not uniformly collected until after 1989. As part of the 3-year risk assessment, residence in an area with high syphilis morbidity (identified by zip code) was determined on the basis of early syphilis case-rates for all zip codes in New York State,

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excluding New York City. Case-rates were calculated by dividing the average early syphilis morbidity for 3 years (1990–1992) for each zip code by the total population for that zip code. Population figures were obtained from the 1990 census. Zip codes with high morbidity from syphilis were defined as areas with case-rates in the top 10% of the state. Data were analyzed by computer (software from SAS Institute, Cary, NC) [4].

All reported cases of congenital syphilis conformed to CDC Surveillance Case Definition and Guidelines [2]. In addition, cases were further defined as "clinical" or "surveillance." Infant clinical cases had evidence of active disease on physical examination or on radiographs, a reactive cerebrospinal fluid (CSF) VDRL test, or a quantitative nontreponemal serologic titer ≥4 times above that of their mother. Stillborn infants of women with clinical or serologic evidence of syphilis were also classified as clinical cases. Infant surveillance cases required the mother to be in one of the following categories: untreated syphilis, treatment for syphilis ≤30 days before delivery, treatment with a non-penicillin regimen, titer failed to decline as expected after treatment, treatment history was not well documented, or there was insufficient follow-up after treatment to assess the status of infection.

Results

A total of 327 infants were reported to the congenital syphilis registry during 1989–1992. After review, 5 infants did not meet the CDC case definition and were excluded from subsequent analysis. The 322 remaining infants, including 4 sets of twins, were born to 318 mothers. Ninety infants (28%) were categorized as clinical cases and 232 (72%) as asymptomatic surveillance cases.

Mothers of congenital cases were typically racial minorities, unmarried, and <30 years old (table 1). In the 3-year risk assessment period, 218 (89%) of 244 women had an identified risk for syphilis. Ninety-two (38%) used drugs (34 reported cocaine use). Sixty-two (25%) had a prior history of syphilis; 25 were infected with syphilis more than once during the most recent pregnancy. A total of 197 women (81%) resided in areas of high early syphilis morbidity; for 83 (34%) of the 244 women, this was the only risk factor identified.

Nearly half of the women had no prenatal care. Other important factors for congenital infection were infection late in pregnancy, treatment <30 days before delivery, and detection of congenital infection at or after delivery. Other factors included medical mismanagement (misdiagnosis or inappropriate treatment of the mother) and no serologic testing during pregnancy.

Two hundred thirty-four women (74%) received no treatment for syphilis during pregnancy. Eighty women (25%) were treated during pregnancy; treatment information was not available for 4 (1%). Of the 80 who were treated, only 24 (30%) were treated with a dose of benzathine penicillin appropriate for the stage of syphilis >30 days before delivery. Nineteen of the 24 delivered asymptomatic infants classified as surveillance cases; 5 women gave birth to infants with clinical signs of syphilis. Two of these women were coinfected with HIV (table 2).

Table 1. Characteristics of mothers who gave birth to infants with congenital syphilis (n = 318).

Characteristic	No. (%)
Age, years	
15–19	47 (15)
20–29	200 (63)
≥30	66 (21)
Unknown	5 (1)
Race/ethnicity	
Black	238 (75)
Hispanic	46 (15)
White	32 (10)
Other	2 (1)
Marital status	
Single	245 (77)
Married	45 (14)
Separated	5 (2)
Divorced	2 (1)
Unknown	21 (7)
Risk factor for syphilis (n = 244)*	
Live in high syphilis morbidity area	197 (81)
Drug use	92 (38)
Prior syphilis	62 (25)
Prostitution	22 (9)
Jail	20 (8)
Homeless	16 (7)
Human immunodeficiency virus infection	5 (2)
None identified	26 (11)
Factor contributing to congenital syphilis†	
No prenatal care	147 (46)
Infection late in pregnancy	58 (18)
First prenatal test negative, no subsequent test	44 (14)
Medical mismanagement	32 (10)
No testing during pregnancy	8 (3)
No prenatal care until late in pregnancy	7 (2)

* Some women had >1 risk.
† Some women had >1 contributing factor.

Of the 322 infants, the majority were born alive, at full term, and asymptomatic; 31 (10%) were stillborn; and 59 (18%), including 6 who died after birth, displayed signs or symptoms indicative of clinical congenital syphilis. Thirteen babies did not develop symptoms until after the immediate newborn period but did so within 2 months of birth. Fourteen (24%) of the 59 clinical cases were identified solely by one or more positive laboratory findings. Four (7%) had cord or venous blood nontreponemal test titers ≥4-fold above the maternal titer; on physical examination, all 4 had obvious clinical signs and symptoms of congenital infection. Of all cases reported, only 60 infants (19%) had complete laboratory evaluations that included long bone radiographs, CSF analysis for cell and protein counts, and a VDRL test. A total of 105 (33%) were not evaluated; 157 received a partial workup, most commonly with a CSF VDRL test (n = 107).

Table 2. Characteristics of infants with clinical congenital syphilis born to mothers treated >30 days before delivery.

