

Neonatal Conjunctivitis with Gram-Negative Diplococci Suggestive of *Neisseria gonorrhoeae*: A Case Report

Felicia^{1*}, Ni Made Dwipayani², I Made Dwi Surya Wibawa², Putu Anindya Agrasidi²,
Komang Diah Kurnia Kesumaputri³

¹Faculty of Medicine, Sumatera Utara University, Medan, North Sumatera, Indonesia

²Ophthalmology Department, Wangaya General Hospital, Denpasar, Bali, Indonesia

³Faculty of Medicine, Udayana University, Denpasar, Bali, Indonesia

ABSTRACT

Introduction: Gonococcal conjunctivitis in a neonate is a conjunctival infection caused by *Neisseria gonorrhoeae*. Transmission commonly occurs during vaginal delivery from an infected mother. This serious infection can threaten vision if not promptly and properly treated. **Case:** A 14-day-old female infant was brought to the ophthalmology clinic by her parents with a complaint of bilateral eye discharge that had been present since she was 2 days old. The discharge was yellow, thick, and sticky. Ocular examination revealed edema and erythema of the upper eyelids with profuse purulent discharge. The tarsal conjunctiva was hyperemic with positive conjunctival vessel injection (CVI) and membrane formation. Mild corneal edema was observed. The direct pupillary light reflex was present. Gram staining of conjunctival swab specimens obtained from both eyes demonstrated Gram-negative diplococci. The patient was presumptively diagnosed with gonococcal conjunctivitis based on the clinical findings and Gram staining demonstrating Gram-negative diplococci. Treatment included eye toilet with sterile cotton buds, a single intravenous dose of ceftriaxone 25 mg/kg body weight, 0.3% ofloxacin eye drops administered six times daily to both eyes, and artificial tears administered six times daily to both eyes. **Discussion:** The clinical findings and Gram-stain results support a presumptive diagnosis of gonococcal conjunctivitis, an infection characterized by rapid progression and a high risk of corneal complications. Management with a single dose of ceftriaxone plus topical therapy led to rapid clinical improvement. **Conclusion:** Prompt diagnosis and treatment of neonatal gonococcal conjunctivitis with systemic and intensive topical antibiotic therapy resulted in a favorable clinical outcome and helped prevent serious ocular complications.

Keywords: Case report, gonococcal conjunctivitis, *Neisseria gonorrhoeae*, neonatal conjunctivitis.



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INTRODUCTION

Neonatal ophthalmia, also known as neonatal conjunctivitis, is a conjunctival infection occurring within the first 28 days of life. Most cases are acquired during vaginal delivery through exposure to an infected maternal birth canal or through contact with an infected caregiver after birth. Neonatal conjunctivitis caused by *Neisseria gonorrhoeae* is typically bilateral and presents within the first 2–5 days of life.¹

The incidence of gonococcal conjunctivitis in neonates is closely associated with the prevalence of maternal gonococcal infection. Gonococcal infection in women, including during pregnancy, is often asymptomatic and therefore frequently goes undiagnosed.

Without maternal treatment and neonatal ocular prophylaxis, the vertical transmission rate of *N. gonorrhoeae* from mother to infant ranges from 30% to 50%. Nearly 20% of untreated or inadequately treated cases of gonococcal conjunctivitis may result in corneal damage.²

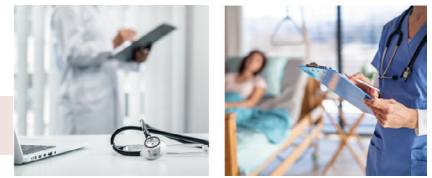
Approximately 10,000 cases of neonatal conjunctivitis are reported worldwide each year.³ It is estimated that nearly 50% of neonates born to mothers infected with *Neisseria gonorrhoeae* will develop gonococcal conjunctivitis. This high transmission rate is largely attributable to the fact that approximately 80% of gonococcal infections in pregnant women are asymptomatic.⁴ In the United States, the

incidence of gonococcal conjunctivitis was estimated at 0.4 cases per 100,000 live births annually between 2013 and 2017.⁵

