

Gonococcal ophthalmia neonatorum: the case for prophylaxis in tropical Africa

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During a period when silver nitrate prophylaxis against ophthalmia neonatorum was discontinued in the maternity ward of the Yaoundé Central Hospital, a study was begun of the prevalence of gonorrhoeal infection among women and their newborn children. Strains of oxidase-positive gonococci were isolated on modified Thayer-Martin agar from vaginal pool specimens of 40 (14%) of the 296 women studied and from the conjunctiva of 12 (4%) of their 297 liveborn children. The risk of transmission from an infected mother to her child was 30%.

No specific symptoms of infection were observed by the mothers with positive cultures at the time of delivery, though 14 of them gave a history of having received treatment for a vaginal infection during pregnancy. Younger, low-parity women were at higher risk of infection. Since gonococcal ophthalmia neonatorum is a preventable cause of blindness, the increasing incidence of gonorrhoeal infection in Africa calls for an urgent re-examination of policies for the prevention of this infection among African women and their newborn children, the majority of whom are born without antenatal care or a trained birth attendant.

Ophthalmia neonatorum has been responsible for as many as 24% of all causes of childhood blindness (1). The idea of using silver nitrate to prevent this infection was introduced by Crede in 1881, and its use became widespread in the early part of the present century; as a result, the incidence of blindness caused by ophthalmia neonatorum has decreased (2). Chemical conjunctivitis, however, can occur in as many as 50% of infants given silver nitrate prophylaxis at birth (3). Because in the 1950s gonococcal conjunctivitis had become so uncommon in the United States of America (10-20 per 10 000 live births) and chemical conjunctivitis so prevalent, a question arose as to the continued necessity of silver nitrate prophylaxis (4, 5). At Babies' Hospital in New York, silver nitrate prophylaxis was discontinued in 1957 for a 6-month trial period, and intensified surveillance for infection was begun (6). Although the incidence of chemical conjunctivitis decreased, four infants developed conjunctivitis which on culture was positive for *Neisseria gonorrhoeae*, and so routine silver nitrate prophylaxis was reinstated.

During 1978, because of a similar concern about chemical conjunctivitis among newborns, the use of silver nitrate prophylaxis was temporarily discontinued in the maternity ward of the Yaoundé Central Hospital in the United Republic of Cameroon. During this period, we studied the prevalence of gonorrhoeal infections among the women delivering in the maternity ward and among their newborn children. This report describes the findings of this study, which began when silver nitrate prophylaxis was not in use.

MATERIALS AND METHODS

The study was conducted for an 8-week period in 1977. During the first 4 weeks, no ophthalmic prophylaxis was used. During the last 4 weeks, 1% silver nitrate was administered to newborns.

Infection among women presenting for delivery

Every third woman who presented for delivery at the maternity ward of the Yaoundé Central Hospital was selected for vaginal culture immediately prior to delivery. A vaginal pool specimen was obtained for culture with a sterile cotton-tipped applicator, immediately plated on modified Thayer-Martin medium, and incubated for 48 h at 37 °C in a candle jar (7). After the incubation, any glistening, greyish-

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white raised colonies, suspect for *N. gonorrhoeae*, were examined. Organisms from suspect colonies were removed from the culture plates with a sterile bacteriological inoculating loop, smeared on a glass microscope slide, fixed with heat, and stained with Gram's stain. The slides were then examined under oil-immersion with a standard light microscope for the presence of Gram-negative diplococci. The remaining suspect colonies on the culture plate were flooded with oxidase; colonies that became black within 30 seconds were considered oxidase-positive. Any culture with both Gram-negative diplococci and oxidase-positive colonies was considered positive for *N. gonorrhoeae*.

At the time of culture, or within 24 hours of delivery, the women were interviewed and their age and parity recorded. At the same time, they were questioned about any history of treatment for vaginal discharge during the pregnancy and/or increased vaginal discharge during the month prior to delivery. All the women and their infants were asked to return 3 days after delivery. At this visit, those women who had a positive vaginal culture were treated with 1 g of oral probenecid and 4.8×10^6 IU of intramuscular aqueous procaine penicillin G.

