Meningococcal septicaemia and a case of clinically mild illness

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Introduction

The advent of new investigations for the detection of invasive meningococcal disease may lead to the diagnosis of milder forms of the infection which would previously have remained undiagnosed. In the context of mild disease there may be difficulty interpreting current guidelines and subsequently formulating an appropriate management and public health plan. This case study demonstrates the issues that may arise when positive serology results become available for a person with either partially, or un-treated mild invasive meningococcaemia.

Case study – a 28-year-old female

Day 1: Onset of mild headache, myalgia and arthralgia.

Day 3: The patient developed a petiechial rash (non-blanching) on lower limbs and trunk. She presented to the Emergency Department of her local hospital. In the hospital she was assessed as being systemically well with no fever, vomiting, photophobia or neck stiffness. Despite the absence of these symptoms she was given a differential diagnosis of meningococcal infection by the night medical registrar. He admitted her to hospital and over the next 12 hours had 2 g IV of ceftriaxone and 3 doses of IV penicillin. At this stage her white cell count was normal. Blood cultures, meningococcal polymerase chain reaction (PCR) and serology were ordered. The night registrar did not notify the public health unit.

Day 4: The patient was seen by a medical team. At this stage her rash had improved and she was still systemically well. Blood cultures and meningococcal PCR were found to be negative. The patient was discharged from hospital with a prescription for antihistamines and a presumed allergic reaction.

Day 12: The public health unit was notified that the patient's meningococcal serology was positive. The results were as follows:

- *Neisseria meningitides* IgM antibody positive to both outer membrane and capsular antigens (serogroup C);
- *Neisseria meningitides* IgG antibody negative.

The public health unit attempted to contact the admitting medical team and was able to speak with the patient's general practitioner. He told public health staff he had seen the patient 2 days prior for an unrelated minor procedure. During this visit she had seemed well and only briefly mentioned her hospital admission.

The patient was then contacted. She stated that she still had some resolving pain in her legs but felt otherwise well. She claimed her rash and headache had resolved. She denied ever having received a meningococcal vaccine. Public health staff advised her to attend the Emergency Department for clinical assessment and treatment of her meningococcal infection.TheEmergencyDepartmentwascontacted and advised of case details and a recommendation to treat the patient for invasive meningococcus.

Close household contacts were identified (her husband and 2 children) and prophylaxis administered accordingly.

The patient attended the Emergency Department and was seen by the staff specialist. She was assessed as clinically well and discharged with no treatment. She was asked to follow up with her general practitioner, the results of nasal and throat swabs which were taken in emergency. These swabs were negative for *N. menigitidis*.

Discussion

Based on an enzyme immunoassay, meningococcal capsular IgM serology has a sensitivity of 92% and specificity of 97%[1] between day 5 and day 20 after the onset of illness.

It may be positive if patients have recently been vaccinated.[1] In contrast, the assay for Outer Membrane Protein is less specific, being positive in some people with disseminated gonococcus. In view of both IgM assays being positive, and in the absence of vaccination this was almost certainly a case of meningococcal septicaemia though clinically a mild illness.

The NSW Notifiable Diseases Manual[2] states that:

> 'A confirmed case requires either:
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> Laboratory definitive evidence,
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> Or Laboratory suggestive evidence and clinical evidence.'

'High titre IgM or significant rise in IgM or IgG titres to outer membrane protein antigens of *N. meningitidis*' represents 'Laboratory suggestive evidence'[2] for invasive meningococcal infection. A time lag of 5–7 days between disease onset and IgM reaching diagnostic levels typically occurs.[3] 'Clinical evidence is then described as 'disease, which in the opinion of the treating clinician is compatible with invasive meningococcal disease.'[2] Similarly, the case definition in the national guidelines relies on 'disease which in the opinion of the treating clinician is compatible with invasive disease'[3]

The management of this patient (both during her initial admission and her second presentation to Emergency) was entirely dependent on the level of clinical suspicion for invasive meningococcus. She was discharged from hospital in the first instance because the treating team believed, in the absence of systemic symptoms, meningococcal infection was unlikely. Similarly, she was discharged from the Emergency Department after she attended at the request of Public Health staff. In this instance, after positive meningococcal serology was detected, with residual myalgias, and despite having been substantially under-treated for meningococcus, no further treatment was given. In both instances the treating doctors followed the guidelines. Their clinical suspicion for invasive meningococcus was low. Whether the treatment received by the patient was in her best interest however remains to be seen.

As this case demonstrates, serological testing for *Neiserria meningitidis* may lead to a delayed diagnosis of meningococcal disease in patients with mild disease. Such patients may not actually fulfil the case definition due to the mild nature of their illness. An outbreak of relatively mild invasive meningococcal infection, also confirmed by serology has been reported in the literature.[4] What needs to be quantified is the risk of people with mild disease progressing to more serious disease. The appropriate response of clinicians and public health personnel in such instances will remain unclear unless further evidence is generated allowing the guidelines to be updated.

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