Prophylaxis against gonococcal ophthalmia neonatorum
A prospective study

R. J. LUND, M. A. KIBEL, G. J. KNIGHT, C. VAN DER ELST

Summary

The incidence of gonococcal ophthalmia neonatorum (GON) in the area served by the Peninsula Maternity
and Neonatal Services in Cape Town is 273/100 000 live births. Two prophylactic agents, 1% silver nitrate
ophthalmic solution and 0.5% erythromycin ophthalmic ointment, were introduced in routine eye care of
the newborn in the main academic obstetric units. These agents resulted in a significant decrease in
the incidence of GON to 34/100 000 live births. The alternative forms of prophylaxis against GON are
discussed and the need for reinstitution of prophylaxis is emphasised.

Methods

The study was conducted during the period January 1983 - January 1985 in the main referral units of the Department
of Obstetrics and Gynaecology of the University of Cape Town, comprising Groote Schuur Hospital (GSH) (4 700 deliveries per
year), Peninsula Maternity Hospital (PMH) (6 200 deliveries per year), and New Somerset Hospital (NSH) (3 700 deliveries per
year). St Monica’s Hospital, with approximately 2 000 deliveries per year, was excluded from the study because no cases of GON
originated from this hospital. The three midwife obstetric units (MOUs), Heideveld, Retreat and Hanover Park, which collectively
deliver about 9 000 infants per annum, were used to monitor the concurrent incidence of GON in an untreated group of infants.
Approximately 90% of all deliveries in the area served by these units occur in these centres.

The trial was conducted in two phases: a pretrial period of 13 months during which the incidence of GON originating from all
these units was evaluated, and a trial period of 12 months during which two prophylactic agents were introduced at the three main
referral units.

The agents were used by the midwives as part of the routine
care of the newborn following careful mechanical wiping of the
infant’s eyes with sterile saline swabs. The silver nitrate was
dripped into the open palpebral fissure using one ampoule per
infant. Erythromycin was introduced by applying a 1 - 2 cm
ribbon of the ointment to the opened palpebral fissure of each
eye without touching the eye with the nozzle. To limit cross-infection
each tube was used a maximum of three times. One of the agents
was introduced in each hospital for the first half of the trial period
and changed to the alternative for the second half.

It is established practice in the area served by the PMNS to
treat all patients with GON to the emergency ward of the Red
Cross War Memorial Children’s Hospital for admission and treat­
ment. Very few patients are referred from other areas. These cases
are therefore taken to represent the incidence of GON in this area.
GON was diagnosed either by finding the organism on Gram
staining or by a subsequent positive culture obtained from an eye
swab. All cases were recorded according to the place of
delivery of the infant. The results of the pretrial and trial periods
were compared for each unit individually and for the treated
group as a whole. The efficacy of the two agents used was also
compared. The study met the ethical criteria laid down by the
Ethics and Research Committee of the University of Cape Town.

Results

The total numbers of live births for the study periods were 24 575
and 23 883 respectively (Table I). The monthly average was 1 890
live births for the pretrial period of 13 months and 1 990 for the
trial period of 12 months. The corresponding monthly average for
the academic referral units alone was 1 221 for both periods.

During the pretrial period 67 cases of GON were treated,
reflecting an incidence of 273/100 000 live births. Introduction of
ophthalmia prophylaxis at PMH resulted in a marked reduction
- 14 cases of GON originated from this unit during the pretrial
period (Table II) but none was detected during the trial period, a
highly significant difference (P < 0.001). A similar reduction
occurred at NSH, where there were 11 cases in the pretrial period
compared with only 1 in the trial period (P < 0.01) (the infant
who developed GON was born in the 2nd week of the trial and
inadvertently did not receive prophylaxis). Three cases were traced
back to GSH during the pretrial period and 4 in the trial period — 3 of the infants in the latter group did not receive prophylaxis owing to default.

The MOUs accounted for 39 cases of GON in the pretrial period compared with 38 in the trial period ($P > 0.05$).

A comparison of the total number of cases which originated from the three hospitals in the treatment group for the two periods reveals a highly significant decrease in the number of cases of GON from 28 to 5 ($P < 0.001$) (Table II). This represents a decrease in incidence from 176/100,000 to 34/100,000 live births. The effect of prophylaxis on non-gonococcal ophthalmia could not be evaluated owing to an unexpected decrease in its incidence in the untreated group originating from the MOUs.

