CASE REPORT

Gonococcal Ocular Infection: A Case of a Young Adult With Perforated Corneal Ulcer

Noralwani Badarol Hisham[1,2], Nur Atikah Md Nor[1], Nurul Husna Azmi[3,4], Siti Norbaya Masri[2], Rosni Ibrahim[2]

[1] Microbiology Unit, Pathology Department, Hospital Kuala Lumpur, 50586 Jalan Pahang, Wilayah Persekutuan Kuala Lumpur, Malaysia
[2] Department of Medical Microbiology, Faculty of Medicine and Health Science, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia
[3] Ophthalmology Department, Hospital Kuala Lumpur, 50586 Jalan Pahang, Wilayah Persekutuan Kuala Lumpur, Malaysia
[4] Ophthalmology Department, Hospital Canselor Tuanku Mukhriz Universiti Kebangsaan Malaysia, Jalan Yaacob Latif, Bandar Tun Razak, 56000 Cheras, Wilayah Kuala Lumpur, Malaysia

ABSTRACT

Neisseria gonorrhoea is highly virulent in ocular infection and can rapidly progresses from keratitis to corneal perforation with delayed presentation. This is a case of a young adult male presented with right eye pain, redness, worsening greenish purulent discharge, eyelid swelling and blurring of vision for one week. It was preceded by a history of purulent urethral discharge two weeks prior to the current complaints. On examination, he had a self-sealed right perforated corneal ulcer. Right eye corneal scraping revealed intracellular Gram-negative diplococci. The cultures of right eye swab and urethral discharge yielded *Neisseria gonorrhoeae* as identified by mass spectrometry. He was treated with intravenous ceftriaxone for one week and right eye tectonic penetrating keratoplasty was performed. His right eye visual acuity was 6/18 unaided, with clear graft during follow-up three months after treatment and surgery.
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Corresponding Author:
Rosni Ibrahim, MPath
Email: rosni.ibrahim@upm.edu.my
Tel: +60397692365

INTRODUCTION

Gonococcal ocular infection is uncommon in adults and can cause hyperacute symptoms. In 2015, L McAnena et al. reported the prevalence of 0.19 gonococcal conjunctivitis cases per 1000 eye emergency patients, predominantly in young adult males (1). Late presentation to healthcare facilities for treatment can result in permanent loss of vision due to rapid progression from keratoconjunctivitis to perforated corneal ulcer (2). This case highlights the importance of education on sexually transmitted infections and their complications among vulnerable groups, such as adolescents and young adults as gonococcal ocular infection carries a high risk of visual morbidity in this productive age group. In this case, in addition to systemic and topical antimicrobial agents, surgical intervention with tectonic penetrating keratoplasty has been successfully done with good resolution of the gonococcal infection and improvement of visual acuity.

CASE REPORT

A young male in his early 20's was referred urgently to the Ophthalmology team from a primary health clinic for worsening right eye redness, pain and eyelid swelling, which was associated with greenish purulent discharge and blurring of vision for one week. He also complains of photophobia and morning crusting. Otherwise, he denies any history of trauma and does not wear contact lenses. These ocular symptoms persisted even after the application of chloramphenicol eye drop from a private clinic three days prior to the presentation. Further history revealed he is sexually active and has a history of yellowish urethral discharge one week before the ocular symptoms, for which he did not seek treatment.

On general examination, he is afebrile with normal vital signs. His visual acuity is counting finger in the right eye

and 6/6 with a pinhole in the left eye. Local examination of the right eye demonstrated pseudo membrane over the upper eyelid, injected conjunctiva, shallow anterior chamber with cell grade 4+ but no hypopyon, moderately hazy cornea with thinning from 5 to 8 o'clock with bulging iris forming plug over perforation measuring 3.5mm x 3.5mm (Fig. 1). Seidel's test was negative. On examination of the urethra, there was scanty purulent yellowish discharge, but no genital ulcer.

