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Case report

# Campylobacter fetus spondylodiscitis: A case report and review of the literature

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ABSTRACT

Campylobacter are common zoonotic food borne pathogens but infrequent causes of disseminated human infection. *Campylobacter fetus* is an unusual cause of human infection and spondylodiscitis. We describe a case of *C. fetus* infection in a 72-year-old woman who presented with indolent onset lumbar spondylodiscitis. The literature is reviewed and the presentation of spondylodiscitis is contrasted with the usual aggressive nature of bacteremia with this pathogen.


## Introduction

The incidence of spondylodiscitis is rising with the majority of disease caused by *Staphylococcus aureus*, hemolytic streptococci and *Enterobacteriaceae*. Identification of the microbial cause with computed tomography (CT) guided biopsy or blood culture is often unsuccessful and best guess empirical treatment based on past experience may be used [1]. Accurate laboratory identification of the causative pathogen allows targeted narrow spectrum antibacterial treatment using safer and more effective therapies. Herein we describe an unusual case of *C. fetus* spondylodiscitis for which typical empirical therapies would not have been adequate and review other cases reported in the literature.

## Case report

A 72-year-old woman presented with gradual onset lower back pain over 14 days and spasmodic shooting pains down her right leg that were of a different nature to her previous sciatica. She had an aortic valve replacement and coronary bypass surgery three years previously due to *S. aureus* endocarditis and was an ex-smoker with chronic obstructive pulmonary disease, asthma, type 1 diabetes mellitus and unilateral uveitis of unknown etiology. There was no past history of immunocompromising illness and no clinical or trans-esophageal echocardiographic evidence of endocarditis. The lumbar spine was tender to palpation and there was no evidence of neurological compromise or fever. Her serum C-reactive protein at presentation was 120 mg/L. Magnetic resonance imaging (MRI) of the spine demonstrated in addition to multi-level degenerative changes, high disc and endplate short tau inversion recovery images (STIR) signal without endplate destruction at level L5/S1 in keeping with an early spondylodiscitis (Fig. 1). Empirical ceftriaxone and rifampin were started at the referring hospital.

A CT guided biopsy using an 18 gauge needle was processed in the Microbiology Laboratory within two hours of the procedure. Neither direct Gram's stain of the tissue nor direct culture on chocolate agar incubated with supplemental carbon dioxide yielded a pathogen. Passage of the tissue through a cooked meat broth revealed a Gram negative rod that grew well on chocolate agar at 37 °C with supplemental carbon dioxide. Representative colonies were analyzed using matrix-assisted laser desorption/ionization time of flight mass spectrometry (MALDI-TOF MS) (Bruker Daltonics GmbH, Germany). The MS profile was that of *C. fetus* with a score of >2, signifying a high likelihood of a correct match. Treatment was changed as soon as *C. fetus* was identified, based on expected sensitivities from the literature and local susceptibility testing, to intravenous amoxicillin 2 g four times a day plus oral doxycycline 100 mg twice daily. The former was switched to oral amoxicillin 2 g three times a day following a good clinical response at day 14. These were continued to good effect, as confirmed on repeat X-rays and three month interval MRI scan, for a further eight weeks. Repeat imaging