### Table I. Total Live Births

<table>
<thead>
<tr>
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<th>Pretrial period</th>
<th>Trial period</th>
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<tbody>
<tr>
<td>GSH</td>
<td>4817</td>
<td>4711</td>
</tr>
<tr>
<td>PMH</td>
<td>7156</td>
<td>6204</td>
</tr>
<tr>
<td>NSH</td>
<td>3906</td>
<td>3742</td>
</tr>
<tr>
<td>MOUs</td>
<td>8702</td>
<td>9226</td>
</tr>
<tr>
<td>Total</td>
<td>24575</td>
<td>23883</td>
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</table>

### Table II. Cases of GON

<table>
<thead>
<tr>
<th></th>
<th>Pretrial period</th>
<th>Trial period</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMH</td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td>NSH</td>
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<td>1</td>
</tr>
<tr>
<td>GSH</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>5</td>
</tr>
</tbody>
</table>

to 0.3%.$^4$ Crede's method, using 1% silver nitrate solution, has stood the test of time and is still widely practised. It is effective, but certain limitations to its use do exist. Up to 90% of infants show some signs of chemical conjunctivitis 3 - 6 hours after application, the reaction subsiding within 24 hours.$^5$ Multidose containers, if used for a protracted period, may become overconcentrated as a result of evaporation, causing more serious reactions.$^4$ This danger is avoided with the single-dose wax ampoules of silver nitrate used in the present study. However, these are currently not available in the RSA. The chemical conjunctivitis may also obscure underlying infections and lead to secondary bacterial infection. Blepharospasm resulting from the chemical irritation may interfere with eye contact, a factor thought to be important in the parent-child interaction.$^5$ A major disadvantage of silver nitrate is its inability to control *Chlamydia trachomatis*, an increasingly important cause of neonatal ophthalmia.$^6$ For these reasons alternative drugs have been recommended.

Topical preparations of 0.5% erythromycin and 1% tetracycline are currently recommended as acceptable alternatives to silver nitrate by the Committee on Drugs of the American Academy of Pediatrics and the Centers for Disease Control (CDC) in the USA,$^7$ as well as in Canada$^8$ and in many other countries. However, there is recent evidence to suggest that penicillinase-producing gonococci are increasingly resistant to tetracycline.$^9$ Rothenberg$^{10}$ of the CDC estimated the risk of an infant developing GON following prophylaxis with these three agents.$^{10}$ They were 0.063 for silver nitrate, 0.012 for tetracycline and 0.005 for erythromycin. However, no formal evaluation of the efficacy of these preparations has been carried out in a single trial. Topical preparations of erythromycin and tetracycline are both well tolerated. Various other agents have been used in prophylaxis against GON but Rothenberg shows them to be less effective.

*Chlamydia trachomatis* is a well-recognised cause of ophthalmia neonatorum$^1$ and is an increasing problem in many areas. Erythromycin is the drug of choice for its treatment, while tetracycline is less effective. Neither of these ophthalmic preparations eliminates pharyngeal carriage of the organism.$^{12}$ The incidence of ophthalmia due to *Chlamydia* in Cape Town is unknown.

### Discussion

Effective screening of pregnant women is not possible in most of southern Africa, with many patients booking late and receiving little antenatal care. This is compounded by ineffective postnatal follow-up of infants. It is therefore apparent that some form of prophylaxis at birth is necessary to prevent the high incidence of GON and its potential for blindness.

Our findings confirm that the incidence of GON is relatively high in Cape Town — 273/100,000 live births. Both silver nitrate and erythromycin have been shown to be highly effective in controlling GON, with almost total eradication of the disorder in units where compliance with prophylaxis was high (PMH and NSH). Few cases originated from GSH compared with the other units. This was expected, since GSH, a high-risk referral unit, provides more intensive antenatal care and venereal disease is more likely to be detected and treated during pregnancy. This unit also has a relatively high incidence of caesarean section (25% in 1983), a procedure which generally prevents contamination of the infant by organisms colonising the birth canal. Furthermore, a number of infants born to these mothers have a protracted stay in hospital and if affected develop GON before discharge. These cases are not reflected in our figures. A few infants born at the GSH maternity unit inevitably ‘escaped the net’, especially early in the study, and this is reflected in our results, 3 of 4 infants with GON not having received prophylaxis. The comparable figures obtained from the MOUs for the two study periods suggest that there was no natural variation in the disorder over the total period.

