Title: Molecular detection of *Campylobacter jejuni* as cause of culture-negative spondylodiscitis

Short Title: *Campylobacter* culture-negative spondylodiscitis

Subject Category: Case Report

List of Authors:

Dennis Tappe (✉)1, Marco H. Schulze2, Anett Oesterlein1, Marianne Abele-Horn1, Stefan Baron3, Daniel Durchholz3, Heinz-Jakob Langen4, Berthold Jany3, and Christoph Schoen1

1 Institute of Hygiene and Microbiology, University of Würzburg, Josef-Schneider-Str. 2, 97080 Würzburg, Germany

2 Institute of Medical Microbiology, University Medical Center Göttingen, Kreuzbergring 47, 37075 Göttingen, Germany

3 Department of Internal Medicine, Medical Mission Hospital, Salvatorstr. 7, 97067 Würzburg, Germany

4 Department of Radiology, Medical Mission Hospital, Salvatorstr. 7, 97067 Würzburg, Germany

Corresponding Author:

Dennis Tappe, MD

Institute of Hygiene and Microbiology, University of Würzburg, Josef-Schneider-Str.2, 97080 Würzburg, Germany

Tel.: 0049-931-201-46036, Fax: 0049-931-201-46445, Email: dtappe@hygiene.uni-wuerzburg.de
Abstract

Spondylodiscitis caused by *Campylobacter* species is a rare disease which is most often caused by *C. fetus*. We report a case of culture-negative spondylodiscitis and psoas abscess due to *C. jejuni* in a 60-year-old woman, as revealed by 16S rRNA gene and *Campylobacter*-specific polymerase chain reactions from biopsied tissue.
Case Report

In April 2011, a 68-year-old Caucasian woman was admitted to the hospital after the general practitioner had found her in a somnolent state with hypoglycemia. Confusion persisted despite administration of intravenous glucose. The woman had been suffering from acute-onset left-sided lumboischalgia (L1) for about 2 weeks and she had received 4 mg dexamethasone with 100 mg diclofenac intramuscularly. Persisting lumbar pain had led to the consultation of an orthopedist who had given her a facet joint infiltration 10 days later. On admission, the patient was in a state of confusion and unable to stand because of severe lower back and left hip pain. Body temperature was 36.8 °C, pulse 78/min and blood pressure 170/85 mmHg. There were no focal neurological deficits and cranial computed tomography (CT) was normal. Laboratory investigation revealed pathological values for C-reactive protein (90.3 mg/L; normal ≤5), fibrinogen (786 mg/dL; normal 200-400), elevated leukocyte count (20,400/µL, predominantly neutrophil granulocytes), low hemoglobin concentration (113 g/L; normal 123-153), and elevated platelet count (572,000/µL). Serum electrophoresis was normal. The patient’s past medical history included diabetes with polyneuropathy, hypertension, restless legs syndrome, hyperthyroidism (currently euthyroid), left and right-sided coxarthrosis and right-sided cervicobrachialgia. She had not traveled abroad. After 5 days confusion almost disappeared. A CT of the lumbar spine was performed which showed irregularities of the base plate of the second lumbar vertebral body. Magnetic resonance imaging (MRI) revealed extensive spondylodiscitis with a left-sided abscess in the psoas muscle (Figure). The patient underwent a CT-guided fine needle biopsy of the lumbar spine. At this time, C-reactive protein was 87.1 mg/L and leukocyte count showed 11,700 cells/µL. Aerobic and anaerobic bacterial culture of the biopsy material yielded no growth after two days of incubation, and 16S rRNA gene polymerase chain reaction (PCR) was performed from stored material. Sequencing of the amplicon and database comparison (NCBI BLAST,
Ribosomal Database Project, and green genes database) revealed 100% identity with each
Campylobacter coli and Campylobacter jejuni. As repeated 16S PCR analysis failed to
discriminate between the two species, specific PCRs for C. jejuni and C. coli (4) were
performed in addition. The mapA gene of C. jejuni was successfully amplified from the
biopsy material, whereas the ceuE gene of C. coli was not detected by PCR. Sequencing of
the amplicon from the mapA-specific PCR revealed 99% identity (523 nt/526 nt) with C. jejuni
(GenBank accession number X80135.1). Bacterial cultures under aerobic, anaerobic and
additional microaerophilic conditions remained sterile after a prolonged incubation time of 10
days and repeated blood cultures and stool cultures for Campylobacter were negative.
Campylobacteriosis serology was performed and Western blot analysis (recomLine
Campylobacter IgG and IgA, Mikrogen, Neuried, Germany) of the patient’s serum was
positive, showing strong bands for PEB4, OMP18 and P39 in the IgG blot. IgA blotting
revealed the presence of a P39 band. Mycobacterial cultures did not yield growth after 3
weeks. The patient was treated with a combination of ciprofloxacin (400 mg bid iv for 1
week) and meropenem (1 g tid for 4 weeks). At the end of antimicrobial treatment laboratory
investigations showed a C-reactive protein level of 1.6 mg/L and normal leukocyte and
platelet counts. Unfortunately, the patient did not return for follow-up examinations.

