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Case report

NOT ALWAYS MENINGITIS: AN INFREQUENT CASE OF MENINGOCOCCAL PNEUMONIA

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Abstract

Invasive meningococcal disease (IMD) is a severe infectious pathology with high mortality and morbidity. Meningitis is the most typical presentation. Meningococcal pneumonia is an infrequent but relevant clinical presentation, mainly associated with advanced age. Given its clinical and epidemiological implications, a microbiological diagnosis is essential. The need for lumbar puncture in this group of patients is a matter of debate between some groups of experts. Here, we present a case of meningococcal pneumonia in Argentina and provide a bibliographical review on this topic.

Key words: pneumonia, meningococcal infections, Neisseria meningitidis, lumbar puncture, antibiotic therapy

Resumen

No siempre es meningitis: Un caso infrecuente de neumonía meningocócica

La enfermedad meningocócica invasiva (EMI) es una patología infecciosa grave con alta mortalidad y morbilidad. La meningitis es la presentación más típica. La neumonía meningocócica es una presentación clínica poco frecuente pero relevante, asociada principalmente a edades avanzadas. Dada sus implicaciones clínicas y epidemiológicas, es esencial un diagnóstico microbiológico. La necesidad de una punción lumbar en este grupo de pacientes es un tema de debate entre algunos grupos de expertos. Aquí, presentamos un caso de neumonía meningocócica en Argentina y proporcionamos una revisión bibliográfica sobre este tema.

Palabras clave: neumonía, infecciones meningocócicas, Neisseria meningitidis, punción lumbar, tratamiento antibiótico

Neisseria meningitidis is a Gram-negative diplococcus and human pathogen whose extent of disease can range from colonizing the upper respiratory tract to invasive meningococcal disease (IMD)[1]. IMD is a severe infectious disease with an overall mortality rate of around 10% with long term physical and neurological complications affecting up to 20% of the survivors[2].

The clinical manifestations of IMD span a wide spectrum, ranging from mild febrile illness to meningitis and sepsis. Around 30-60% of infected individuals experience meningitis, while 20-30% present with sepsis. IMD occurs without meningitis in around 27% of the cases[3]. Meningococcal pneumonia is an unusual but relevant clinical presentation. The clinical presentation is not significantly different from other types of infectious pneumonia[4]. Early initiation of antibiotics is cru-

cial due to the elevated mortality rate of untreated meningococcal disease, which is higher compared with meningococcal meningitis[1].

It is not clear in patients with severe meningococcal pneumonia that lumbar puncture (LP) should be performed to evaluate the meningeal focus. Some experts recommend that LP should not be performed in elderly patients with meningococcal pneumonia due to the risk of clinical deterioration in those with cardiovascular compromise or raised intracranial pressure[5]. Other experts recommend this procedure routinely because it is crucial for accurate diagnosis and appropriate management[6]; even recommend a rapidly and carefully considered decision to perform an LP[7]. In this article, we will describe a case of meningococcal pneumonia in Argentina and provide a bibliographic review on this subject.

Clinical case

An 89-year-old man with a history of chronic obstructive pulmonary disease (COPD) presented to the emergency department with cough, progressive dyspnea up to functional class IV associated with general malaise of 48 hours of evolution. He also reported stitch-like pain in the left hemithorax. He had no history of recent travel or contact with sick individuals. Vital signs on admission were significant for elevated respiratory rate, with an oxygen saturation of 92% with non-invasive ventilation and hypertension. Neurological examination was normal. He denied fever, nausea, vomiting or headache.

A chest X-ray was performed, which showed bilateral infiltrates. In the chest CT scans an infiltrate in the left lower lobe associated with mild pleural effusion was observed (Fig. 1). The relevant findings of the laboratory are summarized in Table 1. Serology for HIV was negative. A nasopharyngeal swab was taken, which turned out to be negative for Influenza and SARS-CoV-2 by polimerase chain reaction (PCR). Additionally, blood cultures were obtained.

Given the presumptive diagnosis of acute community acquired pneumonia with moderate respiratory compromise, it was decided to initiate empirical treatment with ceftriaxone associated with corticosteroids. The patient evolved with poor ventilatory mechanics and respiratory failure, with requirement of orotracheal intubation and mechanical ventilation. A tracheal aspirate was acquired at this point.

