Outcome of Maternal Syphilis at Rajavithi Hospital on Offsprings

Varaporn Sangtawesin MD*,
Watcharee Lertsutthiwong MD*, Wiboon Kanjanapattanakul MD*,
Meera Khorana MD*, Sunthorn Horpaopan MD*

** Neonatal Unit, Department of Pediatrics, Queen Sirikit National Institute of Child Health*

Background: *Syphilis remains an important sexually transmitted disease and continues to be an important problem in Thailand. Despite the clinical efficiency of penicillin in the treatment of pregnant patients with syphilis, infants with congenital syphilis are still encountered. Congenital syphilis poses significant challenges for the clinician because infants may be asymptomatic at birth or present with a highly variable clinical picture.*
Objectives: *To evaluate the outcomes of neonates born to syphilitic mothers, the efficacy of antepartum treatment in the prevention of congenital syphilis and treatment for congenital syphilis after delivery.*
Material and Method: *The surveillance conducted from September 1st, 2002 to December 31st, 2003, involved 63 mothers who were diagnosed with syphilis and their offsprings at Rajavithi Hospital, Bangkok, Thailand. Sixty-four infants had complete physical examination, growth, development and laboratory evaluation at Queen Sirikit National Institute of Child Health at the time of delivery and at the ages of 1, 2, 4 and 6 months.*
Results: *There were 63 mothers and 64 infants recruited in the present study. Fifty-three mothers had prenatal care (84.13%). The VDRL was positive in the first prenatal care visit in 42 mothers (66.67%) and 11 mothers(17.46%) had seroconversion later on. Maternal treatment for syphilis included adequate penicillin 23 cases (36.51%), inadequate penicillin 5 cases (7.94%), erythromycin 9 cases (14.29%) and 26 mothers (41.27%) received no treatment at all. The mean maternal age, mean gestation age at treatment for syphilis and at delivery were 30.31 $\pm$ 5.60 years, 32.75 $\pm$ 6.73 weeks and 38.60 $\pm$ 1.57 weeks respectively. Failure rate in the adequate penicillin group was 8.7%. The mean birth weight of the 64 infants was 3034 $\pm$ 495 grams, no syphilitic stillbirth occurred. Nine infants (14.06%) were identified with presumptive congenital syphilis. The manifestation include hepatomegaly (55.56%), desquamation of palms and soles (44.44%), radiological changes (33.33%) and abnormal cerebrospinal fluid (25%). The fluorescent treponemal antibody absorption immunoglobulin M (FTA-ABS IgM) tests of the infants were positive in 2 out of 9 cases (22.22%). The range of maternal and neonatal VDRL titer were between weakly reactive to 1:32 and nonreactive to 1:32 respectively. Fifty infants (78.13%) including 9 presumptive cases were followed-up, all had normal growth. Thirty-four infants (68%) who had re-evaluation for VDRL titers, were seronegative.*
Conclusion: *Penicillin is the effective treatment of pregnant patients with syphilis and infants with congenital syphilis. The high risk of congenital syphilis correlates with untreated mothers and inadequate maternal syphilis treatment.*

Keywords: *Neonatal outcome in syphilitic mother*

J Med Assoc Thai 2005; 88 (11): 1519-25
Full text. e-Journal: *http://www.medassocthai.org/journal*

Syphilis remains an important global sexually transmitted disease and continues to be an important problem in Thailand. Active syphilis in pregnant women can result in stillbirths, hydrops fetalis, or prematurity. Congenitally infected infants may or may not have signs of disease at birth or the signs may present as late as 2 years of age. Risk of transmission diminishes

Correspondance to : Sangtawesin V, Neonatal Unit, Department of Pediatrics, Queen Sirikit National Institute of Child Health, Bangkok 10400, Thailand.

as the stage of maternal syphilis advances. In early latent (asymptomatic) syphilis the risk of vertical transmission remains about 30-60%[1-4]. Retrospective study of 36 congenital syphilis cases who were diagnosed after the neonatal period at Queen Sirikit National Institute of Child Health from 1986 to 1997[5] showed that the causes of delayed diagnosis were the absence of antenatal care 30.56%, single negative test for VDRL in the first trimester 52.78% and unrecognized positive test for VDRL in 16.67%. Despite the clinical efficiency of penicillin in the treatment of pregnant patients with syphilis, infants with congenital syphilis are still seen[6-8].

