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Case Report

A case of *Brucella* pyelonephritis: a rare case

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ABSTRACT

Brucellosis is a zoonotic disease, seen globally, especially in developing countries and it can affect many organs. Urinary involvement of this disease is a very rare. Pyelonephritis, interstitial nephritis, glomerulonephritis, nephropathy are the reported urinary involvements. In this study, we aimed to report a case of *Brucella* pyelonephritis, who had complaints mimicking acute bacterial pyelonephritis, with a history of polycystic kidney disease and calculi in the left kidney.

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Un caso de pielonefritis por *Brucella*: un caso raro

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RESUMEN

La brucelosis es una enfermedad zoonótica, vista globalmente, especialmente en países en vías de desarrollo y puede afectar muchos órganos. La afectación urinaria de esta enfermedad es muy rara. Pielonefritis, nefritis intersticial, glomerulonefritis y nefropatía son los compromisos urinarios reportados. En este estudio, nuestro objetivo fue informar un caso de pielonefritis por *Brucella*, que tenía síntomas que simulaban una pielonefritis bacteriana aguda, con antecedentes de poliquistosis renal y cálculos en el riñón izquierdo.

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1. INTRODUCTION

Brucellosis is a zoonotic disease caused by the intracellular *Brucella* bacteria genus. This disease is one of the most common zoonotic diseases globally, especially in developing countries. Mediterranean countries (Portugal, Spain, Southern France, Italy, Greece, Turkey, North Africa), Middle East, Eastern European countries are endemic regions for this zoonosis [1, 2]. According to the data of the Turkish Ministry of Health, 6457 new cases were reported in the year 2017 [3]. It is known that it is transmitted to humans because of contact with small-bovine animals (such as sheep, goats, and cattle) or by consuming infected meat, milk, dairy products [1, 2].

Beta-lactam antibiotics are ineffective against *Brucella* bacteria. Antibiotics acting on intracellular microorganisms should be used in the treatment. Therefore, brucellosis should not be kept in mind in cases of prolonged fever in endemic areas [1, 2].

Brucellosis is often complicated by hematogenous and lymphatic ways and spread to various organs, and occasionally may present with focal manifestations in many different organs. Focal manifestations mostly in the osteoarticular, urogenital, or central nervous systems. Sometimes it can become complicated enough to require surgery [4-6]. Genitourinary system involvement is among the focal complications of brucellosis. It has been reported that in various stages of this disease, *Brucella* bacteria is excreted in the urine in 4-50% of the cases and urological involvement can occur in 10% of general brucellosis cases [7]. Epididymo-orchitis is more common in men [4, 6]. However, renal involvement is very rare. Pyelonephritis, interstitial nephritis, exudative glomerulonephritis, and IgA nephropathy are among the very rare genitourinary

involvements due to brucellosis [8].

In this study, we aimed to report a case of *Brucella* pyelonephritis, who had complaints mimicking acute bacterial pyelonephritis, with a history of polycystic kidney disease and calculi in the left kidney.

2. CASE REPORT

A 37-year-old Turkish male patient, had history of polycystic kidney disease, admitted to his the family practice doctor with complaints of fever with rigors, left flank pain, and dysuria for one week. It was learned that oral cephalosporin was prescribed as a preliminary diagnosis of urinary tract infection. He used the treatment for two weeks, and applied to the emergency room due to the persistence of his intermittent fever and newly developed abdominal pain. Abdominal examination was not compatible with acute abdomen. His cephalosporin therapy was changed to oral ampicillin sulbactam 1000 mg q12h. He was advised to apply to infectious diseases outpatient clinic if his complaint persists. No microbiological culture was performed due to the recent administration of oral antibiotic treatment.

Because of the absence of improvement in his condition, he applied to the infectious diseases and clinical microbiology outpatient clinic. On physical examination, the patient was found to be febrile with oral temperature 38.3°C, heart rate 90 bpm, and blood pressure 130/85 mm Hg. Chest and cardiac auscultation did not reveal any abnormality. Abdominal exploration was found to be soft and lax, but there was left renal angle tenderness. Laboratory investigations revealed: White blood cell (WBC) 6.9×10⁹/l (reference interval (RI): 4.60-10.20) (neutrophils 42%; lymphocytes 53.0%); hemoglobin 15 g/l (RI: 12,20-18,10); platelets 260 × 10⁹/L (RI: 150-500); urea 38.2 mg/dL (RI:

17-43); creatinine 0.81 mg/dL (RI: 0.67-1.17); sodium 135 mmol/l (RI:135-145); potassium 4.6 mmol/l (RI: 5-6); and C-reactive protein (CRP) 238 mg/l (normal range, 0-5 mg/l). In addition, the polymerase chain reaction (PCR) test for Coronavirus disease (COVID-19) was negative.