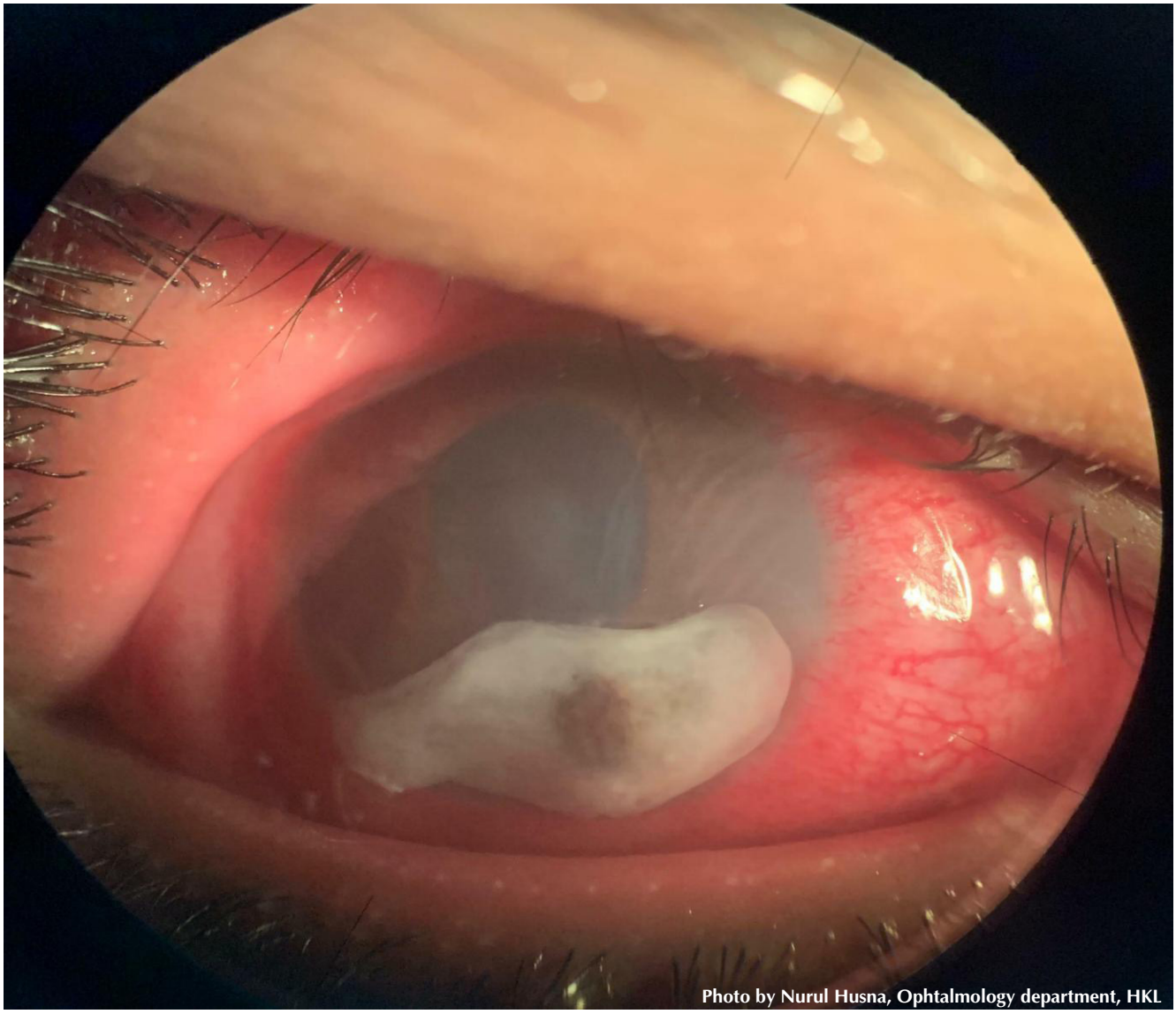

Fig. 1: Local examination of the right eye demonstrates injected conjunctiva and moderately hazy cornea with thinning from 5 to 8 o'clock. The bulging iris forms plug over perforation measuring 3.5mm x 3.5mm, surrounded by infiltrates. The anterior chamber is shallow and the pupil appears irregular.