Gonococcal conjunctivitis is characterized by eyelid edema, purulent conjunctival discharge, conjunctival hyperemia, conjunctival injection with chemosis, stromal keratitis, and preauricular lymphadenopathy. Prompt diagnosis and treatment are essential because of the rapid progression of the infection and the risk of severe complications, including corneal perforation and permanent blindness.⁶

This case is clinically significant because gonococcal conjunctivitis in neonates can progress rapidly and cause vision-threatening

*Correspondence Author felicia2299@gmail.com



corneal complications if treatment is delayed. It highlights that gonococcal infection should remain an important diagnostic consideration in neonates presenting with profuse bilateral purulent discharge and marked eyelid and conjunctival inflammation, even in the absence of reported maternal genital symptoms. The case further emphasizes the importance of early microbiological evaluation and prompt systemic antibiotic treatment, which in this patient was followed by marked clinical improvement within three days.

CASE

A 14-day-old female infant was brought to the ophthalmology clinic by her parents with a complaint of bilateral eye discharge since she was 2 days old. The discharge was yellow, thick, and sticky, recurring approximately every 5 minutes after being wiped away with a cotton ball. The discharge covered both eyelids, making it difficult to open the eyes. The infant was delivered vaginally at term with a birth weight of 3,600 g and cried immediately after birth. The mother denied any history of vaginal discharge or dysuria during pregnancy. The father reported a previous episode of yellowish urethral discharge accompanied by dysuria, which had been treated. Both parents denied a history of multiple sexual partners.

On physical examination, the infant appeared well, with a heart rate of 120 beats/min, a respiratory rate of 40 breaths/min, a body temperature of 36.5°C, and a body weight of 3,900 g. The general physical examination was unremarkable.

Ocular examination revealed edema and erythema of the upper eyelids with profuse purulent discharge in both eyes (**Figure 1**). The tarsal conjunctiva was hyperemic with positive conjunctival vessel injection (CVI) and membrane formation. Mild corneal edema was observed. The direct pupillary light reflex was present. Gram staining of conjunctival swab specimens obtained from both eyes demonstrated Gram-negative diplococci (**Table 1**). The clinical presentation and the presence of Gram-negative diplococci on conjunctival Gram staining supported a presumptive diagnosis of gonococcal conjunctivitis.

Treatment included eye toilet with sterile cotton buds, a single intravenous dose of ceftriaxone 25 mg/kg body weight, 0.3% ofloxacin eye drops administered six times daily to both eyes, and artificial tears administered six times daily to both eyes.

At the 3-day follow-up visit, the patient showed significant clinical improvement (**Figure 2**). The parents reported complete resolution of the eye discharge and ocular redness. Ocular examination showed no edema or erythema of the upper or lower eyelids, and no ocular discharge. The conjunctiva appeared quiet. The cornea was clear without edema, the anterior chamber was deep, the iris crypts were preserved, the pupils were round,

and both direct and consensual pupillary light reflexes were intact. The *ad vitam* and *ad functionam* prognosis was considered bonam, as there was no corneal involvement. The *ad sanationam* prognosis was considered dubia because recurrence may occur with reinfection.

DISCUSSION

Gonococcal conjunctivitis is a conjunctival infection caused by *Neisseria gonorrhoeae*, a Gram-negative diplococcus. This condition is uncommon in adults but occurs more frequently in neonates and is therefore more commonly called gonococcal ophthalmia neonatorum. Approximately 1%–12% of neonates develop gonococcal conjunctivitis.⁷

Table 1. Laboratory report of Gram staining of the patient's conjunctival swab specimen.

Nama Pemeriksaan	Hasil
Pengecatan Gram	Epitel : 1-2/Lpb
	Leukosit : 2-4/Lpb
	Bakteri Basil Gram Negatif : Negatif
	Bakteri Basil Gram Positif : Negatif
	Bakteri Cocus Gram Negatif : Negatif
	Bakteri Cocus Gram Positif : Negatif
	Bakteri Diplococcus Gram Negatif : Positif
	Yeast : Negatif



*Photo documentation by Felicia.

Figure 1. Clinical photograph showing profuse purulent discharge in both eyes.

