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PREGNANCY AND LYME DISEASE

As our understanding of Lyme disease has grown, there has been increasing concern about its similarities to syphilis and the possibility of transmission to the fetus from an infected mother who is spirochetemic during pregnancy. The purpose of this communication is to review the published information in this area, help you to respond to questions from patients, and describe the procedure for reporting Lyme disease cases.

Literature Review

The published literature on this topic is limited. Several case reports suggest that Lyme disease can be transmitted congenitally.^{1,2,3} However, two follow-up studies of small numbers of women diagnosed with acute Lyme disease during pregnancy, most of whom received some treatment, failed to document adverse fetal outcomes.^{4,5,6} Similarly a pilot study of two cohorts of babies, one born in a hospital located in a Lyme disease endemic area and the other born in a nonendemic area, found no association between congenital malformations and the presence of detectable IgG-specific antibodies.⁷

Case Reports

The first report of congenital transmission was made in 1985 by Schlesinger et al.¹ They reported identifying spirochetes morphologically compatible with *Borrelia burgdorferi* from multiple organs of an infant who died shortly after

premature delivery of complications of congenital heart disease. The mother had developed erythema migrans (EM) in the first trimester of pregnancy but was never treated. Although spirochetes were seen in spleen, kidney and bone marrow, they were not seen in heart tissue. A link between the congenital heart disease and Lyme disease was not established.

Weber et al described similar post-mortem detection of *Borrelia* in the brain and liver of a child who died at 24 hours of age from the consequences of perinatal brain damage.² The mother had been treated in her first trimester of pregnancy for EM with a 7 day course of low dose oral penicillin (recommended is 10 days to three weeks). McDonald et al similarly observed borrelia spirochetes in multiple organs including the myocardium in a stillborn term infant whose mother had not sought medical attention for EM in the first trimester of pregnancy.³ Although there was "no significant" tissue inflammation, the authors felt the fetus had "overwhelming spirochetosis".

Follow-up Studies

The two follow-up studies of groups of women with clinically apparent Lyme disease during pregnancy have both been conducted by the Centers for Disease Control (CDC). Markowitz et al reported on 19 pregnancies identified before knowledge of fetal outcome.^{4,5} Thirteen had received antibiotics. Fourteen had normal outcomes. Five had adverse outcomes, three of

whom had received antibiotic therapy. Adverse outcomes included prematurity, cortical blindness, intrauterine fetal death, syndactyly and rash in the newborn. Unlike the stillbirth reported by McDonald et al,³ Lyme disease was not directly implicated in any of these outcomes. Furthermore, there was no apparent pattern to the abnormalities, and there did not appear to be any relation to the trimester of infection or whether the mother received treatment.

A second multistate study by the CDC was presented at the 1987 ICAAC meeting by Ciesielski et al.⁶ Of 17 additional women prospectively followed who acquired Lyme disease while pregnant, all of whom received antibiotic treatment, 15 delivered normal infants with no evidence of infection (negative cord blood IgM). One woman had a missed abortion at 13 weeks, having acquired Lyme disease at 4 weeks gestation; however culture and stain did not document *B. burgdorferi* as the etiology of the abortion. One woman who acquired disease at 7 weeks delivered a child with syndactyly.

Finally, Williams and coworkers reported on a pilot study in which they examined 421 cord blood sera and found no association between congenital malformations and the presence of detectable IgG-specific antibody to *B. burgdorferi*. Although the babies with detectable antibodies tended to be of lower birthweight, to be small for gestational age, and to have had some degree of neonatal jaundice, these trends were not statistically significant.⁷

Comments on the Literature

Even if we assumed that all of the adverse outcomes that have been described in the medical literature so far were due to Lyme disease, and they appear not to be, these results indicate that Lyme disease, when diagnosed and treated during pregnancy, most often results in a normal pregnancy outcome. Additional research is needed to define the risk of congenital transmission of Lyme disease, the clinical consequences of such transmission, and to guide treatment recommendations.

Treatment Issues

Pregnant women with symptomatic Lyme disease should be aggressively treated with a full course of antibiotics, according to the stage of their disease. One question that is often asked is whether pregnant women with early Lyme disease, including constitutional flu-like symptoms and erythema migrans, should be treated with parenteral antibiotics. No studies have been done in pregnant women thus far that establish the need for parenteral antibiotics in early Lyme disease. Another question that is frequently asked is whether persons with documented tick bites by *Ixodes damini* should be treated with antibiotics. At present, no definitive studies have been done to determine the relative efficacy of treating all such bites empirically versus treating only when early symptoms develop.

