CASE REPORT

An atypical form of infantile meningococcal meningitis

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SUMMARY

We describe a rare case of infantile meningococcal (serotype B) meningitis in a 3-month-old Chinese boy with an atypical indolent presentation with prolonged persistent fever despite appropriate antimicrobial therapy likely due to drug fever. The case highlights the need for continued vigilance in identifying similar cases in the future.

BACKGROUND

Invasive meningococcal disease remains one of the chief causes of death from serious bacterial infections in children.[1] The fulminant progression of the disease is much feared. Over the last 10 years in Singapore, we have had a national total of 56 cases of meningococcal disease, giving an average incidence of 0.1 per 100 000 persons per year, with serotype B being the most common (66%).[2] The disease is rare, hence vaccination is not routine.

Case presentation

A 3-month-old term infant presented to the Children's Emergency for a day of fever associated with a blanchable macular rash, which started from the lower limbs and had spread to the truncal region. The baby boy had an accompanying mild rhinorrhoea with a slight reduction in oral intake. There was no significant contact or travel history. Examination findings revealed a well-hydrated and well-perfused infant with a blanchable macular rash over the trunk and limbs (see figure 1). His vaccinations were up to date but did not include the meningococcal vaccine.

A full blood count was done and it showed an unremarkable white blood cell (WBC) count of 10.78×109/L, with a differential absolute neutrophil count (ANC) of 8.15×109/L (75.6%), absolute lymphocyte count (ALC) of 2.08×109/L (19.3%). The platelet count was 234×109/L with a haemoglobin level of 14 g/dL. Urine investigations did not reveal pyuria. The child was given follow-up the next day in clinic.

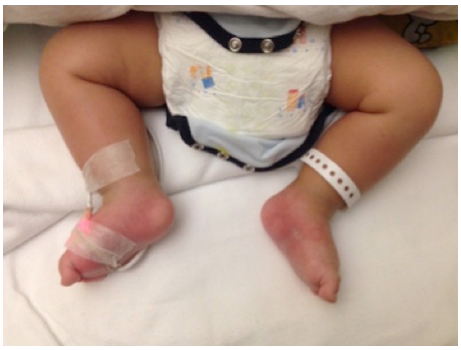

Figure 1 The rash of the infant on day 1 of illness.

During the review, the infant continued to be febrile and had developed three episodes of loose and non-bloody stools. This was associated with persistent poor feeding and decreased urine output. The infant was also noted to be irritable with frequent crying at home but was still consolable. Examination findings were as prior, with fading of the initial rashes. The infant was admitted due to concerns of poor feeding and persistent fever with the likely diagnosis of infantile fever secondary to viral gastroenteritis.

Twelve hours into the admission, the infant became increasingly irritable and difficult to console. Examination revealed a normotensive fontanelle with no focal neurological deficit or neck stiffness. The child was well perfused. The macular exanthem over the limbs remained with no further spread.

Investigations

In view of the irritability, the child underwent a full septic work-up 12 hours into the admission and was noted to have a markedly elevated C-reactive protein level of 198 mg/L, WBC count of 5.38×109/L with differential counts as such—ANC 1.74×109/L (32.3%), ALC 3.04×109/L (56.5%). The haemoglobin level was 9.9 g/dL and the platelet count was 180×109/L. Initial cerebrospinal fluid (CSF) investigations revealed turbid fluid with the WBC count of 8442/μL (85% neutrophils), red blood cell count of 373/μL, lactate at 11.2 mmol/L, glucose at <1.1 mmol/L and protein at 4.14 g/L. The corresponding capillary glucose level was 6.1 mmol/L. Within 4 hours, the CSF grew gram-negative diplococci.

Differential diagnosis

In an infant presenting with a fever and rash associated with irritability and lethargy, the differentials considered apart from bacterial meningitis or bacterial sepsis would include that of a viral exanthem (eg, enteroviral infection), dengue infection and Kawasaki disease.

Treatment

Empirical antibiotic therapy of ampicillin and gentamicin was started immediately after the septic work-up was completed. This was to cover for the

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common bacterial pathogens in the first 3 months of life, namely that of *Escherichia coli*, Group B *Streptococcus* and *Listeria monocytogenes*. It was then escalated to intravenous ceftriaxone when the CSF returned positive for gram-negative diplococci. The CSF culture expectedly grew *Neisseria meningitidis* with sensitivity to ceftriaxone and intermediate sensitivity to penicillin. The blood culture done returned negative 2 days later.

At the point of escalation of antibiotics (16 hours into the admission), the infant required a fluid bolus due to clinical evidence of compensated shock with a capillary refill time of 3 seconds, tachycardia of 160/min and a normal blood pressure of 108/85 mm Hg. Thereafter, the infant remained haemodynamically stable. The rash subsequently evolved to have a petechial component over the lower trunk and abdomen, with the rash over the limbs still remaining largely blanchable.