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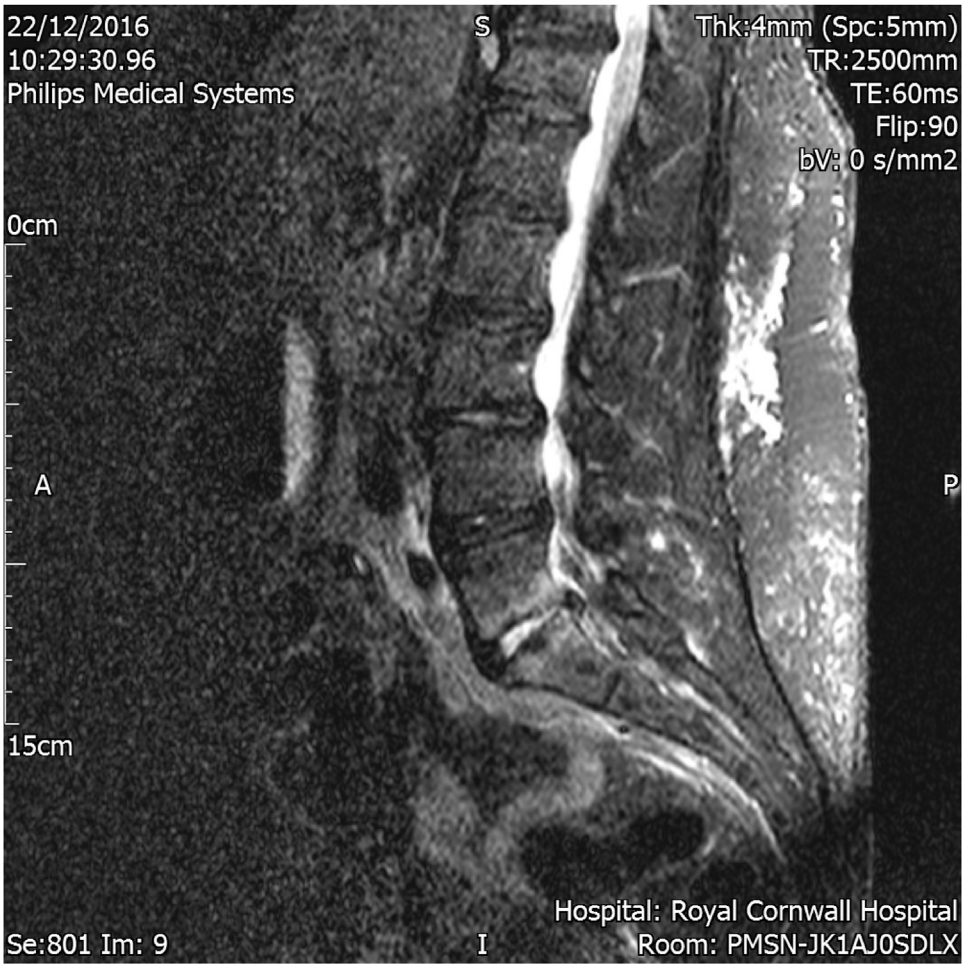


**Fig. 1.** T2W STIR sagittal section MRI scan at presentation with high signal in disc space and Modic changes in the endplates indicative of spondylodisciitis.

showed near complete disappearance of intra-discal fluid signals and the process of spontaneous fusion (Fig. 2). The identity of the isolate was confirmed by the Gastrointestinal Bacteria Reference Unit, Public Health England, Colindale, UK using whole genome sequencing and noted to be sensitive to amoxicillin/clavulanate and tetracyclines with respective minimum inhibitory concentrations of 0.064 mg/L and 1 mg/L.

*C. fetus* infection in otherwise healthy individuals has been associated with occupations involving intensive animal contact [2]. Further questioning failed to identify any such association, in particular there was no direct contact with farms or farm animals, no unusual or unconventional dietary habits and no known exposure to unpasteurized milk or uncooked meats.

## Discussion

Gram negative bacteria of the genus *Campylobacte*r are commensals and common gastrointestinal pathogens of wild and domesticated animals, birds and reptiles [3]. They are usually spread fecal-orally via contaminated food and water and close animal contact, including companion animals. The commonest infecting species are *C. jejuni* and *C. coli* which typically cause gastroenteritis in humans. Globally the incidence of enteric campylobacter infection is on the rise. It is estimated that in the United Kingdom there are over half a million episodes of campylobacter gastroenteritis per annum [3]. *C. fetus* is an enteric and venereal pathogen, predominately of cattle and sheep and unlike *C. jejuni* and *C. coli* is an uncommon finding in humans [2]. Only 0.15% of human campylobacteriosis presents with bacteremia and although *C. fetus* has a predilection for intra vascular infections only a minority of campylobacter bacteremias are due to *C. fetus* [4,5]. In Plymouth UK between 2011–2017 five bacteremias, four *C jejuni* and one *C coli*, were identified.

Spondylodiscitis due to *C. fetus* has rarely been reported. A PubMed search using the terms *Campylobacter fetus* AND (discitis OR spondylodiscitis) combined with a manual search of abstracts and published case series identified nine other cases (Table 1) [6–14]. In two of the cases only the abstract was available in english and consequently only certain elements of these reports are included in the following discussion. Where noted three of the four cases were due to subspecies fetus, the commonest human subspecies. Seven out of the ten were in males with a median age of 64 (range 36–91). Presentations ranged from indolent (as described here) to obtunded and septicemic. Of the nine cases where it is noted, all involved the lumbar-saccral region and four of the seven cases where noted had recent or current bacteremia. Few

