CASE REPORT

Cellulitis: An unusual manifestation of Neisseria meningitidis infection

Nurul Hafizah MUHD YUSOFF1, Zetti ZAINOL RASHID1, Anita SULONG1, Mohamad Nasir SHAFIEE2, Zalina ISMAIL1

1Department of Medical Microbiology & Immunology, 2Department of Obstetrics and Gynaecology, Faculty of Medicine, Universiti Kebangsaan Malaysia Medical Centre, Kuala Lumpur, Malaysia

Abstract

Introduction: Neisseria meningitidis infections often cause severe meningitis as well as bacteraemia. However, cellulitis in meningococcal diseases have rarely been described. Here, we report a case of right lower limb cellulitis caused by N. meningitidis.

Case Report:

A 69-year-old woman presented with fever and lower limb swelling. She had diabetes mellitus, hypertension, dyslipidaemia and a history of surgical resection of vulvar carcinoma. N. meningitidis was isolated from her blood culture.

Discussion: This report provides additional evidence in support of N. meningitidis as a cause of cellulitis.

Keywords: Cellulitis, meningococcal, Neisseria meningitidis

INTRODUCTION

Cellulitis is an acute infection of skin involving the dermis and subcutaneous tissues, most commonly caused by beta-haemolytic streptococci (groups A, B, C, G and F) and Staphylococcus aureus. Sometimes, culture studies are unavailable leaving some degree of uncertainty in its aetiology. N. meningitidis is a Gram-negative diplococcus. They are further classified into serogroups according to immunologic reactivity of their capsular polysaccharides, with at least 13 serogroups identified. Most cases of meningococcal diseases are caused by 6 of the serogroups (A, B, C, W135, X, and Y). The typical manifestations of meningococcal diseases are meningitis (50% of patients), meningococcaemia (5-20%) and pneumonia (5-15%). Other infectious syndromes associated with meningococcal disease are conjunctivitis, otitis media, epiglottitis, septic arthritis, urethritis and purulent pericarditis.

Cellulitis is an uncommon manifestation of this infection, with only a few reported cases in the literature.

CASE REPORT

A 69-year-old woman presented with fever associated with chills and rigors for one day, and right lower limb swelling. She had history of diabetes mellitus, hypertension and dyslipidaemia and had surgical resection of stage IIb squamous cell carcinoma of the vulva 2 years ago. She had recurrent admissions in the past three months for right lower limb lymphoedema following the vulva resection. She was also prescribed with prophylaxis low molecular weight heparin daily to prevent venous thromboembolism.

Her last admission was one month back for bilateral lower limb swelling with cellulitis. Otherwise, she had no shortness of breath or symptom of meningitis. On assessment, she was conscious and alert, her temperature was 38.2°C, pulse rate 112 beats per minute and blood pressure 115/56 mmHg. The right lower limb was swollen up to mid-thigh, tense, tender and warm. Examinations of other systems were unremarkable. Her blood investigation revealed total white blood cell count was 22 x 10^9/L with 89.1% neutrophils, haemoglobin 9.2 g/dL, haematocrit 27.2%, and platelet 418 x 10^9/L. Her C-reactive protein level was 23.76 mg/dL. Doppler ultrasound of right lower limb showed right lower limb deep venous thrombosis. She was diagnosed as right lower limb thrombosis with cellulitis, hence was started on intravenous ceftriaxone 1 gram daily, daily dressing and treatment dose of anticoagulant.

Address for correspondence: Zalina Ismail, Department of Medical Microbiology & Immunology, Pre-clinical Building, Faculty of Medicine, UKM Medical Centre, Jalan Yacob Latif, Bandar Tun Razak, 56000 Cheras, Kuala Lumpur, MALAYSIA. Tel: +603-91459580. Email: zalina.ismail@ppukm.ukm.edu.my
The blood culture and sensitivity taken prior to ceftriaxone grew gram-negative diplococci after one day of incubation. *Neisseria meningitidis* was later confirmed by API® NH (bioMérieux) identification kit. The strain was susceptible towards penicillin, ampicillin, cefotaxime, ceftriaxone, chloramphenicol, rifampicin and ciprofloxacin. The patient was transferred to isolation bay and appropriate chemoprophylaxis was given to the care givers (500 mg of ciprofloxacin stat dose). The ceftriaxone was completed for seven days. Subsequent blood culture after completion of antibiotic was negative. Upon discharged, the patient was afebrile and the right lower limb swelling was much reduced.

