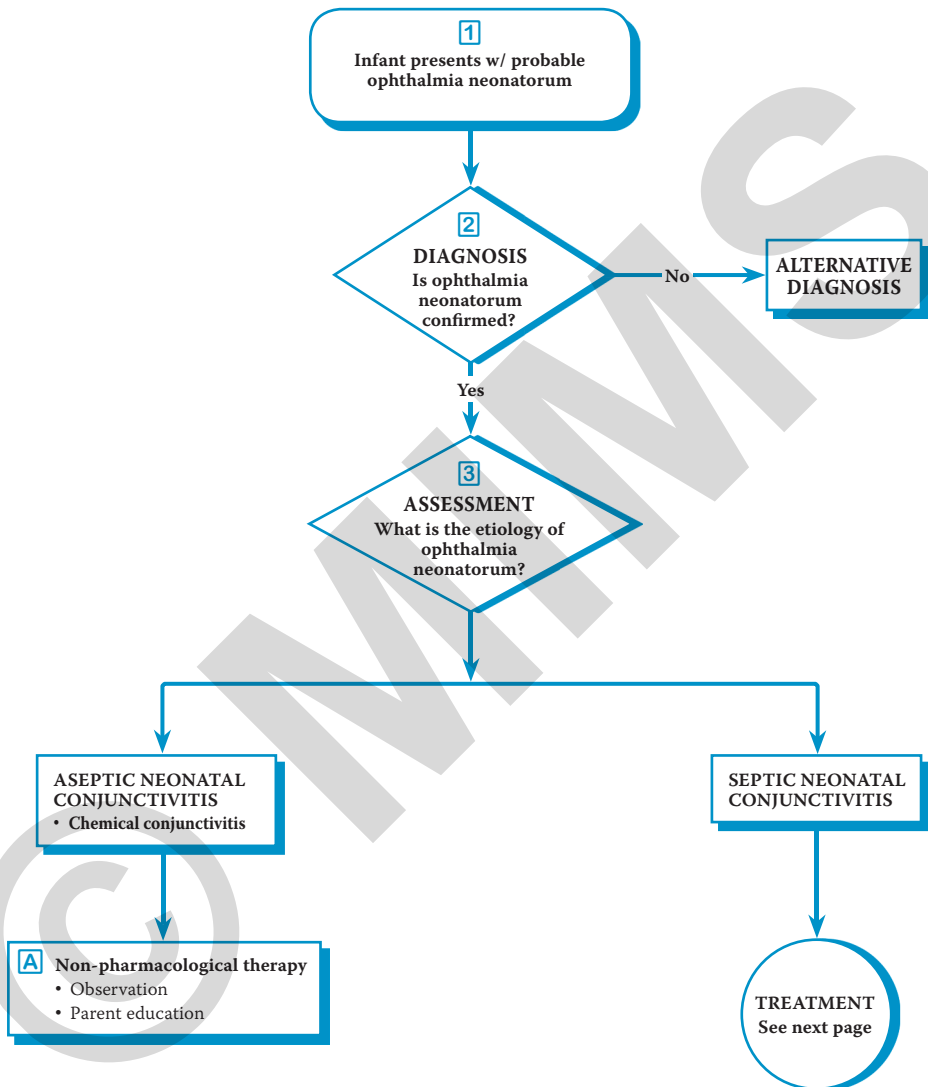