Eighteen hours after blood cultures were drawn, they tested positive for Gram-negative diplococci. A Sepsis (BCID) Film Array® was performed, identifying *Neisseria meningitidis*, facilitating timely and appropriate treatment. Tracheal aspirate also turned out to be positive for *Neisseria meningitidis*. Antibiogram showed this strain to be sensitive to both penicillin and ceftriaxone, with MICs of 0.064 ug/mL and 0.004 ug/mL respectively. The isolate was referred to the Argentine National Reference Laboratory, where it was characterized as serogroup W belonging to sequence type ST-11 clonal complex (ST-11 cc).

Since the central nervous system (CNS) is the main site of involvement in IMD, the attending team decided in an interdisciplinary agreement the need for a LP to rule out meningitis. Although the patient did not present symptoms or signs compatible with CNS involvement at admission, it was decided to perform it, obtaining normal cerebrospinal fluid (CSF) characteristics and negative culture.

Treatment with ceftriaxone at meningeal doses was continued for 7 days. Even though this clinical presentation has proven to be severe, the patient evolved favourably.

Figure 1 | Chest X-ray and chest tomography (CT) performed when the patient was admitted. A: Chest X-Ray with bilateral infiltrates. B: Chest CT scan shows an infiltrate in the left lower lobe associated with mild pleural effusion

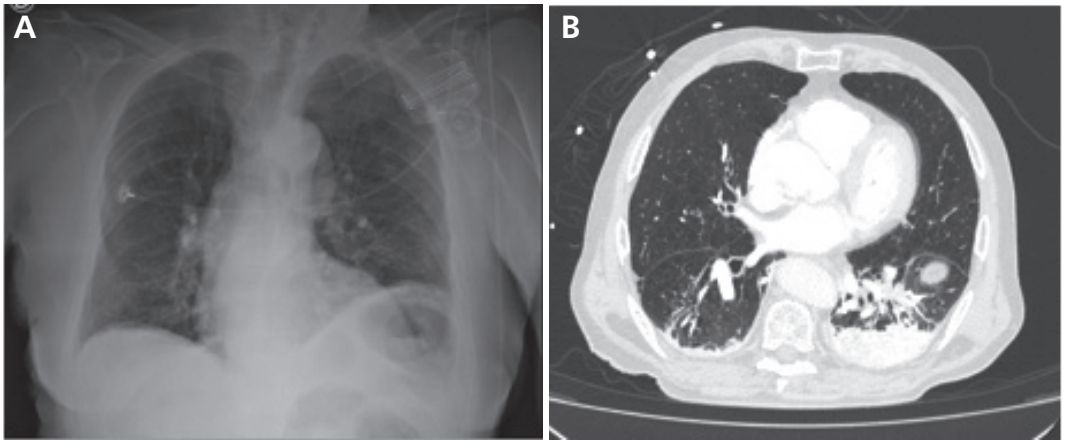

Table 1 | Laboratory findings

Leukocytes	84.5%
Segmented neutrophils	8.1%
Lymphocytes	1.26 mg/dL
Creatinine	79 mg/dL
Urea	0.41 mg/dL
Total bilirubin	0.15 mg/dL
Direct bilirubin	48 UI/L
Alkaline phosphatase	23 UI/L
GOT	9 UI/L
GPT	15 568/mm^3

GOT: glutamyl oxaloacetic transaminase; GPT: glutamyl pyruvic transaminase

Improvements in both ventilation mechanics and oxygenation parameters were seen, and extubation was performed within the first 96 hours. Then, decolonization of the patient was performed. Notification was made to the Department of Health and an epidemiological investigation was carried out. Eventually, chemoprophylaxis of 13 contacts was indicated. An informed consent for the publication of the case was verbally obtained from the responsible family member.

Discussion

Meningococcal pneumonia is an infrequent, yet relevant diagnosis with important significance in epidemiological and clinical management[8]. *Neisseria meningitidis* is an encapsulated Gram-negative aerobic diplococcus that colonises up to 7-23% of the adult´s nasopharynx[4] but can also cause significant and sometimes fatal infections, particularly meningitis. Extra-meningeal disease is rare and has been mostly associated with comorbidities. Among them, meningococcal pneumonia is one of the most frequent (5-15%)[9]. A total of 344 cases have been identified in the literature[2]. Nevertheless, this is the first one reported in our centre and, to our knowledge, one of the very few reported in our country[10].