Infection among newborns

Each liveborn child delivered by a mother in the study had specimens taken for culture from both eyes immediately after delivery. The specimens were obtained by lightly rotating a sterile, cotton-tipped applicator in the conjunctiva of each eye. They were then plated on modified Thayer-Martin agar, incubated, and examined for oxidase-positive gonococci as described previously. During the last 4 weeks of the study, 1% silver nitrate was instilled into the eyes of the newborns immediately after the specimens for culture were obtained. At the return visit on the third day after delivery, those infants who had a positive culture for gonorrhoea were examined, and among them, those who had not had silver nitrate prophylaxis were treated with intramuscular aqueous procaine penicillin G and 1% ophthalmic tetracycline.

RESULTS

Infection among women presenting for delivery

A total of 296 women with liveborn children provided specimens for culture and were interviewed; 40 (14%) of them had organisms identified as *N. gonorrhoeae* isolated from cultures of the vaginal pool. The age distribution of these women is shown in Table 1.

Table 1. Vaginal pool cultures for *N. gonorrhoeae* by mothers' age at time of delivery, Yaoundé Central Hospital, 1977

Age group of mothers (years)	No. of women for culture	No. of women with a positive culture
15-19	90	15 (17) ^a
20-24	85	13 (15)
25-29	71	8 (11)
30-34	43	4 (9)
35-39	7	0
40-44	0	0
Total	296	40 (14)

^a Figures in parentheses are percentages.

A total of 175 women were under 25 years of age, of whom 28 (16.0%) were infected. Among the 121 women aged 25 years or older, 12 (9.9%) were infected. The difference in infection rates between these age groups is not statistically significant. The parity of women with positive cultures is shown in Table 2. There were 132 women of parity 3 or less, and among them 29 (22%) were infected. Among the 164 women of parity greater than 3, 11 (7%) were infected. This difference in infection rates by parity is statistically significant ($P < 0.001$).

Among the 40 women with positive cultures, all had noted an increase in vaginal discharge during the preceding month, and 14 (35%) gave a history of treatment for vaginal infection during the pregnancy. Among the 256 women who did not have a positive culture, 224 (88%) had noted an increase in vaginal discharge during the preceding month and 5 (2%) gave a history of treatment for vaginal infection

Table 2. Gonococcal cultures, by parity of the mothers, Yaoundé Central Hospital, 1977

Parity of mother	No. of women for culture	No. of women with a positive culture
1	39	14 (36) ^a
2	42	10 (24)
3	51	5 (10)
4	56	5 (9)
5	30	3 (10)
6	78	3 (4)
Total	296	40

^a Figures in parentheses are percentages.

during pregnancy. The difference between these two groups in the frequency of a history of infection during pregnancy is statistically significant ($P < 0.001$).

Infection among newborns

A total of 297 live infants (including one twin birth) were born to the 296 mothers studied. Among these infants, 12 (4%) had cultures positive for *N. gonorrhoeae*. The risk of transmission of *N. gonorrhoeae* from an infected mother to her infant was 30% (12 out of 40). A total of 262 (88%) of the 297 children, including 11 of the 12 with a positive culture, were examined again 3 days after birth. Of the 12 children with a positive culture, 8 had been born during the first 4 weeks of the study when silver nitrate was not used prophylactically; 7 of these children had purulent conjunctivitis and were treated, and 1 child did not return for follow-up. The remaining 4 children with a positive culture had received 1% silver nitrate immediately after the conjunctival cultures were obtained; none of them had clinical conjunctivitis at the post-delivery examination on the third day, and they were not treated.

DISCUSSION

Silver nitrate prophylaxis against ophthalmia neonatorum was discontinued in the maternity ward of the Yaoundé Central Hospital because of the frequent occurrence of chemical conjunctivitis. During the period immediately after discontinuation we found that 14% of mothers had gonococcal infection and that 4% of the children born to these women acquired gonococcal infection of the eye. The recognition of this gonococcal conjunctivitis led to the early reintroduction of silver nitrate prophylaxis.

The rate of transmission from an infected mother to a newborn was 30% in our study, which is similar to the rates of transmission observed by some investigators and higher than those observed by others (8). The apparently higher rate may be due partly to the fact that the vaginal pool culture method, which we used, identifies only 85–90% of infected women, as verified by endocervical culture (9). We did not further test the *Neisseria* strains identified by smear and by oxidase testing, so there is a possibility that some of our isolates were *N. meningitidis*.

