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***Campylobacter fetus* meningitis and subdural empyema[☆]**



Meningitis y empiema subdural por *Campylobacter fetus*

Bacterial meningitis is a serious condition that requires early antibiotic therapy. Its most frequent aetiology is *Streptococcus pneumoniae* and *Neisseria meningitidis*. It is rare for the responsible pathogen to have an animal reservoir, as is the case of *Campylobacter fetus* (*C. fetus*), whose reservoir is the digestive tract of cows and sheep, being a causal pathogen of zoonosis. Here we present a case of meningitis due to *C. fetus*.

The patient was a 59-year-old male smoker with no history of chronic alcohol consumption, hypertension or dyslipidaemia. He initially sought treatment for vomiting, diarrhoea and abdominal pain. After three days of dietary measures, the symptoms of fever (up to 40 °C), headache, prostration and dysarthria persisted, for which complementary tests were carried out, in which CRP 27.3 mg/dl, procalcitonin 0.4 ng/ml and 9,629 10³/ug leukocytes with left shift (86.9% neutrophils) stood out. With the suspicion of infection of the central nervous system, a cranial CT scan was performed, which showed a left frontotemporoparietal hypodense subdural haematoma of 17 mm with deviation from the midline and another right frontotemporoparietal haematoma of 5 mm. With these findings, empirical antibiotic coverage was started with ceftriaxone, ampicillin, linezolid and acyclovir, and urgent surgery was performed with drainage of the collections. Initially, the clinical and radiological course was favourable, with decreased collections and no deviation from the midline, so a lumbar puncture was performed on the third day of antibiotic therapy, with yellowish-looking fluid coming out, with 13 predominantly monomorphonuclear leukocytes (86%), with glucose consumption (52 mg/dl in CSF, capillary glycaemia being 116) with proteinuria (304 mg/dl) and an outlet pressure of 13 mmHg.

One week after admission, the patient began to present a new neurological deterioration consisting of greater dysarthria. EEG with pathological tracing was performed, adjusting anticonvulsant treatment. Growth was detected in the subdural fluid samples sent

in blood culture bottles (bioMérieux), so a Gram stain was performed directly from the bottle, this being highly suggestive of *Campylobacter* spp. Seeding was carried out on PVX (bioMérieux) and COS (bioMérieux) plates with incubation for 24 h and subsequent reincubation for another 24 h with no growth. It was also seeded on Campyloset agar (CAM-bioMérieux), incubating in a hood with GENbox microaer sachets for 48 h, observing growth of colonies, subsequently proceeding to identification with the Vitek MS system (bioMérieux). Sensitivity studies were carried out on Mueller-Hinton 2 agar +5% sheep blood (MHS-bioMérieux) with disc-plate in microaerophilia (in a hood with GENbox micro-bioMérieux sachets), being sensitive to carbapenems, so antibiotic therapy was modified to meropenem 2 g every 8 h, with the patient subsequently presenting a favourable clinical course. Antibiotic therapy was completed for four weeks and the anticonvulsant dose could be lowered until withdrawal. Prior to discharge, a brain MRI was performed, which showed a persistent left parietal subdural haematoma and discreet right meningeal thickening, without clinical repercussions, so no new drainage was performed. In subsequent follow-up, the patient remained asymptomatic.

C. fetus is a gram-negative bacillus found in the digestive tract of cattle and sheep, and can be transmitted after ingestion of contaminated food (such as milk or meat) or after direct contact with infected animals¹. However, this contact with infected animals has only been identified in slightly more than half of the case².

Meningitis due to *C. fetus* is infrequent (0.02 per million inhabitants) and usually occurs in people with compromised immunity, generally with a history of alcoholism, liver disease, advanced age, diabetes mellitus, corticosteroid treatment or neoplasia¹.

The first published case dates back to 1960, and since then 37 cases of meningitis due to *C. fetus* have been documented (Table 1)^{1–5}, but only two case studies of empyema have been published^{6,7}. Patients' average age is 50 years, and the majority are male (81%). As a risk factor, 27% have a history of alcoholism, 16% have diabetes mellitus, whilst 43% of cases are healthy patients. Although all the patients presented alterations in the biochemistry of the cerebrospinal fluid, in many cases the culture of the cerebrospinal fluid was negative (in up to 9 cases the only isolation was in blood), whilst the blood culture was positive in 81% of the cases. In 18%, the isolation was only in cerebrospinal fluid. Regarding the outcome, 72% were cured and there were three deaths among the published cases. There is no established treatment protocol. In the publications reviewed, many patients were treated with broad-

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Table 1
Summary of the cases published to date of meningitis due to *Campylobacter fetus*.

