Congenital syphilis — who is at risk?

A prevalence study at Baragwanath Hospital, Johannesburg, 1985-1986

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Summary

The prevalence of syphilis (or positive serology) in pregnant mothers delivering at Baragwanath Hospital, Johannesburg, was assessed in order to try to establish the prevalence of congenital syphilis and possibly to identify a specific population at risk. From August 1985 to January 1986 all mothers admitted to the major delivery wards were screened to determine whether they were booked or unbooked patients and whether they were seroreactive for syphilis. Infants of seropositive mothers were examined for clinical signs of congenital syphilis. A total of 9 071 patients were screened, 25% unbooked. The prevalence of mothers who had positive serological results with the rapid plasma reagin (RPR) test ⩾ 8 U was 1,8% in the booked patients opposed to 9,6% in the unbooked group ($P < 0,00001$). During the study period 41 infected infants were found — 23 symptomatic, 15 stillborn and 3 aborted fetuses. All these neonates were born to unbooked mothers and had positive RPR test results ⩾ 8 U. The results highlight the fact that congenital syphilis is still an important cause of infant morbidity and mortality and that the unbooked mother is at risk of having an affected offspring, especially when her RPR test is seroreactive ⩾ 8 U.

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Contrary to the sexually transmitted diseases of the Eighties (e.g. acquired immunodeficiency syndrome) syphilis is relatively easy to diagnose and can still be cheaply and effectively treated with penicillin. The treponemes are as sensitive to penicillin today as they were when this therapy was introduced by Mahney and Harris in 1934.[1] Although congenital syphilis is a potentially preventable disease, it was the clinical impression from experience in the neonatal department of Baragwanath Hospital, Soweto, Johannesburg, that congenital syphilis remains a major contributor to perinatal morbidity and mortality in the RSA.

Baragwanath Hospital is the only fully equipped hospital for primary, secondary and tertiary care in Soweto, a rapidly urbanising black residential area, south-west of Johannesburg. Although the official population is estimated at 1,5 million (1985 census), it is probably much more and fluctuates continuously. There is a continual influx from rural areas because workers are attracted by job opportunities in industry, mining and commerce. The maternity complex at Baragwanath Hospital was completed in 1973 and provides 323 maternity and 330 neonatal beds. At present the hospital manages about 70% of all deliveries in Soweto, the other 30% are dealt with in community health centres (C. van Gelderen — personal communication).

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Despite the fact that there is growing concern world-wide at the increased incidence of sexually transmitted diseases in Africa, there are very few publications to verify this, especially since the 1960s. A study was designed to assess the prevalence of positive syphilis serology in mothers delivering at Baragwanath Hospital, to try to establish the prevalence of congenital syphilis and to identify a specific population at risk.

Patients and methods

The study was carried out during the 6-month period August 1985 - January 1986. All mothers admitted to the 8 major post-delivery wards at Baragwanath Hospital were investigated. A few mothers were not admitted to these wards postnatally either because the wards were full, the mother had a septic focus or the mother was very ill and needed specialised care. These latter cases were not included in the study as they were scattered throughout the hospital and follow-up was difficult.

These post-delivery mothers were screened to determine whether they were booked or unbooked patients. Unbooked mothers were defined as those who had never attended antenatal clinics or who had attended only once so that the results of the rapid plasma reagin (RPR) test was not known at the time of delivery.

At delivery a RPR test should be performed routinely on cord blood if the mother is unbooked. If it was found that cord blood was not taken at the time of delivery, a blood sample was taken from the mother. The results of the RPR tests were recorded in either the patients' bedletters or the admission book in the postnatal ward or had to be sought in the serology laboratory. If these results were not found, the test was repeated if the mother was still in the hospital.

Booked mothers, by definition, were mothers who had attended an antenatal clinic at least twice before delivery so that their RPR test status was known at delivery and it was to be hoped that they would have received therapy if their serology was positive. Usually the booked mothers had the result of their RPR test recorded on their antenatal cards. If they did not have proof of their RPR test status with them and could not produce the card, the relevant antenatal clinic or the South African Institute for Medical Research (SAIMR) serology laboratory was contacted.