The species most often isolated from rare Campylobacter-related spondylodiscitis is
C. fetus (1,3,8,9,12,13), possibly because C. fetus tends to cause invasive disease more
frequently than C. jejuni and C. coli. To the best of our knowledge, only one case each of
spondylodiscitis due to C. jejuni (5) and C. coli (6) have been reported. As 16S rRNA gene
PCR analysis could not discriminate between C. jejuni and C. coli in our case, we conducted
specific PCRs for either species (4). From the biopsy material the mapA gene of C. jejuni was
successfully amplified, thus proving C. jejuni as cause of the spondylodiscitis in the case of
the 68-year-old woman presented here. The range of the 16S rRNA gene PCR encompasses also mycobacteria and *Brucella* sp., organisms which are also known to cause spondylodiscitis. These bacteria were neither detected molecularly nor by culture in the case presented. Moreover, the acute extraintestinal campylobacteriosis was also reflected by positive IgA-serology. The patient did not recall diarrheic symptoms or fever. However, there was leukocytosis and confusion on admission, and occasional loose stools which were attributed to the numerous drugs the patient received for her medical conditions. Although the patient did not receive antibiotic treatment prior to the tissue biopsy, bacterial cultures remained sterile for an extended incubation period. Specific *Campylobacter* cultures under microaerophilic conditions were set up from cool stored remains of the biopsy only after the 16S PCR was positive, which was possibly too late. We assume that the spondylodiscitis and the psoas abscess were due to a previous bacteremia following a short asymptomatic (or oligosymptomatic) gastrointestinal infection. *Campylobacter* bacteremia has been found to have an incidence of 0.1% to 1% in relation to enteritis (5), and patients aged 65 or higher had an incidence which was 3 times higher than in younger age groups (10). In line with other reports about *Campylobacter* spondylodiscitis, our patient was over 60 years of age (1,3,6,12,13), and had an underlying medical condition (8,12). However, cases without explicit predisposing conditions have also been reported in the elderly (3,6,13), and *Campylobacter* bacteremia studies showed inconsistent results regarding patient age and underlying diseases (5). As also seen in our case, spondylodiscitis due to *Campylobacter* spp. is often accompanied by nearby located abscesses, such as in the psoas muscle (3,6), paravertebrally (1,6) or epidurally (12,13). One case of concomitant pyogenic meningoencephalitis has also been described (9).

Erythromycin and fluoroquinolones are often recommended for the treatment of systemic campylobacteriosis (7). No susceptibility testing could be performed in the case
presented, as no viable isolate could be cultured. The patient was primarily treated with meropenem, because a recent retrospect analysis of *Campylobacter* stool isolates from our hospital had revealed high rates of intermediate susceptibility to erythromycin (51%) and resistance to ciprofloxacin (52%) and doxycycline (38%) (11). The ciprofloxacin and tetracycline resistance rates which had been detected in the survey approximated resistance data of *Campylobacter* spp. from animal reservoirs in Germany (2). The antibacterial treatment reported by others consisted of cefotaxime followed by ciprofloxacin (6,12), ofloxacin plus rifampicin which was later changed to amoxicillin (3), or doxycycline and erythromycin (13), combined with surgery in almost all patients. There are no international recommendations for the treatment of lumbar spondylodiscitis (3). In most cases the outcome of *Campylobacter* spondylodiscitis after treatment was favourable, except for two cases caused by *C. fetus* in the elderly, in whom death occurred (1,12).

References


**Figure legends**

**Figure**

Magnetic resonance imaging of the patient’s spine. Signs of spondylodiscitis between lumbar body 2 and 3 with a reduction of lumbar disc height and diffuse enhancement caused by inflammation are visible. Abscess formation (arrowhead) in left psoas muscle with surrounding inflammation is shown. Coronary view, fat-suppressed T1 image after gadolinium application.