Objective

1. To evaluate the outcome of neonates born to syphilitic mothers.

2. To evaluate efficacy of treatment of antepartum syphilis in the prevention of congenital syphilis.

3. To determine the efficacy of treatment for congenital syphilis.

Material and Method

This was a prospective cohort study from September 1st, 2002 to December 31st, 2003. All mothers who delivered their offspring at Rajavithi Hospital, Bangkok, Thailand had syphilis serologic screening (first prenatal visit and at 28-32 weeks prenatal visit) routinely. Rapid plasma reagin test or Venereal Disease Research Laboratory (VDRL) test with titer and confirmatory microhemagglutinin assay for antibodies to Treponema pallidum were used to identify infected patients. All these mothers and their offsprings were included in the present study with numbers for the identification ran chronologically. Evaluation of the neonates born of the syphilitic mothers included complete physical examination, VDRL test with titer, Fluorescent Treponemal Antibody, absorbed with nonpallidum treponemes immunoglobulin M (FTA-ABSIgM), long-bone radiographs, complete blood count. Liver function tests or chest X-ray were performed in specific cases with special indication. Findings on physical examination that were consistent with congenital syphilis included a characteristic rash, rhinitis, hepatomegaly($\geq$ 3 cm below right costal margin), splenomegaly. Small for gestational age was defined as birth weight < 10th percentile by gestational age at the time of delivery. Radiographic findings included osteochondritis, periostitis, metaphisitis or radiolucent band of long bones. Anemia was defined as a hematocrit level < 35% and thrombocytopenia was defined as a platelet count < 150,000/mm^3.Cerebrospinal fluid (CSF) examination included a VDRL titer test, white and red blood cell count, and protein concentration. Elevated CSF white blood cell count was defined as > 25 white blood cells/mm^3 and elevated CSF protein was identified as protein >150 mg/dL respectively.

In the present study the authors defined congenital syphilis by means of the Centers for Disease Control and Prevention (CDC) surveillance case definition for presumptive congenital syphilis as[9]:

(1) infants whose mothers had untreated or inadequate treatment regardless of signs in the infant or child.

(2) infants who had a reactive treponemal test and any of the following: evidence of congenital syphilis on physical examination, any evidence of congenital syphilis on radiographs of long bones, a reactive CSF VDRL test result, an elevated CSF cell count or protein level (without other causes), a quantitative nontreponemal serologic titer which is fourfold higher than the mother's or a reactive test for FTA-ABS-19S IgM antibody.

A syphilitic stillbirth was defined as a fetal death in which the mother had untreated or inadequately treated syphilis of a fetus after 20 weeks gestation or of a fetal weight > 500 gram.

The authors divided the infants into four groups according to maternal treatment history.

Group 1 infants born of adequate penicillin-treated mothers.

Group 2 infants born of inadequate penicillin-treated mothers.

Group 3 infants born of erythromycin treated mothers

Group 4 infants born of untreated mothers

Adequate penicillin treatment was defined as the mother who was treated with 2.4 million units intramuscularly administered of benzathine penicillin G weekly for 3 weeks with the last dose given at least one month before delivery.

Failure of treatment of syphilis in pregnancy was defined as the mother who had adequate penicillin treatment but still had persistent or no 4 folds decrease of non-treponemal titer 3 months after treatment, or delivered an infant diagnosed with congenital syphilis by CDC definition guidelines.

The presumptive congenital syphilitic cases were treated by using recommendation of CDC guideline[10]. The authors treated them with aqueous crystalline penicillin G 50,000 units/kg/dose IV every 12 hours during the first 7 days of life and every 8 hours there-

after for a total of 10 days. All infants were followed after discharge at 1, 2, 4, 6 months of age or until clinical and laboratory tests were normal. VDRL test with titer were repeated at 3, 6 months or until negative finding.

Statistical analysis

Data were presented by frequency tables using number and percentage, mean, median and standard deviation to determine the result distribution.

