Lessons from practice

Neisseria meningitidis: an uncommon cause of conjunctivitis

Clinical record

A 28-year-old man developed a painful left eye with purulent discharge two weeks after recovering from coronavirus disease 2019. His medical history included multiple sclerosis (untreated) and myopia (managed with contact lenses).

Reduced vision prompted emergency department review and slit lamp examination demonstrated diffuse conjunctival erythema without keratitis. Visual acuity was reassuringly intact in the left eye (6/9-1 with glasses, 6/6-2 pinhole) and right eye (6/6-2 with glasses, 6/6-1 pinhole). He was discharged with a diagnosis of bacterial conjunctivitis and prescribed topical chloramphenicol for seven days.

Unexpectedly, cultures from an eye swab returned predominant growth of *Neisseria meningitidis*. The patient was recalled and, following Australian Therapeutic Guidelines, was treated as for invasive meningococcal disease.[1] Intravenous ciprofloxacin 400 mg three times a day was prescribed considering history of ceftriaxone anaphylaxis. High risk contacts were provided rifampicin prophylaxis. The patient was systemically well with no clinical signs of meningism. Blood cultures collected before administration of systemic antibiotics were negative. After receiving five days of ciprofloxacin, the patient was discharged. It was unclear whether he had been previously vaccinated for meningococcal disease.

N. meningitidis antibiotic susceptibility testing results released 24 hours following antibiotic cessation revealed resistance to ciprofloxacin. This created a clinical conundrum; the patient was well and clinical features of bacterial conjunctivitis had resolved; however, he had not received effective systemic antibiotic therapy as recommended. After department discussion, he received a five-day course of intravenous ceftriaxone 2 g twice a day through hospital-in-the-home, following a desensitisation protocol, and completed treatment without any adverse events.

Concurrently, a 51-year-old man with no significant medical history and no history of meningococcal vaccination presented to a peripheral medical assessment unit with two days of eye pain, purulent eye discharge and transiently blurred vision. He was initially prescribed topical chloramphenicol for bacterial conjunctivitis; however, he was subsequently recalled to hospital for systemic therapy following the isolation of *N. meningitidis* from eye swabs. He was otherwise well and was treated with intravenous ceftriaxone 2 g twice a day for five days, with resolution of symptoms. The isolate subsequently tested susceptible to ceftriaxone. Close contacts were provided chemoprophylaxis.

Both patients' isolates were tested at the Neisseria reference laboratory with typing revealing non-capsulated strains, confirmed by whole genome sequencing.

Discussion

Although rare, predominant growth of *Neisseria meningitidis* in an eye swab supports a diagnosis of meningococcal conjunctivitis in the appropriate clinical context.[1,2] Invasive meningococcal disease, most commonly manifesting as septicaemia and meningitis, has been reported to accompany or follow conjunctivitis.[2] Hence guidelines recommend systemic antibiotic therapy for meningococcal conjunctivitis as for invasive disease. Management includes prophylaxis of high risk contacts, as invasive disease may develop in a small number of these contacts.[2] However, the risk of progression from meningococcal conjunctivitis to invasive disease is unknown. There is a paucity of data regarding meningococcal conjunctivitis in Australia as only cases of invasive disease are reported to public health authorities and it is unclear whether non-sterile sites meet the laboratory definition for reporting.[2,3] Additionally, most cases of bacterial conjunctivitis are treated empirically without a microbiological diagnosis.

The current Australian Therapeutic Guideline treatment recommendations for meningococcal conjunctivitis are influenced by a 1990 review of 84 cases of meningococcal conjunctivitis (including 3 case reports from Australia), describing septicaemia, meningitis or both in 17.8% of cases.[4] A recent review of meningococcal conjunctivitis from the United Kingdom similarly reported that 10–29% of cases developed invasive meningococcal disease overall, and this was less in patients who received systemic antibiotic therapy.[5]

Antibiotic therapy is typically empiric pending susceptibility testing. This necessitates consideration of local resistance rates and risk factors for resistance. Intravenous ceftriaxone is used as first-line therapy in Australia due to penicillin resistance in about 13% of isolates. Rates of ciprofloxacin resistance are low in Australia, with only one invasive isolate testing resistant in 2021, but should be considered in imported cases or in patients who have lived overseas.[6,7]

Australian guidelines currently support prescription of intravenous antibiotics for invasive disease.[1] However, topical or oral antibiotic therapy appears to be adequate in a number of described cases of meningococcal conjunctivitis.[5] Although current guidelines do not recommend sampling, eye specimens from cases of bacterial conjunctivitis are being collected nonetheless. The available literature

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demonstrates ambiguity in testing and treating meningococcal conjunctivitis.[2-5]

Further research is required to establish a risk stratification approach for management of meningococcal conjunctivitis based on the likelihood of development of invasive disease. For example, research could incorporate the severity of the clinical syndrome, host risk factors and *N. meningitidis* strain or serotype. Devising a risk-based management plan for individual cases would reduce unnecessary hospital admission and antibiotic exposure. With faster typing and whole genome sequencing results expected in the future, the laboratory may be able to provide treating clinicians with specific virulence information at the time of diagnosis. This would allow appropriate case management and contact tracing to be initiated early, limiting the impact of the condition on the patient and the community.

Fortunately, both the patients recovered completely, without features of invasive disease. It remains uncertain if oral antibiotic therapy would have sufficed. Further investigation of meningococcal conjunctivitis and the relationship with invasive disease is needed to improve clinical management.

Lessons from practice

- *Neisseria meningitidis* is an infrequently identified pathogen in bacterial conjunctivitis.
- *N. meningitidis* isolated from non-sterile sites, including conjunctiva, has been associated with an increased risk of invasive meningococcal disease; however, it remains unclear whether systemic antibiotics are required for all cases.
- Reporting and notification of *N. meningitidis* from non-sterile sites is inconsistent among laboratories, contributing to an inadequate understanding of the burden of *N. meningitidis* conjunctivitis in Australia and thus a paucity of evidence to support public health guidelines.
- Australian guidelines currently suggest treating *N. meningitidis* conjunctivitis similarly to invasive meningococcal infections with systemic antibiotics.
- Systematic collection of data from *N. meningitidis* conjunctivitis cases is needed to define risk factors for progression to invasive disease and optimum treatment and outcomes.

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1 Bacterial conjunctivitis and *Neisseria meningitidis* (meningococcal) meningitis [published 2019 Apr]. In: Therapeutic Guidelines [digital]. Melbourne: Therapeutic Guidelines Limited; 2021 Mar. https://www.tg.org.au (viewed Oct 2021).

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