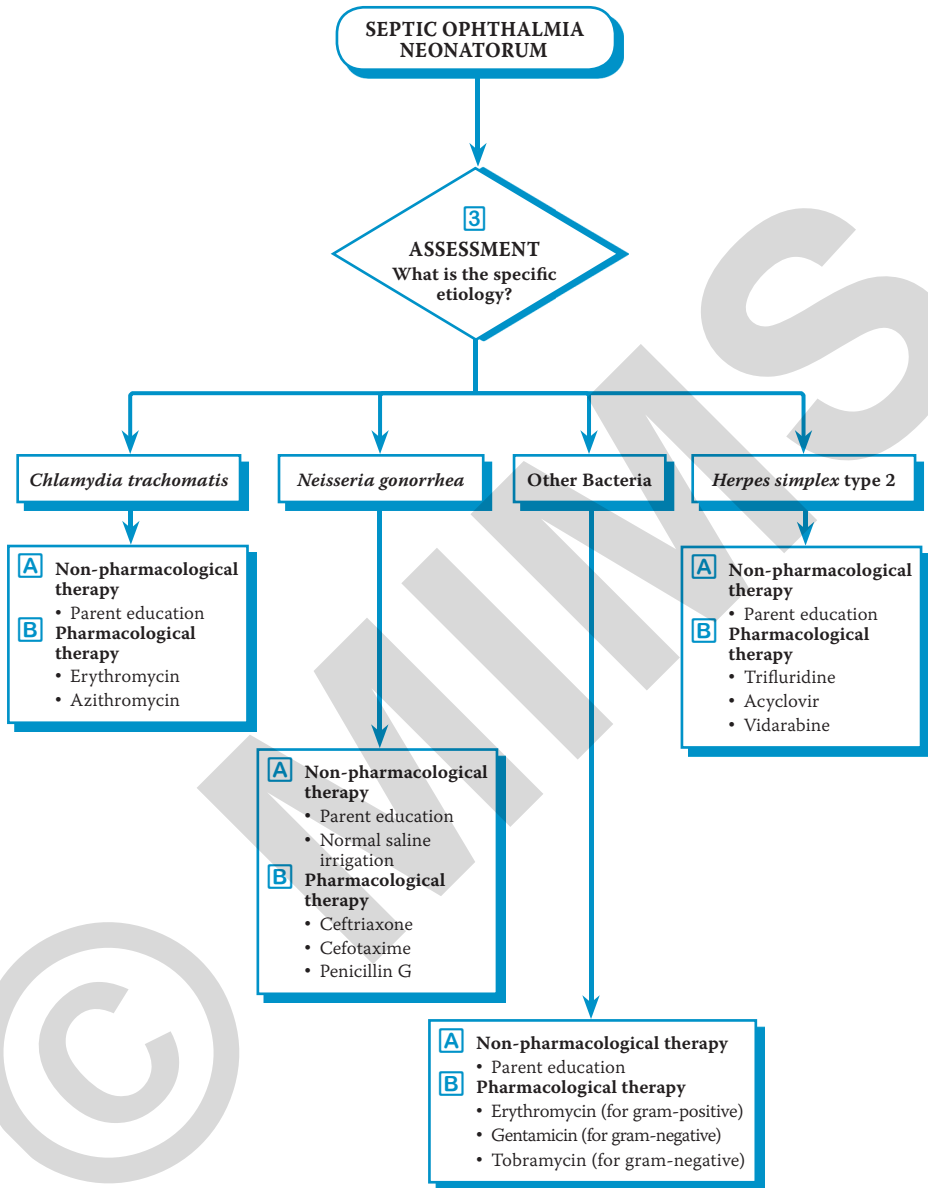


