

# *Campylobacter fetus* meningoencephalitis: a case report

K. Mnif, N. Ben Lasfer, M. Abid, S. Rouis, M. Ben Ticha,  
F. Bellazreg, W. Hachfi, A. Letaif

Department of Infectious Diseases, Farhat Hached University Hospital, Sousse, Tunisia

## ABSTRACT:

- **Introduction:** *Campylobacter*(*C*) *fetus* meningoencephalitis is rare and occurs mainly in elderly and immunocompromised patients. We report an observation of *C. fetus* meningoencephalitis in a woman with a favorable evolution.
- **Case report:** A 54-year-old woman with systemic lupus erythematosus was treated with mycophenolate mofetil (MMF) and corticosteroids. The patient presented at the emergency department of Sahloul University Hospital with a fever and headache for 24 hours. She had regular contact with sheep and cattle. She reported a penicillin allergy. On admission, she had a temperature of 39°C and she was confused. Brain CT scan was normal. Lumbar puncture showed a clear cerebrospinal fluid (CSF) with 1300 leukocytes/mm<sup>3</sup> (65% lymphocytes) and low glucose levels. CSF microscopic examination was negative. She was treated with vancomycin, cotrimoxazole, and gentamicin with an improvement of the neurological symptoms and apyrexia. The next day, she had a neurological deterioration. Brain angio-magnetic resonance imaging was normal. The culture of the CSF became positive for *C. fetus*. Our patient was treated with imipenem combined with ciprofloxacin and obtained clinical and biological improvements.
- **Conclusions:** *C. fetus* is a rare cause of bacterial meningoencephalitis. The underlying immunodepression should always be considered.
- **Keywords:** *Campylobacter fetus*, Meningoencephalitis, Rare.

## INTRODUCTION

*Campylobacter fetus* is a commensal bacterium in the gastrointestinal tract of sheep and cattle. Invasive infection is uncommon in humans. Though, it can affect immunocompromised individuals<sup>1</sup>, leading to several clinical manifestations. Meningoencephalitis is one of these. However, little is known about its clinical characteristics, predisposing factors, and outcome. Between 1960 and 2018, only 29 cases of *C. fetus* meningoencephalitis were reported<sup>2</sup>.

We report a case of *C. fetus* meningoencephalitis in an adult from a rural region in central Tunisia.

## CASE REPORT

A 54-year-old woman presented at the emergency department (Sousse, Tunisia) reporting fever and headache for 24 hours. She was being treated with mycophenolate mofetil (MMF) and corticosteroids (10 mg/day) for systemic lupus erythematosus (SLE). She reported regular contact with sheep and cattle and denied eating undercooked or raw meat. She reported a penicillin allergy. Physical examination showed drowsiness, confusion, and fever (39°C). She had meningeal signs (a stiff neck and a positive Brudzinski sign). Blood laboratory examination was normal, including white blood



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cells (WBC) count (5600 leukocytes/mm<sup>3</sup>, the normal level should be between 4000 and 10,000 leukocytes/mm<sup>3</sup>). Brain CT scan was normal. Lumbar puncture was performed, it showed a clear cerebrospinal fluid (CSF) with 200 red cells/mm<sup>3</sup> and pleocytosis (1300 leukocytes/mm<sup>3</sup>) with 65% lymphocytes, low glucose levels (CSF glucose/ serum glucose= 0.3) and raised protein concentrations (1.7 g/l). CSF microscopic examination was negative. Herpes simplex virus (HSV) polymerase-chain-reaction (PCR) on CSF was negative and the other viruses were not tested. The result of the CSF culture was not yet ready. Meningococcal and pneumococcal serum antigen testing were negative. Her blood culture was negative. The patient was treated in the emergency department with vancomycin 40 mg/kg per day, cotrimoxazole 800/160 mg twice per day and gentamicin 5 mg/kg per day (*Listeria monocytogenes* meningoencephalitis was suspected) with an improvement of the neurological symptoms and apyrexia. On the third day of hospitalization, she presented confusion and dysarthria. Brain angio-magnetic resonance imaging (MRI) did not show any parenchymal abnormalities. CSF culture became positive for *C. fetus* after 11 days. *C. fetus* was susceptible to ampicillin, amoxicillin/clavulanic acid, imipenem, and ciprofloxacin. Echocardiography was normal. The patient was treated with imipenem 500 mg 4 times daily for two weeks, combined with ciprofloxacin 750 mg twice a day for three weeks. The evolution was marked by the normalization of the clinical exam. Control lumbar puncture 2 weeks later found clear CSF, red cells < 1/mm<sup>3</sup>, 100 leukocytes/mm<sup>3</sup>, normal glucose but raised protein concentrations. CSF culture was negative.