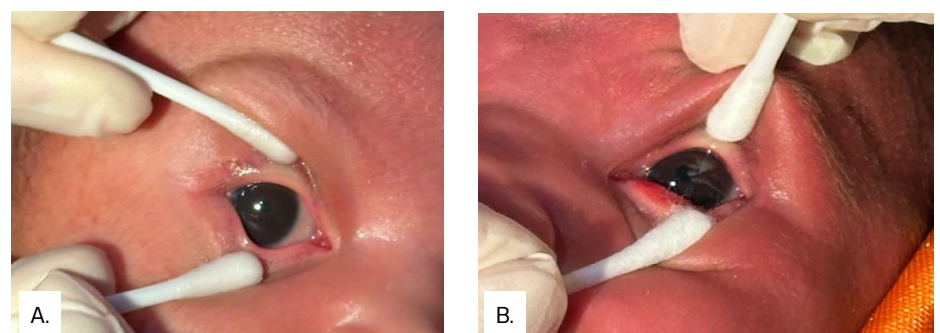
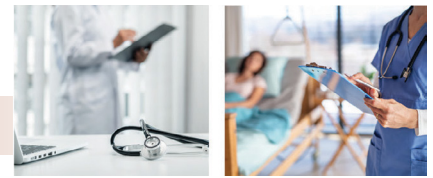


*Photo documentation by Felicia.

Figure 2. Clinical appearance of both eyes on the third day after treatment. (A) Right eye. (B) Left eye.



N. gonorrhoeae can infect neonates through direct contact with an infected birth canal during vaginal delivery. In addition, the bacterium may ascend into the uterine cavity, particularly with prolonged rupture of membranes, allowing vertical transmission even in infants delivered by cesarean section.⁸ *N. gonorrhoeae* infects the eye by adhering to and penetrating conjunctival epithelial cells through the action of pili and outer membrane proteins. Once inside the cells, the bacteria proliferate and trigger a proinflammatory response by releasing endotoxins, leading to various clinical manifestations and potentially causing corneal ulceration. Capillary permeability also increases due to the release of local vasoactive mediators, resulting in eyelid edema and hyperemia.⁹

This infection typically affects both eyes and is clinically more severe than non-gonococcal conjunctivitis. Serous discharge in the early stage may progress to profuse mucopurulent discharge within 24 hours, and membrane formation may occur. Eyelid edema, conjunctival hyperemia, and conjunctival edema are common clinical findings, while corneal involvement has been reported in approximately 16% of cases.¹⁰ The patient's clinical presentation, including profuse purulent discharge, eyelid edema, conjunctival hyperemia, and the presence of Gram-negative diplococci, was consistent with the characteristic features of gonococcal conjunctivitis. In severe cases, chemosis, corneal ulceration, and even corneal perforation may occur. Infected neonates may also develop other localized gonococcal infections, including rhinitis and proctitis.¹¹

The United States Preventive Services Task Force (USPSTF) recommends universal ocular prophylaxis for all newborns because of the high rate of perinatal transmission in the absence of ocular prophylaxis and the significant morbidity associated with gonococcal conjunctivitis.¹² In the absence of ocular prophylaxis, the rate of vertical transmission of gonococcal infection from mother to newborn ranges from 30% to 50%. The USPSTF found convincing evidence that ocular prophylaxis of newborns with 0.5% erythromycin ophthalmic ointment can prevent gonococcal ophthalmia neonatorum.¹³

Ocular prophylaxis has been used since the late nineteenth century. In 1880, silver nitrate eye drops were introduced to prevent conjunctival infection caused by *N. gonorrhoeae* in neonates. At that time, treatment options were limited, making silver nitrate the primary prophylactic agent because of its effectiveness and low cost. However, the high incidence of chemical conjunctivitis, reported in 50%–90% of neonates receiving silver nitrate, led to its discontinuation in the United States and its withdrawal in many developed countries.¹⁴

The Centers for Disease Control and Prevention (CDC) recommends prenatal screening and treatment of pregnant women as the most effective strategy for preventing ophthalmia neonatorum caused by *Neisseria gonorrhoeae*. Screening should be performed at the first prenatal visit and repeated during the third trimester or at delivery in women who have not previously been screened or who have received inadequate prenatal care.¹⁵