Ophthalmia Neonatorum (1 of 8)





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1 OPTHALMIA NEONATORUM

- Conjunctivitis occurring in a newborn during the first month of life
- Also called neonatal conjunctivitis
- Organisms causing neonatal conjunctivitis are usually acquired from the infected birth canal of the mother during vaginal delivery, though some may acquire the infection from their immediate surroundings
- One of the leading cause of blindness in infants via corneal ulceration & subsequent opacification or perforation & endophthalmitis
 - Pneumonia & otitis media are reported in some of the newborn w/ Chlamydia conjunctivitis

Clinical presentation

- Eyelid & palpebral conjunctiva erythema & edema
- Purulent eye discharge

Risk Factors

- Inadequate or no prenatal care
- Maternal infections (especially sexually transmitted diseases) before & during pregnancy
- Exposure of the infant to infectious organisms
- Inadequacy of ocular prophylaxis immediately after birth
- Organisms harboring in the mother's birth canal
 - Increased shedding of organisms in the vaginal tract of the mother during the last trimester
- Ocular trauma during delivery
- Premature rupture of membranes
- Prolonged labor

2 DIAGNOSIS

- Laboratory diagnosis is important in identifying the causative agent & appropriate treatment

Cultures

- Indicated in all cases of suspected neonatal conjunctivitis
- *Chlamydia trachomatis* culture specimens should contain conjunctival cells & not exudate only
 - Obtained from the everted eyelid using a dacron-tipped swab
- *Neisseria gonorrhea* cultures is best done using blood agar, chocolate agar &/or Thayer-Martin media
- Viral cultures are not routinely used to establish a diagnosis

Histology

- Smears for cytology & special stains are recommended in cases of suspected infectious neonatal conjunctivitis
- Conjunctival scrapings for gram stain & giemsa stains should be obtained from the palpebral conjunctiva of all infants w/ neonatal conjunctivitis
- Gonococcal neonatal conjunctivitis has gram negative intracellular kidney bean-shaped diplococci in conjunctival smears
- Chlamydial neonatal conjunctivitis shows intracytoplasmic inclusion bodies in Giemsa stain
- Herpetic conjunctivitis has eosinophilic intranuclear inclusions

Enzyme-Linked Immunosorbent Assay (ELISA)

- Highly sensitive & specific for diagnosing chlamydial cause of neonatal conjunctivitis w/ results obtained w/ in several hrs

Direct Immunofluorescence Test

- Gold standard for diagnosing chlamydial infections
 - Shows the presence of an impressively large number of punctate, fluorescing chlamydial elementary bodies, resembling "star-spangled sky at night"

Microimmunofluorescence assay

- For detection of *Chlamydia trachomatis* IgG & IgM antibodies

3 ASSESSMENT

- Identifying the specific cause & clinical presentation of ophthalmia neonatorum is essential in deciding the treatment to be given to the infant

Aseptic (Non-Infectious)

- Usually connotes to chemical conjunctivitis
- Classically secondary to silver nitrate instillation for ocular infection prophylaxis
- Time of onset: 1-36 hrs postpartum
- Usually disappears w/ withdrawal of offending agent or spontaneously in 2-4 days
- Clinical presentation:
 - Mild, transient conjunctival injection w/ tearing
 - Lid swelling associated w/ redness of the eyes
 - Rarely, lacrimal stenosis

Septic (Infectious)

- Bacterial, chlamydial or viral infection acquired during passage through an infected birth canal
- Due to the lack of immunity & absence of local lymphoid tissue at birth, the neonatal conjunctiva is particularly vulnerable to infection

Chlamydial neonatal conjunctivitis

- Genital serovars type D-K of *Chlamydia trachomatis* is the most frequent cause of neonatal conjunctivitis
- Also called inclusion conjunctivitis
- Time of onset: 5-14 days postpartum
- Colonization of the eye w/ *C. trachomatis* after birth does not always result in infection
- Clinical presentation:
 - Eyelid edema
 - Bulbar conjunctival injection
 - Initially the discharge is watery then becomes mucopurulent discharge
 - No follicles
 - Pseudomembrane formation
 - Severe cases may result in conjunctival scarring & peripheral corneal pannus w/ corneal scarring
 - Hemorrhagic eye discharge is a highly specific sign of neonatal chlamydial conjunctivitis
- Infantile pneumonia may occur if it is left untreated
 - Untreated cases may persist for 3-12 mnths
- Other extraocular involvement: Nasopharyngeal, rectal & vaginal colonization

Gonococcal neonatal conjunctivitis

- Usual cause is the gram-negative diplococcus *Neisseria gonorrhoeae* that can penetrate an intact epithelium causing epithelial edema & corneal ulceration
 - More severe than chlamydial neonatal conjunctivitis as it can progress to corneal perforation, endophthalmitis & blindness if unrecognized & untreated
- Incubation period: 2-5 days
- Time of onset: 24-48 hrs postpartum
 - Can present later (> 7 days) if a topical antibiotic was used
 - Can occur earlier in cases of premature rupture of membranes
- Clinical presentation:
 - Severe hyperacute purulent discharge
 - Marked eyelid edema
 - Marked chemosis
 - Marked bulbar conjunctival injection
 - Pre-auricular lymphadenopathy
- Other extraocular involvement: Stomatitis, arthritis, rhinitis, septicemia, meningitis & anorectal infection

