

Meningococcal serogroup W and varicella-zoster virus meningitis in an Irish infant

Kene Maduemem, Adela Vatca, Ahmed Satti Mohammed, Yurelis Diaz Rodriguez

ABSTRACT

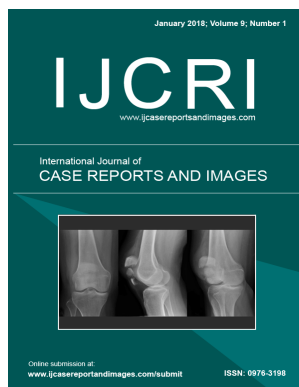
Introduction: Meningococcal disease remains a major cause of morbidity and mortality in children globally. The most common serogroups in Europe are B and C. There has been a downward trend in the incidence of the latter because of the immunization schedules in most European countries. N. meningitidis W135, otherwise referred to as MenW is an uncommon serogroup but gained popularity following the Hajj outbreaks in the year 2000.

Case Report: A previously well 11-month-old girl presented with varicella rash, high grade pyrexia. She became very irritable with bulging anterior fontanelle. Examination findings revealed nuchal rigidity. MenW and varicella zoster virus were isolated in cerebrospinal fluid (CSF). She received a three-week course of intravenous ceftriaxone and acyclovir. Magnetic resonance imaging of the brain showed some empyema collection in the right frontal lobe. She had some motor regression. She recovered but with residual sensorineural hearing loss.

Conclusion: This case might represent an emerging trend of this rather uncommon serogroup. This has been anticipated by some European countries where MenACWY vaccine has been incorporated in their immunization schedules.



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CASE REPORT

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Introduction: Meningococcal disease remains a major cause of morbidity and mortality in children globally. The most common serogroups in Europe are B and C. There has been a downward trend in the incidence of the latter because of the immunization schedules in most European countries. *N. meningitidis* W135, otherwise referred to as MenW is an uncommon serogroup but gained popularity following the Hajj outbreaks in the year 2000. **Case Report:** A previously well 11-month-old girl presented with varicella rash, high grade pyrexia. She became very irritable with bulging anterior fontanelle. Examination findings revealed nuchal rigidity. MenW and varicella zoster virus were isolated in cerebrospinal fluid (CSF). She received a three-week course of intravenous ceftriaxone and acyclovir. Magnetic resonance imaging scan of the brain showed some empyema collection in the right frontal lobe. She had some motor regression. She recovered but with residual sensorineural hearing loss. **Conclusion:** This case might represent an emerging trend of this rather uncommon serogroup. This has been anticipated by some European countries where MenACWY vaccine has been incorporated in their immunization schedules.

Kene Maduemem¹, Adela Vatca¹, Ahmed Satti Mohammed²,
Yurelis Diaz Rodriguez¹

Affiliations: ¹Registrar, Pediatrics, Cork University Hospital, Cork, Ireland; ²Registrar, Pediatrics, Mercy University Hospital, Cork, Ireland.

Corresponding Author: Kene Ebuka Maduemem, Department of Paediatrics, University Hospital Galway, Galway, Ireland, H91 YR71; Email: ebukakene@rocketmail.com

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INTRODUCTION

Globally, acute bacterial meningitis is one of the severe infectious diseases, accounting for an estimated 171,000 deaths each year [1]. *Neisseria meningitidis* is now considered to be the leading cause of bacterial meningitis in many regions of the world, causing an estimated 1.2 million cases of bacterial meningitis and sepsis globally each year [2]. Up to the 1980s, *N. Meningitidis* W135 (NM W135), or MenW was considered a minor serogroup, of little importance [3]. MenW cases became well known during the Hajj-associated outbreaks in 2000 [4]. We describe the case of an 11-month-old girl with meningococcal W135 meningitis on a background of varicella infection.

CASE REPORT

An 11-month-old girl presented with two-day history of varicella rash with high grade fever. Oral intake was reduced with reduced urine output. Mother felt bulging

anterior fontanelle just before presentation. Past medical history was insignificant. No history of foreign travel or contacts. Immunization history was up to date. Her four-year-old brother had varicella infection three weeks prior.