During the examination on the third day after birth, we identified conjunctivitis in 7 out of the 8 infected children who did not receive prophylaxis. The eighth child did not return for follow-up. We believe that in a non-study setting, many children with symptomatic gonococcal eye disease would not be recognized. Other studies have demonstrated that

gonococcal conjunctivitis may be asymptomatic or may have a prolonged incubation period (10–12), and the risk of not recognizing eye infections and of progressive eye disease might therefore be even greater.

The increasing prevalence of penicillin-resistant gonococci in Africa makes the selection of appropriate prophylactic agents for ocular gonococcal infection difficult (13). Ophthalmic preparations of tetracycline (1%) or erythromycin (0.5%) have been suggested as alternatives to the standard 1% silver nitrate solution (8). It is uncertain whether these agents could be as effective as silver nitrate in situations where penicillin resistance is increasingly common since these organisms have combined antimicrobial resistance to a variety of other antibiotics including tetracycline and erythromycin.

The gonorrhoea infection rate among women delivering in the Yaoundé Central Hospital was 14%, which is similar to the rates obtained in other African studies (14). A second study at the Yaoundé Central Hospital has confirmed this infection rate, and shown gonorrhoeal infection rates of 21% among nongravid women attending the child-spacing clinic, and 16% among women who sought advice because of difficulty in conceiving (15). The infected women we studied were younger and of lower parity, had more complaints of vaginal discharge, and were more likely to have received treatment for vaginal discharge than non-infected women. Unfortunately we could not determine if the treatments given were for gonorrhoea or for other problems, or what medications and dosages had been used. None the less, the trends in age, parity and history of previous vaginal infection during pregnancy suggest that a schedule could be developed for managing symptomatic patients seen in antenatal clinics or at the time of delivery.

Gonococcal infection of women is a serious problem in many parts of Africa where it causes acute pelvic inflammation and postpartum sepsis (14). At the Yaoundé Central Hospital *N. gonorrhoeae* was isolated from 25% of all women with puerperal sepsis.^a Gonorrhoeal infection may also be a major cause of infertility in countries such as Gabon where 30% of women over 50 years of age have not had children, or in the south-east of the United Republic of Cameroon where the infertility rate approaches 24% (16, 17).

Ophthalmia neonatorum was a serious problem in our delivery population in Yaoundé. Since gonococcal infection is more common in populations of rural women elsewhere in the United Republic of Cameroon (22% in the authors' unpublished data), gonococcal ophthalmia neonatorum may be a more

^a SHASHA, V. W. A study of some aetiological aspects of puerperal infection at the principal maternity hospital of Yaoundé. Doctoral dissertation, University Centre for Health Sciences (CUSS), University of Yaoundé, 1976.

serious complication of delivery in rural areas. In this country neither the percentage of children under five years of age who are blind nor the proportion of blindness due to gonococcal ophthalmia is known.

Even so, we feel that this study emphasizes the value of silver nitrate prophylaxis. Further study of the problem of blindness among young children in this country may suggest additional prevention efforts.

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RÉSUMÉ

LA CONJONCTIVITE GONOCOCCIQUE DU NOUVEAU-NÉ: POUR UNE PROPHYLAXIE EN AFRIQUE TROPICALE

Pendant la période où l'on a cessé de pratiquer la prophylaxie de la conjonctivite purulente du nouveau-né au moyen de nitrate d'argent à la maternité de l'hôpital central de Yaoundé, a été entreprise une étude sur la prévalence des infections gonococciques chez les femmes et leurs nourrissons. Des souches de gonocoques oxydase-positifs ont été isolées sur gélose modifiée de Thayer-Martin, à partir de prélèvements vaginaux rassemblés provenant de 40 (14%) des 296 femmes étudiées et de prélèvements conjonctivaux provenant de 12 (4%) de leurs 297 enfants nés vivants. On a estimé à 30% le risque de transmission de la mère à l'enfant. Aucun symptôme spécifique d'infection n'avait été ob-

servé par les mères présentant des cultures positives au moment de l'accouchement, encore que 14% d'entre elles aient déclaré avoir été traitées pour une infection vaginale au cours de leur grossesse. C'est chez les paucipares jeunes que le risque d'infection était le plus important. Etant donné que la conjonctivite gonococcique du nouveau-né est une cause de cécité évitable, l'incidence croissante des gonococcies en Afrique appelle un réexamen urgent des politiques en matière de prévention des gonococcies chez la femme africaine et les nourrissons, qui pour la plupart sont mis au monde en l'absence de tout soin prénatal ou même sans l'intervention d'une accoucheuse qualifiée.

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