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Disease in children due to serogroup W-135 *Neisseria meningitidis*

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Summary

Two cases of meningococcal disease due to serogroup W-135 *Neisseria meningitidis* are presented. One died from fulminating meningococcaemia and the other had severe meningoencephalitis with acute septic arthritis. Serogroup W-135 *N. meningitidis* is pathogenic for man, and laboratories should attempt to identify and serotype the organism so that more data about the disease it causes can be obtained.

Résumé

Deux cas de maladie meningococcale due au sérogroupe W-135 *N. meningitidis* sont présentés. L'un décéda des suites d'une meningococémie fulminante et l'autre d'une meningoencéphalite aigue avec arthrite septique. Le sérogroupe W-135 *N. meningitidis* est pathogène chez l'homme et les laboratoires devraient tenter d'identifier et de sérotyper l'organisme afin d'obtenir davantage de données au sujet de la maladie qu'il cause.

Introduction

Meningococcal infections are usually fatal conditions that affect all age groups in various communities of the world. The serogroups of *Neisseria meningitidis* that have been recognized as causative agents of meningococcal disease include serogroups A, B, C and D [1]. Reports on meningococcal meningitis from Nigeria have highlighted the predominance of serogroups A and C [2,3]. In recent times some strains of *N. meningitidis* that did not react with recognized antisera to serogroups A, B, C and D were reported, and these strains were classified into new serogroups X, Y, Z and Z' by Slaterus [4] and Slaterus *et al.* [5]. Evans [6] reported on new additional serogroups designated Bo, 29E and W-135; of which Bo was found to be similar to Slaterus' group Y. Fallon [7] found that serogroup Z' of Slaterus was the same as serogroup 29E. The currently recognized serogroups of *N. meningitidis* are therefore A, B, C, D, W-135, X, Y, Z and 29E [8].

The disease caused by serogroups of *N. meningitidis* other than A, B, and C is infrequently reported, hence the view that other serogroups, especially W-135, described as 'minor groups' are probably less virulent and of little clinical importance [9]. The early report on documented cases of infections due to *N. meningitidis* W-135 was by Hammerschlag and Baltimore [10]. These authors reported on three infants from whom serogroup W-135 was isolated from the blood cultures of two of them while the organism was positive from the culture of the joint effusion of the third case. Kim *et al.* [11] later reported on a case of meningitis in a 20-month-old boy caused by *N. meningitidis* type W-135.

To our knowledge there has been no previous report from Nigeria on disease due to *N. meningitidis* serogroup W-135. In the present communication we report on two cases of childhood meningococcal disease due to serogroup W-135 *N. meningitidis*.

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Case reports

Case 1 (A.B.)

A 12-year-old boy presented, after a fall whilst playing, a 2-day history of abnormal behaviour

and convulsions. He was febrile (38.5°C), drowsy, with neck stiffness and a positive Kernig's sign. There was also hepatosplenomegaly.

An impression of meningitis was made and after blood cultures and lumbar puncture, the patient was started on intravenous penicillin (500,000 Units/kg/day) and chloramphenicol (100 mg/kg/day). On the third day of admission he developed a painful swelling of the left elbow joint with marked limitation of movement, which resolved after 11 days. The patient was hospitalized for 15 days and was found to have completely recovered on follow-up examination.

Case 2 (L.S.)

A 5-year-old girl presented with a history of cough, fever, abdominal pain, vomiting and diarrhoea of 1 week duration. Her temperature was 38°C (axillary) and she had diffuse abdominal tenderness. Other physical findings were normal.

A clinical impression of typhoid was made, and after full blood count and blood culture, treatment was started with intravenous chloramphenicol (100 mg/kg/day).

Three days after admission examination of the patient revealed marked abdominal guarding with a positive rebound tenderness. An impression of perforated typhoid was made and surgical consultation sent. Two hours prior to surgery the patient started bleeding freely from the nostrils and mouth. She later died despite adequate resuscitative measures. No autopsy was done.

Bacteriological studies

The cerebrospinal fluid obtained from case 1 (A.B.) was turbid. On microscopic examination the white blood cell (WBC) count was 346/μl; polymorphs 98%, and lymphocytes 2%. Protein content was 100 mg/dl. A Gram-stained smear revealed Gram-negative intracellular diplococci. Culture on chocolate agar showed typical oxidase-positive colonies. The isolate was superoxol-negative and was resistant to amylase [12]. Sugar degradation tests showed acid production from glucose and maltose; *N. meningitidis* was confirmed.

A serological slide-agglutination test was carried out using *N. meningitidis* rabbit antisera against serogroups A, B, C, W-135, X, Y, and Z, obtained from the Centres for Disease Control (CDC) (Atlanta, U.S.A.), and meningococcus antisera A, B, C and D from Wellcome Reagents Ltd (Beckenham, U.K.).

The slide-agglutination test was only positive against CDC W-135 antiserum. The serogroup was identified as *N. meningitidis* serogroup W-135. The isolate was sensitive to penicillin, ampicillin, cotrimoxazole, augmentin, erythromycin, chloramphenicol, tetracycline, cefotaxime and cloxacillin, but resistant to gentamicin.

The blood culture isolate from the second case was also confirmed as *N. meningitidis* serogroup W-135 using similar procedures. The isolate was also sensitive to penicillin, ampicillin, cotrimoxazole, augmentin, erythromycin, chloramphenicol, tetracycline, cefotaxime and cloxacillin, but resistant to gentamicin. Both isolates were β-lactamase negative by the starch paper technique [13].

Discussion

Serogroup W-135 *N. meningitidis* has emerged as a significant cause of disease in man and should probably no longer be considered as of little clinical importance. These two cases when combined with previously reported cases [9–11] show a wide spectrum of the clinical manifestations of the disease. The disease can be fatal, as was the case in one of our patients (L.S.), and as has previously been reported by Griffiss *et al.* [9] and Holmes *et al.* [14]. Hammerschlag *et al.* [10] and Roberts [15] have reported serogroup W-135 associated with arthritis. This manifestation was also seen in one of our patients (A.B.). Our patient (L.S.) may well have died from consumption coagulopathy as she bled quite freely from the nose and gums. Griffiss *et al.* [9] also reported this complication in one of their patients. Laboratory data could not be obtained to confirm the diagnosis of consumption coagulopathy in our patient. In keeping with other reports, none of our patients showed any skin manifestations of meningococcal infection.

Serogroup W-135 is unlikely to be routinely identified by clinical laboratories [9] because of the difficulty in obtaining antisera against this serogroup. This is particularly applicable to

developing countries. The isolates are more likely to be reported as 'non-groupable'. This is rather unfortunate as it is in developing countries that epidemics of *N. meningitidis* occur and large scale vaccination programmes are now being undertaken. Clinical and epidemiological information on the minor serogroups (X, Y, Z, W-135 and 29E) should be collected in these countries as capsular polysaccharide vaccines against these serogroups are being developed and in some situations are already available.

As reported elsewhere [9], rifampicin prophylaxis should be given to close contacts of patients when the organism is insensitive to sulphonamides. However, the prohibitive cost of rifampicin will prevent good patient compliance, as it is the poorer section of the community in developing countries that are more likely to be exposed to the organism. However, minocycline is also useful for chemoprophylaxis and it is not as expensive as rifampicin.

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