IDCases 26 (2021) e01249

Contents lists available at ScienceDirect

IDCases

journal homepage: www.elsevier.com/locate/idcr

Case report

Campylobacter fetus Meningitis: A diagnosis to suggest in immunocompromised patients

M. Talbi[a], M. Abdeljelil[a,*], M. Marzouk[a], F. Ben Fradj[b], Y. Ben Salem[a], J. Boukadida[a]

[a] Laboratory of Microbiology UR12SP34, University Hospital Farhat Hached Sousse, Tunisia
[b] Department of Internal Medicine, University Hospital Sahloul Sousse, Tunisia

ARTICLE INFO

Article history:
Received 27 June 2021
Received in revised form 8 August 2021
Accepted 8 August 2021

Keywords:
Campylobacter fetus
Immune deficiency
Meningitis
Antibiotic therapy

ABSTRACT

Campylobacter fetus causes in humans mostly gastroenteritis. Systemic infection occurs almost exclusively in immunocompromised patients with chronic debilitating diseases. We report the case of a *Campylobacter fetus* meningitis in a woman aged 48 years with a history of systemic lupus erythematosus treated with corticosteroids and immunosuppressive drugs. Cerebrospinal fluid culture was positive for *Campylobacter fetus*. The evolution was favorable using imipenem and ciprofloxacin.

Introduction

Bacterial meningitis is a severe disease that requires urgent and effective antimicrobial therapy. Besides the bacteria usually responsible for meningitis such as *Streptococcus pneumoniae, Neisseria meningitidis* and *Haemophilus influenzae*, it is sometimes necessary to evoke other bacteria in certain particular contexts. *Campylobacter*, an important agent of gastroenteritis, is a Gram-negative, microaerophilic, zoonotic bacterium. Systemic infection with *Campylobacter fetus* (*C. fetus*) is rare and occurs among patients with immunocompromised state and in pregnant women [1] and is primarily associated with bacteremia and extra intestinal infections [2]. We report a case of *C. fetus* meningitis in a woman with systemic lupus erythematosus treated with corticosteroids and immunosuppressive drugs.

Case presentation

A 48-year-old woman presented with confusion, headache and fever for 24 h. Her past medical history included systemic lupus erythematous for which she had been treated with prednisolone (5 mg/kg daily) and mycophenolate mofetil (1000 mg/daily) for two years. She was admitted in internal medicine service with fever (39 °C), neck stiffness and positive Kering's and Brudzinski's signs on examination. Focal neurological signs and cutaneous rash were absent.

The white blood cell count was 12,000 /mm3 and the C-reactive protein was 168 mg/L. Brain MRI was normal. Cerebrospinal fluid (CSF) was slightly cloudy, microscopic analysis revealed a white blood cell count of 1300/μL (65 % lymphocytes and 35 % polynuclear neutrophils), with high protein and low glucose levels and direct Gram stain revealed no organisms. The sample was seeded on chocolate agar with Isovitalex and blood agar and fluid thioglycolate medium. The patient was treated empirically with vancomycin, trimethoprim/sulfamethoxazole and acyclovir (8 mg/Kg daily). She also received adjunctive dexamethasone for 4 days. Herpes Simplex Virus polymerase chain reaction (PCR) in CSF and bacterial blood culture were both negative.

After forty-eight hours of aerobic incubation at 37 °C, the fluid thioglycolate medium appeared slightly cloudy. Gram stain from fluid thioglycolate showed Gram-negative curved rods (Fig. 1). This morphology was highly suggestive of *Campylobacter.* Growth occurred only on agars incubated under a microaerophilic atmosphere (génerbox bioMérieux, France) at 37 °C and 25 °C respectively. These isolates were positive for oxidase and catalase, negative for urease and hippurate hydrolysis. According to these conventional methods and to the API Campy system (bioMérieux), the isolate was identified as *C. fetus.* Antimicrobial susceptibility was performed by the disc diffusion method on Mueller Hinton agar according to the recommendations of CA-SFM EUCAST 2018 [3]. The isolate was susceptible to ampicillin, amoxicillin/clavulanic acid, erythromycin, ciprofloxacin and tetracycline. The minimum inhibitory concentration for ertapenem determined by the E-test (bioMérieux) was 0.032 μg/mL. The empirical treatment was changed to imipenem combined with ciprofloxacin and the patient remained asymptomatic after four days of dual therapy.

* Corresponding author.
E-mail address: meriem.abdeljalil@gmail.com (M. Abdeljelil).

http://dx.doi.org/10.1016/j.idcr.2021.e01249

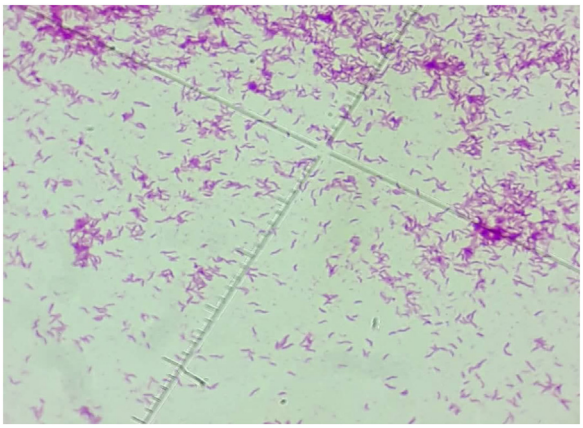

Fig. 1. Gram stain of *Campylobacter* from the fluid thioglycolate.