Results

During the sixteen-month-study-period, there were 63 mothers with syphilis during pregnancy and the number of their infants was 64 (1 pair of twins). The majority of women were Thai (98.41%). The mean maternal age was 30.31 $\pm$ 5.60 years. Twelve mothers had more than one sexual partner (18.75%) and previous parity 45 cases (71.43%). There were 4 hepatitis-B virus carriers, 2 with positive HIV-antibodies, 1 with herpes simplex virus infection and one gonorrheal vaginitis. Fifty three (84.13%) mothers had prenatal care. The VDRL was positive in the first prenatal care visit in 42 women (66.67%). The other 11 mothers had seroconversion (17.46%). The median of maternal VDRL titers at the time of treatment and delivery was 1:2, ranging from 1:2-1:32. Thirty- seven mothers were treated before delivery but only 23 (36.51%) had been treated adequately with penicillin. Five mothers were inadequately treated with penicillin (7.94%), 9 were treated with erythromycin (14.29%) and 26 (41.27%) had no treatment at all. Mean gestation age at treatment for syphilis and at delivery was 32.75 $\pm$ 6.73 and 38.60 $\pm$ 1.57 weeks respectively (Table 1). Failure of treatment defined as VDRL does not decrease fourfolds after 3 months, occurred in 2 mothers from group 1. The first case had VDRL titer 1:4 at 32 week gestational age with positive anti –HIV antibody; after treatment the titer rose to 1:8 at delivery. The other case had VDRL titer 1:4 at 22 week gestational age; after treatment the VDRL titer was 1:4 at delivery. This accounted for the failure rate in adequate penicillin-treated mothers of 8.7%.

Neonatal outcome

The mean birth weight was 3,034 $\pm$ 495 grams, mean gestational age was 38.6 $\pm$ 1.57 weeks. Four infants were delivered prematurely (6.25%) and 5 (7.81%) had intrauterine growth retardation. There was no syphilitic stillbirth. The male/female ratio was 37/27 (1.4:1).

There were 41 presumptive cases of congenital syphilis according to CDC definition, 5 in group 2, 9 in group 3 and 27 in group 4. Two highly possible infected infants in the first group had reactive VDRL titer. The first case did not have any clinical manifestation but his mother had rising VDRL titer from 1:4 to 1:8 after treatment. The 2nd infant, whose mother had persistent VDRL titer (1:4) after treatment had skin rash and desquamation with reactive VDRL. The FTA-ABS IgM was negative in both infants.

In group 2, there were 5 mothers and 5 infants. One mother had late antenatal care and her infant presented with jaundice and hepatomegaly. Four other mothers had seroconversion of VDRL titer (range 1:2-1:32) during the second to third trimester but their babies did not have any clinical manifestation of congenital infection. The VDRL titers of the babies range from nonreactive to weakly reactive.

In group 3, the maternal VDRL titers ranged from weakly to 1:8. All babies were clinically normal with negative FTA- ABS IgM with VDRL titers ranging from nonreactive to weakly reactive.

Seven of 27 infants in group 4 (1 pair of twins) had clinical manifestation; desquamation of skin 4/7 (57.14%), hepatomegaly 4/7 (57.14%) abnormal long bone radiograph 3/7(42.86%), positive FTA-ABS IgM 2/7(28.57%), reactive CSF VDRL 1/4(25%). The reasons for the lack of maternal treatment before delivery include no antenatal care, only early single visit, or seroconversion at delivery. No babies in the present study had four folds VDRL titer higher than the maternal titer (Table 2).

Only 9 infants (14.06%) had clinical manifestation of congenital syphilis (Table 2). Seven of these 9 infants were delivered from mothers in the untreated group (Group 4), one was from the mother with treatment failure (Group 1) and the last one from the mother with inadequate treatment (Group 2). The clinical manifestations were hepatomegaly with or without jaundice in 5/9 (55.56%), desquamation of palms and soles with or without skin rash in 5/9 (55.56%), abnormal

Table 1. Serologic data of the 64 infants born to the syphilitic mothers

Infant characteristic	
VDRL titer; Median	1:2
Range	NR-1:32
VDRL titer $\geq$ 4 fold of mother; n/N (%)	0/64 (0)
Positive long bone; n/N (%)	3/33 (9.09)
Reactive CSF VDRL; n/N (%)	1/7 (14.29)
Reactive for FTA-ABS IgM; n/N (%)	2/64 (3.13)

Table 2. Clinical manifestations of the 9 presumptive congenital syphilis in the present study