All RPR tests from Baragwanath Hospital and the Soweto clinics were done in one central laboratory at the SAIMR. The test used was the RPR Circle Card Test (Brewer Diagnostic). If the mother's result was positive and she was unbooked or there was no documented evidence of adequate therapy antenatally she was treated with 24 MU benzathine benzylpenicillin G intramuscularly as a single dose. Fluorescent treponemal antibody-absorption (FTA-ABS) tests were not routinely done on the seropositive mothers to confirm the diagnosis.

All neonates of seropositive mothers were examined to determine if they had any clinical signs of congenital syphilis. Clinical disease was suspected if the presence of skin rashes, petechiae, anaemia, hepatosplenomegaly, snuffles or condylomata was found. All the neonates were examined by one paediatrician (A.V.). If suggested on clinical examination, the diagnosis was confirmed by radiography of the long bones and

an FTA-ABS (IgM) blood test. Routine FTA-ABS (IgM) tests were not done on asymptomatic babies. This study only highlights those cases with signs of congenital syphilis at birth. This means that some of the asymptomatic babies could still have developed signs of congenital syphilis later. However, all asymptomatic infants born to seropositive mothers were routinely treated with benzathine benzylpenicillin G 50 000 U/kg as a single dose intramuscularly. Infants with symptomatic congenital syphilis at birth were treated with procaine benzylpenicillin 50 000 U/kg as a single daily dose for 10 days intramuscularly. If there was central nervous system involvement or any doubt as to the involvement, benzathine benzylpenicillin G 50 000 U/kg was administered intravenously in twice daily doses for 10 days.[2]

As far as possible permission was obtained to do autopsies on stillborns and aborted fetuses from seropositive mothers to determine the cause of death.

The study was approved by the Committee for Research on Human Subjects of the University of the Witwatersrand.

Results

During 1985 there were 19 946 deliveries at Baragwanath Hospital and in 1986 there were 19 853. Thus the mean delivery rate over a 6-month period was 9 949.

The RPR test status of 9 071 mothers was studied at Baragwanath Hospital during the 6-month study period. Of this total, 6 845 mothers (75,5%) were booked and 2 226 (24,5%) were unbooked. This ratio of 3:1 was consistent throughout the whole study period (Table I). Of the 6 845 booked cases, the RPR test results of 6 287 (91,8%) could be traced, whereas only 1 652 (74,2%) of the unbooked mothers' results were found.

RPR test results of 2 U (or 1:2) and higher were considered positive. To reduce the prevalence of false-positive results when using non-treponemal tests, it has been suggested that results of 4 U or less be excluded,[3,4] and these figures have also been calculated in this study. Of the booked patients 5,9% (373 of 6 287) were RPR-positive (1,8% of the results were positive $\geqslant$ 8 U). In the unbooked group of mothers 16,2% (264 of 1 625) had a positive RPR test of which 156 patients (9,6%) were positive $\geqslant$ 8 U. (Table I). The percentage of RPR-positive booked and unbooked mothers remained relatively constant over the study period.

During the period of the study, 23 live babies with symptoms of congenital syphilis were detected, while 15 stillbirths and at least 3 abortions were found to be the result of congenital syphilis. Forty-one offspring were thus affected by syphilis. It is very important to note that none of these babies were born to the booked group of mothers; all of them were delivered to the unbooked group of mothers who were seroreactive $\geqslant$ 8 U. The prevalence of affected offspring in unbooked mothers with RPR tests $\geqslant$ 8 U was 26,3%.

Discussion

The 9 071 mothers followed up between August 1985 and January 1986 probably represent most of the deliveries over that period at Baragwanath Hospital. Of these patients 24,5% were unbooked. This correlates well with statistics from Coronation Hospital, a hospital dealing mainly with patients of mixed races in the Johannesburg area (22,6% unbooked)[5] but is high compared with that in other centres in the RSA where the figures range from 5% - 19% of total deliveries.[6,7] The unbooked rate for Soweto as a whole is probably lower, since all unbooked mothers are referred from the clinics for delivery at Baragwanath Hospital. Assuming that no unbooked deliveries took place at the clinics, the prevalence of unbooked deliveries for the whole of Soweto (including the clinics) would drop to 17%.