Full blood count showed slight increase in total white blood cells to 11.36 x 10^9/L with high absolute neutrophil count of 8.43 x10^9/L. The inflammatory marker C-reactive protein was increased to 38.6 mg/L. Gram stain from right eye corneal scraping showed intracellular Gram-negative diplococci (Fig. 2) and cultures from urethral and right eye swab on Chocolate agar yielded small, glistening and raised colonies (Fig. 3), which was catalase and oxidase positive. The organism was identified by matrix-assisted laser desorption/ ionization time-of-flight mass spectrometry (MALDI-TOF MS) as *Neisseria gonorrhoeae*. It was susceptible to ceftriaxone, intermediate to penicillin and tetracycline, and resistant to ciprofloxacin by disc diffusion based on Clinical and Laboratory Standards Institute (CLSI) guidelines.

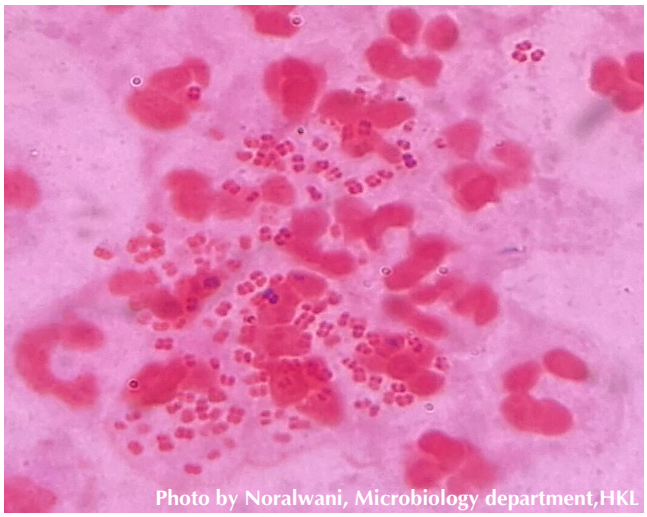

Fig. 2: Gram stain of the corneal scraping shows numerous neutrophils and intracellular Gram-negative diplococci

Fig. 3: Culture of right eye swab on chocolate agar incubated in 5% carbon dioxide yields pure, small, glistening and raised Neisseria gonorrhoeae colonies

Based on the ophthalmology review, diagnosis of self-sealed perforated corneal ulcer secondary to *Neisseria gonorrhoeae* infection was established. He was started on intravenous ceftriaxone and oral doxycycline for seven days. Topical ceftazidime 5%, moxifloxacin hydrochloride and atropine 1% eye drops were also administered. Due to the worsening hyperacute infection causing progressive corneal melting and perforation, he was warranted for emergency right eye tectonic penetrating keratoplasty to preserve the globe. It involved the trephination of the infected tissue. Subsequently, a donor corneal graft measuring 0.5mm larger was sutured to the recipient bed with 16 interrupted sutures. Subconjunctival injection of gentamicin/dexamethasone was given as post-surgical prophylaxis. Intraoperative histopathological examination of the corneal button showed the corneal tissue was covered by unremarkable stratified squamous epithelium with neutrophilic infiltration seen within the stroma, interpreted as an acute inflammatory process. This was compatible with the clinical findings of corneal ulcer.

All medications started before operation were continued and he was started on oral acetazolamide potassium. He had an episode of corneal graft leaking which resolves after re-suturing procedure. He was discharged well on day 4 post operation with topical dexamethasone to be tapered slowly for at least one-year. Topical timolol, ceftazidime 5% and moxifloxacin hydrochloride eye drops were prescribed for at least two to four weeks, and the exact duration would be determined based on patient's response as assessed during subsequent follow-up. Upon monthly follow-up until the third month, his right eye showed improvement of the visual acuity of 6/18 unaided and with pinhole. The graft was clear with no signs of rejection and recurrent infection. However, the last follow-up showed slight deterioration in visual acuity as he was non-compliant to the eye drops due to his work. Unfortunately, he defaulted the subsequent clinic follow-up.