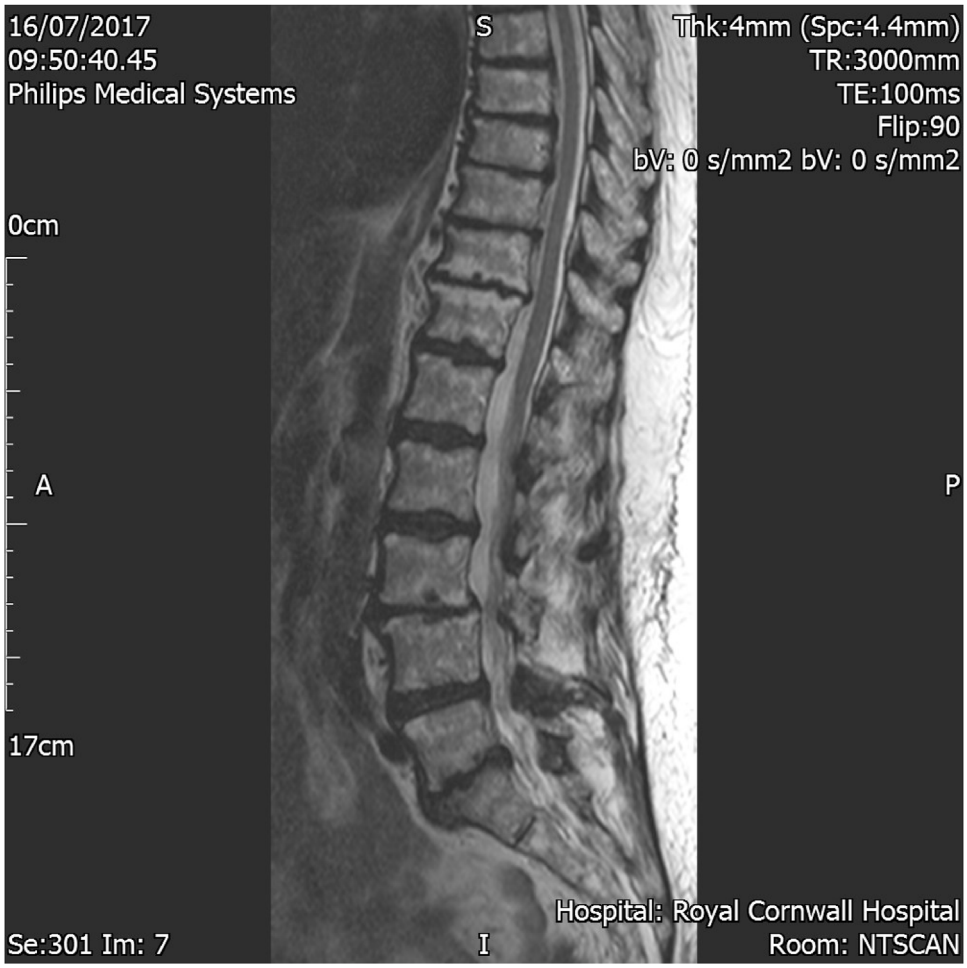


**Fig. 2.** T2W sagittal section MRI scan at final follow-up with resolution of fluid signals in the disc space and spontaneous fusion of L5/S1 level.

of the cases had significant co-morbidities (e.g. cardiovascular, diabetes) and none had overt immunosuppression other than diabetes and chronic alcohol abuse in three cases and in one case, adequately treated HIV (CD4 count of over 500). In one report it was speculated that reversible skin test anergy was due to the *C. fetus* infection [7]. This contrasts sharply with case series describing *C. fetus* bacteremic disease where the majority of patients had significant co-morbidities or immunosuppression and often presented with clinically severe disease [15,16].

Unlike common causes of spondylodiscitis such as staphylococci and streptococci, the antibacterial susceptibilities of *C. fetus* are less predictable. This is reflected in the fact that of the five cases where susceptibilities or initial treatment response were specified, all were resistant to or failed with the empirical regimen used and none of the selected definitive treatment regimens were suitable for blind empirical treatment of spondylodiscitis. These difficulties with treatment selection underline the importance of making an accurate and correct diagnosis in campylobacter spinal infections. The use of mass spectrometry in the laboratory allowed rapid identification of the cultured *C. fetus* whereas traditional phenotypic testing takes 2–3 days and genotypic identification is not available in most routine diagnostic laboratories, costing over $100 per isolate at our local commercial laboratory. Basic acquisition costs of MALDI-TOF are considerable, running into the hundreds of thousands of dollars but running costs and consumables are minimal and it can be used across the whole spectrum of pathogens as part of the routine diagnostic laboratory practices. MALDI-TOF is reported as being highly reliable in the diagnosis of *C. fetus*. A total of 66 clinical *C. fetus* strains when compared against a PCR gold standard were all correctly identified using MALDI-TOF whereas only one of 1230 other campylobacter species was incorrectly identified as *C. fetus* [17–19]. *C. fetus* consists of four sub species each having a specific habitat and risk factors for human infection. MALDI-TOF appears to be poor at differentiating between these and currently one cannot rely on MALDI-TOF to accurately sub speciate [19].