Diagnosis of gonococcal conjunctivitis requires a comprehensive clinical and microbiological evaluation, including a thorough history and physical examination. Several diagnostic tests for *N. gonorrhoeae* infection can be performed using conjunctival scraping or exudative fluid specimens. Gram staining demonstrating intracellular Gram-negative diplococci allows a presumptive diagnosis of *N. gonorrhoeae* infection, and treatment should be initiated promptly. The definitive diagnosis (gold standard) is established by bacterial culture using Thayer-Martin or chocolate agar media.^{16,17}

Initial management includes topical irrigation with normal saline every 1–2 hours to remove excessive mucopurulent or purulent discharge. Continue irrigation until the discharge has ceased. Thereafter, erythromycin or tetracycline ophthalmic ointment may be administered. However, topical antimicrobial therapy alone is ineffective, and the increasing global prevalence of erythromycin resistance has reduced its effectiveness as a first-line treatment. Therefore, systemic antibiotic therapy is more effective for managing neonatal gonococcal conjunctivitis.⁴ Without prompt antibiotic therapy, gonococcal conjunctivitis may progress to corneal

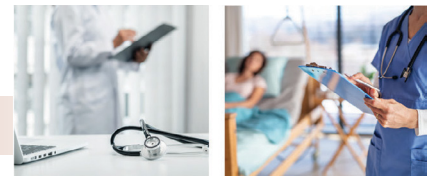
perforation within 24–48 hours of symptom onset.⁹

According to World Health Organization (WHO) guidelines, first-line treatment for neonatal gonococcal conjunctivitis is a single dose of ceftriaxone at 25–50 mg/kg body weight, administered intravenously (IV) or intramuscularly (IM), with a maximum dose of 150 mg. Alternative regimens include a single intramuscular dose of kanamycin at 25 mg/kg body weight (maximum 75 mg) or spectinomycin at 25 mg/kg body weight (maximum 75 mg). In addition, cefotaxime at 100 mg/kg body weight as a single dose may be administered either intravenously or intramuscularly.⁴

The American Academy of Ophthalmology (AAO) guidelines recommend antibiotic therapy based on the extent of infection, distinguishing between localized and disseminated disease. For localized infection, a single intravenous (IV) or intramuscular (IM) dose of ceftriaxone (25–50 mg/kg body weight; maximum 125 mg) or cefotaxime (100 mg/kg body weight) is recommended. For disseminated infection, determine additional treatment in consultation with the appropriate medical specialists. If corneal involvement is present, adjunctive topical antibiotic therapy with erythromycin or gentamicin ophthalmic ointment may be administered. Systemic antibiotic therapy is also recommended for infants born to mothers with active gonococcal infection, even in the absence of clinical signs of conjunctivitis.¹¹

Four key strategies for preventing gonococcal conjunctivitis and its associated complications include preventing the transmission of sexually transmitted infections (STIs), screening pregnant women for genital gonococcal infection, providing universal ocular prophylaxis for all newborns, and ensuring early diagnosis and treatment of neonatal ocular infection.¹⁸

This case highlights the importance of screening parents for sexually transmitted infections (STIs), providing neonatal ocular prophylaxis, and ensuring prompt and appropriate management to prevent the severe complications of gonococcal conjunctivitis.



CONCLUSION

Neonatal gonococcal conjunctivitis is a serious infection caused by *Neisseria gonorrhoeae* that may result in severe complications, including corneal ulceration and perforation, if not diagnosed and treated promptly. Diagnosis is based on clinical evaluation, including history taking and physical examination, with Gram staining demonstrating Gram-negative diplococci supporting a presumptive diagnosis. Prompt administration of a single-dose systemic antibiotic combined with intensive topical therapy results in favorable clinical outcomes and helps prevent permanent vision-threatening complications.

DECLARATIONS

Consent for Publication

Written informed consent for publication of the case report was obtained from the patient's parent.

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Author Contributions

F contributed to data collection, literature review, and manuscript preparation. NMD, IMDSW, and PAA contributed to the clinical evaluation, management, and supervision of the patient. KDKK contributed to the literature review and discussion. All authors reviewed and approved the final manuscript.

Conflict of Interest

All authors declare that they have no conflicts of interest.

Declaration on the Use of Artificial Intelligence (AI)

The authors used an AI tool to assist with grammar checking and language editing. The authors reviewed and approved the final manuscript and take full responsibility for its content.

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