CASE REPORT / OLGU SUNUMU

DOI: 10.4274/mjima.galenos.2025.25507.19
Mediterr J Infect Microb Antimicrob 2025;14:25507.19
Erişim: http://dx.doi.org/10.4274/mjima.galenos.2025.25507.19

Salmonella-induced Psoas Abscess in a Patient with Multiple Myeloma: A Case Report and Systematic Literature Review

Multipl Miyeloma Tanılı *Salmonella* Kaynaklı Psoas Absesi: Olgu Sunumu ve Sistematik Literatür Taraması

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Abstract

Salmonella is a gram-negative enteric bacillus primarily responsible for gastrointestinal infections. Psoas abscess due to *Salmonella* is an exceptionally rare clinical entity. Here, we have presented the case of a 65-year-old woman with multiple myeloma who developed a *Salmonella*-induced psoas abscess. She was admitted to the emergency department with persistent nausea and vomiting for the past 1 month. Blood cultures grew *Salmonella* spp., and abdominal computed tomography (CT) revealed a 43-mm abscess in the right psoas muscle. On the 10th day of hospitalization, CT-guided percutaneous drainage was performed, and *Salmonella* spp. was isolated from the abscess culture. Despite administering 6 weeks of antibiotic therapy, the patient's clinical course was fatal. We also reviewed 29 previously published cases of *Salmonella*-associated psoas abscesses, among which two (6.8%) had fatal outcomes. This case adds to the limited literature by highlighting a rare clinical presentation and providing a review of the clinical features, therapeutic strategies, and outcomes of *Salmonella*-related psoas abscesses.
Keywords: *Salmonella*, psoas abscess, immunosuppression, multiple myeloma, antibiotic resistance

Öz

Salmonella, esas olarak gastrointestinal enfeksiyonlardan sorumlu gram negatif enterik bir basildir. *Salmonella* kaynaklı psoas apsesi, son derece nadir görülen bir klinik durumdur. Burada, multipl miyelom tanılı 65 yaşında bir kadın hastada *Salmonella* kaynaklı psoas apsesi sunulmaktadır. Hasta son 1 aydır devam eden bulantı ve kusma şikayetiyle acil servise başvurdu. Kan kültürlerinde *Salmonella* spp. üredi ve abdominal bilgisayarlı tomografi (BT) ile sağ psoas kasında 43 mm çapında bir apse görüldü. Yatışının 10. gününde BT eşliğinde perkütan drenaj uygulandı ve apse kültüründen *Salmonella* spp. izole edildi. 6 hafta antibiyotik tedavisine rağmen hasta kaybedildi. Ayrıca, daha önce yayınlanmış 29 *Salmonella* ilişkili psoas apsesi vakasını inceledik; bunlardan ikisinin (%6,8) öldüğünü saptadık. Bu vaka, hem nadir görülen bir klinik tabloyu vurgulamakta, hem de *Salmonella* ile ilişkili psoas apselerinin klinik özellikleri, tedavi stratejileri ve sonuçları hakkında bir inceleme sunarak sınırlı literatüre katkıda bulunmaktadır.
Anahtar Kelimeler: *Salmonella*, psoas apsesi, immünosupresyon, multipl miyelom, antibiyotik direnci

***This case was presented as a poster at the KLİMİK 2025 Congress.**

Cite this article as: Çakır Kıymaz Y, Özdemir Kol İ, Terzi H. *Salmonella*-induced psoas abscess in a patient with multiple myeloma: a case report and systematic literature review. Mediterr J Infect Microb Antimicrob.

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Received/Geliş Tarihi: 22.05.2025 **Accepted/Kabul Tarihi:** 19.08.2025

Epub: 05.09.2025
Published: 12.11.2025

Introduction

Salmonellosis, caused by the gram-negative bacillus *Salmonella*, remains a significant infectious disease burden, particularly in low-income countries[1]. Its clinical spectrum most commonly includes acute gastroenteritis, bacteremia, enteric fever, and asymptomatic carriage. Although focal infections are more typical in immunocompromised individuals, extraintestinal manifestations such as musculoskeletal involvement have also been reported in immunocompetent patients[2].

A psoas abscess, which is defined as a purulent collection within the iliopsoas muscle of the retroperitoneal space, is most often caused by *Staphylococcus aureus*[3]. In contrast, *Salmonella*-induced psoas abscess is exceptionally rare, with fewer than 40 cases described in the literature[4-31]. Here, we have presented a unique case of *Salmonella* psoas abscess in a patient with multiple myeloma in light of a systematic review of published cases.

