Atypical gastrointestinal presentation and overcoming diagnostic and therapeutic challenges in fulminant *Capnocytophaga canimorsus* sepsis

Pushpa Saajan[1*], Ashby Mathew[2], Anusha Karunasagar[1], Ehab Elghaysha[2], Fiona Mulyansaka[1], Shikandhini Visuvanthan[1]

European Journal of Medical Case Reports
Volume XX(XX):01–06
DOI: XXXX

ABSTRACT

Background: *Capnocytophaga canimorsus* is a fastidious, zoonotic Gram-negative *Bacillus* that can cause rapidly fatal septicemia. Delays in microbiological diagnosis due to slow growth are common, reducing survival chances. This case uniquely highlights both an atypical gastrointestinal presentation and the resolution of a diagnostic impasse through extended CO_2 incubation triggered by astute clinical suspicion.

Case presentation: A 57-year-old male patient, recently tapered off corticosteroids for inflammatory arthritis, presented with diarrhea, vomiting, and hypotensive collapse. He rapidly developed disseminated intravascular coagulopathy and multi-organ failure. Empirical piperacillin-tazobactam and gentamicin failed; cultures flagged positive at 72 hours with no initial growth. Only after clinicians alerted the laboratory, extended incubation under CO_2 enabled growth of *C. canimorsus* by day seven, confirmed via MALDI-TOF. Switching to meropenem led to recovery, although amputations of the necrotic tissues, including both toes and digits from his right hand, were necessary due to disseminated intravascular coagulopathy.

Conclusion: This case demonstrates that *C. canimorsus* infection may initially mimic gastroenteritis and progress rapidly to fulminant sepsis. Early clinical suspicion, timely communication with microbiology for adapted incubation protocols, and prompt escalation to effective antimicrobial therapy are critical for survival.

Keywords: *Capnocytophaga canimorsus*, disseminated intravascular coagulopathy, Septicemia.

Type of Article: CASE REPORT **Specialty:** Microbiology and Infectious diseases

Received: 17 August 2025
Revised (1): 15 September 2025
Accepted: 19 September 2025

Correspondence to: Pushpa Saajan
*Microbiology Department of The Princess Alexandra Hospital NHS Trust Harlow, Harlow, UK.
Email: pushpa.saajan@gmail.com
Full list of author information is available at the end of the article.

Background

Capnocytophaga canimorsus (*C. canimorsus*) is a fastidious, facultative anaerobic Gram-negative bacillus of the Flavobacteriaceae family. It is a common commensal in the oral cavities of dogs and cats, carried by an estimated 67%-86% of dogs. Human infection most often follows a dog or cat bite [1]. The clinical spectrum ranges from localized skin and soft tissue infections to fulminant septicemia with disseminated intravascular coagulopathy (DIC) and multiple organ failure, carrying an overall mortality rate of approximately 30% [1,2,4]. This high fatality is attributed to potent virulence mechanisms, including resistance to phagocytosis and gliding motility that facilitates rapid bloodstream dissemination. Additional virulence factors include immunoglobulin A1 protease, phospholipase A2, and aminopeptidases [3]. Reported manifestations encompass meningitis, endocarditis, pneumonia, corneal ulcers, cellulitis, and septic arthritis [5]. Symptoms typically develop within 1-7 days of inoculation, usually after a dog bite [4]. Severe disease is more likely in individuals with splenic dysfunction, liver cirrhosis, chronic corticosteroid use, neutropenia, chemotherapy, or alcohol abuse [1,3,5]. The incidence is estimated at 0.5-0.7 cases per million population annually, with disproportionately higher rates in immunocompromised individuals, particularly those with a history of splenectomy or alcoholism [1]. Hematologic malignancies such as acute and chronic myelogenous leukemia, non-Hodgkin lymphoma, Hodgkin disease, and multiple myeloma are among the most common comorbidities in severe cases [3,6]. The presentation of *C. canimorsus* septicemia often mimics that of other Gram-negative bacteremias [3], complicating clinical diagnosis. Laboratory confirmation is equally challenging due to the organism's slow growth, with cultures requiring a mean of 6 days and sometimes up to 14 days to yield growth [2,6]. Special media and temperature requirements add to the difficulty of isolation. Early recognition and prompt antimicrobial therapy are critical to

