Bilateral orbital cellulitis due to *Neisseria gonorrhoeae* and *Staphylococcus aureus*: a previously unreported case

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Cellulitis of the orbit is a common cause of proptosis in children, and also frequently arises in the elderly and the immunocompromised. The condition is characterized by infection and swelling of the soft tissues lining the eye socket, pushing the eye ball outwards and causing severe pain, redness, discharge of pus and some degree of blurred vision. There is a small risk of infection spreading to the meninges of the brain and causing meningitis. This paper reports the case of an adult in whom polymicrobial bilateral orbital cellulitis had developed due to *Staphylococcus aureus* and *Neisseria gonorrhoeae* infection. *N. gonorrhoeae* infections are acquired by sexual contact. Although the infection may disseminate to a variety of tissues, it usually affects the mucous membranes of the urethra in males and the endocervix and urethra in females. To the authors’ knowledge this is the first report of polymicrobial bilateral orbital cellulitis due to *S. aureus* and *N. gonorrhoeae* in medical literature.

**Abbreviations:** CT, computed tomography; PPNG, penicillinase-producing *N. gonorrhoeae*.

**Introduction**

Bacterial orbital cellulitis is a rare infectious disease that involves ocular adnexal structures posterior to the orbital septum and threatens the functions of orbital structures. Orbital cellulitis usually occurs following dental or sinus infections, trauma to the eyelids or external ocular infection in children and young adults (Ferguson & McNab, 1999; Gomez Campderara *et al.*, 1996). Orbital cellulitis has been linked with a number of serious complications including restriction of extraocular movements, cavernous sinus thrombosis, cornea opacities, loss of vision, proptosis, frontal abscess, meningitis, osteomyelitis, seizures and even death (Ferguson & McNab, 1999; Fearon *et al.*, 1989; Korinth *et al.*, 2003; Bekibe & Onabajo, 2003).

The most common causative agents of bacterial orbital cellulitis are Gram-positive cocci, such as *Staphylococcus aureus*, *Streptococcus* species and *Peptostreptococcus* species, and Gram-negative bacilli like *Haemophilus influenzae* (Bekibe & Onabajo, 2003; Newell & Leveille, 1982; Malik *et al.*, 2004). Incidences of peri-orbital or orbital cellulitis due to *Neisseria gonorrhoeae* are extremely rare. However, *N. gonorrhoeae* causes acute purulent conjunctivitis in neonates (ophthalmia neonatorum), children and adults. In the past, *N. gonorrhoeae* has been linked with preseptal cellulitis, orbital cellulitis and keratoconjunctivitis cases (Henderson *et al.*, 1997; Frazier *et al.*, 1979; Saad *et al.*, 1988).

**Case report**

A 42-year-old unemployed adult male from Petaling Jaya was admitted to the eye ward in the University of Malaya Medical Center (UMMC), Kuala Lumpur, Malaysia, with periorbital swelling, purulent discharge, severe orbital pain, tenderness and erythema of both eyes that had lasted 1 week. The patient did not respond to ampicillin (500 mg four times daily) and topical gentamicin (four times daily), or to topical chloramphenicol prescribed by the local general practitioner and casualty medical officer at the UMMC, respectively.

There had been no past history of lid lesions, sinusitis, trauma, foreign body injury or previous infection involving the orbital area. On examination both his eye lids were found to be swollen, erythematosus and warm, and associated with conjunctival infection, chemosis and purulent discharge. His visual acuity was normal in both eyes. Movements in both eyes were reduced due to pain. Ocular examination was otherwise normal. No tenderness was noted over sinus areas, and his throat showed no exudates or oedema. His abdomen was soft without any masses, tenderness or organomegaly. A provisional diagnosis of bilateral orbital cellulitis or orbital abscess was made.
Eventually, the patient was admitted to the male ophthalmology unit. Treatment comprising intravenous cefuroxime (750 mg, 8 hourly) and intravenous gentamicin (160 mg daily, in two divided doses) and topical cefuroxime and gentamicin was initiated.

A computed tomography (CT) scan of the brain and orbit performed on the day of admission revealed thickening and inflammation of the upper and lower eye lids of both eyes. There were no intracorneal inflammatory changes or any fluid collection. Paranasal sinuses and both globes appeared normal. Laboratory results showed: haemoglobin level, 172·0 g l⁻¹; white blood cell count, 18·0 × 10⁹ l⁻¹ with 1 % eosinophils, 78 % polymorphonuclear leukocytes, 16 % lymphocytes and 6 % monocytes; and platelet count, 536 × 10⁹ l⁻¹.

Blood specimens for culture and antibiotic sensitivity and conjunctival swabs were taken on the day of admission. As sexually transmitted infections were not suspected at that time, a urethral swab was not taken for culture and antibiotic sensitivity. The conjunctival swabs were processed by inoculating the samples onto chocolate agar and modified Thayer-Martin agar, which were incubated in 5–10 % CO₂ at 37 °C for 2 days. BACTEC 9240 (Becton-Dickenson Microbiology), a continuous blood culture monitoring system, was used for processing of blood specimens. Blood specimens gave sterile results after 5 days of routine incubation in this system.

