**Bacteroides fragilis** Bacteremia Complicated by Spondylodiscitis, Spinal Epidural Abscess, and Sepsis: A Case Report

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**Patient:** Male, 63-year-old

**Final Diagnosis:** Spondylodiscitis, spinal epidural abscess and sepsis as a complication of *Bacteroides fragilis* bacteremia

**Symptoms:** Fever and altered level of consciousness. Significant thoracic spine pain was also reported during the last three months

**Medication:** —

**Clinical Procedure:** Surgical decompressive therapy, with abscess drainage, combined with appropriate antibiotic therapy for twelve weeks

**Specialty:** Medicine, General and Internal

**Objective:** Rare coexistence of disease or pathology

**Background:** Pyogenic spondylitis comprises several clinical entities, including native vertebral osteomyelitis, septic discitis, pyogenic spondylodiscitis, and epidural abscess. The lumbar spine is most often infected, followed by the thoracic and cervical areas. It mainly develops (i) after spine surgery; (ii) from history of blunt trauma to the spinal column; (iii) from infections in adjacent structures (such as soft tissues); (iv) from iatrogenic inoculation after invasive procedures (such as lumbar puncture); and (v) from hematogenous bacterial spread to the vertebra (mainly through the venous route). Any delay in diagnosis and treatment can lead to significant spinal cord injury, permanent neurological damage, septicemia, and death.

**Case Report:** We describe a 63-year-old man with no significant past medical history who presented with fever and an altered level of consciousness. Significant thoracic spine pain was also reported during the last 3 months. The final diagnosis was vertebral spondylodiscitis, contiguous spinal epidural abscess, and sepsis due to *Bacteroides fragilis* bacteremia. Clinical recovery was achieved after surgical decompressive therapy with abscess drainage combined with appropriate antibiotic therapy for 12 weeks. The primary focus of the infection was not clarified, despite all the investigations that were performed.

**Conclusions:** Spondylodiscitis, spinal epidural abscess, and sepsis as complications of *Bacteroides fragilis* bacteremia are rare in a patient without any previously known predisposing conditions and without an obvious primary focus. Early diagnosis and proper treatment of anaerobic spondylodiscitis, especially if epidural abscess and sepsis are present, are of great importance to reduce mortality and avoid long-term complications.

**Keywords:** Bacteria, Anaerobic • Case Reports • Epidural Abscess • Sepsis

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- Study Design: A
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Background

Pyogenic spondylitis includes a wide range of clinical entities, such as native vertebral osteomyelitis (NVO), septic discitis, pyogenic spondylodiscitis, and epidural abscess [1]. It is an infrequent and serious cause of back pain. The lumbar spine is most often infected (50-60% of cases), followed by the thoracic (7) areas (approximately 30% of cases) and cervical areas (about 10%). It mainly develops (i) after spine surgery; (ii) from history of blunt trauma to the spinal column; (iii) from infections in adjacent structures (such as soft tissues); (iv) from iatrogenic inoculation after invasive procedures (such as lumbar puncture); and (v) from hematogenous bacterial spread to the vertebrae (mainly through the venous route) [1,2]. In patients aged 50 years or older, NVO is the most common form of hematogenous osteomyelitis [3]. Any delay in diagnosis and treatment can lead to significant spinal cord injury, permanent neurological damage, septicemia, and death. In patients who experience spinal epidural abscess, the best clinical outcomes have been achieved after probe surgical intervention, abscess drainage, and appropriate antibiotic therapy [1-3].