Further questioning of the patient revealed no contact with domestic animals, no consumption of unpasteurized milk or milk products and no ingestion of raw meat.

Discussion

C. fetus is a zoonotic pathogen. The primary reservoir of *Campylobacter subspecies fetus* is the gastrointestinal tracts of poultry, cattle and sheep. Its mode of transmission to humans can be linked to contact with domestic animals or to the consumption of raw meat and unpasteurized milk. However, the source of *C. fetus* in humans often remains unknown as in this case. Several studies have shown that *C. fetus* infections affect immunocompromised individuals, suggesting that this bacterium is an opportunistic human pathogen. Indeed, the physiopathology of systemic infections with *C. fetus* involves several factors: a high resistance of *C. fetus* to the bactericidal power of serum, linked to the presence on its surface of a protein layer comparable to a capsule which prevents the fixation of the C3b fraction of the complement [4], the decrease in gastric acidity favoring intestinal colonization by *C. fetus* and the failure of the host's local and general immune response, explaining the evolution towards systemic infections with secondary locations such as meningitis, meningoencephalitis, endocarditis, septic arthritis, osteomyelitis and lung abscess. The diagnosis of *C. fetus* meningitis can only be obtained on the basis of CSF and blood cultures. Isolation of *Campylobacter* can be difficult, since it requires microaerophilic conditions and enriched media.

Classically, *C. fetus* is identified if the isolate grows at 25 °C but not at 42 °C, is negative for hippurate hydrolysis, is susceptible to cephalothin and is resistant to nalidixic acid [5]. For the identification of our strain, we were based on the morphology of the Gram stain, conventional biochemical traits as well as the API campy system (bioMérieux). Actually, 16S rRNA sequencing and Matrix assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS) offer great advantages over the API Campy system for the identification of *Campylobacter* species [6]. The therapeutic management of *C. fetus* meningitis is not well codified. Treatment failures with third-generation cephalosporins have been reported [7]. Resistance to ciprofloxacin was estimated to 5 % [8]. Imipenem has the strongest bactericidal effects and successful use of this antibiotic in *C. fetus* meningitis was reported in previous cases [9]. Unfavorable outcome of *C. fetus* meningitis with relapsing and persisting infection has been reported [10]. This slow clinical response suggests a prolonged course of antimicrobial therapy in *C. fetus* meningitis. The prognostic factors of unfavorable evolution are: the immunocompromised state and the delay in the start of an adapted antibiotic therapy. Thus, in a context of immune deficiency, the therapeutic approach of meningitis must take into account the possibility of meningitis to an unusual bacterium.

In conclusion, *C. fetus* meningitis is uncommon and is usually observed in immunocompromised patients. The diagnosis can only be obtained on the basis of CSF or blood cultures. Actually, it is difficult to draw conclusions concerning antimicrobial therapy for this disease.

Author statement

Talbi. M, Abdeljelil. M: Drafting the manuscript.
Ben Fradj. F: Managing the patient.
Marzouk. M, Ben Salem.Y: Interpretation of data.
Boukadida. J: Critical revision.

Funding

No funding source.

Ethical approval

We have read and complied with policy of the journal on ethical consent, as stated in the Guide to authors.

Declaration of Competing Interest

The authors report no declarations of interest.

References

[1] Fujihara N, Takakura S, Saito T, Iinuma Y, Ichiyama S. A case of perinatal sepsis by Campylobacter fetus subsp. fetus infection successfully treated with carbapenem—Case report and literature review. Infect 2006;53(5):199–202.
[2] King EO. Human infections with Vibrio fetus and a closely related Vibrio. J Infect Dis 1957;101(2):119–28.
[3] Société Française de Microbiologie. In: CASFM/EUCAST:Société Française de Microbiologie, editor. Tableaux des concentrations critiques pour l'interprétation des CMI et des diamètres critiques des zones d'inhibition. *Campylobacter* spp.. . p. 113–4.
[4] Dumoulard B, Wallet F, Glowacki F, Courcol RJ. Bactériémie à Campylobacter fetus subsp. fetus chez une patiente infectée par le virus de l'hépatite C. Ann Biol Clin 2004;62:587–9.
[5] Rennie RP, Strong D, Taylor DE, Salama SM, Davidson C, Tabor H. Campylobacter fetus diarrhea in a hutterite colony: epidemiological Unidad de Enfermedades, observations and typing of the causative organism. J Clin Microbiol 1994;32(3):721–4.
[6] Bessede E, Solecki O, Sifre E, Labadi L, Megraud F. Identification of Campylobacter species and related organisms by matrix assisted laser desorption ionization-time of flight (MALDI-TOF) mass spectrometry. Clin Microbiol Infect 2011;17(11):1735–9.
[7] Francioli P, Herzstein J, Grob JP, Vallotton JJ, Mombelli G, Glauser MP. Campylobacter fetus subspecies fetus bacteremia. Arch Intern Med 1985;145 (February (2)):289–92.
[8] Morooka T, Oda T, Shigeoka H. In vitro evaluation of antibiotics treatment of meningitis caused by Campylobacter fetus subspecies fetusr. Pediatr Infect Dis J 1989;8(9):653–4.
[9] Herve J, Aissa N, Legrand P, et al. Campylobacter fetus meningitis in a diabetic adult cured by imipenam. Eur J Clin Microbiol Infect Dis 2004;23(9):722–4.
[10] Blaser MJ. Campylobacter fetus-emerging infection and model system for bacterial pathogenesis at mucosal surfaces. Clin Infect Dis 1998;27(2):256–8.