

Current usefulness of Credé's method of preventing neonatal ophthalmia

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Abstract The conjunctiva's bacterial profile at birth and 1 week after Credé's gonococcal ophthalmic prophylaxis was evaluated over a 3-month period using culture and direct immunofluorescence. Thirty-four neonates received 10% silver vitellinate and 42 sterile saline. *Chlamydia trachomatis* was recovered in 7/34 and 9/42 neonates receiving silver vitellinate and saline at birth and in 8/34 and 12/42 after 1 week, respectively. *Neisseria gonorrhoeae* was not identified. Credé's may not be the ideal prophylactic method in areas with a low prevalence of *N. gonorrhoeae*.

Introduction

Since its introduction in 1881, Credé's method of reducing neonatal ophthalmia has been used worldwide.¹ It requires the instillation of one drop of 1% silver nitrate (AgNO₃) at birth but is often followed by chemical conjunctivitis. Although alternative solutions such as silver vitellinate, tetracycline or erythromycin^{2,3} are reported to be less effective, the low incidence of gonococcal ophthalmia in many settings encourages services to change their protocols.^{4,5} There are no recent studies describing the side-effects of silver vitellinate. In populations with a low incidence of gonococcal ophthalmia, the changes in the ocular flora associated with its use might be different from those reported in high-incidence populations. This study describes the bacterial conjunctival profile of neonates

receiving silver vitellinate at birth and 1 week after birth and compares these changes with a group of neonates receiving ocular toilette with sterile saline.

Methods

This descriptive study of neonates was conducted in a maternity hospital in Aracaju, Brazil. The incidence of gonococcal ophthalmia in this setting is very low (<1%), while the incidence of *Chlamydia trachomatis* is unknown. The hospital guidelines advise the use of 1% silver nitrate for all newborns. Owing to procurement problems, however, the hospital was not employing prophylaxis at the time of the study. After obtaining maternal informed consent, neonates were randomised to receive either one drop of 10% silver vitellinate (Argyrol[®] Laboratories, Allergan Frumtost) or saline solution in both eyes soon after birth and when the child was stable.

Two conjunctival specimens were collected within the 1st 2 hours of life and

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before any cleaning or eye instillations. Specimens were collected by rolling cotton swabs on the inferior corner of the conjunctiva using a standardised technique.⁶ They were cultured on several media for aerobic and anaerobic bacteria including enriched chocolate agar⁶ and examined for *C. trachomatis* using a direct immunofluorescence (DIF) test.⁷ Participants were then followed 1 week later at their home or health centre when two further swabs were collected.

Analysis

The proportions of cultures and DIF tests that were positive on enrolment and follow-up were compared by treatment group using the χ^2 test with Yates' correction or Fischer's Exact test, where appropriate. The study protocol was approved by the Research Ethics Committee of the Federal University of Sergipe, Brazil.

Results

A total of 76 newborns were enrolled from March to May 2006 (Table 1). Of these, 34

received silver vitellinate and 42 received saline. Twenty-nine infants using silver vitellinate and 17 using saline were followed 1 week later. Ten (29%) and three (7%) children receiving silver vitellinate and saline, respectively, had positive cultures on enrolment ($p=0.02$). Similarly, seven (20%) and nine (21%) of the children receiving silver vitellinate and saline, respectively, had a positive DIF for *C. trachomatis* on enrolment. Positive cultures were recovered more frequently during follow-up, and had increased from 13 (38%) to 35 (93%) 1 week later ($p<0.001$). *C. trachomatis* was still the most frequently detected micro-organism 1 week later (23% in the silver vitellinate and 31% in the saline groups). Many infants had discordant DIF results on follow-up, with nine of 42 specimens testing negative at birth and positive 1 week later (Table 1). The proportions of infants with positive cultures and DIF results did not differ by treatment group.