Outcome and follow-up

Despite being on appropriate antimicrobial therapy, the infant continued to have daily febrile spikes of 40°C with poor feeding and irritability. A cranial ultrasound done 4 days after revealed sonographic features of meningitis with a small heterogeneous lesion at the vertex concerning for an early abscess. A CT scan of the brain revealed no abnormal enhancement or focal lesion to suggest abscess formation.

Repeat CSF studies done 6 days after admission revealed a decrease in WBC count (342/μL, 48% neutrophils), normal CSF biochemistry and no bacterial growth. The infant made a gradual clinical recovery with eventual resolution of the fever 14 days after initiation of antibiotics. The likely cause of the delayed resolution of the fever was attributed to a postinfectious inflammatory cause, possibly a drug fever. Intravenous ceftriaxone was discontinued after 12 days of therapy.

Contact tracing was initiated at the point of initial suspicion for meningococcal meningitis and postexposure prophylaxis was given as appropriate. The infant underwent a hearing test (otoacoustic emission testing) at 6 months of age with a partial left-sided hearing loss noted. There was mild isolated gross motor delay noted at 8 months of age. He remains on follow-up.

DISCUSSION

Infantile fever associated with rashes is a common presenting complaint to paediatricians. Though meningococcal infection typically presents with a purpuric non-blanchable rash, the rash can be of different morphologies as per this case and can hence be easily mistaken for a viral exanthem. Despite the well-known tempo of rapid deterioration in meningococcal infections, it remains a differential even in cases with a more indolent, subacute course. The important clue to the eventual diagnosis for this case remains the persistent irritability of the infant.

In an early septic work-up of an infant, the initial WBC count can remain normal with negative blood cultures despite having definite evidence of bacterial meningitis and a significantly raised C-reactive protein level. Using the existing Rochester criteria in predicting the presence of a serious bacterial infection in this case would have resulted in a missed diagnosis despite a published negative predictive value of 98.9%.[3] As such, this demonstrates the need for a high index of suspicion for meningitis in an irritable child and to be cautious in relying on a full blood count to detecting a serious bacterial infection.

Prompt treatment of meningococcal meningitis typically results in rapid resolution of fever over the next 3–4 days.[1] However, prolonged fever post initiation of appropriate antimicrobials will need further evaluation for complications like an infected subdural effusion or a brain abscess formation. Nevertheless, in the absence of any significant findings on imaging and if the child demonstrates clinical improvement with no new symptoms, the possibility of an inflammatory cause like that of a drug fever would be most likely. This can be further confirmed with resolution of the fever after discontinuation of the drug.

Previous meningococcal vaccinations covered the A, C, Y, W-135 serotypes. As a result, serotype B infection remained the most common in the last 10 years[4] both in countries which included it as a routine vaccination like the UK and those which have not, like Singapore. As such, the incorporation of the meningococcal B vaccine into the UK routine childhood immunisation schedule from September 2015 with a published coverage of 88% for strains in the UK and 78% for that in Europe[5] now brings hope in the further prevention of outbreaks and decreased incidence of this deadly disease among vaccinated populations. At the moment, the Advisory Committee on Immunization Practices in the USA has only recommended the vaccines to be given to young adults from 16 to 23 years of age for short-term protection.[6] Current evidence demonstrates a good safety profile of the vaccine but long-term efficacy and safety data remain to be published.

Learning points

- Though meningococcal infection typically presents with a purpuric non-blanchable rash, the rash can be of different morphologies as per this case and can hence be easily mistaken for a viral exanthem.
- In an early septic work-up of an infant, the initial white blood cell count can remain normal with negative blood cultures despite having definite evidence of bacterial meningitis and a significantly raised C-reactive protein level.
- Prompt treatment of meningococcal meningitis typically results in rapid resolution of fever over the next 3–4 days.[1] However, prolonged fever post initiation of appropriate antimicrobials will warrant further evaluation for complications like an infected subdural effusion or a brain abscess formation.

Contributors Both authors contributed to the writing of the manuscript.

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REFERENCES

1 Andrew JP, Finn A , *et al*. Neisseria meningitidis. In: Sarah L, Larry P, Charles P, eds. *Principles and practice of pediatric infectious disease- 4th edition*. Philedelphia: Elsevier, 2012:737.
2 Ministry of health Singapore [Internet]. Reports | Ministry of Health. https://www.moh.gov.sg/content/moh_web/home/Publications/Reports.html.
3 Jaskiewicz JA, McCarthy CA, Richardson AC, *et al*. Febrile infants at low risk for serious bacterial infection--an appraisal of the Rochester criteria and implications for management. Febrile Infant Collaborative Study Group. *Pediatrics* 1994;94:390.
4. Jafri RZ, Ali A, Messonnier NE, *et al*. Global epidemiology of invasive meningococcal disease. *Popul Health Metr* 2013;11:17.
5 MenB (meningococcal B) vaccine [Internet]. MenB (meningococcal B) vaccine. http://www.meningitis.org/menb-vaccine.
6 Centers for Disease Control and Prevention. Use of serogroup B meningococcal vaccines in adolescents and young adults: recommendations of the advisory committee on immunization practices, 2015 [Internet]. Centers for Disease Control and Prevention. 2015 https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6441a3.htm.