The known irritant effects of silver nitrate were experienced, although wax ampoules, which eliminate the risk of over-concentration, were used. Erythromycin was very well tolerated. A comparison of the efficacy of silver nitrate and erythromycin was not possible because too few cases were detected after the introduction of prophylaxis, but both seem to have been highly effective in controlling the infection.

When Crede in Leipzig ($1881$)$^1$ first introduced prophylaxis using 2% silver nitrate solution he was able to report a drop in the incidence of GON in his unit from 10% to 0.3%. Crede’s method, using 1% silver nitrate solution, has stood the test of time and is still widely practised. It is effective, but certain limitations to its use do exist. Up to 90% of infants show some signs of chemical conjunctivitis 3 - 6 hours after application, the reaction subsiding within 24 hours.$^5$ Multidose containers, if used for a protracted period, may become overconcentrated as a result of evaporation, causing more serious reactions.$^4$ This danger is avoided with the single-dose wax ampoules of silver nitrate used in the present study. However, these are currently not available in the RSA. The chemical conjunctivitis may also obscure underlying infections and lead to secondary bacterial infection. Blepharospasm resulting from the chemical irritation may interfere with eye contact, a factor thought to be important in the parent-child interaction.$^5$ A major disadvantage of silver nitrate is its inability to control *Chlamydia trachomatis*, an increasingly important cause of neonatal ophthalmia.$^6$ For these reasons alternative drugs have been recommended.

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### Conclusion

The relatively high incidence of GON in Cape Town is confirmed and both 0.5% erythromycin topical ointment and 1% silver nitrate ophthalmic solution have been shown to be highly effective when used in the routine care of the newborn infant. The authors recommend that prophylaxis be reintroduced in the area studied and in any other areas where it is not routine policy. Erythromycin ophthalmic ointment (0.5%) is preferred because it is well tolerated and is also effective in preventing *Chlamydia* ophthalmia. As this preparation is not available in the RSA every effort should be made to provide it at a cost-effective rate. Alternatively, a 1% tetracycline ophthalmic preparation or 1% silver nitrate (preferably in single-dose ampoules) should be used.

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REFERENCES


Endoscopic examination of the nose and results of functional endoscopic sinus surgery in 50 patients

S. P. KLOPPERS

Summary

The concept of and motivation for endoscopic examination of the nose in conjunction with computed tomography of the paranasal sinuses in cases of persistent or chronic recurring sinusitis is discussed.

A review of the first 50 cases operated on by the author is given comparing pre- and postoperative symptomatology as well as the most common complications observed.


According to Messerklinger and Stammberger most infections of the paranasal sinuses are rhinogenic, spreading from the nose into the sinuses. Endoscopic investigation has proved that if sinusitis does not heal or is recurring, the common focus of infection is usually a stenotic area. These narrow or stenotic areas are usually the ethmoidal infundibulum (at the entrance to the maxillary sinus) and the frontal recess (at the entrance to the frontal sinus).

The anterior ethmoidal cells are the gateway to the frontal and maxillary sinuses and any obstruction here will influence the drainage and ventilation of the frontal and/or maxillary sinuses. The most easily detected stenosis is from a septal deviation, but until now stenosis in the lateral nasal wall and especially in the anterior ethmoid was undetected or overlooked.

A 'paradoxically curved' middle turbinate (curved convexly in a lateral direction) (Fig. 1), a medially displaced uncinate process, a very large bulla ethmoidalis and a concha bullosa (Fig. 2) may all impair drainage and ventilation in the middle meatus.

The histological features of the mucous membrane of the infundibula in chronic recurring sinusitis are characterised by the following extensive changes of the mucous glands: (i) the glandular acini increase in volume; (ii) the mucus produced thickens and can obstruct the efferent ducts; (iii) glandular

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Fig. 1. 'Paradoxically curved' left middle turbinate.