Case Reporting

Lyme disease is a reportable disease in Connecticut. Health care providers can report cases using the PD23 form, which is available from the Epidemiology Program office. If a pregnant woman is diagnosed as having Lyme disease, please notify the Epidemiology Program by telephone at (203) 566-5058.

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RABIES IN CONNECTICUT - 1988

In 1988, there were 382 animals examined for evidence of rabies infection by the Connecticut State Department of Health Services (Table 1). This total is similar to the 380 examinations performed during 1987. In comparison to 1986, this figure represents a 12% decrease in the number of animals submitted for testing.

Table 1
Testing for Rabies in Animals by County
Connecticut, 1988

COUNTY	POS	NEG	NOT TESTED*	TOTAL
Fairfield	0	61	0	61
Hartford	3	130	5	138
Litchfield	3	20	1	24
Middlesex	1	15	1	17
New Haven	0	47	1	48
New London	1	36	0	37
Tolland	0	32	1	33
Windham	0	21	0	21
Out of State	1	20	0	3
TOTAL	9	364	9	382

* SPECIMEN RECEIVED IN A CONDITION UNSUITABLE FOR TESTING

During 1988, nine cases of rabies were confirmed by the State Department of Health Services Virology Laboratory. Eight of these cases were submitted from communities within Connecticut, while one was submitted from New York State. All nine involved bats, with two isolates occurring in June (Litchfield County, New York State), four in July (Hartford County - 2, Litchfield County, New London County), two in August (Hartford County, Middlesex County), and one in September (Litchfield County). Human contact had occurred in two of these incidents, while domestic animal contact occurred in two other incidents. In the human contacts, rabies post exposure treatment was administered. In the domestic animal incidents, both animals were found to be adequately immunized and were given booster shots as a precautionary measure.

The positivity rate was 2.4% for all animals examined during 1988 in comparison to a 0.7% rate during 1987. For bats, the positivity rate was 10.2% (N=88) in 1988; in comparison, the rate was 3.3% (N=90) in 1987. As in the past nine years, the bat has been the only animal found rabid in the state. The last terrestrial animal isolate of rabies occurred in 1978 and involved two foxes (Hartford County - 1) (New London County - 1). The last human case occurred in 1932, and the last rabid cat and dog in the state were reported in 1941 and 1954 respectively.



LABORATORY TESTING FOR RABIES

Animal rabies is diagnosed by examination of brain material from submitted animal heads. In recent years, bats have been the only species carrying rabies in Connecticut. In the case of human exposure by biting or scratching, these animals should be submitted to the state virology laboratory for rabies testing. Other species routinely tested for rabies after biting a human include foxes, skunks and raccoons. Rodents (mice, rats, hamsters, squirrels, chipmunks) and rabbits have not been shown to carry rabies in Connecticut and are not usually accepted for testing.

The direct fluorescent antibody and mouse inoculation tests for rabies are very reliable in diagnosing or ruling out rabies. Both tests are available without charge at the state laboratory. This is the only laboratory in Connecticut where clinical rabies testing is performed. Test results are available within 48 hours of submission and in most cases post exposure prophylaxis should be delayed until the results are available.

The necessity for testing should be determined first by the patient's physician or the physician on-call in the emergency room at the local hospital. If additional information is needed, members of the Epidemiology Program staff (566-5058) are available for consultation. Emergency consultation after hours and on weekends can be arranged by calling the Health Department's emergency telephone number (566-4800).

Instructions for Submitting the Animal:

1. The animal must be dead with its brain intact. If the animal is killed with a bullet, care should be taken NOT to shoot the animal in the head thereby destroying the brain.
2. The body of small animals, such as bats, or the head of larger animals should be wrapped

in a double plastic bag, sealed securely and refrigerated until delivery to the laboratory on wet ice. **SPECIMENS SHOULD NOT BE FROZEN.**

3. All pertinent information i.e. physician or veterinarian's name, address, and telephone number; name, address and telephone number of person(s) exposed; animal information; and a brief description of the incident, should be attached to the outside of the container. Submission forms are available at the laboratory and veterinarians' offices.
4. Specimens must be hand delivered to the laboratory at 10 Clinton Street in Hartford and not mailed. The virus laboratory is open from 8:00 a.m. to 4:00 p.m. Monday through Friday and 8:30 a.m. to 12 noon Saturday. A guard is on duty weekdays in the evening. For after hours delivery, there is a silver, refrigerated "rabies" box in the parking area under the east wing of the laboratory.
5. Positive results are phoned to the veterinarian or physician involved and to an epidemiologist in the Epidemiology Program, State Department of Health Services.

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