**DISCUSSION**

Cellulitis is a common infection that tends to recur in some group of affected patients following an initial episode. Predisposing factors for non-purulent leg cellulitis include previous cellulitis, wound, current leg ulcers, lymphoedema/chronic leg oedema, excoriating skin diseases, tinea pedis and body mass index >30 kgm\(^2\). In the present case, the patient had underlying diabetes mellitus and also chronic right lower limb lymphoedema following wide local excision of the vulvar carcinoma. She had multiple episodes of right lower limb cellulitis that required admission and treated with antibiotics. In addition, there was also venous insufficiency involving the right lower limb as shown in the Doppler ultrasound. All these risk factors predisposed the patient to have recurrent lower limb cellulitis.

To date, fifteen cases of meningococcal cellulitis have been described in the English literature. In 2001, Porras *et al.* had briefly described 10 of the cases and in 2014, Ozaki *et al.* further described another three cases and summarized the thirteen cases reported in the literature. In this present report, we described the thirteen cases as well as another two reported cases and also our case. All sixteen cases were briefly summarized in Table 1.

Among the 16 cases, most of them are female (87.5%) with female to male ratio 7:1. There were six children (median age 9 month) and 10 adults (median age 66.5). Meningococcal cellulitis among children manifested as periorbital cellulitis. Three of them also had concomitant conjunctivitis, one with pericarditis and another one case had meningitis. None of them had underlying medical problem. As compared to adults, most of the adult cases had underlying medical condition such as diabetes mellitus, heart disease, kidney disease, hypertension, connective tissue disease, prolonged steroid therapy, obesity as well as poor circulation. In the present case, the patient also had chronic lower limb lymphoedema which was also a predisposing factor for cellulitis. The sites of meningococcal cellulitis in adults were limbs, chest as well as face and neck areas. Meningitis, sialadenitis, supraglottitis and endocarditis had been reported to occur in adult cases. The prognosis of the cellulitic meningococcal disease is generally favourable. Among children cases, all of them had good prognosis and recovered from the illness, however one of them with concurrent meningitis sustained hearing loss. Outcome was favourable in adult cases except one patient who died despite treatment.

These cases highlighted the predilection of periorbital cellulitis in meningococcal diseases among children while the cellulitic areas in adults also involved limbs, chest and neck. The presences of predisposing factors were also more prevalent in adult cases as compared to children. Concurrent conjunctivitis and meningitis must be looked into when dealing with meningococcal diseases among children. Favourable outcome of all cases except one elderly case further emphasis on the timely appropriate management.

In conclusion, our case together with other reported cases highlighted the possibility of meningococcal disease manifested as cellulitis. Thus, appropriate specimen (e.g. blood, CSF, aspirates) must be sent for culture before starting empirical treatment in dealing with patient presented with cellulitis. Timely appropriate management and treatment is crucial to reduce the morbidity as well as mortality caused by *N. meningitidis* infection.

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### TABLE 1: Summary of reported cases of cellulitis caused by *N. meningitidis*