Case Report

A 63-year-old man presented to our clinic with fever and an altered level of consciousness. His past medical history was insignificant. His wife reported that he experienced pain in the mid-back region and fever that spiked up to 38°C for the previous 3 months. The pain was constant and became worse at night. During the last month before his presentation, the pain became stronger and radiated to his chest. He was treated with several courses of non-steroidal anti-inflammatory drugs and muscle relaxants from his general practitioner. He was also treated with cefuroxime and azithromycin for a presumed respiratory infection. Ten days before his presentation, he was hospitalized for a presumed urine infection. His urine analysis showed 8 to 10 white blood cells (WBC) per high-power field, while urine cultures were negative. Blood cultures were performed. Debridement of the spinal canal and abscess pressure with laminectomy, foraminotomy, and facetectomy were initially administered. He was operated on by the orthopedic and spine surgery team of our hospital 24 h after his admission. A 1-stage operation with a standard posterior midline approach over the spinous processes, with the patient in a prone position, was done in the T region. A wide decompresion with laminectomy, foraminotomy, and facetectomy were performed. Debridement of the spinal canal and abscess drainage were also achieved. Two perioperative samples of the epidural abscess were examined. Routine bacterial, fungal, and acid bacilli cultures of all samples that were investigated did not show any possible pathogens. The polymerase chain reaction for the detection of Mycobacterium tuberculosis from the abscess fluid was also negative. Gram staining was not performed. The sample for histopathological analysis was inconclusive. However, Bacteroides fragilis was isolated from both blood cultures on the fifth day of his hospitalization; bacterial isolation results and antimicrobial susceptibility patterns were available during the end of the second week of his hospitalization. B. fragilis was sensitive to amoxicillin/clavulanic acid, piperacillin/tazobactam, carbapenems, and heart rate 115 beats/min. Palpation and percussion of his back showed severe point tenderness over his mid-T spine. His neurological examination was normal. The rest of the clinical examination was not remarkable. Results of his laboratory investigations showed mild anemia (hemoglobin: 10.3 g/dL) and WBC of 16,170/mm³ (neutrophils: 92%). The erythrocyte sedimentation rate was 95 mm/h, and the C-reactive protein level was 16.8 mg/dL. All other laboratory values were within the reference range, except for renal function markers: serum urea and creatinine levels were 72 mg/dL and 2.6 mg/dL, respectively. Urine analysis showed mild microscopic hematuria. The urine culture was negative.

His electrocardiogram showed sinus tachycardia, while the transthoracic echocardiogram did not show any vegetations. The chest radiography and the abdominal ultrasound did not show any abnormal findings. Magnetic resonance imaging (MRI) of the T spine suggested septic spondylodiscitis at the T6-T7 level, with associated osteomyelitis at the T6 and T7 vertebra, as well as a mass-like lesion in the anterior epidural space measuring 4×2.2×1 mm, representing an epidural abscess (Figure 1A, 1B). Two sets of blood cultures for bacteria (aerobic and anaerobic) and fungi were obtained during the first day of his hospitalization. No other blood cultures were obtained during his hospitalization and the follow-up period. Serological studies showed that (i) antibodies for HIV, HCV, Coxiella burnetii, and Brucella species were all within normal limits, and (ii) HBsAg and the venereal disease research laboratory test results were normal. The purified protein derivative skin test was also negative.

The patient was hemodynamically stabilized. Meropenem 1 g intravenously (i.v.) every 8 h and teicoplanin 12 mg/kg i.v. daily were initially administered. He was operated on by the orthopedic and spine surgery team of our hospital 24 h after his admission. A 1-stage operation with a standard posterior midline approach over the spinous processes, with the patient in the prone position, was done in the T region. A wide decompression with laminectomy, foraminotomy, and facetectomy were performed. Debridement of the spinal canal and abscess drainage were also achieved. Two perioperative samples of the epidural abscess were examined. Routine bacterial, fungal, and acid bacilli cultures of all samples that were investigated did not show any possible pathogens. The polymerase chain reaction for the detection of Mycobacterium tuberculosis from the abscess fluid was also negative. Gram staining was not performed. The sample for histopathological analysis was inconclusive. However, Bacteroides fragilis was isolated from both blood cultures on the fifth day of his hospitalization; bacterial isolation results and antimicrobial susceptibility patterns were available during the end of the second week of his hospitalization. B. fragilis was sensitive to amoxicillin/clavulanic acid, piperacillin/tazobactam, carbapenems, and
metronidazole. Resistance to clindamycin was reported. His treatment was changed to ertapenem 1g i.v. daily and metronidazole 500 mg i.v. every 8 h for 3 weeks.

The patient gradually improved and regained his normal state of consciousness and mobility. All renal function markers eventually normalized. He was then discharged and continued ertapenem 1g i.v. daily and metronidazole 500 mg i.v. every 8 h, completing, in total, a 12-week course. After 6 weeks of treatment, infection markers declined to normal levels. No recurrence was found in the MRI scan that was performed 1 year after diagnosis (Figure 2). A colonoscopy that was performed before the patient left the hospital showed multiple diverticula in the left and right colon (Figure 3). A 1.5-cm polyp was also found and was completely excised (Figure 4). The histological examination revealed a tubulovillous adenomatous polyp with high-grade dysplasia.