improving survival [2]. Prognosis is particularly poor in patients presenting with septic shock, with mortality rates approaching 60% [6]. We report a case of *C. canimorsus* septicemia complicated by severe sepsis and DIC in a patient recently tapered off corticosteroids for inflammatory arthritis following a dog bite. This case underscores the diagnostic challenges, rapid clinical deterioration, and importance of timely recognition in managing this rare but life-threatening infection.

Case Presentation

A 57-year-old Caucasian male patient presented to the emergency department with a 1-day history of diarrhea, vomiting, and diffuse limb pain. On arrival, he exhibited signs of septic shock and multi-organ failure. Physical examination revealed a purpuric rash, petechiae, necrotic fingers and toes (Figure 1). Persistent hypotension required intensive care unit (ICU) admission for vasopressor support and aggressive fluid resuscitation.

The patient reported two recent dog bites to his right wrist - one two weeks before presentation and another 2 days prior. His past medical history included inflammatory arthritis, for which he had recently completed a tapering course of corticosteroids. He was otherwise independent and had no other significant comorbidities.

Initial vital signs were concerning: oxygen saturation 85% on 15 l/minute via non-rebreather mask, respiratory rate 33 breaths per minute, blood pressure 91/55 mmHg, heart rate 116 bpm, and temperature 36°C. Physical examination showed mottled skin, capillary refill time of 6 seconds, and hypoglycemia. Urine output was approximately 100 ml/hour. Admission blood results are summarized in Table 1. Chest X-ray was unremarkable, and the electrocardiogram showed sinus tachycardia. Computed tomography pulmonary angiogram excluded pulmonary embolism. Computed tomography of the abdomen and pelvis demonstrated periportal edema and subtle thickening of the right hemicolon, consistent with colitis as an initial finding.

Urine, stool, and blood cultures were obtained, and empirical antibiotic therapy was initiated with IV piperacillin-tazobactam and gentamicin according to the local septic shock protocol. Over the next 3 days, the patient's condition deteriorated: platelet count fell to 27×10^9/l, he became anuric requiring hemofiltration, and inflammatory markers continued to rise. Blood cultures flagged positive after 72 hours, showing thin, elongated Gram-negative bacilli. In consultation with microbiology, *C. canimorsus* was suspected, prompting prolonged incubation and modified culturing techniques. On day seven, *C. canimorsus* was confirmed by MALDI-TOF mass spectrometry. Based on microbiology advice, antibiotics were escalated to IV meropenem, after which the patient's clinical status began to improve. Table 2 summarizes the patient's key biochemical parameters on admission and after 10 days of antibiotic therapy, showing marked improvement in inflammatory and coagulation profiles. Despite presenting with septic shock and peripheral necrosis, the patient responded well to timely antibiotic therapy, completing 2 weeks of meropenem. With close monitoring and appropriate supportive care, the patient showed full clinical improvement, highlighting that early recognition and prompt treatment can lead to a favorable outcome. Amputations of necrotic tissues, including both toes and several fingers, were required due to disseminated intravascular coagulopathy.

Microbiological testing: Blood cultures became positive after 72 hours of incubation. Gram staining revealed thin, elongated Gram-negative rods (Figure 2). Aliquots from the positive culture were inoculated onto three