No.	GA (wk)	BW (gm)		Rx during pregnancy	VDRL titer (Mother/infant)	FTA-ABS IgM	Radiograph of Long bone	CSF WBC (cell/mm^3) Protein (mg%)	Physical exam
4	38	3410	AGA	none	1:4/WR	neg	normal	ND	desquamation
5	40	3685	AGA	none	1:2/WR	neg	radiolucent band	WBC 4, Protein 86, VDRL-NR	desquamation, rash
11	37	2500	AGA	none	1:16/1:4	neg	normal	ND	hepatomegaly
23	37	2965	AGA	adequate	persist 1:4/WR	neg	normal	ND	desquamation
27	38	2980	AGA	inadequate	1:4/WR	neg	normal	ND	jaundice hepatomegaly
38	39	2610	AGA	none	1:16/1:4	neg	normal	WBC 0, Prot 76, VDRL-1:2	hepatomegaly
43	37	2150	SGA	none	1:32/1:32	pos	radiolucent band saw-tooth appearance, osteochondritis	Wbc0, prot 88 VDRL-NR	jaundice hepatomegaly splenomegaly desquamation rash, thrombocytopenia (platelet count 50,000/cu mm), anemia
44	41	3120	AGA	none	1:4/WR	neg	normal	Wbc 5, prot 56 VDRL-NR	thrombocytopenia (platelet count 88,000/cu mm)
45	38	2750	AGA	none	1:8/1:8	pos	radiolucent band	ND*	hepatomegaly, desquamation

WR = weakly reactive, ND = not done, neg = negative, pos = positive, prot = protein
* The consent were not received

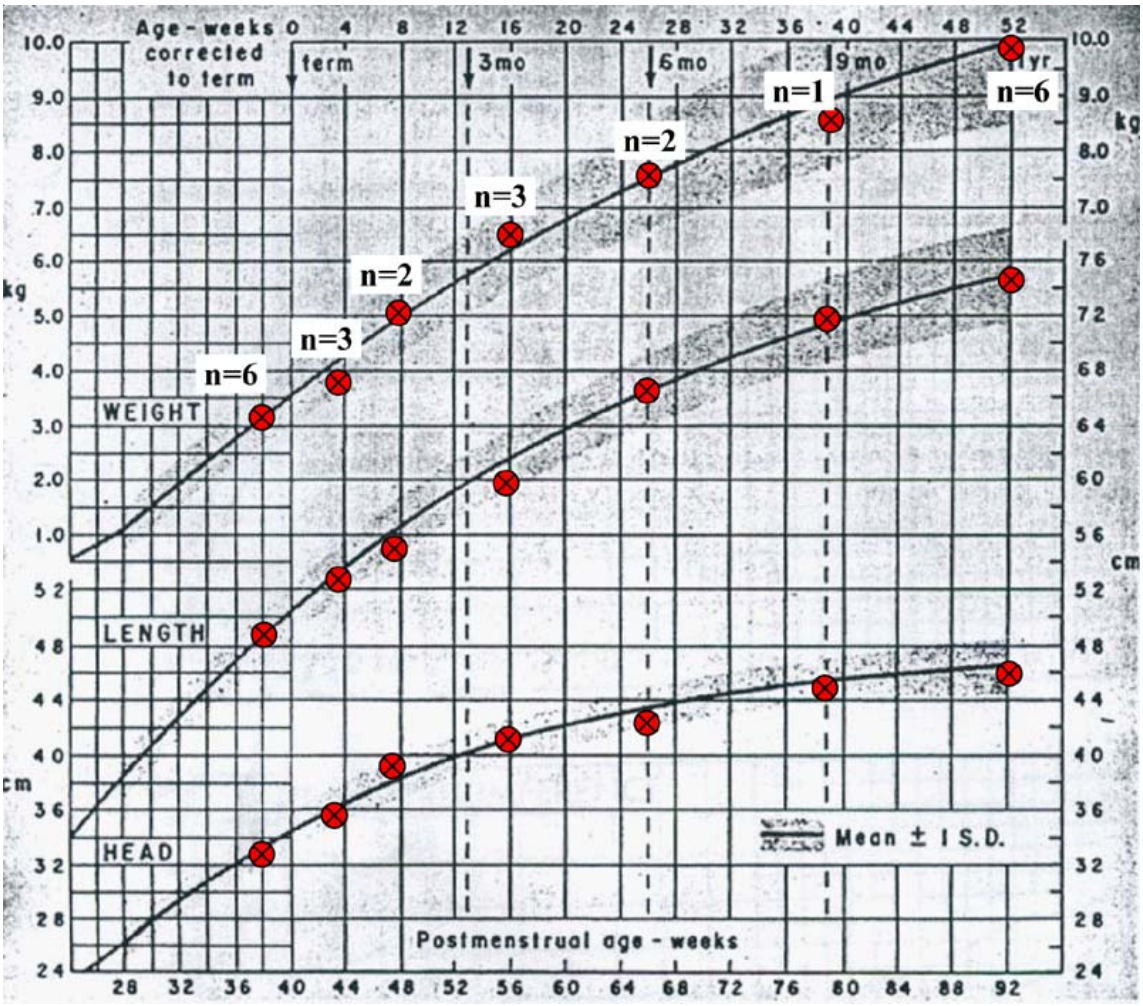
radiograph (radiolucent band, metaphysitis osteochondritis,) in 3/9 (33.33%), thrombocytopenia in 2/9 (22.2%) and abnormal cerebrospinal fluid in 1/4 (25%).