The culture from conjunctival swabs yielded moderate growth of a Gram-negative diplococci and a scanty growth of Gram-positive cocci. The Gram-negative diplococci were oxidase-positive. These and the Gram-positive cocci were identified as Neisseria gonorrhoeae and Staphylococcus aureus, respectively, by conventional methods, API NH for Neisseria and Haemophilus species (BioMerieux) and API STAPH (BioMerieux). The Neisseria gonorrhoeae was a non-penicillinase-producing strain belonging to serogroup W11/111.

Antibiotic sensitivity was tested on chocolate agar (Neisseria gonorrhoeae) and Mueller–Hinton nutrient agar (Staphylococcus aureus) by Kirby–Bauer disc diffusion method (Bauer et al., 1966), and zone diameters were interpreted according to National Committee for Clinical Laboratory Standards guidelines (NCCLS, 2004). The Neisseria gonorrhoeae strain was sensitive to penicillin, ciprofloxacin, ceftriaxone, chloramphenicol, cefuroxime and erythromycin, while the Staphylococcus aureus strain was susceptible to methicillin, erythromycin, chloramphenicol, cefuroxime and gentamicin.

After 48 h of antibiotic therapy with cefuroxime and gentamicin, the patient showed remarkable improvement, with decreased lid swelling and tenderness, and resolution of the discharge. He was discharged on oral cefuroxime for 1 week and topical cefuroxime and gentamicin. He has remained well over the follow-up period of 3 months.

**Discussion**

This adult patient with *N. gonorrhoeae* and *S. aureus* infection involving the orbits of both eyes is the first reported case of bilateral polymicrobial orbital cellulitis in English medical literature. *N. gonorrhoeae* is a Gram-negative diplococci with flattened adjacent sides. The organism is frequently found in polymorphonuclear leukocytes (neutrophils) and the areas most commonly involved with this organism are the urethra, cervix, rectum, pharynx, skin lesions, synovial fluids, blood and conjunctiva. The bacteria adhere to columnar epithelial cells by fimbriae, which extend several millimetres from the cell surface, penetrate them and multiply on the basement membrane, allowing the organism to gain access to the orbital tissues. *N. gonorrhoeae* is usually transmitted by direct or manual contact with genital secretions or infected urine, or by autoinoculation (Saad et al., 1988). Nevertheless, several published studies have revealed that many men and women with gonococcal infections are asymptomatic (Klouman et al., 2000; Biro et al., 1995). The presence of *N. gonorrhoeae* in our patient may be explained by either the patient, his partner or both having suffered from an asymptomatic gonococcal infection. It has been suggested that eye infections due to penicillinase-producing *N. gonorrhoeae* (PPNG) progress rapidly from purulent conjunctivitis to corneal ulceration and perforation (Henderson et al., 1997). However, PPNG may have a lesser tendency to invade the corneal epithelium than non-PPNG (Frazier et al., 1979; Saad et al., 1988). On the other hand, *S. aureus* is the most commonly isolated pathogen from patients with orbital cellulitis (Ferguson & McNab, 1999).

The preferred methods of diagnosis of orbital cellulitis are CT scan of the orbits and swabs taken directly from the orbital abscess or conjunctiva for direct smear and culture. Blood culture can be used if there is a case of generalized bacteraemia. Both the CT scan and conjunctival swab were useful in our patient.

Empirical intravenous antibiotic treatment for orbital cellulitis is usually chosen to cover a broad spectrum of bacteria including *Staphylococcus* species, *Streptococcus* species and anaerobes. In our patient, a combination of intravenous cefuroxime and intravenous gentamicin was successful in managing the patient. *N. gonorrhoeae* is typically sensitive to penicillin, but gonococcal resistance to antimicrobial agents is an emerging problem in the treatment of infections caused by *N. gonorrhoeae* in south-east Asian and African countries. PPNG has been a problem in most south-east Asian and African countries for about two decades and the situation has not abated. Nevertheless, penicillin remains the main drug of choice for non-PPNG. In PPNG infections, spectinomycin, azithromycin, fluoroquinolones like ciprofloxacin and ofloxacin, and ceftriaxone are suggested. The treatment should be continued for at least 1 week as compared with the one-off dosage of ciprofloxacin or ceftriaxone used for urethral infections (Henderson et al., 1997; Saad et al., 1988; Reed & Jones, 1984).

Our case report suggests that it is worth considering taking...
conjunctival swabs from patients with suspected orbital cellulitis or other eye infections. Isolation of *N. gonorrhoeae*, a rare pathogen in orbital cellulitis, and *Staphylococcus aureus* would not have been possible without the benefit of the conjunctival swab.

References


