A rare case of community-acquired meningitis caused by *Staphylococcus aureus*

Abstract

Bacterial meningitis in Africa is caused mainly by three bacteria: *Streptococcus pneumoniae*, *Neisseria meningitidis* and *Haemophilus influenzaeB*. *Staphylococcus aureus* is a rare cause of bacterial meningitis. We report the case of a 36-year-old woman with dental caries admitted for acute meningitis. A cerebrospinal fluid (CSF) culture revealed the presence of *Staphylococcus aureus*. The patient had a good clinical evolution with intravenous antibiotic therapy.Following a review of the literature, we discuss the characteristics of Staphylococcus aureus meningitis.

Key words: meningitis, community, *Staphylococcus aureus.*

Write the objective of the study in the summary in a brief manner, respecting the Lemurad method, and write the names of the antibodies in the results paragraph of the abstract.

Suggestion to write the prevalence rate and the most common antibiotics

Introduction

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Bacterial meningitis is a serious, life-threatening infection and a major public health problem in sub-Saharan Africa (1). The most frequent causes of meningitis in Africa are: *Streptococcus pneumoniae, Neisseria meningitidis* and *Haemophilus influenzae* type B(2). Meningitis due to *Staphylococcus*is a rare but a potentially fatal disease. It often occurs after neurosurgical procedures or in immunocompromised patients (3). There are few data on its epidemiology. Nevertheless, its incidence is on the rise, particularly community-acquired meningitis. Theprevalencein Africa is estimated to be between 0.89% and 5% of all causes of bacterial meningitis (2;4). We report a rare form of community-acquired *Staphylococcus aureus*meningitis in a patient with no previous history of hospitalization or neurosurgical intervention.

The case

The patient was a 36-year-old female, unvaccinated against pneumococcus and meningococcus. She had no past medical history of diabetes, sickle cell anemia or any other medical or surgical history. She presented with an intense helmet-type headache associated with post prandial vomiting that did not relieve the headache. She also reported photophobia, vertigo and tinnitus. Physical examination revealed a fever of 39.5°C with no sweating or chills, and a stiff neck with Kernig's sign positive. Oral examination revealed 5 category I decayed teeth, 2 category IV decayed teeth and presence of tartar. The genitourinary examination was normal, as was the rest of the physical examination.

Based on her clinical presentation, the following hypothesis were evoked: infectious meningitis (bacterial, viral), an intracranial abscessor a subarachnoid hemorrhage.

Her complete blood count showed a white blood cell count of 15.82 × 109/L, a haemoglobin level of 12.1g/dL and a platelet count of 249,000/mm3. C-Reactive Protein was 58.3 mg/L and procalcitonin 1.51 ng/mL.

Write the abbreviations mentioned for the first time in the article, such as:CSF, CT scan and HIV

A brain CT scan showed bulging of the cerebellar tonsils in the foramen magnum (Chiari I malformation) and normal-sized ventricles. There was no cerebral expansive lesion, no mass effect and no peripheral contrast enhancement.

CSF analysis showed a clear macroscopic appearance. Cytological examination of the CSF revealed a pleocytosis of 580 leucocytes, 75% of which were lymphocytes, 20% unaltered polynuclear neutrophils and 5% altered polynuclear neutrophils. Biochemistry revealed an elevated CSF protein of 1.35 g/L, with a blood glucose/CSF glucose ratio of 0.66. Direct microscopic examination revealed the presence of Gram-positive cocci. Bacteriological culture of the CSF revealed methicillin-sensitive *Staphylococcus aureus*. The Xpert MTB Rif test on the CSF was negative, and PCR for viruses was not performed. Two pairs of blood cultures were collected, with negative results.

HIV serology was negative, serum protein electrophoresis showed an albumin/globulin ratio of 1.4 with no qualitative abnormalities. Fasting plasma glucose was 1.09 g/l and glycated hemoglobin was 6.1%.