The examination findings revealed a very irritable girl moaning in distress. Neurological examination confirmed bulging anterior fontanelle. There was neck stiffness with positive Brudzinski sign. Head circumference was 46.5 cm. Vital signs were temperature 39.9°C, heart rate 148 per beats per minute, respiratory rate 44 breaths per minute, blood pressure 114/66 mmHg. Other clinical findings included hepatomegaly 2 cm below costal margin, generalized vesicular rash.

Blood workup revealed C-reactive protein 212 mg/L, white cell count 15900/mm³, neutrophil 8560/mm³, lymphocytes 5608/mm³, platelet 62000/mm³, hemoglobin 9.7 g/dL. Normal coagulation profile. Blood glucose 4.8 mmol/L. Serum sodium 132 mmol/L. Other electrolytes were normal. Intravenous cefotaxime (50 mg/kg 8 hourly) and acyclovir (20 mg/kg 8 hourly) were commenced. Lumbar puncture was deferred because of thrombocytopenia. Three days after admission, the platelet count improved to 180000/mm³. Lumbar puncture was done with cloudy cerebrospinal fluid analysis of glucose 0.6 mmol/L, protein 1607 mg/dL. Microscopy reveal a white cell count 2600/mm³ (50% polymorphs, 50% lymphocytes), red cell count 74/mm³. Cerebrospinal fluid polymerase chain reaction was positive for MenW serogroup and varicella zoster virus (VZV). Blood and CSF culture grew MenW. The intravenous cefotaxime was changed to ceftriaxone (80 mg/kg/day) after three days following the sensitivity of the blood culture. She was treated with three-week course of the antibiotic and antiviral. Several episodes of vomiting and raised blood pressure warranted an urgent brain MRI scan (Figure 1). The scan demonstrated diffuse restricted fluid within the dependent lateral ventricles consistent with purulent cerebrospinal fluid. There are patchy areas of dural enhancement most marked in the right frontal region with extra fluid collection. The raised blood pressure resolved without medication. She had motor regression evidenced by head lag. Family members received oral rifampicin as chemoprophylaxis. Public health was notified, and recommended patient and family members receive MenACWY vaccine.

Follow-up demonstrated motor improvement with physiotherapy. Unfortunately, she developed sensorineural hearing loss requiring cochlear implants. She is being followed-up for neurodevelopment progress. The risk of epilepsy was discussed with parents by the neurology team.

DISCUSSION

Neisseria meningitidis is the leading cause of bacterial meningitis in all age groups especially in countries where conjugate vaccines against *Streptococcus pneumoniae*

