

## CASE REPORT

### Cellulitis: An unusual manifestation of *Neisseria meningitidis* infection

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#### 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*.<sup>1</sup> 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).<sup>2</sup> 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.<sup>3</sup> Cellulitis is an uncommon manifestation of this infection, with only a few reported cases in the literature.<sup>6</sup>

#### 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<sup>9</sup>/L with 89.1% neutrophils, haemoglobin 9.2 g/dL, haematocrit 27.2%, and platelet 418 x 10<sup>9</sup>/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.

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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  $>30 \text{ kgm}^{-2}$ .<sup>4</sup> In the present case, the patient had underlying diabetes mellitus and also chronic right lower limb lymphedema 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.<sup>5,6</sup> 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 cellullitic 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 cellullitic 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***

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

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

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