Case Presentation

A 65-year-old woman with a history of multiple myeloma presented to the emergency department with persistent nausea and vomiting for the past month. On admission, she was in moderate general condition, conscious, oriented, and cooperative. Her vital signs were as follows: temperature 38 °C, blood pressure 110/70 mmHg, pulse 73 bpm, respiratory rate 20 breaths/min, and oxygen saturation 99% on room air. Respiratory examination revealed normal breath sounds, and the abdomen showed no guarding, rebound, or tenderness. Other systemic findings were unremarkable.

Laboratory evaluation demonstrated a white blood cell count of 3.28 × 10^3/μL, hemoglobin 7.4 g/dL, platelet count 6 × 10^9/L, C-reactive protein 216 mg/L, and creatinine 3.5 mg/dL (baseline 2.0 mg/dL). Thoracic computed tomography (CT) revealed a left-sided pleural effusion measuring up to 8 cm in thickness with associated passive atelectasis (Figure 1). Accordingly, she was admitted to the hematology department and transfused with two units of erythrocyte suspension and one unit of platelet concentrate. Blood cultures yielded nontyphoidal *Salmonella* spp. (identified by MALDI-TOF MS; Bruker Daltonics, Germany; score 2.132), susceptible to fluoroquinolones and cephalosporins (Table 1). For this, intravenous ciprofloxacin (400 mg/day) was initiated.

To investigate the source of infection, abdominal CT was performed, which revealed a 43-mm fluid collection with gas formation in the right psoas muscle (Figure 2). Magnetic resonance (MR) cholangiography further suggested bilateral psoas collections, extending up to 9 cm on coronal T2-weighted images (Figure 3). CT-guided percutaneous drainage of the abscess was accordingly performed, and the culture of the aspirate again grew *Salmonella* spp. (serovar not identified; MALDI-TOF MS score 2.070). Following the emergence of ciprofloxacin resistance, therapy was switched to ceftriaxone 2 g IV every 12 h (Table 2).

The patient's history included hospitalization 3 months ago for *Salmonella* bacteremia after an episode of gastroenteritis, which was treated with a 14-day course of ceftriaxone. At that time, stool cultures were negative, and abdominal imaging

Figure 1. Thoracic exhibiting a pleural effusion in the left hemithorax with a thickness of up to 2 cm and passive atelectasis
CT: Computed tomography

Table 1. Antibacterial minimum inhibitory concentration results for *Salmonella* spp. in the blood culture

Antimicrobial agent	Minimum inhibitory concentration (mg/mL)	Sensitivity
Amikacin	≤8	Resistant
Ampicillin	≤4	Sensitive, standard dose
Ampicillin/sulbactam	≤1/8	Sensitive, standard dose
Cefepime	≤1	Sensitive, standard dose
Ceftazidime	≤1	Sensitive, standard dose
Ceftriaxone	≤1	Sensitive, standard dose
Ciprofloxacin	<0.0625	Sensitive, standard dose
Ertapenem	≤0.25	Sensitive, standard dose
Gentamicin	≤2	Resistant
Imipenem	≤0.25	Sensitive, standard dose
Levofloxacin	≤0.5	Sensitive, standard dose
Meropenem	≤0.125	Sensitive, standard dose
Piperacillin/tazobactam	≤4/4	Sensitive, standard dose
Trimethoprim/sulfamethoxazole	≤2/38	Sensitive, standard dose

showed no abscess formation. During the current admission, her condition progressively deteriorated, requiring transfer to the intensive care unit. Follow-up thoracic CT revealed recurrent pleural effusion (8 cm) and multiple mediastinal lymph nodes. Pleural drainage was performed, though cultures were negative. Ceftriaxone therapy was continued.

Further evaluation for possible spondylodiscitis was planned, but MR imaging (MRI) with contrast could not be performed due to worsening renal function. Positron emission tomography imaging was scheduled; however, the patient's condition declined further, and she ultimately succumbed to her illness.

Literature Review

A comprehensive literature review was conducted with reference to the PubMed, Scopus, and Web of Science databases, covering studies published from database inception through May 2025. The search strategy employed the keywords "*Salmonella*" and "psoas abscess" and was restricted to adult patients (age ≥18 years). Only English-language case reports were considered, whereas pediatric cases were excluded.

From the retrieved literature, cases were screened for eligibility based on the availability of summary or full-text data. Extracted variables included demographic characteristics, clinical presentation, underlying risk factors, immune status, culture results, antimicrobial therapy, and clinical outcomes. A total of 33 cases were identified as such, of which 29 adult cases met the inclusion criteria for detailed analysis. An overview of the study selection process and the summarized case characteristics is illustrated in Figure 4.