Other bacterial causes of neonatal conjunctivitis

- Bacteria may be transmitted to the infant after birth through air w/ association w/ obstructed nasolacrimal duct
- Gram positive organisms:
 - Staphylococcus aureus*
 - Streptococcus viridians*
- Gram negative organisms:
 - Escherichia coli*
 - Haemophilus sp.*
 - Enterobacter sp*
 - Pseudomonas sp.*, rarely occur but may cause corneal perforation, blindness & death
- Time of onset: 2-5 days postpartum
- Clinical presentation:
 - Eyelid edema
 - Conjunctival injection w/ discharge
 - Chemosis
- Milder course w/o corneal & systemic involvement

3 ASSESSMENT (CONT'D)**Viral neonatal conjunctivitis**

- *Herpes simplex* (HSV) virus type 2 can rarely cause neonatal conjunctivitis
- Time of onset: 3-15 days postpartum
- Clinical presentation:
 - Vesicular skin lesions of the lid or lid margin
 - Non-specific lid edema
 - Moderate conjunctival injection
 - Non-purulent serosanguinous discharge
 - True conjunctival membranes
 - Corneal geographic or micro-dendritic epithelial keratitis different from the typical adult herpetic dendrites

A NON-PHARMACOLOGICAL THERAPY**Observation**

- Chemical conjunctivitis usually resolves w/in 24-36 hrs unless there is bacterial infection complication

Parent Education

- When appropriate, explain the natural history of the disease & the importance of prevention
- Educate parents or caregiver to wash their hands frequently to prevent transmission of neonatal conjunctivitis
- Educate pregnant women on:
 - The importance of having regular prenatal check up & prenatal care as prophylaxis
 - The importance of treating sexually transmitted infections to decrease the incidence of ophthalmia neonatorum
- Emphasize the importance of treating the mother & her sexual partner(s) as usually the causative organism is sexually transmitted

Normal saline irrigation

- In gonococcal conjunctivitis, normal saline irrigation helps remove the mucopurulent debris from the lids & conjunctiva
 - May be performed 4 times a day

B PHARMACOLOGICAL THERAPY**Treatment**

- Treatment is basically based on the clinical picture & laboratory diagnosis
- Infants should be hospitalized to monitor response to treatment especially those w/ septic neonatal conjunctivitis
- Systemic treatment is usually given rather than topical drugs in order that systemic dissemination may be prevented

Acyclovir

- Treatment option for viral neonatal conjunctivitis
 - Recommended dosage: 30 mg/kg/day IV divided to 3 doses for at least 2 wks
- By competing w/ deoxyguanosine triphosphate for viral DNA polymerase & by incorporation into viral DNA, it inhibits viral replication

Aminoglycosides

- Eg Tobramycin, Gentamicin
- Gentamicin is an alternative treatment for gonococcal neonatal conjunctivitis
 - Recommended dosage: intramuscular dose twice daily for 1 wk
- Tobramycin & Gentamicin may be used as treatment for gram-negative bacteria causing neonatal conjunctivitis (except *N. gonorrhea*)
 - Recommended dosage: Oint or drops 4 times a day

Azithromycin

- Alternative treatment for patients w/ chlamydial conjunctivitis intolerant to Erythromycin
 - Recommended dosage: 20 mg/kg/day orally for 3 days
 - Studies proving the efficacy of Azithromycin for chlamydial conjunctivitis are limited

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B PHARMACOLOGICAL THERAPY (CONT'D)**Cefotaxime**

- Treatment option for neonates w/ gonococcal conjunctivitis & hyperbilirubinemia
- Recommended dosage: 100 mg/kg IV or IM

Ceftriaxone

- Drug of choice for gonococcal neonatal conjunctivitis
- Recommended dosage: 25-50 mg/kg IV or IM as a single dose, not to exceed 125 mg
- Topical antibiotic therapy alone is inadequate & is unnecessary when systemic treatment is administered
- Inhibits bacterial growth by binding to one or more of the penicillin-binding proteins
- Use w/ caution in infants who is born prematurely & w/ hyperbilirubinemia