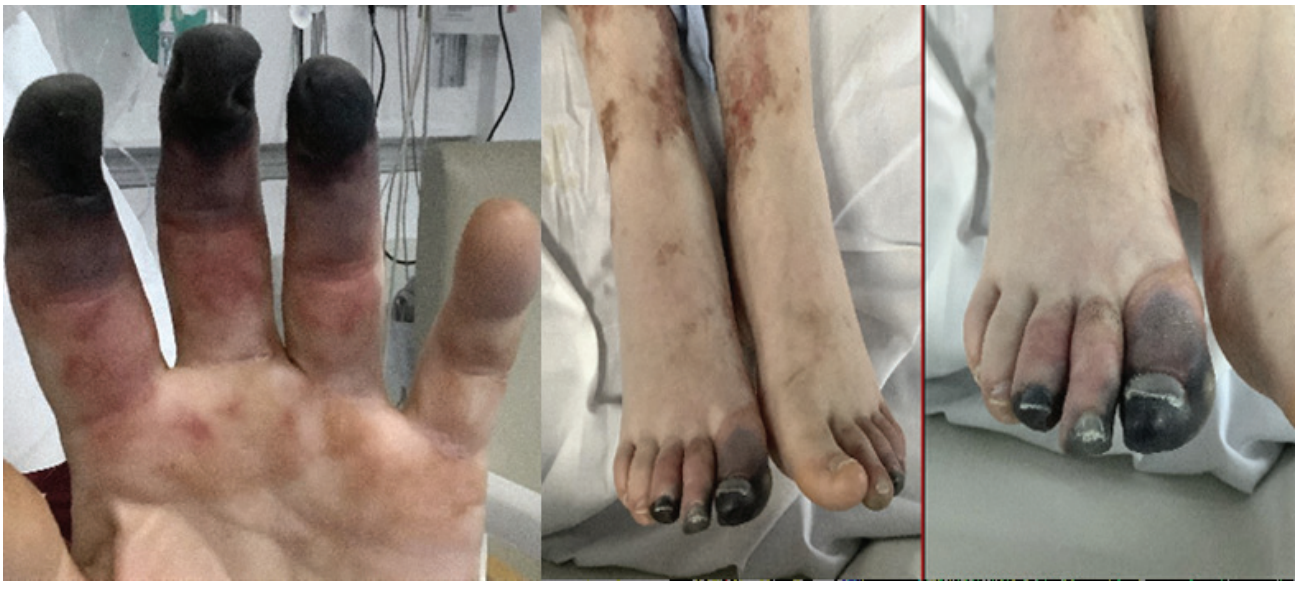

Figure 1. *Necrotic changes involving distal fingers and toes due to DIC (patient anonymized; consent obtained).*

Table 1. *Timeline of key clinical events in patient with Capnocytophaga canimorsus sepsis.*

TIME POINT	CLINICAL EVENT
Day 0	First dog bite
Day 12	Second dog bite
Day 12	Patient presented with fever, gastrointestinal symptoms, vomiting, and diffuse limb pain
Day 12	Developed septic shock
Day 12	Blood cultures taken
Day 12	Necrosis of fingers and toes noted on examination
Day 12	Started IV piperacillin-tazobactam
Day 15	Blood cultures flagged positive for Gram-negative rods
Day 15	Switched to IV meropenem
Day 19	Blood cultures identified *Capnocytophaga canimorsus*
Day 26	Completed two weeks of meropenem; patient clinically improved

Table 2 . *Comparison of blood test results on admission and after day 10 of antibiotics.*

BLOOD RESULTS ON ADMISSION		BLOOD RESULTS AFTER 10 DAYS
CRP	332	77
PCT	241	1.2
WCC	15.6	14.4
Hemoglobin	156	88
Platelets	30	295
Fibrinogen	1.8	Not performed
D-dimer	73513	Not performed
INR	1.7	1.0
APTT	58.6	39.7
Alb	23	18
Bilirubin	33	05
ALP	113	283
ALT	469	15
eGFR	15	10
Na	135	136
K	4.4	5.1
Mg	0.56	0.89
Serum creatinine	368	667
Urea	13	23.6

blood agar and two chocolate agar plates. One set of blood and chocolate agar plates was incubated aerobically in 5%-10% CO_2, while the second set was incubated in >10% CO_2. An additional blood agar plate was incubated anaerobically. No growth was observed after 48 hours on aerobic or anaerobic plates, prompting extended incubation. By day 5, scant growth appeared on the blood agar plate incubated at 5%-10% CO_2. Gram staining of the colonies showed delicate, fusiform Gram-negative rods, consistent with *C. canimorsus*. MALDI-TOF mass spectrometry confirmed the identification, yielding a score of 2.38. Further incubation enhanced colony morphology. By day 10, colonies demonstrated pleomorphic sizes and