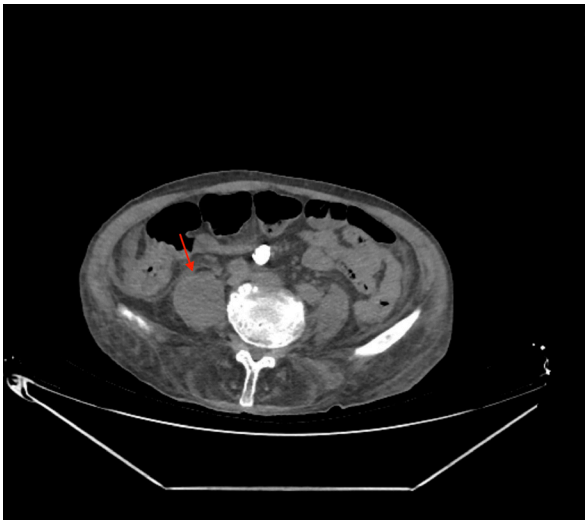

Figure 2. Abdominal CT showing a 43-mm fluid collection with gas formation in the right psoas muscle

CT: Computed tomography

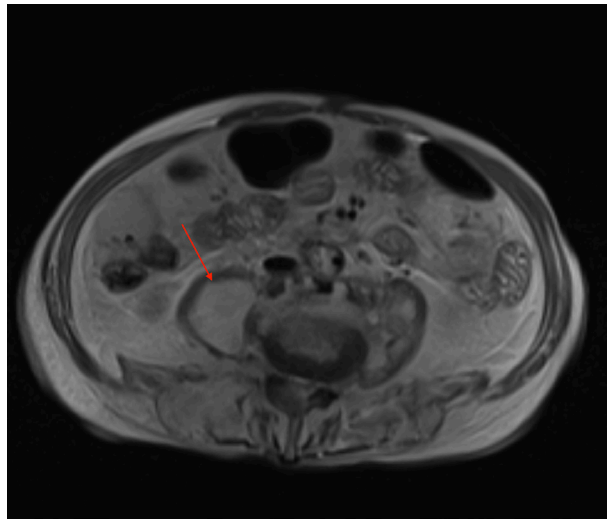

Figure 3. MRI cholangiography displays suspected collection areas suggestive of psoas abscess in both psoas muscles, reaching up to 9 cm

MRI: Magnetic resonance imaging

Table 2. Antibacterial minimum inhibitory concentration results for *Salmonella* spp. in the abscess culture

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Amikacin	≤8	Resistant
Ampicillin	≤4	Sensitive, standard dose
Ampicillin/sulbactam	≤1/8	Sensitive, standard dose
Cefepime	≤1	Sensitive, standard dose
Ceftazidime	≤1	Sensitive, standard dose
Ceftriaxone	≤1	Sensitive, standard dose
Ciprofloxacin	>1	Resistant
Ertapenem	≤0.25	Sensitive, standard dose
Gentamicin	≤2	Resistant
Imipenem	≤0.25	Sensitive, standard dose
Levofloxacin	>2	Resistant
Meropenem	≤0.125	Sensitive, standard dose
Piperacillin/tazobactam	≤4/4	Sensitive, standard dose
Trimethoprim/sulfamethoxazole	≤2/38	Sensitive, standard dose