A definitive diagnosis of methicillin-sensitive *Staphylococcus aureus* meningitisin an immunocompetent patient with a dental portal of entry was retained. The patient was hospitalized and treated with Ceftriaxone 4grammes per day in a single dose. The Headache resolved within 5 days, and stable apyrexia was observed after two days of treatment. No episodes of vomiting were reported. All clinical signs resolved after 8 days of antibiotic therapy with normalization of the inflammatory biomarkers initially described. No follow-up lumbar puncture was performed in view of the improvement in her clinical state.

Discussion

Acute bacterial meningitis represents a heavy burden of morbidity and mortality in sub-Saharan Africa, with an incidence of up to 1,000/100,000 cases(2;5;6). The three most frequently encountered germs are *Streptococcus pneumoniae*, *Neisseria meningitidis* and *Haemophilus influenzaeB*. Staphylococcal meningitis accounts for no more than 10% of all bacterial meningitis(7). The majority of these cases are secondary to neurosurgical procedures, and usually involve methicillin-resistant *Staphylococcus aureus* (MRSA) (7). We describe a case of acute community

acquired meningitis caused by methicillin-sensitive*Staphylococcus aureus*. This is the first case documented in the infectious and tropical diseases department of CHNU Fann since 2018. This rarity is in line with data from existing literature.In a study by Aguilar J et al, therewere only 17 cases of Staphylococcal meningitis out of a total of 668 cases of meningitis recorded over 9 years(8).

Most studies have focused on MRSA because of its severity and the difficulties involved in its management (8;9). But with the current tragedy of antibiotic resistance, it would be pertinent to study the epidemiological characteristics of MSSA meningitis to prevent the selection of mutant strains.

In our patient, no immunosuppressive factors were found that could have predisposed her to a serious infection. Furthermore, at the time of diagnosis, a through history taking enabled us to determine the progressive nature of her symptoms, which was insidious and had been evolving for a fortnight. This clinical presentation is similar to that of cases reported by Pinet P et al(7), and Lerche A et al(10), who reported fifteen and eight days of evolution respectively. However, this is in contrast with most cases of acute bacterial meningitis, wherein the clinical signs develop abruptly over a period of a few days. In a large review of cases, Pintado Vicente et al found that clinical evolution was acute (≤ 7 days) in 89% of patients(11).

In contrast to the results of some studies which described frequent extra-neurological signs(7;12), associated with bacteremia in 81% of cases (13), our patient presented only neurological and general signs without bacteremia. This is perhaps one of the limitations of our clinical case. For, based on a single patient, it is difficult to generalize the data to other similar situations.

Traditionally, dental infections can be complicated by intracranial suppuration. However, in view of our patient's poor oral condition, and the germ isolated from the CSF, we wondered whether a meningitis-like complication was also possible. In the literature, it has been widely described that *Staphylococcus aureus* can establish cariogenic biofilms(14;16). This can be the starting point for a meningitis-like complication. To the best of our knowledge, previous studies on *Staphylococcus aureus* meningitis have not focused on the germ's portal of entry.

Analysis of the CSF showed that the fluid was clear, predominantly lymphocytic. This is not in line with known data on acute bacterial meningitis, or even specifically *Staphylococcus aureus* meningitis(17), which is often predominantly neutrophilic. The antibiotic ceftriaxone at a dose of 2 g taken prior to admission could explain this

discrepancy. This phenomenon is sometimes referred to as “decapitated meningitis”, where early administration of effective antibiotics suppresses the inflammatory response typical of bacterial meningitis, resulting in a decrease in CSF neutrophils and a relative predominance of lymphocytes.

The patient received a 10-day course of intravenous ceftriaxone-based antibiotics, adapted to her SASM microbiologic profile. The results of the antibiotic susceptibility test made it possible to maintain this initial treatment regimen.

Conclusion

The bacteria most frequently associated with meningitis in Africa are *Streptococcus pneumoniae, Neisseria meningitidis* and *Haemophilus influenzae B*. However, in rare cases, other germs may be responsible, as was observed in our patient. Hence the importance of a systematic culture of the CSF in order to establish a precise diagnosis and institute a treatment adapted to the antibiogram.

If you find more recent references, it would be better.

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