Erythromycin

- Drug of choice for chlamydial neonatal conjunctivitis
- Recommended dosage: 50 mg/kg/day orally in 4 divided doses for 14 days
- Topical antibiotic therapy alone is inadequate & is unnecessary when systemic treatment is administered
- Advantages of oral Erythromycin include: Eradication of the nasopharyngeal carriers, treatment of associated pneumonitis & also being more effective than topical in preventing relapse of conjunctivitis
- A second course of treatment may be required thus monitoring the response to treatment is necessary
- Also used for treatment of other gram-positive bacteria causing neonatal conjunctivitis
- Dosage: 0.5% ointment 4 times a day
- May cause infantile hypertrophic pyloric stenosis
- Signs & symptoms of this disease (eg intestinal obstruction) should be monitored

Penicillin G

- Alternative treatment for gonococcal neonatal conjunctivitis
- Recommended dosage: 100,000 units/kg/day IV in 4 divided doses for 1 wk
- Inhibits bacterial growth by binding to one or more of the penicillin-binding proteins

Trifluridine (Trifluorothymidine)

- Treatment option for viral neonatal conjunctivitis
- Recommended dosage: 1% ophthalmic drops every 2 hrs for 7 days
- Inhibits viral replication by incorporating into the viral DNA in place of thymidine

Vidarabine

- Adjunct therapy to Acyclovir for the treatment of viral neonatal conjunctivitis

Prophylaxis

- Easy to administer, safe & inexpensive in preventing sight-threatening gonococcal neonatal conjunctivitis

Erythromycin

- Drug of choice for neonatal conjunctivitis prophylaxis
- Recommended dosage: 0.5% Erythromycin oint 1 cm ribbon in each eye as single dose applied as soon as possible after birth
- Preferred prophylaxis than silver nitrate due to less incidence of chemical conjunctivitis
- Effective prophylaxis for gonococcal neonatal conjunctivitis but not in chlamydial neonatal conjunctivitis
- Inhibits bacterial growth by inhibiting bacterial RNA-dependent protein synthesis

Povidone-iodine

- Alternative prophylaxis for chlamydial neonatal conjunctivitis
- 2.5% ophthalmic soln in each eye applied as soon as possible after birth
- Studies have shown that it has superior bactericidal effects & also active against viruses but further studies are recommended

Silver nitrate

- More effective as a prophylaxis for *N. gonorrhea* than Erythromycin & should be used in areas where that organism is prevalent
- Not effective prophylaxis for *C. trachomatis*
- Usage as prophylaxis is discouraged as it can cause chemical neonatal conjunctivitis

Tetracycline

- Alternative prophylaxis for chlamydial neonatal conjunctivitis
- Recommended dosage: 1% Tetracycline oint 1 cm ribbon in each eye as single dose applied as soon as possible after birth
- Inhibits bacterial protein synthesis by binding to the 30S & possible the 50S ribosomal subunits of susceptible bacteria preventing additions of amino acids to the growing peptide chain

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Dosage Guidelines

ANTIVIRAL		
Drug	Dosage	Remarks
Aciclovir (Acyclovir)	10 mg/kg IV 8 hrly x 10 days	Adverse Reactions - GI effects (N/V, diarrhea, inc liver enzymes); Local effects (injection site pain, inflammation, phlebitis, extravasation); CNS effects (seizures, coma, tremors); Other effects (hypersensitivity reactions, hematological changes) Special Instructions - Use w/ caution in patients w/ renal impairment, neurological/ hepatic abnormalities, electrolyte imbalance