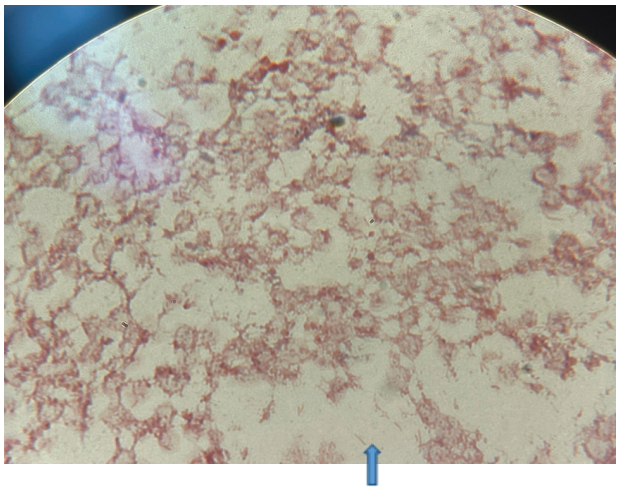

Figure 2. *Gram stain from positive blood culture showing thin, elongated Gram-negative rods consistent with Capnocytophaga.*

shapes, yellow pigmentation on blood agar, spreading edges, and finger-like projections consistent with gliding motility (Figures 3 and 4). The isolate was sub-cultured into Robertson's cooked meat medium, from which subsequent growth was obtained. The isolate was referred to the UK Health Security Agency reference laboratory, Colindale, for antimicrobial susceptibility testing using the broth microdilution method against amoxicillin-clavulanate, piperacillin-tazobactam, clindamycin, ciprofloxacin, and meropenem. As there are no established interpretive breakpoints for *C. canimorsus* and E-tests are not validated for this organism, Minimum inhibitory concentration (MIC) values could not be reliably interpreted. Further susceptibility testing was not possible because the isolate failed to grow in repeated broth microdilution cultures.

Discussion

To the best of our knowledge, there are only a limited number of published UK reports of *C. canimorsus* septicemia, and many infections are likely underdiagnosed because of the organism's fastidious growth requirements.

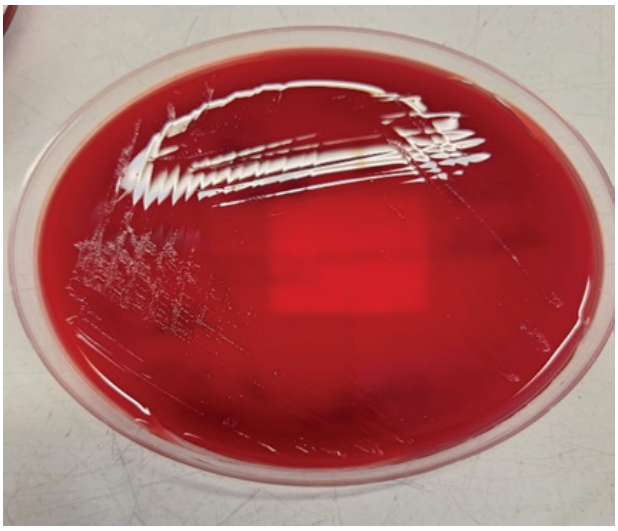

Figure 3. *Blood agar at day 7 in 5%-10% CO_2 showing fine yellow colonies with spreading edges.*