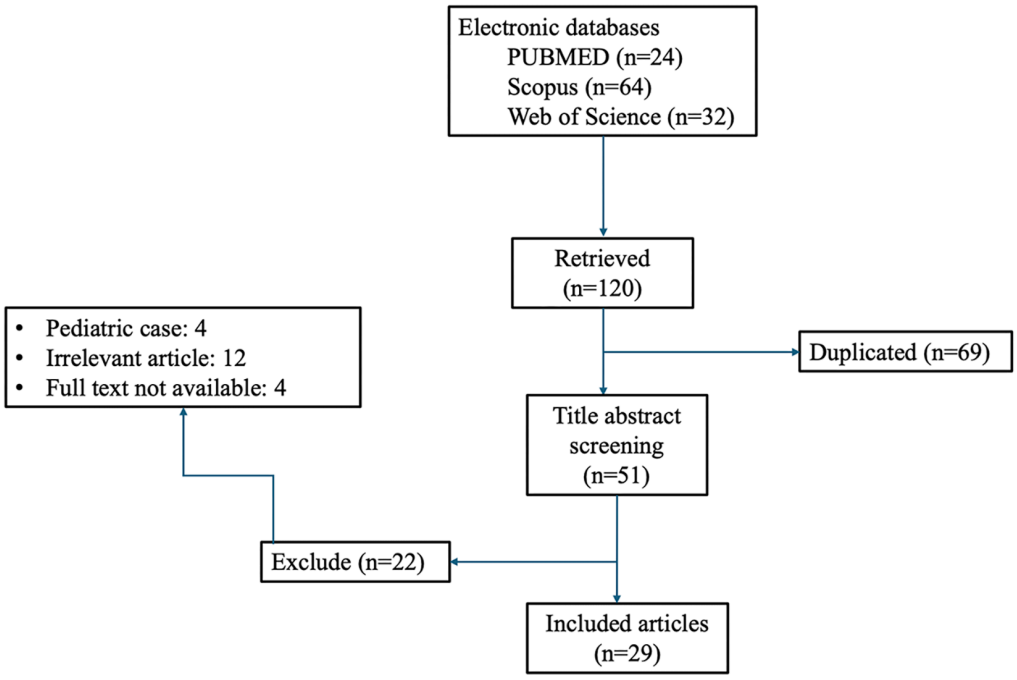

Figure 4. MRI cholangiography displays suspected collection areas suggestive of psoas abscess in both psoas muscles, reaching up to 9 cm
MRI: Magnetic resonance imaging

Discussion

Salmonella-induced psoas abscess is an exceptionally rare clinical entity. Our review of the English-language literature identified 33 reported cases, of which 29 adult cases with accessible summary or full-text data were analyzed. The mean patient age was 55.4 years, and 72% (n=21) of them were male. The most frequently reported symptoms were fever (65%, n=19), back pain (41%, n=12), and hip pain (38%, n=11). Commonly identified risk factors included diabetes mellitus (17%, n=5), steroid use (7%, n=2), and malignancy (7%, n=2), although 45% (n=13) of patients had no known underlying conditions (Table 3). In our case, the main risk factor was multiple myeloma, which is a hematologic malignancy associated with profound immunosuppression.

Psoas abscesses are typically classified as primary, arising from hematogenous or lymphatic spread, or secondary, resulting from contiguous spread of nearby infections[32]. In several cases, the distinction is challenging. In our review, concurrent infections such as vertebral osteomyelitis/spondylodiscitis (24%, n=7) and sacroiliitis/septic arthritis (21%, n=6) were identified, whereas 34% (n=10) had no additional infectious focus. Our patient had a prior episode of *Salmonella* bacteremia following gastroenteritis 3 months earlier, with no evidence of abscess formation at that time. This clinical course suggested hematogenous seeding as the likely mechanism of a primary abscess.

Imaging plays a central role in diagnosis. CT remains the gold standard owing to its high sensitivity and specificity, although MRI and ultrasound may be valuable, especially for early detection or in patients where radiation exposure is a concern[32]. Microbiological confirmation through blood and abscess cultures is critical for guiding targeted therapy[33]. In the reviewed cases, abscess cultures were positive in 59% (n=17), blood cultures in 55% (n=16), and both in 21% (n=6) of the patients. In our patient, both blood and abscess cultures grew *Salmonella* spp., although serotyping was not performed.

Optimal management generally requires a combination of antibiotics and drainage, either percutaneous or surgical. Reported antibiotic regimens include fluoroquinolones, ampicillin, trimethoprim/sulfamethoxazole, and third-generation cephalosporins[12,23]. In our review, drainage was performed in 79% (n=23) of the cases. Treatment duration varied between 5 weeks and 10 months, with most patients achieving full recovery. In the present case, intravenous ciprofloxacin was initiated based on blood culture results, but resistance was later detected in the abscess culture, necessitating a switch to ceftriaxone. Despite applying appropriate therapy and drainage, the patient's condition deteriorated, and she ultimately died.

Although most cases in the literature showed favorable outcomes, two fatalities were reported. One involved a previously healthy 56-year-old male with a perinephric abscess and aortic wall involvement, likely complicated by vascular compromise[6].