He was hospitalized to Infectious Diseases and Clinical Microbiology ward for further investigation. Due to the persistent fever, a differential diagnosis of infective endocarditis was performed. The ultrasound echography did not reveal endocarditis stigma including vegetation, murmur, splinter hemorrhage, Osler nodules, and Janeway lesions. Three sets of blood samples and urine cultures were collected. Of two sets of blood samples collected in aerobic and anaerobic bottles (BACTEC Plus® Aerobic/F, BACTEC Plus® Anaerobic/F), the aerobic bottles were flagged positively after >24 h of incubation. The Gram-stained smear of the sample showed presence of Gram-negative coccobacilli in clumps, and culture on blood and chocolate agar plates grew the same organism (Figure 1). The isolate was positive for catalase, oxidase and urease tests and agglutinated with positive control serum from the Brucelloslide test (BioMerieux®, France). The preliminary identification of the isolate was *Brucella spp.* Urinalysis revealed leukocytes 500/μl (normal range), protein 0.25 g/l (normal range) the other parameters (glucose, nitrate) were negative. The culture of a urine sample collected at the time of admission did not yield growth of any organisms. The serum sample showed anti-*Brucella* antibodies at a titer of 1:1280 (Plasmatec®, Dorset, UK). He also has a history of polycystic kidney disease and the presence of calculi in the left kidney (9 mm- in the renal pelvis. Re-interviewing the patient, he was observed that the patient was a chef and often consumes unpasteurized cheese and milk. Attending to these results doxycycline plus rifampicin was administered based on a positive *Brucella* antibodies titer. Although he showed a positive response initially, there was no improvement in the patient clinic and no decrease in CRP. Therefore, an abdominal computed tomography (CT) scan was performed, revealing an infectious liquid collection behind the left renal kidney (Figure 2A). Attending these results, a radiological and clinical diagnosis of acute pyelonephritis was made. A control urinalysis was done to evaluate the patient for possible treatment unresponsiveness due to the patient's polycystic kidney, being negative. Empirical therapy with ciprofloxacin 400 mg IV q12h plus Trimethoprim/sulfamethoxazole (TMP/SMX) PO q12h was initiated.



Figure 1: *Brucella* growth on the chocolate agar plate.

After 14 days of treatment, the clinical status and the fever of the patient improved. CRP regressed and the patient was discharged. The outpatient follow-ups were continued with ciprofloxacin 2x750 mg tablet and TMP-SMX 2x1 tablets. In the first month of the treatment, the titer decreased to 1:640, and the control CT was also had improved (Figure 2B).

Since the study is a case report, there was no need to be approved by the ethics committee. Written consent was obtained from the patient regarding the use of his medical data.

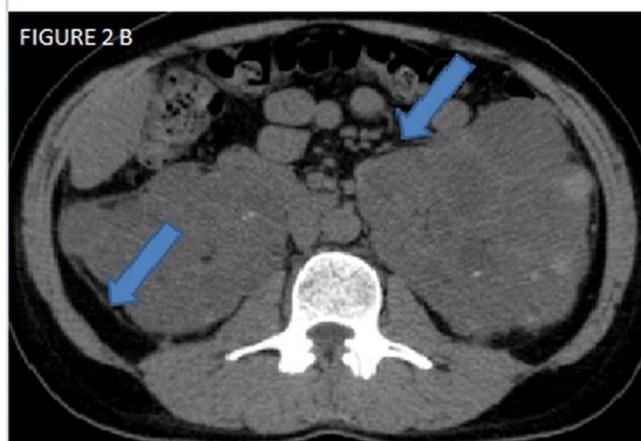
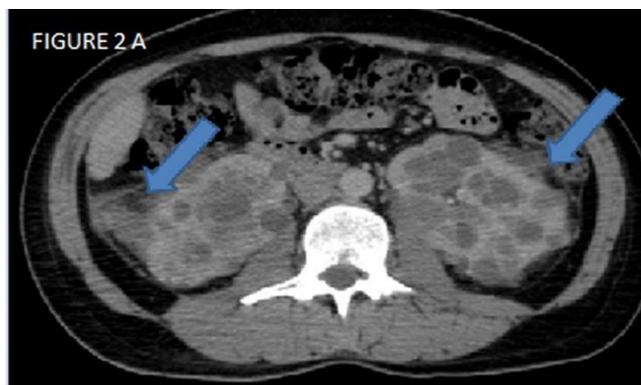


Figure 2: Polycystic kidney and an infectious liquid collection behind the kidneys in the Abdomen CT scan (Figure 2A). Figure 2B reveals an abdominal CT scan after the treatment, observing that the infectious liquid collection formations in Figure 2A were regressed after the treatment as indicated by the arrows.