*C. fetus* spondylodiscitis is an unusual infection usually presenting, unlike other *C. fetus* infections, in an indolent manner with the affected having few underlying co-morbidities or being immunosuppressed. The use of MALDI-TOF allowed rapid and accurate identification of this fastidious pathogen and led a prompt switch away from typical spondylodiscitis treatment regimens to one more likely to be effective against this fastidious and atypical cause of disease.

**Table 1**
Summary of reported cases of *C. fetus* spinal infections.

| Reference | Age/Sex | Spinal level | How isolate identified/ Subspecies | Empirical treatment/ Sensitive in vitro? | Definite treatment/ Total duration of effective treatment | Systemic inflammation eg rigors, hypotension/ fever | Presenting CRPmg/ Blood cultures | Overt immunosuppression | Co-morbidities |
|---|---|---|---|---|---|---|---|---|---|
| Current case | 72/Female | L5/S1 | MALDI, Whole Genomic Sequencing/ Not known | Ceftriaxone and rifampin/No | Amoxicillin and doxycycline/10 weeks | No/No | 120/ Negative | None noted | CABG, COPD, DM and asthma |
| Francioli [6] | 78/Male | Lumbar region | Not noted/ Not noted | Ceftriaxone/Not reported | Erythromycin (failed) then amoxicillin/ 32 weeks | No/Yes | Not noted/ Positive | None noted | Chronic alcohol abuse |
| Mathieu [7] | 36/Female | L5/S1 | Not noted/ fetus | None | Doxycyline and erythromycin/ 3 months | No/No | 51/Not noted | Anergic to skin tests, reversed after successful treatment of infection | None noted |
| Bachmeyer (French, only abstract reviewed) [8] | 62/Male | Not noted in abstract | Not noted | Not noted | Not noted | Not noted | Neither noted | Not noted | None noted |
| Yamashita [9] | 66/Male | L5/S1 | Not noted/ fetus | Cefazolin/No | Fosfomycin followed by clindamycin then alternating doxycycline and erythromycin/ 6 months | No/No | 34/Not noted | None noted | None noted |
| Ozeki (Japanese, only abstract reviewed) [10] | 49/Male | L4/L5 | Not noted/ fetus | Not noted | Not noted | Yes/Not noted | Not noted/ Positive | None noted | None noted |
| Chaillon [11] | 91/Female | L2/L3 and L3/ L4 | 16 s rRNA PCR/fetus | Ofloxacin and rifampin/No, resistant to ciprofloxacin | Amoxicillin/6 weeks | No/Yes | 111/ Negative | None noted | None noted |
| Tanaka [12] | 37/Male | L2/L3 and L3/ L4 | Not noted/ Not noted | Cefdinir, Cefotiam/ Treatment failed | Ciprofloxacin and minocycline/14 months | No/Yes | 6/Positive | None noted | None noted |
| Choi [13] | 81/Male | L3/L4 | 16 s rRNA PCR/ testudinum | Ceftriaxone/Not reported | Azithromycin/6 weeks | Yes/Yes | 225/ Positive | None noted | Hypertension, DM and ESRF |
| Laenens [14] | 53/Male | L4/L5 | Not noted/ Not noted | Flucloxacillin then ceftriaxone/ Assumed resistant, not noted | Ciprofloxacin/6 weeks | No/No | 100/ Negative | None noted | Treatment controlled HIV with CD4 count of >500 |

Effective treatment is the use of any antimicrobial to which the isolate was sensitive in vitro.
Definitive treatment is the antimicrobial selected in response to growing the bacterium.
CABG: Coronary artery bypass grafting, COPD: Chronic obstructive pulmonary disease, DM: diabetes mellitus, ESRF: End stage renal failure.

## Author statement

Conceptualization, literature search and writing original draft DO and JG
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Review and improvements in the draft All authors
Agreement of submitted and amended draft All authors

## Declaration of interests

None.

## Conflictof interest

None.

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