CEPHALOSPORINS		
Drug	Dosage	Remarks
Cefotaxime	50-100 mg/kg/day IV/IM 12 hrly	Adverse Reactions - GI effects (N/V, diarrhea, hepatitis); Hematologic effects (leucopenia, eosinophilia, thrombocytopenia); Other effects (injection site irritation, hypersensitivity reactions, urticaria, exanthema) Special Instructions - Use w/ caution in patients w/ pseudomembranous colitis, renal insufficiency
Ceftriaxone	20-80 mg/kg/day IV/IM 24 hrly	Adverse Reactions - GI effects (diarrhea, inc liver enzymes, pseudomembranous colitis); Hematologic effects (leucopenia, neutropenia, blood dyscrasias); Other effects (hypersensitivity reactions, pruritus, rash, fever) Special Instructions - Use w/ caution in patients w/ renal impairment, superinfection

EYE ANTI-INFECTIVES & ANTISEPTICS			
Drug	Available Strength	Dosage	Remarks
Chloramphenicol	1% opth oint	Apply 3 hrly for the first 48 hrs postpartum	Adverse Reactions - Hematological effect (bone marrow hypoplasia including aplastic anemia); Other effects (allergic reactions, superinfection) Special Instructions - Avoid prolonged use as it can cause overgrowth of nonsusceptible organisms
Erythromycin	0.5 % opth oint	Apply 1-cm ribbon into each conjunctival sac once	Adverse Reactions - Ocular effects (minor irritation, redness); Other effects (hypersensitivity reactions) Special Instructions - After application, massage eyelid to spread the oint - A minute after application, wipe excess oint using a sterile cotton

All dosage recommendations are for children w/ normal renal & hepatic function unless otherwise stated.

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Dosage Guidelines

EYE ANTI-INFECTIVES & ANTISEPTICS (CONT'D)			
Drug	Available Strength	Dosage	Remarks
Gentamicin ¹	0.3% ophth drops	Apply 1-2 drops 4-6 hrly	Adverse Reactions - Ocular effects (bacterial/fungal corneal ulcer, burning, irritation, nonspecific conjunctivitis, conjunctival epithelial defects, conjunctival hyperemia); Other effects (allergic reactions, thrombocytopenic purpura) Special Instructions - Avoid prolonged use as it can cause overgrowth of nonsusceptible organisms
Trifluridine (Trifluorothymidine)	1% ophth	Instill 1 drop 2 hrly	Adverse Reactions - Ocular effects (palpebral edema, superficial punctate keratopathy, stromal edema, keratitis sicca, increased intraocular pressure) Special Instructions - Avoid prolonged use as it can cause overgrowth of nonsusceptible organisms
Vidarabine (Vidarabine monohydrate)	3% ophth oint	Apply 0.5 inch ribbon into the lower conjunctival sac of each eye 3 hourly	Adverse Reactions - Ocular effects (lacrimation, conjunctival inj, superficial punctate keratitis, punctal occlusion, uveitis, corneal vascularization) Special Instructions - Avoid use w/ corticosteroid

¹Gentamicin in combination w/ corticosteroids is available. Please see the latest MIMS for specific formulations.

MACROLIDES		
Drug	Dosage	Remarks
Azithromycin	10 mg/kg PO 24 hrly x 3 days	Adverse Reactions - Cardiac effects (arrhythmia, QT prolongation, Torsades de pointes); GI effects (vomiting, diarrhea, constipation, pseudomembranous colitis, tongue discoloration, cholestatic jaundice); Renal effects (acute renal failure, interstitial nephritis); CNS effects (convulsions, hyperactivity); Other effects (hypersensitivity reactions, thrombocytopenia) Special Instructions - Use w/ caution in patients w/ cardiac arrhythmia, congenital QT prolongation, electrolyte disturbance, cardiac insufficiency
Erythromycin	30-50 mg/kg/day PO x 14 days	Adverse Reactions - Cardiac effects (arrhythmia, QT prolongation, Torsades de pointes); GI effects (vomiting, diarrhea, constipation, pseudomembranous colitis, tongue discoloration, cholestatic jaundice); Renal effects (acute renal failure, interstitial nephritis); CNS effects (convulsions, hyperactivity); Other effects (hypersensitivity reactions, thrombocytopenia) Special Instructions - Use w/ caution in patients w/ cardiac arrhythmia, congenital QT prolongation, electrolyte disturbance, cardiac insufficiency

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Please see the end of this section for the reference list.