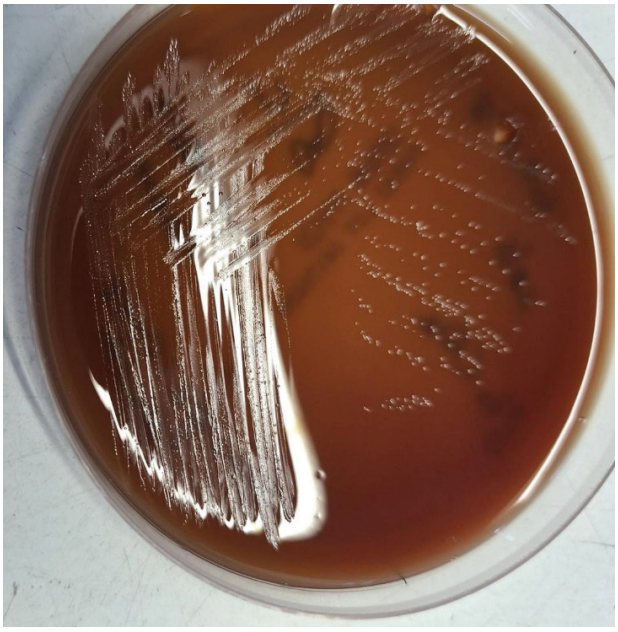

Figure 4. *Blood agar at day 10 demonstrating yellow pigmentation and finger-like projections consistent with gliding motility.*

Blood cultures may remain negative unless prolonged incubation in enriched 5%-10% CO_2 is undertaken.

Our patient, with only transient steroid exposure for inflammatory arthritis, presented initially with gastrointestinal symptoms before rapidly progressing to septic shock, coagulopathy, and multi-organ failure. This atypical onset mirrors other reports of sudden deterioration and death in otherwise healthy individuals [1]. In our case, early clinical suspicion during ICU review prompted the microbiology team to extend incubation, leading to visible colony growth on day 7. MALDI-TOF mass spectrometry provided rapid and reliable species confirmation, underlining its practical diagnostic value once colonies appear.

In our case, susceptibility testing could not be completed because the isolate failed to grow in repeated broth microdilution cultures, a recognized limitation with this fastidious organism. When MIC data are unavailable, clinicians should rely on published case experience and expert consensus, which support the use of β-lactams and carbapenems, and adjust therapy based on the patient's clinical response rather than awaiting definitive laboratory results.

Empirical piperacillin-tazobactam was ineffective, but escalation to meropenem resulted in clinical recovery. This emphasizes that in severe *C. canimorsus* sepsis, clinicians should consider early carbapenem use if patients fail to improve on standard regimens.

Comparable cases from the UK and worldwide have described purpura fulminans, renal abscess, meningitis, and rapidly fatal septic shock [7-9]. In contrast, our patient's illness began with gastrointestinal symptoms, highlighting a broader clinical spectrum of *C. canimorsus* disease and the potential for diagnostic delay when presentations are atypical.

This report underscores the critical need for heightened clinical vigilance when evaluating patients with gastrointestinal symptoms and recent animal bites, even without overt immunosuppression. Outstanding communication with microbiology teams to adapt incubation protocols can dramatically reduce diagnostic delays. Given the estimated 29.7% mortality in immunocompetent patients and even higher rates in those presenting with septic shock, post-exposure prophylaxis after dog bites should be considered, particularly in high-risk patients [10].

Conclusion

This case demonstrates that *C. canimorsus* infection may initially mimic gastroenteritis and progress rapidly to fulminant sepsis. Early clinical suspicion, timely communication with microbiology for adapted incubation protocols, and prompt escalation to effective antimicrobial therapy are critical for survival.

What's new?

Canimorsus fulminant sepsis following two sequential dog bites within 2 weeks, in a patient with only transient immunosuppression. Uniquely, the illness began with atypical gastroenteritis-like symptoms rather than classic early sepsis features, delaying recognition. This case highlights how early clinical suspicion, communication with the microbiology laboratory to extend incubation, and MALDI-TOF MS identification enabled targeted therapy and survival despite disseminated intravascular coagulation and digital amputations.

Acknowledgments

We acknowledge Ahmed Aly for obtaining patient consent for publication of the case report.

List of Abbreviations

DIC	Disseminated intravascular coagulopathy
ICU	Intensive care unit
IV	Intravenous
MALDI-TOF MS	Matrix-assisted laser desorption/ionization-time-of-flight Mass spectrometry
MIC	Minimum inhibitory concentration

Conflict of interest

The authors declare that they have no conflict of interest regarding the publication of this case report.

