

Treatment and prevention of ophthalmia neonatorum

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Abstract

Question In my office I occasionally see neonates with conjunctivitis. What are the current recommendations for ocular prophylaxis at birth? Do topical antibiotics alone provide adequate treatment of neonatal conjunctivitis? When is systemic therapy indicated?

Answer All infants should receive ocular prophylaxis at birth to prevent gonococcal ophthalmia. Neonates presenting with signs of conjunctivitis should have a conjunctival swab sent for Gram stain and culture. If Gram-negative diplococci are present on the Gram stain results, the infants and their parents should be treated immediately for presumed gonorrhea. Infants with chlamydial infection should be treated with oral antibiotics. Most of all other forms of bacterial conjunctivitis can be treated with topical antibiotics, with the exception of *Pseudomonas* infection. Infants should be followed during their treatment and upon completion of therapy to ensure resolution of symptoms. For cases in which sexually transmitted bacteria are implicated, the mothers and their sexual partners should be treated.

Traitement et prévention de la conjonctivite suppurée du nouveau-né

Résumé

Question Je vois à l'occasion à mon cabinet des nouveau-nés atteints de conjonctivite. Quelles sont les recommandations actuelles pour la prophylaxie oculaire à la naissance? Les antibiotiques topiques à eux seuls sont-ils un traitement suffisant de la conjonctivite néonatale? Quand une thérapie systémique est-elle indiquée?

Réponse Tous les nouveau-nés devraient recevoir une prophylaxie oculaire à la naissance pour prévenir la conjonctivite gonococcique. Chez les nouveau-nés qui présentent des signes de conjonctivite, on devrait procéder à un prélèvement conjonctival et l'envoyer pour une coloration de Gram et une culture. Si des diplocoques Gram négatif sont présents dans les résultats de la coloration de Gram, le nouveau-né et ses parents devraient être traités immédiatement pour une présumée gonorrhée. Les nouveau-nés atteints d'une infection aux chlamydias devraient être traités avec des antibiotiques par voie orale. La plupart des autres formes de conjonctivite bactérienne peuvent être traitées avec des antibiotiques topiques, à l'exception des infections aux *Pseudomonas*. Il faudrait suivre les nouveau-nés durant leur traitement et à la fin de la thérapie pour s'assurer de la disparition des symptômes. Dans les cas où des bactéries transmises sexuellement sont en cause, les mères et leurs partenaires sexuels devraient être traités.



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Conjunctivitis is an inflammatory disease characterized by conjunctival erythema, swelling, and discharge.¹ Ophthalmia neonatorum (ON), also called *neonatal conjunctivitis*, is an acute, mucopurulent infection occurring in the first 4 weeks of life,² affecting 1.6% to 12% of all newborns,^{3,4} caused by chemical, bacterial, or viral processes.³ Before the 1880s, ON was the primary cause of neonatal blindness and the term *ophthalmia neonatorum* was used only for cases of conjunctivitis due to *Neisseria gonorrhoeae*.^{5,6} In 1881, Dr Carl Siegmund Franz Credé, a German obstetrician, introduced ocular prophylaxis with 2% silver nitrate at birth, which resulted in a dramatic reduction in the

incidence of neonatal gonococcal conjunctivitis from 10% to 0.3%.^{5,7} In recent years, there has been increasing debate about the necessity of “Credé’s prophylaxis” given that the prevalence of sexually transmitted infections has declined, treatment of ON has improved, and prophylaxis carries a certain risk of developing antibiotic resistance. As a result, ocular prophylaxis has fallen out of practice in some countries in the developed world, which has led to the reemergence of sight-threatening infections.⁸ In the current Canadian context, the evidence supports that ocular prophylaxis should remain the standard of care⁵; however, debate and controversy have emerged around this issue in Canada.⁹

Causes of ON

Causes of ON include the following.

Chemical conjunctivitis. Chemical conjunctivitis accounts for most cases of ON,⁴ presenting as a mild, purulent conjunctivitis within the first 24 hours of life. It is most commonly associated with silver nitrate prophylaxis, or secondary to prophylaxis with other agents such as erythromycin or tetracycline.³ Chemical conjunctivitis is a self-limiting condition that does not require any diagnostic tests or treatment.¹⁰

Non-sexually transmitted bacteria. Non-sexually transmitted bacteria account for 30% to 50% of cases of ON.⁵ The most commonly isolated microorganisms are listed in **Box 1**. The role of *Staphylococcus aureus* is unclear, as it is commonly cultured from the eyes of asymptomatic infants.¹ Most cases of bacterial ophthalmia can be treated with topical antibiotics (aminoglycosides, polymyxin B sulfate-trimethoprim solution, macrolides, or fluoroquinolones).^{1,3,11} Ophthalmia neonatorum caused by *Pseudomonas* is rare but can present with eyelid edema, erythema, and purulent discharge causing corneal perforation,

endophthalmitis, blindness, and possibly death.^{3,4} Presumptive diagnosis can be made from Gram stain results, and a definitive diagnosis is based on conjunctival culture results.⁴ Systemic antibiotics have poor penetration into the anterior chamber of the eye, and thus both systemic and topical aminoglycoside antibiotics, and occasionally subconjunctival injections, are required for effective treatment. These infants require isolation and assessment by an ophthalmologist.³