## DISCUSSION

*C. fetus* is a gram-negative bacterium. Many animal species are involved as a reservoir. In humans, it can cause the febrile and gastrointestinal syndrome. *C. fetus* infection may develop by eating contaminated food, such as milk or beef, or direct contact with infectious animals<sup>2,3</sup>. Meningitis caused by *C. fetus* is an uncommon disease (0.02 per million people)<sup>3,4</sup> and it is associated with an immunocompromised state or serious underlying conditions. Diabetes, malignancies, corticosteroid therapy, an immunosuppressive drug, HIV infection, hepatic failure, or chronic alcoholism are risk factors for developing the disease<sup>5,6</sup>. In literature, alcoholism and diabetes are the most reported underlying conditions<sup>7</sup>. Van Samkar et al<sup>4</sup> showed, in their review, that 16 of 22 patients with *C. fetus* meningitis were immunocompromised including alcoholism in 9 patients, diabetes in 6, use of immunosuppressive medication in 2, and leukemia and asplenia in 1 patient each. There are only a few cases of *C. fetus* meningitis in healthy people<sup>4,5</sup>. Our patient was treated with immunosuppressive drugs and corticosteroids. Contact with domestic animals can be the source of infection. However, contact with animals or animal products could only be identified in 68% of patients with *C. fetus* meningitis<sup>4</sup>.

The clinical manifestations are mainly digestive (2.4% of gastrointestinal infections are due to *Campylobacter*). In 0.15% of cases, the infection is complicated by bacteremia and affects other organs<sup>6</sup>.

Clinical manifestations of *C. fetus* meningoencephalitis can be mild, although fever, neurological abnormalities, and meningeal signs were noted in the majority of published cases<sup>5</sup>. The meningeal triad is rarely present<sup>4</sup>. According to scholars<sup>4</sup>, clinical manifestations of *C. fetus* meningitis vary and only 64 and 59% had headache and neck stiffness, respectively<sup>4</sup>. Even, if the patient has no meningeal signs or neurological abnormalities, clinicians should consider the possibility of *C. fetus* meningitis in immunocompromised patients with high-risk dietary habits, or gastrointestinal symptoms<sup>7</sup>. Our patient presented with the usual neurological and meningeal signs without digestive manifestations.

*C. fetus* has a vascular tropism, especially in the case of pre-existing vascular lesions, as well as several cases of endocarditis, thrombophlebitis, and meningeal forms<sup>6,8-10</sup>. In our case, endocarditis was excluded by normal echocardiography and negative blood culture.

CSF abnormalities were present in all patients with *C. fetus* meningitis<sup>4</sup>. CSF culture can be positive. However, it can be negative in 23% of the *C. fetus* meningitis cases, whereas blood cultures were positive<sup>4</sup>.

Furthermore, positive blood culture can be useful to confirm the diagnosis of *C. fetus* meningitis<sup>11</sup>. In our case, CSF culture was positive, but after 11 days. This may be explained by the necessity of selective media for *Campylobacter*'s isolation<sup>6</sup> and the importance of repetitive blood culture and even lumbar punctures<sup>4</sup>. A lumbar puncture is not carried out in front of the neurological aggravation of our patient.

When *C. fetus* meningitis is suspected but culture remains negative, PCR in the serum may provide the diagnosis<sup>11</sup>.

No treatment protocol for *C. fetus* meningoencephalitis has yet been established<sup>10</sup>. Previous studies<sup>7,12</sup> reported the susceptibilities of *C. fetus* to meropenem, imipenem, cefotaxime, ampicillin, gentamicin, tetracycline, and ciprofloxacin. Cefotaxime is not an appropriate antimicrobial for *C. fetus* infection, since lower bactericidal activities *in vitro* were reported compared to those of ampicillin, gentamicin, and imipenem<sup>13</sup>. The present case was successfully treated with imipenem combined with ciprofloxacin after the results of the antibiotic susceptibility test. Other cases reported successful treatment with imipenem or ampicillin as monotherapy. However, there is no clear evidence that *C. fetus* meningitis should be treated with one or more antibiotics<sup>5,10</sup>. However, prolonged monitoring is necessary because of potential relapses<sup>4</sup>.

## CONCLUSIONS

*C. fetus* is a rare cause of bacterial meningitis, and it is associated with immunocompromised state. Rapid detection of the bacteria is necessary to start effective and prolonged antibiotic therapy to avoid complications.

**CONFLICT OF INTEREST:**

The authors declare that they have no conflicts of interest.

**PATIENT'S CONSENT**

The patient gave the informed consent to participate in the study.

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