This high prevalence of unbooked mothers is disconcerting. Several studies have been undertaken in the RSA to try to identify the mother who does not book.[5-7] It seems that these mothers differ from booked mothers in that they are usually single, not working, have a high prevalence of positive syphilis serology and have a poor relationship with the father of the child.[5,7] The prevelance of non-booking seems to be directly related to the distance the patients have to travel to the nearest clinic and is inversely related to their socio-economic status.[5]

It was difficult to determine in the present study how many of the unbooked mothers were local or came from rural areas. The high prevalence of unbooked mothers in our hospital is probably not an accurate reflection of the antenatal booking status of the more permanent local population, since it is probably influenced by a high number of pregnant mothers who come from rural areas. Unbooked mothers are not usually delivered at the clinics, but are referred to Baragwanath Hospital.

Our impression is that the mothers from rural areas or homelands are usually unbooked. Their reasons are not quite the same as those for the urban areas. Political issues and poor socio-economic conditions may play a role. These could include resettlement in areas where the antenatal care facilities are inadequate, mothers living too far from clinics and, as the fathers are usually migrant labourers working away from home, the fact that they get little support morally or financially.

Even in the cities it might be difficult for pregnant women to attend antenatal clinics since they need time off if they are employed and many employers are ignorant or indifferent. Daily-wage earners cannot afford to lose a day's wages.

Another important factor might be that these mothers are 'caught short' — this means that some of them had intended

TABLE I. RESULTS OF RPR TESTS ON BOOKED AND UNBOOKED MOTHERS

	Booked			Unbooked		
Month	Total No. of patients	RPR +ve	$\geqslant$ 8 U	Total No. of patients	RPR +ve	$\geqslant$ 8 U
August	**992**	**68 (6,8)**	**19 (1,9)**	**227**	**45 (16,2)**	**21 (7,5)**
September	**1 125**	**69 (6,1)**	**18 (1,6)**	**238**	**34 (14,3)**	**18 (7,5)**
October	**1 042**	**56 (5,4)**	**20 (1,9)**	**263**	**52 (19,8)**	**33 (12,5)**
November	**991**	**68 (6,9)**	**25 (2,5)**	**307**	**31 (10,1)**	**15 (4,9)**
December	**1 071**	**54 (5,0)**	**13 (1,2)**	**286**	**58 (20,3)**	**48 (16,0)**
January	**1 066**	**58 (5,4)**	**18 (1,7)**	**254**	**44 (17,3)**	**23 (9,0)**
Total	**6 287**	**373 (5,9)**	**113 (1,8)**	**1 625**	**264 (16,2)**	**156 (9,6)***

* The prevalence of RPR $\geqslant$ 8 U in unbooked mothers was significantly greater than in booked mothers (chi-square test 594; $P < 0{,}00001$).
The numbers in parentheses are the percentage of mothers with positive results.

to attend an antenatal clinic in the last month or so of pregnancy, but had gone into labour before booking.[6]

A major problem with the vast patient turnover in a hospital such as Baragwanath is the difficulty with which results are obtained and acted upon, even when the assays have been done. It is not surprising that 91,8% of the booked mothers' results were traced. However, even with diligent tracing, only 74,2% of the unbooked mothers' results could be found. Either the blood samples were not sent off at or after delivery or the blood specimens were mislaid or lost. Without a concerted effort by the authors even fewer results would have been found and fewer would have been acted upon. Of even greater concern is the fact that nearly 25% of the unbooked mothers were discharged without any knowledge of their RPR test status. This implies that their next pregnancy will be at risk.