DISCUSSION

Neisseria gonorrhoeae, is a strict human pathogen which mainly adheres to, colonizes and invades the urogenital epithelium. It activates the host immune response which results in the influx of the neutrophils and subsequently the phagocytosis of the bacteria. In the purulent exudate, it is being transmitted to another person through direct mucosal contact such as through sexual activity or perinatally from a mother to her newborn (3). It can also spread systemically, causing complications such as arthritis and endocarditis. Owing to the various clinical presentations, accurate test is needed to screen the high-risk groups to reduce the infection's transmission, for targeted therapy to be administered and prevent the spread of antimicrobial resistance (4).

In the resource-limited settings, Gram stain showing intracellular Gram-negative diplococci has high sensitivity and specificity in symptomatic men with genital gonorrhoeae to give rapid diagnosis for targeted treatment initiation (4). *Neisseria gonorrhoeae* is a fastidious organism which is capnophilic and can be grown successfully by bedside culture on nutritional agar such as Thayer-Martin agar and chocolate agar, immediately incubated within 20 minutes after inoculation of the sample. Molecular tests such as the GeneXpert Chlamydia trachomatis/ *Neisseria gonorrhoeae* (CT/NG) are advanced rapid diagnostic tool but are not widely available and expensive-especially in developing countries-and do not provide antimicrobial susceptibility result (4). *Neisseria gonorrhoeae* has been shown to develop resistance to the current first line treatment, the extended spectrum cephalosporins. It is a concern as no new antibiotics have been discovered. Vaccine is hard to develop as *Neisseria gonorrhoeae* lacks polysaccharide capsule and there is constant

antigenic change of its pili, outer membrane protein and lipo-oligosaccharide to escape the host's immune system (3).

Gonococcal ocular infection is rarely reported in non-neonatal populations. It is transmitted by autoinoculation or direct transmission of the infected genital secretion or urine (2). In this case, it is possible for the patient to acquire gonococcal conjunctivitis by lack of safe sex and hygiene practice such as hand washing while having untreated gonorrhoeae and transmits the infection to his right eye. It can cause hyperacute symptoms which progress rapidly by penetrating intact corneal epithelium, subsequently progress from stromal and epithelial keratitis to ulcerative keratitis within 48 hours (5). High clinical suspicion of gonococcal ocular infection can help to elucidate the sexual history for early diagnosis in the primary care setting. The prognosis depends on the severity of the infection at the time systemic treatment is initiated (2). Without timely treatment, it will eventually lead to corneal perforation and endophthalmitis (5). Therefore, educating healthcare practitioners and high-risk groups about the severe outcomes is crucial to prevent irreversible vision loss.

In this case, unfortunately the diagnosis of gonococcal infection is delayed as the infection has progressed to cause corneal melting and perforation. In addition to intravenous ceftriaxone and topical antibiotics to treat the infection, surgical management which is tectonic penetrating keratoplasty is done. Intensive treatment with antibiotics to resolve the infection and inflammation before emergency corneal transplant is considered to have better outcome in perforated corneal ulcer secondary to infective cause (2). The availability of surgical modality in the treatment option has successfully salvaged the patient's right eye and the follow-ups months after the treatment and surgery show good improvement of the vision. The limitation of this case report is the lack of patient's compliance to eye drops and subsequent follow-up, hence the long-term outcome cannot be ascertained. The patient and family members need to be educated to gain insight on the disease, the treatments' indication, and the possible complications in the future. Follow-ups can be done in the nearest primary healthcare facilities to ensure compliance and recognise early sign of complications such as graft failure and recurrent infection.

CONCLUSION

Neisseria gonorrhoeae is a highly virulent organism in eye infection. Without timely diagnosis and management, it can lead to ophthalmic emergency, which is corneal perforation and subsequently cause loss of vision. Combination of susceptible systemic first-line antimicrobial agent such as third generation cephalosporin, topical antibiotics and surgical treatment such as tectonic penetrating keratoplasty give better outcome in the management of perforated corneal ulcer secondary to gonococcal infection.

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