Sexually transmitted bacteria

Chlamydia trachomatis: Sexually transmitted bacteria including *C trachomatis* account for up to 40% of all cases of ON in Canada.^{3,5} An infant born vaginally to a mother with chlamydial cervicitis has a 50% to 75% chance of acquiring the bacteria in the nasopharynx, rectum, vagina, or conjunctiva.¹² Of neonates with proven exposure to chlamydia, 30% to 50% will develop conjunctivitis.¹³ The prevalence of chlamydial infections is higher in the spring and summer months.¹⁴ The incubation period is typically 1 week after delivery; however, it varies from 5 to 14 days or earlier if membranes ruptured prematurely.¹⁵ The clinical manifestations vary from mild conjunctival injection with scant watery discharge to severe mucopurulent discharge with eyelid edema, chemosis, and pseudomembrane formation.^{6,13} Loss of vision is very rare. Most cases of chlamydial infections resolve spontaneously without complications, but, if left untreated, superficial corneal vascularization and conjunctival scarring can occur.¹³ Newborns with conjunctivitis should have specimens of their conjunctiva and pharynx sent for culture. The American Academy of Pediatrics recommends a 14-day course of systemic erythromycin (50 mg/kg/d, divided in 4 doses).¹⁶ Topical therapy is not indicated.¹³ Erythromycin has a 10% to 20%

Box 1. Causes of ophthalmia neonatorum

Causes of ophthalmia neonatorum include the following:

Chemical

Bacterial

- *Chlamydia trachomatis*
- *Neisseria gonorrhoeae*
- *Haemophilus* species
- *Streptococcus pneumoniae*
- *Staphylococcus aureus*
- *Staphylococcus epidermidis*
- *Streptococcus viridans*
- *Escherichia coli*
- *Pseudomonas aeruginosa*
- Other

Viral

- Adenovirus
- Herpes simplex virus

failure rate and thus some infants will require a second or occasionally a third course of erythromycin.¹¹ Parents should be informed of the potential risk of pyloric stenosis and counseled on monitoring.¹³ A small study has demonstrated that a short course of oral azithromycin (20 mg/kg once daily for 3 days) might be an effective treatment alternative; however, further studies are needed.¹⁷ The infant's mother and her sexual partners should be treated for chlamydia.³

Neisseria gonorrhoeae: *Neisseria gonorrhoeae* accounts for less than 1% of all reported cases of ON in Canada.⁵ In the absence of adequate prophylaxis, 30% to 42% of infants born by vaginal delivery to infected mothers will develop gonococcal ON.⁶ The transmission rate is higher in mothers with concomitant chlamydial infection.¹⁸ Infants born to mothers with known gonococcal infection should be treated with a single parenteral dose of cefotaxime or ceftriaxone.^{5,7} If left untreated, gonorrheal ON can lead to corneal scarring, ulceration, panophthalmitis, and perforation of the globe within 24 hours.⁷ The disease typically presents with profound chemosis, edema of the eyelids, and abundant purulent discharge that might be blood-tinged from superficial hemorrhage within 2 to 5 days of birth; however, it can manifest up to 2 to 3 weeks after delivery.^{6,7} Infants with gonorrheal ON should be hospitalized, treated with frequent irrigation of the conjunctiva and intravenous or intramuscular administration of ceftriaxone (25 to 50 mg/kg, to a maximum dose of 125 mg), and evaluated for disseminated gonococcal disease (eg, arthritis, sepsis, meningitis).^{1,3,4} The infant's mother and her sexual partners should be treated for gonorrhea.¹

Viral conjunctivitis. Viral conjunctivitis is most commonly caused by adenovirus and herpes simplex virus.^{1,6}

Infants with adenovirus ON might present with petechial hemorrhage or occasionally with large subconjunctival hemorrhages.¹ Lymphadenopathy is associated with approximately 50% of cases of viral conjunctivitis.¹ Infants with conjunctivitis caused by herpes simplex virus might be diagnosed late, as they are commonly treated empirically for chlamydial or gonococcal infection.⁶ Herpetic lesions on the borders of the eyelids are common and present 6 to 14 days after birth.⁶ These infants require diagnostic evaluation, including lumbar puncture, and assessment by an ophthalmologist. Treatment includes systemic acyclovir (60 mg/kg in divided doses 3 times a day) for 14 days, coupled with topical ophthalmic solution (ie, 1% trifluridine, 0.1% iododeoxyuridine, or 3% vidarabine).^{16,19}

Preventing conjunctivitis

The Canadian Paediatric Society recommends that ocular prophylaxis with 1% silver nitrate, 0.5% erythromycin ointment, or 1% tetracycline hydrochloride be given to all newborns, including those born by cesarean section, in the first hour after birth.⁵ It is important to note that routine ocular prophylaxis does not prevent chlamydial ON; and that although gonorrheal ON has become relatively rare with the introduction of ocular prophylaxis, it must continue to be considered, given its high propensity to cause severe ocular destruction and blindness.³

Competing interests

None declared

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