**Discussion**

NVO usually involves 1 or more adjacent vertebral bodies, owing to their rich cellular marrow and ample blood supply. The corresponding intervertebral disk, which has no blood supply, can also be affected together or independently [1-3]. Moreover, epidural infections have increased dramatically with the increased use of vascular access, spinal instrumentation, and injection drugs, and these infections can have insidious presentation and variable progression and can promote neurologic decline [5,6]. The most common pathogens are *Staphylococcus aureus* (more than 50% of the cases in Europe), Enterobacteriaceae (*Escherichia coli* being the most common in this group), *Enterococcus* species, coagulase-negative staphylococci, and other streptococci. *M. tuberculosis*, *Brucella* species, and *M. avium* complex are other possible causes [7-9]. Unusual pathogens are *Salmonella* species, *C. burnetii*, *Nocardia* species, fungi, and parasites; however, in approximately 30% of the cases, no pathogen can be isolated [1,3,7,10]. Although they were not present in our patient,
several comorbid conditions can predispose a patient to the evolution of pyogenic spondylodiscitis. These are mainly older age, diabetes mellitus, chronic renal failure, liver cirrhosis, cancer, active i.v. drug abuse, recent instrumentation, long-term corticosteroid use, malnutrition, and an immunocompromised state [1,3]. Our patient was diagnosed 3 months after his initial symptoms; the average time to diagnosis in most published studies averaged between 2 and 4 months [11]. Blood cultures can identify most cases of vertebral osteomyelitis. However, they can miss 1 of 5 gram-positive cocci and 1 of 2 gram-negative rods [12]. Vertebral biopsies, CT-guided or surgical, can document almost all anaerobic cases of vertebral osteomyelitis. Interestingly, previous antibiotic intake was shown as the only predictor for vertebral biopsy negativity [12,13].

Anaerobic infections cause approximately 3% of all axial skeleton infections [1-3]. They are most common in patients with direct
inoculation due to penetrating spinal trauma and in the diabetic population [14]. They are mainly caused by Bacteroides species, Peptococcus species, and Propionibacterium acnes [14,15]. Bacteroides species are non-spore-forming gram-negative bacilli. They are predominantly obligate anaerobic components of the normal flora in several mucous membranes; therefore, they are a common cause of endogenous infections (mainly of the abdo-
men, skin, soft tissues, lung, central nervous system, and pelvis) [16]. The B. fragilis group is a member of the Bacteroidaceae family. It includes several species, with B. fragilis being the most frequent isolate. These bacteria mainly cause intra-abdominal infections and infections that originate from those florae (such as perianal abcesses and decubitus ulcers) [1,14,15]. The B. fragilis group is responsible for about 55% of all cases of anaero-
bic bacteremia and is correlated with a mortality rate of up to 30% [15-17]. Intraabdominal infections were the primary focus in more than 50% of the reported cases [15,17]. However, B. fragilis bacteremia complicated by spondylodiscitis, spinal epidural abscesses, and sepsis is rare in a patient without any previously known predisposing conditions and without an obvi-
ous primary focus [18,19]. It has been also described as a rare pathogen in patients with sickle cell disease who experience acute hematogenous osteomyelitis [20].

A significant number of these patients experience polymicro-
bial anaerobic bacteremia; E. coli was the most common co-
pathogen isolated [1,14,15,17,21]. Since our patient was treated with potent antibiotics before his presentation, we could not exclude the presence of possible bacterial co-infection; thus, we administered ertapenem during the full course of his therapy, together with metronidazole. Ertapenem has shown interesting results in patients with spinal infections, both as monotherapy and in combination with other antibiotics, being an excellent option for outpatient parenteral antimicrobial therapy [21,22]. Furthermore, in the 2015 Infectious Diseases Society of America clinical practice guidelines, oral metronida-
zole was suggested as the drug of choice for the treatment of anaerobic NVO; it has excellent bioavailability and favorable long-term outcomes [23,24]. Although double anaerobic cov-
erage is generally not recommended, we continued metroni-
dazole through the full course of therapy, since recent data have suggested that ertapenem 1g i.v. daily may be subopti-
mal in terms of achieving pharmacokinetic/pharmacodynamic targets in patients with bone and joint infections [25].

Even though the primary focus of the infection was not clar-
ified, a few hypotheses could be made. The patient was di-
agnosed with diverticular disease before his discharge from the hospital. Although he did not report any symptoms of di-
verticulitis, several cases of asymptomatic diverticulitis have been reported, and some of them were associated with serious complications [26]. Moreover, retrospective studies and sev-
eral case reports have shown possible associations between bacteremia from certain intestinal microbes, including B. fra-
gilis and premalignant and malignant colon lesions. Intestinal dysbiosis and perturbed barrier function are the most prob-
able mechanisms described for these bacteria to enter the bloodstream [27,28].

Conclusions

Spondylodiscitis, spinal epidural abscess, and sepsis as comp-
plications of B. fragilis bacteremia are rare in a patient without any previously known predisposing conditions and without an obvious primary focus. Early diagnosis of anaerobic spondy-
lodiscitis, epidural abscess, and sepsis and proper treatment (surgical decompressive therapy combined with appropriate antibiotic therapy) are important for reducing mortality and avoiding any possible long-term complications.

Declaration of Figures’ Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

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