All presumptive cases and 2 highly possible cases in the first group were given penicillin by using the recommended regimen of CDC guideline. Fifty infants 50/64 (78.13%) were followed-up at the high risk clinic. There were 21, 3, 4 and 22 cases in the first, second, third and fourth group respectively. All had normal growth (Fig. 1). Thirty-four infants including all who had clinical manifestations (68%) had been re-evaluated for VDRL titers and radiographs at the ages of 3-6 months. All of the tests were negative.

Discussion

The authors have described 64 infants who were born of 63 pregnancies with syphilis. Although 53 cases (84.13%) had antenatal care, only 23 cases (36.51%) had adequate treatment before delivery. In the present study the failure rate of treatment of syphilis in the pregnancy was 2 in 23 cases (8.7%). Only one baby from this group of mothers had solely skin manifestation without other evidences of congenital syphilis. Alexander reported on the efficacy of penicillin for overall syphilis treatment in pregnancy to be 98.2%. Treatment failure occurred in women with secondary or early latent syphilis[7]. Sheffield reported that high VDRL titer at treatment and delivery, early maternal stage of syphilis, the interval less than 30 days from treatment to delivery and prematurity were associated with congenital syphilis after adequate treatment for maternal syphilis[8]. The authors had insufficient data in the present study to define the stage of maternal syphilis in cases of failure.

Erythromycin is probably adequate for the maternal treatment but is inadequate to treat in utero syphilis[10-12]. In the erythromycin-treated group of the present study, there was no infant with clinical mani-



Growth Record for infants in relation to gestational age and fetal and infant norms (combined sexes), University of Oregon. (From Babson S: Growth of low-birthweight infants, J Pediatr 77:11, 1970)

Fig. 1 The mean weight, height and head circumference at birth, 2, 4, 6, 12 months old of the infants during follow up (n = number of infants)

festation or serologic abnormalities that suggested syphilis infection. This differed from the reports of South and Hashisaki[13,14]. The reasons for this may be the low number of cases, the low VDRL titers in this group or the late manifestation which had not been detected. Irrespective of the reasons, these infants should still be the high risk group who need treatment for congenital syphilis.

All cases with clinical manifestation and laboratory evidences of congenital syphilis were born from mothers with untreated or inadequately treated for maternal syphilis. Hepatosplenomegaly was the most common clinical feature in the present study similar to previous reports[5,15-18].

In the previous report of Cremin and Fisher the periosteal reaction was the most common radiographic abnormality[19]. This differed from the study of Hira that metaphyseal dystrophy (radiolucent band, saw-tooth appearance etc.) was more common than the periosteal reaction[16]. Although periosteal reaction was not seen in the present study, the authors' previous study of early congenital syphilis postneonatal period also revealed that periosteal reaction is common[5]. Periosteal reaction, however, was nonspecific and it could resolve spontaneously even without therapy[15].

All of these presumptive congenitally infected infants were treated with penicillin, had good imme-

diate outcome and normal growth and development after 6-month-follow up.