No.	Ref.	Year	Author	Age	Gender	Associated factors	Identification method	Culture	Outcome
1	4	1960	Edwds	50	F	AHT	BCH	BC CSF	Cured
2	3	1962	Robin	47	M	Alcoholism	Not described	Not described	Cured
3	3,4	1964	Collins	55	M	CLL	BCH	BC CSF	Unknown
4	3,4	1966	Killam	48	F	Unknown	BCH	BC	Haemiparesis
5	3,4	1969	Reyman	69	F	Diabetes Mellitus	BCH	BC CSF	Died
6	3	1969	Stille	50	M	Diabetes Mellitus	Not described	Not described	Cured
7	4	1971	Gunderson	53	M	Drug abuse	BCH	BC	Coma
8	3,4	1976	Gubina	46	M	Unknown	BCH	BC	Cured
9	3,4	1976	Gubina	40	M	Unknown	BCH	BC	Cured
10	4	1978	Zelinger	50	M	Unknown	BCH	BC	Cured
11	4	1984	Hanai	53	M	Liver dysfunction	BCH	BC, CSF	Cured
12	3,4	1985	Francioli	68	M	Cancer	BCH	BC, CSF	Died
13	3,4	1985	Francioli	65	M	Alcoholic cirrhosis	BCH	BC	Cured
14	3	1985	Malbrunot	38	M	Alcoholism	Not described	BC, CSF	Cured
15	4	1986	Lyda	30	M	Unknown	BCH	CSF	Cured
16	4	1986	Lyda	42	M	Unknown	BCH	CSF	Cured
17	4	1986	Yamazaki	53	M	Unknown	BCH	BC, CSF	Unknown
18	4	1986	Yamazaki	53	M	Unknown	BCH	BC, CSF	Unknown
19	3,4	1987	Rao	47	M	Renal treatment	BCH	BC, CSF	Cured
20	3	1989	Clavelou	39	F	Alcoholism	Not described	BC	Cured
21	3,4	1990	Kato	55	M	Alcoholism, Diabetes Mellitus	BCH	CSF	Cured
22	4	1993	Inoe	40	M	Unknown	BCH	CSF	Cured
23	3	1996	Wlihelm	83	M	Alcoholic cirrhosis	Not described	BC	Died
24	3,4	1998	Dronda	47	M	Alcoholism	API-Campy PCR	BC, CSF	Cured
25	4	2002	Ozeki	49	M	Alcoholic cirrhosis	BCH	BC, CSF	Haemiparesis
26	3,4	2004	Herve	71	M	Diabetes Mellitus	API Campy GS	BC, CSF	Cured
27	4	2006	Shiroyama	43	M	Unknown	BCH	BC, CSF	Cured
28	3,4,6	2008	Kanayama	51	M	Unknown	BCH	BC, CSF	Cured
29	3,4	2008	Umehara	40	M	Crohn's disease	BCH	BC, CSF	Cured
30	3,4	2010	Martinez	28	M	Unknown	GS	BC	Cured
31	3,4	2013	Suy	75	M	Diabetes Mellitus	GS	BC, CSF	Cured
32	2,3,4	2016	Van Samkar	23	F	Unknown	Not described	CSF	Problems concentrating
33	2,3,4	2016	Van Samkar	52	M	Unknown	Not described	BC, CSF	Cured
34	5	2016	Moon	64	M	Alcoholism, Diabetes Mellitus	BCH GS	BC	Cured
35	4	2017	Ishihara	48	F	Unknown	MALDI-TOFF	BC, CSF	Cured
36	1	2019	Kenta	35	F	Unknown	GS	BC	Cured
37	3	2019	Sho Tbe	56	M	Alcoholism	Not described	BC, CSF	Cured
38		2020	Present	59	M	AHT	MALDI-TOFF	CSF	Cured

AHT: arterial hypertension, BC: blood cultures, BCH: biochemical, CLL: chronic lymphocytic leukaemia, CSF: cerebrospinal fluid, F: female, GS: genetic sequencing, M: male, PCR: polymerase chain reaction, Ref.: bibliographic reference.

spectrum antibiotic therapy or combination therapy, but there have also been reports of patients cured after monotherapy with ampicillin or amoxicillin³. We could highlight the fact that a multicentre study identified an intermediate sensitivity or resistance of 12% to ampicillin, 80% to cefotaxime and 100% to erythromycin, as well as the fact that there are reported cases of *C. fetus* strains resistant to ceftriaxone, cefotaxime and penicillin. Some authors recommend treatment with carbapenems, as well as prolonged treatment^{2,5}.

In conclusion, meningitis due to *C. fetus* is rare, but should not be ruled out even if we are dealing with a healthy patient with no apparent contact with infected animals, especially if associated with a digestive condition. Its treatment would be prolonged antibiotic therapy.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.eimce.2022.02.005>.

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