3. DISCUSSION

Although it is rare, brucellosis may present different focal complications in the urinary system. In the current literature although despite its rarity, it has been reported that pyelonephritis due to *Brucella* species may occur in different forms of brucellosis [7-11]. With this case presentation, we aimed to contribute the literature a case of *Brucella* pyelonephritis, who had complaints mimicking acute bacterial pyelonephritis. The patient was evaluated as acute brucellosis because the symptom duration was 1 week.

Brucellosis is known to be transmitted to humans because of contact with small-bovine animals (such as sheep, goats, and cattle) or by consuming infected meat, milk, dairy products [1, 2]. The presented case was chef, and he had an occupational risk due to the possibility of contact with raw meat.

The entire literature on brucellosis pyelonephritis consists of

only a limited number of reported cases. Therefore, there is no clear consensus on clinical findings, diagnosis, treatment and management [7-12]. It has been reported that pyelonephritis may form as a complication of *Brucella* endocarditis or direct involvement [9]. The presented case did not have endocarditis stigma such as vegetation on echocardiography, murmur, splinter haemorrhage, Osler nodules, Janeway lesions.

Brucella contamination with kidney involvement is unusual and commonly manifests as acute interstitial nephritis (which incorporates haematuria, pyuria, and proteinuria), continual interstitial nephritis (that is much like renal tuberculosis), or glomerulonephritis. Renal abscess because of *Brucella* is rare [13]. Onaran et al. [14] reported a case of a 36-year-old person who evolved a renal and peri-nephric abscess three months after the diagnosis of brucellosis. This changed into dealt with doxycycline and rifampin for 10 weeks. The abscess become resected and a next PCR assay showed the analysis. Bartralot et al. [15] reported a case of abscess in the left kidney and groin in an 82-year-old woman with chronic *Brucella* infection. This patient had been operated for therapeutic purposes. She was diagnosed with chronic renal brucellosis by culture and pathological results. Pathological examinations after surgical resection of both cases helped in the diagnosis. Our case did not receive a surgical treatment due to the polycystic kidney. His urine cultures were negative; being could attributed to the peri-nephric involvement. We do not have conclusive evidence due to was not possible to perform a biopsy on whether the *Brucella* bacterium has reached the kidney. However, the existing lesions completely regressed with treatment. This may be evidence that the patient had pyelonephritis due to *Brucella*. The reason for the failure of *Brucella spp.* growth in urine culture may be attributed as it is a hard-growing microorganism and has not been cultured in a specific medium [1, 2]. The urine samples of the presented patient were only inoculated in 5% blood agar and Eosin Methylene Blue (EMB) agar.

There is no literature information that Brucellosis is more common in damaged organs before. However, in this context, the patient's underlying polycystic kidney may had caused renal involvement because of stasis during excretion of *Brucella* bacteria in the urine.

Although the symptoms can be very different in brucellosis; high fever, chills, sweating, and muscle-joint pain are the most common symptoms. However, it should be kept in mind that brucellosis can affect any organ and cause all kinds of symptoms. This case also showed that when kidney involvement is present in brucellosis, urinary system infection could be also observed [7-9]. It was reported that

renal involvement in brucellosis would improve without sequelae with appropriate treatment [9-11]. In addition, the presented case had symptoms of fever with rigors, left flank pain, and dysuria. All the symptoms regressed after the treatment.

Due to the rarity of the *Brucella* pyelonephritis there is no consensus on its treatment [7-11]. Doxycycline, streptomycin, rifampicin are the first choice antibiotics in the treatment of general brucellosis. Fluoroquinolones are not first-line drugs, being useful in cases of drug resistance, antimicrobial toxicity and relapses. TMP-SX can be used as a third drug for complex of focal brucellosis [1, 2, 9, 10]. Since we also experienced drug-related side effects in the patient we presented, we had difficulty in the treatment management.

As a result, Brucellosis should be considered in urinary system involvements that cannot be diagnosed in endemic regions due to the feature of brucellosis involving every organ.

4. CONFLICT OF INTERESTS

The authors have no conflict of interest to declare. The authors declared that this study has received no financial support.

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