<table>
<thead>
<tr>
<th>Ref</th>
<th>Age/sex</th>
<th>Underlying medical condition</th>
<th>Site of cellulitis</th>
<th>Source of culture specimen</th>
<th>Sero-group</th>
<th>Other clinical manifestation</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Right ankle, calf</td>
<td>Cellulitic area</td>
<td>N/A</td>
<td>None</td>
<td>Favourable</td>
</tr>
<tr>
<td>7</td>
<td>64 years/ F</td>
<td>CHF, DM, Obesity, dyscariasis, Poor lower-extremity circulation</td>
<td>Face Neck</td>
<td>Blood</td>
<td>N/A</td>
<td>Bacteraemia</td>
<td>Favourable</td>
</tr>
<tr>
<td>8</td>
<td>45 years/ F</td>
<td>MCTD, Poor lower-extremity circulation, Hypocomplementemia</td>
<td>Left calf</td>
<td>Blood</td>
<td>Y</td>
<td>Bacteraemia Endocarditis</td>
<td>Favourable</td>
</tr>
<tr>
<td>9</td>
<td>76 years/ F</td>
<td>DM, Steroid-dependent asthma</td>
<td>Face Neck</td>
<td>Blood</td>
<td>N/A</td>
<td>Bacteraemia</td>
<td>Favourable</td>
</tr>
<tr>
<td>10</td>
<td>44 years/ F</td>
<td>None</td>
<td>Neck</td>
<td>Blood</td>
<td>Y</td>
<td>Supraglottitis</td>
<td>Favourable</td>
</tr>
<tr>
<td>5</td>
<td>83 years/ F</td>
<td>Pulmonary Hypertension, Systemic hypertension</td>
<td>Left hand &amp; arm</td>
<td>Blood</td>
<td>C</td>
<td>Bacteraemia</td>
<td>Favourable</td>
</tr>
<tr>
<td>11</td>
<td>85 years/ F</td>
<td>Polymyalgia rheumatica, Chronic Heart failure, Chronic Renal failure Stroke</td>
<td>Left neck Left shoulder Left anterior chest</td>
<td>Blood Aspirate</td>
<td>Y</td>
<td>Sialadenitis</td>
<td>Fatal</td>
</tr>
<tr>
<td>12</td>
<td>33 years/ F</td>
<td>Nephrotic syndrome</td>
<td>Right thigh</td>
<td>CSF</td>
<td>C</td>
<td>Meningitis</td>
<td>Favourable</td>
</tr>
<tr>
<td>12</td>
<td>51 years/ F</td>
<td>None</td>
<td>Anterolateral neck</td>
<td>Blood</td>
<td>W132</td>
<td>Bacteraemia</td>
<td>Favourable</td>
</tr>
<tr>
<td>6</td>
<td>85 years/ M</td>
<td>None</td>
<td>Right periorbital and neck</td>
<td>Blood</td>
<td>N/A</td>
<td>Bacteraemia</td>
<td>Favourable</td>
</tr>
<tr>
<td>Present report</td>
<td>69 years/ F</td>
<td>Vulvar cancer, Chronic lower limb lymphedema, DM</td>
<td>Right lower limb</td>
<td>Blood</td>
<td>N/A</td>
<td>Bacteraemia</td>
<td>Favourable</td>
</tr>
<tr>
<td>13</td>
<td>9 years/ F</td>
<td>None</td>
<td>Right periorbital area</td>
<td>Conjunctival exudate</td>
<td>C</td>
<td>Conjunctivitis</td>
<td>Favourable</td>
</tr>
<tr>
<td>14</td>
<td>8 months/ M</td>
<td>None</td>
<td>Periorbital area</td>
<td>Blood</td>
<td>C</td>
<td>Bacteraemia</td>
<td>Favourable</td>
</tr>
<tr>
<td>15</td>
<td>9 months/ M</td>
<td>None</td>
<td>Right Periorbital area</td>
<td>Blood</td>
<td>B</td>
<td>Bacteraemia</td>
<td>Favourable</td>
</tr>
<tr>
<td>16</td>
<td>19 months/ F</td>
<td>None</td>
<td>Right Periorbital area</td>
<td>Blood Periorbital aspirate</td>
<td>C</td>
<td>Conjunctivitis</td>
<td>Bacteraemia</td>
</tr>
<tr>
<td>17</td>
<td>4 months/ F</td>
<td>None</td>
<td>Left Periorbital area</td>
<td>Conjointival exudate</td>
<td>B</td>
<td>Conjunctivitis</td>
<td>Favourable</td>
</tr>
</tbody>
</table>

CHF, congestive heart failure; DM, diabetes mellitus; MCTD, mixed connective tissue disease;
REFERENCES