Funding

None.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report.

Ethical approval

Ethical approval was obtained from the Information Governance Department, Princess Alexandra Hospital NHS Trust (confirmation dated 20 May 2024). Written informed consent for publication was obtained from the patient.

Author details

Pushpa Saajan[1], Ashby Mathew[2], Anusha Karunasagar[1], Ehab Elghaysha[2], Fiona Mulyansaka[1], Shikandhini Visuvanthan[1]

1. Microbiology Department of The Princess Alexandra Hospital NHS Trust Harlow, Harlow, UK
2. Intensive Care Unit of The Princess Alexandra Hospital NHS Trust Harlow, Harlow, UK

References

1. Woźniak P, Szymczak R, Piotrowska A. A case of fulminant sepsis caused by Capnocytophaga canimorsus after a dog bite. IDCases. 2020;21:e00798. https://doi.org/10.1016/j.idcr.2020.e00798
2. Keshava VE, Bhavsar HV, Ghionni N, Baba RH, McNamee W. Overwhelming sepsis due to *Capnocytophaga canimorsus* in an immunocompetent individual: a rare case study. Cureus. 2020;12(9):e10359.
3. Mandell GL, Bennett JE, Dolin R. Principles and practice of infectious diseases. 7th ed. Philadelphia, PA: Churchill Livingstone; 2010.
4. Martins -Baltar A, Meyer S, Barraud O, Garnier F, Ploy MC, Vignon P, et al. Routine use of 16S rRNA PCR and sequencing in septic shock: two cases of Capnocytophaga canimorsus infection in immunocompetent patients. BMC Infect Dis. 2022;22:355. https://doi.org/10.1186/s12879-022-07328-z
5. Török E, Cooke FJ, Moran E. Oxford handbook of infectious diseases and microbiology. Oxford, UK: Oxford University Press; 2017. https://doi.org/10.1093/med/9780199671328.001.0001
6. Ahmad S, Yousaf A, Inayat F, Anjum S. *Capnocytophaga canimorsus*-associated sepsis presenting as acute abdomen: do we need to think outside the box? BMJ Case Rep. 2019;12(3):e228167. https://doi.org/10.1136/bcr-2018-228167
7. Killington K, Lee N, Asher R, Farrant O, Stone N. Purpura fulminans secondary to *Capnocytophaga canimorsus* bacteraemia following a dog bite: a case report and review of literature. Access Microbiol. 2023;5(6):000505. https://doi.org/10.1099/acmi.0.000505.v3
8. Trainor-Moss S, Acquah RR, Peirse M, Beadles W. Renal abscess with *Capnocytophaga canimorsus* infection from a dog bite. BMJ Case Rep. 2022;15(12):e250447. https://doi.org/10.1136/bcr-2022-250447
9. Wilson JP, Kafetz K, Fink D. Lick of death: *Capnocytophaga canimorsus* is an important cause of sepsis in the elderly. BMJ Case Rep. 2016;2016:bcr2016215450. https://doi.org/10.1136/bcr-2016-215450
10. Nakayama R, Miyamoto S, Tawara T, Aoyagi A, Oguro T, Kobayashi N, et al. *Capnocytophaga canimorsus* infection led to progressively fatal septic shock in an immunocompetent patient. Acute Med Surg. 2022;9(1):e738. https://doi.org/10.1002/ams2.738

Summary of the case

1	Patient (gender, age)	57-year-old male
2	Final diagnosis	Fulminant *Capnocytophaga canimorsus* septicemia
3	Symptoms	One-day history of diarrhea, vomiting, and diffuse limb pain, he exhibited signs of septic shock and multi-organ failure. Physical examination revealed a purpuric rash, petechiae, and necrotic toes.
4	Medications	Initially piperacillin-tazobactam then Meropenem was given
5	Clinical procedure	Amputation the necrotic tissues, including both toes and digits from his right hand.
6	Specialty	Microbiology and infectious disease