The profile for the two collections included *Staphylococcus aureus* (5% and 21%), *Staphylococcus epidermidis* (0% and 17%), micrococcus spp (5% and 0%)

TABLE 1. Bacterial culture and Chlamydia trachomatis direct immunofluorescence (DIF) results at birth and after 1 week follow-up by treatment group.

	Vitellinate group				Saline group			
	Positive	Negative	Missing	Total	Positive	Negative	Missing	Total
Culture on follow-up								
<i>Culture at birth</i>								
Positive	7	3	–	10	1	1	1	3
Negative	16	4	2	22	11	4	–	15
Missing	2	–	–	2	3	–	21	24
Total	25	7	2	34	15	5	22	42
DIF on follow-up								
<i>DIF at birth</i>								
Positive	4	1	2	7	7	8	1	9
Negative	4	17*	6	27	5	16	–	21
Missing	–	–	–	–	–	2	3	5
Total	8	18	8	34	12	26	1	42

* Fisher Exact test, $p=0.02$.

and gram-negative bacteriae (5% and 5%). *N. gonorrhoeae* was not found. Negative samples decreased from 62% to 19% (Table 2).

Discussion

C. trachomatis is the bacterium most frequently found in children with clinical signs of neonatal ophthalmia, even in areas such as sub-Saharan Africa where *N. gonorrhoeae* is still prevalent.⁸ This bacterium, while still common in some regions, is rare in Latin America (<1% in most places)² and, because silver nitrate produces chemical conjunctivitis and is ineffective against *C. trachomatis*, alternative solutions for preventing neonatal ophthalmia are increasingly being used.⁸

During the 3 months of data collection, no cases of *N. gonorrhoea* were detected. Bacterial colonisation increased and in both groups its profile changed after 1 week. *Staphylococcus aureus* and *Staph. epidermidis* had increased colonisation after 1 week and *C. trachomatis* was the most frequently detected bacterium in both groups at birth and during follow-up. Silver nitrate and silver vitellinate are both ineffective against *C. trachomatis*, although the latter produces less chemical conjunctivitis. Whether the Credé method is still suitable in locations with very low *N. gonorrhoeae* prevalence is now in question, although alternative

solutions are not effective against the most common aetiological agents.⁸ Furthermore, some of these solutions include antibiotics which might induce bacterial resistance or patient sensitisation.

Regular antenatal care, starting during early pregnancy, and screening for sexually transmitted diseases (STD) reduce the number and severity of cases of neonatal ophthalmia.² The World Health Organization proposes a syndromic approach for screening for STDs and for treating suggestive case empirically, thus reducing the risk of infection during and after delivery.⁹

Brazil is a large country with many disparities in healthcare provision and socio-economic conditions, but women there have relatively good access to antenatal care. In Aracaju, it is reported that 89% of mothers attend antenatal care in public healthcare facilities and that good preventive practices including HIV/STD testing at birth are being implemented.¹⁰

The Credé method did not affect the results of culture and DIF. As it frequently leads to chemical conjunctivitis, it may be unnecessary in places such as Aracaju where there is a low prevalence of *N. gonorrhoeae* and cases can be treated as they are diagnosed. This might not be the case elsewhere (such as some areas of sub-Saharan Africa and Asia) where the prevalence of *N. gonorrhoeae* is high and preventive strategies are required for *C. trachomatis* and *N. gonorrhoeae*.

TABLE 2. *Micro-organism profile at birth and after 1 week of follow-up.*

Micro-organisms	Birth, n (%)	Follow-up, n (%)
<i>Chlamydia trachomatis</i>	10 (18)	14 (22)
<i>Staphylococcus aureus</i>	3 (5)	13 (21)
<i>Staphylococcus epidermidis</i>	–	11 (17)
<i>Staphylococcus</i> spp	3 (5)	10 (16)
<i>Micrococcus</i> spp	3 (5)	–
Other gram-negative	3 (5)	3 (5)
No growth	34 (64)	12 (19)
Total*	56 (100)	63 (100)

* Some samples had more than one micro-organism.

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