The prevalence of active syphilis in mothers in our study is not known. When comparing the number of seropositive mothers in the booked and unbooked group it becomes apparent that major differences exist. Whereas only 5,9% of the booked mothers were seropositive, 16,2% of the unbooked mothers were seropositive. Thus there is nearly a threefold majority in seropositivity in the unbooked group. This has also been found in other studies.[5,7]

When only mothers with a positive serology of $\geqslant 8$ U in the two groups are considered, the difference is even greater — 1,8% in the booked group as opposed to 9,6% in the unbooked group. This represents a fivefold difference between the two groups. It is therefore evident that infants of unbooked mothers are at far greater risk of suffering from the sequelae of syphilis than those of booked mothers.

In a study of Wassermann reaction results from antenatal clinics in Soweto, Eisenberg[8] found that the prevalence of seroreactive pregnant women declined steadily from 20,8% in 1949 to 10,8% in 1981. These figures probably do not accurately reflect the prevalence of seroreactivity in the community but do give some indication of a decline in positive serology. The prevalence of seroreactive pregnant women in the booked group in this study was 5,9%. This may be a better indicator of the present prevalence of positive seroreactivity in the community and it seems probable if the decline described by Eisenberg[8] is accepted. The true prevalence probably lies somewhere between 5,9% (booked mothers) and 16,2% (unbooked mothers).

The true prevalence of syphilitic mortality and morbidity is probably underestimated. Consent could not be obtained for autopsies on all stillborns and the mother's serology was often not known at the time of delivery. Similarly, the prevalence of abortions is underreported, since most aborted fetuses would be delivered in the gynaecological wards and not in the maternity hospital. Further, the 23 symptomatic babies only represent the very early cases of congenital syphilis and some of the babies born to seropositive mothers could still have developed signs and symptoms of congenital syphilis later if they had not been treated with penicillin. In studies in the USA and Africa it was found that between 20% and 30% of seroreactive asymptomatic babies developed signs and symptoms of congenital syphilis later.[9–11]

Since serological studies were not routinely done on asymptomatic babies, this information could not be determined in our study. In our experience late-onset congenital syphilis has become very rare — probably because of the routine treatment of all infants born to seropositive mothers or because of frequent early exposure to antibiotics. During 1986 congenital syphilis in the paediatric wards at Baragwanath Hospital made up less than 0,5% of the total admissions, 23 cases out of a total of 4 863 admissions (Department of Paediatrics, Baragwanath Hospital, inpatient statistics, 1986 — unpublished data). It is not known whether the infants were born in Soweto, but assuming that they were, two-thirds of the cases presented at birth. All the above data indicate that the prevalence of congenital syphilis is 0,45%, but this is probably an underestimation.

In Lusaka[9] it was found that nearly half of the seroreactive pregnant women were delivered of affected offspring. In the present study the prevalence was much lower (only 6,4% of all seroreactive women or 15,2% of all seroreactive mothers with RPR test $\geqslant 8$ U).

It is important to note and probably of great significance that all 41 of the affected offspring were delivered to the unbooked group of mothers with a positive serology for syphilis (RPR test $\geqslant 8$ U). This means that the prevalence of affected offspring in this group is 26,3%. One out of every 4 mothers in this group will give birth to an affected child — abortion, stillbirth or a symptomatic infant. Four of these live-born infants died within the first week of life, giving a mortality rate in the neonatal period of 17,4% for congenital syphilis.

Conclusion

Syphilis in pregnancy, and congenital syphilis in particular, remains an important cause of perinatal morbidity and mortality.

It is disconcerting that more than 25% of the deliveries during the period studied involved unbooked mothers. They have a high prevalence of seropositivity and seem to be the group most at risk for having affected offspring.

There are still many controversies regarding the screening, diagnosis and treatment of syphilis in newborns and during pregnancy. It is obvious that more research in these fields is necessary, probably involving many centres, to establish trends, morbidity and effective therapy regimens.

A detailed study of the unbooked mother, her reasons for not booking and where she comes from is also needed in big centres. Only by approaching this problem epidemiologically can we combat this preventable disease.

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