Conclusion

Syphilis remains an important sexually transmitted disease and continues to be an important problem. The risk of congenital syphilis correlates with untreated mothers and inadequate maternal syphilis treatment. Infants after adequate treatment were completely resolved with normal growth.

Acknowledgement

The authors wish to thank the physicians and nurses in the Obstetric-Gynecology Unit, Rajavithi Hospital, pediatric residents, physicians and nurses in Neonatal Unit, Queen Sirikit National Institute of Child Health who have been so helpful in performing this work.

References

1. Hurting A-K, Nicoll A, Carne C, Lissauer A, Connor N, Webster JP, et al. Syphilis in pregnant women and their children in the United Kingdom: results from national clinician reporting surveys 1994-7. BMJ1998; 317: 1617-9.
2. Stoll BJ. Congenital syphilis: evaluation and management of neonates born to mothers with reactive serologic test for syphilis. Pediatr Infect Dis J 1994; 13: 845-53.
3. Ikeda MK, Jenson HB. Evaluation and treatment of congenital syphilis. J Pediatr 1990; 117: 843-52.
4. Gutman LT. Syphilis. In: Feigin RD, Cherry JD, editors. Textbook of pediatric infectious disease. 3rd ed. Philadelphia: WB Saunders, 1992: 552-63.
5. Sangtawesin V, Chotpitayasunondh T, Waranawat N. Early congenital syphilis diagnosed after neonatal period. Thai J Pediatr 2000; 39: 320-7.
6. Nathan L, Bawdon RE, Sidawi JE, Stettler RW, McIntire OD, Wendel GD Jr. Penicillin level following the administration of benzathine penicillin G in pregnancy. Obstet Gynecol 1993; 82: 338-42.
7. Alexander JM, Sheffield JS, Sanchez PJ, Mayfield J, Wendel GD Jr. Efficacy of treatment for syphilis in pregnancy. Obstet Gynecol 1999; 93: 5-8.
8. Mcfarlin BL, Bottoms SF, Dock BS, Isada ND. Epidemic syphilis: maternal factors associated with congenital syphilis. Am J Obstet Gynecol 1994; 170: 535-40.
9. Centers for Disease Control and Prevention. Case definitions for public health surveillance. MMWR Recomm Rep 1990: 39(RR-13): 34-8.
10. Sexually transmitted disease treatment guidelines 2002. Centers for Disease Control and Prevention. MMWR Recomm Rep 2002: 51(RR-6): 26-30.
11. Centers for Disease Control and Prevention. 1998 Guildlines for treatment of sexually transmitted disease. MMWR Morb Mortal Wkly Rep 1998; 47: 28-49.
12. Wendel GD JR, Stark BJ, Jamison RB, Melina RD, SallivanTJ. Penicillin allergy and desensitization in serious infections during pregnancy. N Engl J Med 1985;312:1229-32.
13. South MA, Short DH, Knox JM. Failure of erythromycin estolate therapy in utero syphilis. JAMA 1964; 190: 70-1.
14. Hashiasaki P, Wertzberger GG, Conrand GL, Nichols CR. Erythromycin failure in pregnant woman. Sexual Transmitted Disease 1983; 10: 36-8.
15. Ingall D, Sanchez PJ, Musher DM. Syphilis. In: Remington JS, Klein JO, editors. Infectious disease of fetus and newborn infant. 2nd ed. Philadelphia: WB Saunders, 1983: 335-74.
16. Hira SK, Bhat GJ, Patel JB, Din SN, Attli RV, Patel ML, et al. Early congenital syphilis: clinico-radiologic features in 202 patients. Sexual Transmitted Disease 1985; 12: 177-83.
17. Correa AG. Congenital syphilis:evaluation, diagnosis and treatment. Semin Pediatr Infect Dis 1994; 5: 30-4.
18. Chawla V, Pandit PB, Nkrumah FK. Congenital syphilis in the newborn. Arch Dis Child 1988; 63: 1393-4.
19. Cremin BJ, Fisher RM. The lesion of congenital syphilis. Br J Radiol 1970; 43: 333-41.