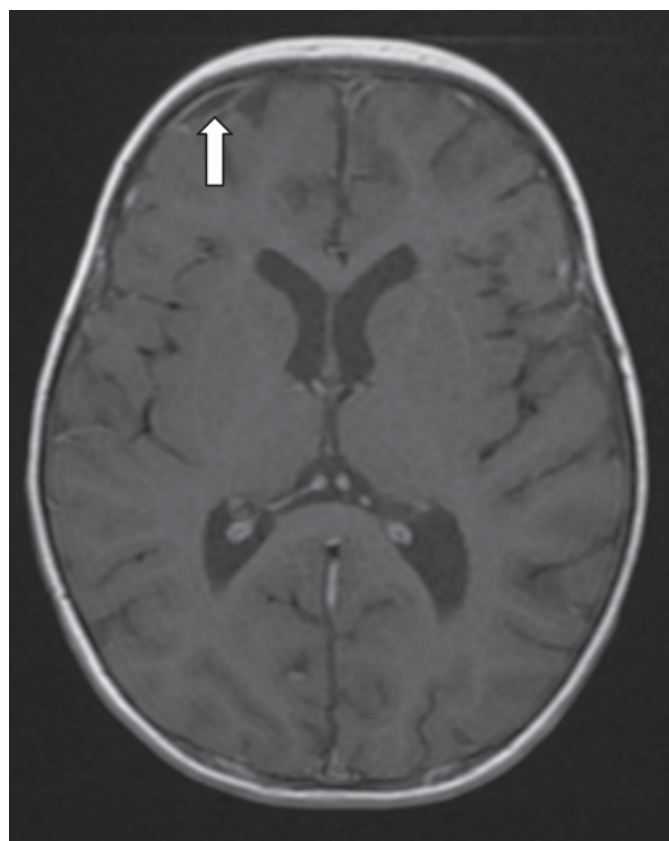


Figure 1: Contrast enhanced magnetic resonance imaging scan of brain showing diffuse restricted fluid within the dependent lateral ventricles. Patchy areas of dural enhancement most marked in the right frontal region (arrow) with extra fluid collection in that region without mass effect.

and *Haemophilus influenzae* type b, have been added to the national immunization schedule [5]. Meningococcal disease has an annual incidence of one case per 100,000 population in Europe, marked by occurrence of outbreaks [6]. MenW has been known to be rare and to be associated with sporadic cases. This serogroup represented 2.6–4% of all reported *N. Meningitidis* in the UK, France, and the United States in the 1990s [7–9]. Cases of MenW in returning pilgrims and their contacts have been reported in several countries following the Hajj outbreaks of 2000 and 2001 [4, 10]. These outbreaks strengthened the re-enforced use of MenACWY vaccine, one of the traveler's vaccine. In many European countries, further cases later occurred in persons with no history of close contact with a returning pilgrim [11].

There was no history of foreign travel in our patient who was previously healthy. In this case, the patient was probably immunosuppressed by the co-existing varicella-zoster virus (VZV) infection. Activation of natural killer (NK) cells may be suppressed during VZV infection. Complement factor P, involved in innate anti-meningococcal response through the activation of the alternative pathway of the complement has been shown to be a ligand for the natural killer cell-activating receptor Nkp46. The VZV-induced suppression may therefore

favor invasive meningococcal disease (IMD) through less efficient activation of complement. Cerebrospinal fluid polymerase chain reaction was positive for both VZV and MenW. She received a three-week course of antibiotic and antiviral for IMD. In England, MenW cases are being diagnosed across all regions and all age groups. Most MenW cases are diagnosed in previously healthy individuals who never travelled abroad, indicating that the emergent strain may probably be endemic.

Unfortunately, bacterial meningitis fatality rates remain high, with reported cases between 2% and 30%, despite emerging antibiotics [12]. Moreover, permanent sequelae such as epilepsy, mental retardation, or sensorineural hearing loss are observed in 10–20% of those who survive [13].

Taha et al., described six cases of MenW disease in France in 2012 [14]. The cases were not linked epidemiologically or geographically. However, all cases were linked to recent travel to Sub-Saharan Africa by the patient or patient contacts.

The quadrivalent conjugate vaccine against serogroup A, C, W135 and Y disease (MenACWY) indicated for use in subjects of 12 months of age or older (Nimenrix, GlaxoSmithKline, Belgium) was licensed in the European Union in 2012 [15]. In England, MenACWY vaccine was introduced in 2015 and offered to teenagers in secondary schools.

To the best of our knowledge, this is the first reported Pediatric concomitant case of meningococcal W serogroup and varicella zoster meningitis in Republic of Ireland.

CONCLUSION

MenW serogroup is a relatively uncommon cause of meningitis in Western Europe. Although this case might demonstrate the sporadic nature of this serogroup, it could probably be one of the emerging causes of meningococcal disease of public health importance. The authors argue that incorporation of MenACWY vaccine in the immunization schedule in Ireland will be beneficial.

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Author Contributions

Kene Ebuka Maduemem – Substantial contributions to conception and design, Acquisition of data, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published
Adela Vatea – Substantial contributions to conception and design, Acquisition of data, Acquisition of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published
Ahmed Satti Mohammed – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published
Yurelis Diaz Rodriguez – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor of Submission

The corresponding author is the guarantor of submission.

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Conflict of Interest

Authors declare no conflict of interest.

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