Referring to epidemiology, the most frequent serogroups in Argentina were B and C. Meningococcal pneumonia specifically is mostly related with Y and W serogroups, although there are recent reports of serogroup B related meningococcal pneumonia[4,9]. Pneumonia is the most common presentation of IMD in the elderly (>65 years old)[1]. In the most recent Argentinian case series, pneumonia represented 1.8% of the IMD cases[10]. Apart from older age and serogroups Y and W, a number of risk factors have been described, although not well characterised[11], including smoking, COPD, people living in close quarters, previous viral infection (specially Influenza)[12], immunoglobulin and complement deficiencies, asplenia, and other immunodeficiencies[1].

The clinical presentation is not significantly different from other types of infectious pneumonia[4]. According to previous case series, the most common symptoms were fever and chills (>50%) followed by pleuritic pain. Dyspnea and productive cough (23 and 31% respectively) were less common[4]. Chest X-ray abnormalities may include unilateral infiltrates (70% of cases), bilateral infiltrates (20%), and pleural effusion (10%)[4]. Meningococcal bacteremia is a serious complication that almost always presents with sepsis, a purpuric rash, can develop disseminated intravascular coagulation and could rapidly progress to death[2]. Complications of meningococcal pneumonia are uncommon and include septic shock, lung abscess, pleural effusion, and pericarditis[4]. Factors associated with poor prognosis include old age, presence of comorbid conditions, and pneumonia caused by serogroup W[2,9].

A microbiological diagnosis is essential, given the epidemiological and clinical implications. Early recognition is crucial as meningococcal pneumonia has a higher mortality rate compared to meningococcal meningitis[9], and fatality rate increases with age, comorbidities and serogroup Y[4,9]. However, blood culture positivity rates are variable in meningococcal pneumonia case series (6-79%)[4]. While a respiratory sample is important, it can also be misleading[2] especially due to the high rate of colonization and increased carrier rate with age[13] potentially leading to false positive results. In our patient, the isolate was characterized as serogroup W belonging to ST-11 cc, a hypervirulent clone that has been associated with high levels of morbidity and mortality[14] and that has been associated with IMD in Argentina over the years.

Currently, there are no specific guidelines or recommendations regarding the necessity for LP in the absence of neurological signs or symptoms. In our patient, a LP was performed due to the severity of the condition; however, there were no clear signs of meningitis. Just as some experts recommend[6,7], this team decided to perform a LP early. In addition, the

clinical respiratory deterioration that led to orotracheal intubation and deep sedation did not allow for a complete neurological examination. The negative result allowed us to carefully choose the antibiotic, adjust the dose and duration. Likewise, decomplex clinical management in the Intensive Care Unit. Additionally, detecting a pathogen other than meningococcus or *Haemophilus influenzae* could prevent unnecessary antibiotic prophylaxis for those in contact with the patient. Furthermore, a Gram stain of the CSF could allow for a quicker confirmation of the presence of meningococcus compared to other samples, which take longer to process.

Empiric antibiotic treatment consists of third-generation cephalosporins[2]. There is no definitive guidance on the regimen but it is likely to be similar to that of other invasive meningococcal diseases[2]. Glucocorticoid administration is generally not recommended[2]. Almost equally important is administrating chemoprophylaxis to close contacts of patients that present a meningococcal infection. The most common options are rifampicin, ciprofloxacin and ceftriaxone[1].

Due to the unpredictable nature of IMD, continuing monitoring and vigorous surveillance programs are vital to identify outbreaks and tracking trends that define the disease burden over time. Furthermore, surveillance guides public health strategies aimed at preventing IMD. Immunization programs are pivotal in disease prevention, and effective vaccines exist for preventing disease by serogroups A, B, C, W, and Y[15].

In conclusion, meningococcal pneumonia is an unusual but relevant clinical presentation of IMD. It is mostly associated with the elderly and comorbidities. Early recognition is challenging but essential given the mortality rate and the epidemiological burden of the infection, as well as ruling out meningeal involvement through a careful decision to perform LP. Prompt treatment is fundamental to minimise morbimortality associated.

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Conflict of interest: None to declare

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