ผลลัพธ์ของทารกที่มารดาติดเชื้อซิฟิลิส ซึ่งคลอดที่โรงพยาบาลราชวิถี

วราภรณ์ แสงทวีสิน, วัชรี เลิศสุทธิวงค์, วิบูลย์ กาญจนพัฒนกุล, มิรา โคราษา, สุนทร ฮ้อเผ่าพันธ์

ที่มา: *โรคซิฟิลิสเป็นโรคติดต่อทางเพศสัมพันธ์ที่พบบ่อยและยังเป็นปัญหาทางสาธารณสุขของไทย แม้ว่ายาเพนนิซิลลินจะใช้รักษาโรคนี้ได้ดีในหญิงตั้งครรภ์แต่ยังพบทารกเป็นซิฟิลิสแต่กำเนิด และทารกที่เป็นโรคบางรายอาจไม่แสดงอาการเมื่อแรกเกิด ทำให้เป็นปัญหาในการวินิจฉัยและรักษา*

วัตถุประสงค์: *เพื่อศึกษาผลลัพธ์ของทารกที่มารดาติดเชื้อซิฟิลิส ประสิทธิผลในการรักษาในหญิงตั้งครรภ์ เพื่อป้องกันการเกิดซิฟิลิสแต่กำเนิดและประเมินผลการรักษาในทารกหลังคลอด*

วัสดุและวิธีการ: *ศึกษามารดา 63 รายที่ได้รับการวินิจฉัยว่าเป็นซิฟิลิส และทารกของมารดาเหล่านี้ที่มาคลอดที่โรงพยาบาลราชวิถี ตั้งแต่วันที่ 1 กันยายน พ.ศ. 2545 ถึง 31 ธันวาคม พ.ศ. 2546 จำนวน 64 ราย ทารกทุกรายได้รับการตรวจร่างกาย การติดตามการเจริญเติบโต การส่งตรวจทางห้องปฏิบัติการเมื่อแรกคลอดและติดตามที่อายุ 1, 2, 4, 6 เดือน*

ผลการศึกษา: *มารดาที่ได้รับการวินิจฉัยว่าเป็นซิฟิลิสมีจำนวน 63 ราย ทารกคลอด 64 ราย (แฝด 1 ราย) มีการฝากครรภ์ก่อนคลอด 53 ราย (84.13%) การตรวจ VDRL ให้ผลบวกในการมาฝากครรภ์ครั้งแรก มีจำนวน 42 ราย (66.67%) ให้ผลบวกในการตรวจครั้งที่ 2 จำนวน 11 ราย (17.46%) มารดาได้รับการรักษา ด้วย penicillin ครบ 23 ราย (36.51%), inadequate penicillin 5 ราย (7.94%), erythromycin 9 ราย (14.29%) มารดาจำนวน 26 ราย (41.27%) ไม่เคยได้รับการรักษา อายุเฉลี่ยของมารดา 30.31 $\pm$ 5.60 ปี อายุครรภ์เฉลี่ยของมารดาเมื่อให้การรักษา และขณะคลอดเท่ากับ 32.75 $\pm$ 6.73 และ 38.60 $\pm$ 1.57 สัปดาห์ตามลำดับ การรักษามารดาในกลุ่ม adequate penicillin ล้มเหลว 8.7% น้ำหนักเฉลี่ยของทารกทั้งหมดเท่ากับ 3,034 $\pm$ 495 กรัม ไม่พบทารกตายคลอด มีทารก 9 รายที่มีอาการแสดงทางคลินิกที่เข้าได้กับการติดเชื้อซิฟิลิสแต่กำเนิด พบตับโตมากที่สุด(55.56%) รองลงมาคือผิวหนังลอกที่ฝ่ามือฝ่าเท้า (44.44%), ความผิดปกติของกระดูก (33.33%) ความผิดปกติของน้ำไขสันหลัง (25%) ผลการตรวจทางห้องปฏิบัติการ FTA-ABS IgM ให้ผลบวก 2 ราย (22.22%) VDRL titer ของมารดาพบ weakly positive - 1:32 และของทารก non-reactive - 1:32 ไม่มีทารกรายใดที่มีผล VDRL titer $\geq$ 4 เท่าของมารดา ได้ติดตามทารกหลังจำหน่าย 50 ราย (78.13%) ทุกรายมีการเจริญเติบโตปกติ ตรวจ VDRL ซ้ำ 34 ราย (68%) ให้ผลลบทุกราย*