Maternal stage of syphilis	Contributory medical conditions	No. of days treated before delivery/doses of benzathine penicillin	Maternal RPR titer at treatment/ delivery	Gestational age; manifestations of congenital infection
Secondary	None	81/2	64/16	Full term; long bone
	HIV+, drug use	53/1	128/32	37 weeks; cutaneous lesions, died
	HIV+, drug use	41/2 + 10 days iv aqueous penicillin G	128/16	37 weeks; long bone
Early latent	None	87/1	8/2*	Full term; CSF VDRL, abnormal CSF protein and cell count
Late latent	None	45/3	32/8	36 weeks; CSF VDRL, abnormal CSF protein and cell count

NOTE. Long bone = positive radiographic findings, CSF = cerebrospinal fluid, HIV+ = human immunodeficiency virus–positive, iv = intravenous, RPR = rapid plasma reagin.

* Automated reagin test titer decline not seen until 4 months after delivery.

Discussion

Analysis of the upstate New York surveillance data raises three issues with important implications for the prevention and management of congenital syphilis: prenatal screening, clinical assessment of the infant at risk for infection, and treatment of pregnant women.

Three points should be emphasized regarding screening of pregnant women for syphilis infection. First, in some populations screening efforts must be intensified. As shown by others [1–3], infection occurs most frequently in women with high-risk behavior patterns and lifestyles. In our series, only 55% had obvious risk factors for syphilis (e.g., a history of drug abuse, prostitution, incarceration, homelessness, HIV infection, and past syphilis infection). Women affected by the current epidemic tended to receive their medical care in emergency rooms, drug treatment clinics, and jails rather than in physicians' offices and prenatal care clinics. Therefore, screening programs need to be more widely implemented in these settings.

Second, high-risk women should be screened frequently, perhaps monthly for syphilis. If a pregnant woman has been previously infected with syphilis, this should serve as a "red flag" for frequent testing. National guidelines recommend that women be screened for syphilis when pregnancy is first detected and that high-risk women be retested during the third trimester and at delivery [5]. Because health care for at-risk women is often sought at nontraditional sites, a more pragmatic approach would be to emphasize the need for more frequent testing for pregnancy and syphilis, perhaps at every medical encounter for women at high risk. The wisdom of this approach is underscored by the fact that high-risk sexual activity continues throughout pregnancy; in our series, 8% of women had repeat infections during pregnancy and 18% were infected late in pregnancy.

Third, a universal screening program at the time of delivery is an important strategy for prevention of the complications of congenital syphilis, especially in areas with a high prevalence of infection. This is necessary when there are obvious gaps in opportunities for screening created by poor health care–seeking behavior and lapses in clinical care. For example, >70% of the maternal infections in upstate New York were not identified until at or after delivery, and >30% of these women had no serologic test for syphilis before delivery. In addition, ~50% of cases were associated with no or inadequate prenatal care, and a substantial proportion (13%) were associated with failure of the medical care system to test for or medically manage syphilis in pregnant women. In December 1989, a statewide regulation requiring screening for syphilis at delivery was implemented in New York State. This regulation has been associated with an overall increase in the number of children identified with asymptomatic congenital syphilis (unpublished data).

It could be argued that limiting delivery screening to high-risk women identified by history and physical examination would be more cost-effective. However, others have reported that targeted screening for hepatitis B virus infection among pregnant women is ineffective [6]. In our series, 34% of the women had no risk identified other than residence in an area (zip code) with high early syphilis morbidity.

The importance of a complete medical evaluation of the infant at risk for congenital syphilis must be emphasized. Fewer than 1 infant in 5 reported to our registry had documented complete diagnostic workups for congenital syphilis

with CSF studies and radiography of long bones. The limitations of these tests, including lack of sensitivity and specificity, have been well described [7, 8]. Nevertheless, it is important to document abnormalities to monitor response to therapy and because, in some instances, an abnormal test result (e.g., CSF findings) may provide the only evidence of congenital syphilis [7]. The CDC has emphasized the importance of this point by making failure to test an infant at risk for infection a reason to report that child as a case of congenital syphilis.

A newborn titer ≥4-fold higher than the maternal titer is currently used as a diagnostic criterion for congenital infection [5]. Similar to findings by others [9, 10], very few infants in our series met this standard, and each had clinical findings that superseded the presence of the elevated titer. One medical management problem encountered by our bureau stems from the tendency of some clinicians to interpret this criterion inappropriately in the obverse, that is, if the infant titer is 4-fold lower, it is sometimes considered evidence the child is not infected.

Present national guidelines consider administration of benzathine penicillin >1 month before delivery to be adequate treatment for fetal infection, if the appropriate serologic response is observed in the mother. In our series, 5 women who received appropriately timed and clinically adequate therapy gave birth to infants with clinical evidence of congenital syphilis. This phenomenon has been previously reported [11, 12] and suggests that in some cases the recommended therapy, when given in the last trimester (2–3 months before birth), may be insufficient to adequately treat the fetus. With current knowledge, we cannot adequately identify which women with third-trimester infections are at risk for treatment failure [13], and the consequences of missing an infected infant are too great to ignore.

The New York State Department of Health recommends that infants born to mothers treated in the third trimester should, at the least, be monitored serologically for 1 year and preferably these infants should also have baseline CSF and long bone studies. Further, if there is a risk of the infant being lost to follow-up and treatment is considered, these infants should be treated with a 10-day course of intravenous aqueous crystalline or intramuscular procaine penicillin G. We do not recommend use of a single intramuscular dose of benzathine penicillin because of reports of treatment failures in infants [14] and the possibility of such treatment masking inadequately treated infections during the newborn period.

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