Table 3. Characteristics of patients with psoas abscess induced by *Salmonella*

Reference	Age/ gender	Symptoms	Risk factor(s)	Source of the positive culture	*Salmonella spp.*	Other infection focus	Drainage	Treatment	Outcome
Reichle et al.[5]	51/M	Fever and back pain	None	Blood, abscess, urine, aneurysm, and stool	*S. typhimurium*	Aortic wall aneurysm	Yes	Chloramphenicol*	Cured
Kanwar et al.[6]	56/M	Fever	None	Blood, abscesses, and urine	*S. enteritidis*	Perinephric abscess, aortic wall	Yes	Chloramphenicol*	Death
Yu[7]	63/F	Prolonged fever for two weeks	None	Abscess	*S.* group B	None	Yes	Ciprofloxacin*	Cured
Lortholary et al.[8]	40/F	Fever, back, and joint pain	History of typhoid fever and psoas abscess	Abscess	*S. typhi*	None	Yes	Following ceftriaxone and amikacin, and ciprofloxacin for 8 weeks	Cured
Inufusa et al.[9]	56/M	Fever, chills, and low-back pain	None	Abscess	*S. dublin*	Rupture of the infected abdominal aortic aneurysm	Yes	8 weeks*	Cured
Heyd et al.[10]	75/F	Left hip pain and fever	Steroid treatment for ITP	Blood and urine	*S. enteritidis*	None	Yes	Ciprofloxacin*	Cured
	74/F	Fever, right groin, hip, and upper thigh pain	Chronic steroid treatment for MG	Blood	*S. enteritidis*	None	Yes	Ciprofloxacin*	Cured
Carnevalini et al.[11]	63/M	Fever, abdominal pain	DM, abdominal aortic aneurysm rupture surgery	Abscess	*S. typhimurium*	Aorto-bisiliac graft infection, Abdominal aortic mycotic aneurysm	Yes	Ciprofloxacin 10 weeks	Cured
Shakespeare et al.[12]	32/M	Left lower back and left inguinal pain	None	Abscess	*S. typhi*	None	Yes	Cefotaxime 5 weeks	Cured
Jean et al.[13]	50/FM	Abdominal pain	Hemodylasis	Blood and abscess	*S. choleraesuis*	None	Yes	Imipenem 6 weeks	Cured
Altay et al.[14]	56/M	Abdominal and back pain, fever, cough, and sputum	DM hemodialysis, S. infection history	Blood, abscesses, and urine	*S. choleraesuis*	Lumbar osteomyelitis	Yes	Ciprofloxacin 6 weeks	Cured
Navin et al.[15]	21/F	Painful restriction of movement of the left hip	None	Abscess	*S. paratyphi A*	Sacroiliitis and iliac bone osteomyelitis	Yes	Following ciprofloxacin, TMP/SMX for 6 weeks	Cured
Reddix et al.[16]	36/F	Fever, left hip, thigh, and buttock pain	None	Abscess	*S. enterica*	Sacroiliac joint involvement	Yes	Ceftriaxone (4 weeks) and TMP/SMX (6 months)	Cured
Compain et al.[17]	64/M	Fever and right hip pain	Total left hip arthroplasty for osteoarthritis	Synovial fluid	Non-typhi *S.*	Septic arthritis of the hip	Yes	Ceftriaxone and ciprofloxacin*	Cured

Learch et al.[18]	75/M	Abdominal and back pain	DM	Blood and abscess	*S. enterica*	Aortic aneurysm, paravertebral abscess	Yes	No information	Cured
Zheng et al.[19]	42/M	Fever and back pain	None	Abscess	*S.* group B	Thoracal osteomyelitis	Yes	Following iv levofloxacin and TMP/SMX, moxifloxacin (oral) 6 weeks	Cured
Hirai et al.[20]	52/M	Fever and back pain	DM	Blood, epidural fluid, and stool	*S. altona*	Epidural abscess and spondylodiscitis	Yes	Following ceftriaxone and ciprofloxacin for 12 weeks	Cured
Kuo et al.[21]	52/M	Left hip pain	Aplastic anemia	Blood and abscess	*S.* O9 (Group D)	Osteomyelitis	Yes	Ciprofloxacin 10 months	Cured
Abu Bakar et al.[22]	66/F	Fever, epigastric pain that radiated to the back	None	Blood	*S. paratyphi* B.	Paraaortic abscess	No (It was denied by the patient)	Following Ceftriaxone (4 weeks), oral ciprofloxacin	Cured
Yanagisawa et al.[23]	53/M	Fever and right groin pain	HIV positivity	Abscess	*S. enterica* subsp. enterica serovar *Enteritidis*	None	Yes	Ciprofloxacin*	Cured
Aoyama et al.[24]	71/M	Fever and stupor	Gastric cancer	Blood	*S. choleraesuis* ssp.	None	No (Because of thrombocytopenia)	Ceftriaxone 2 weeks	Death
Farrar et al.[25]	65/M	Polyuria, polydipsia, back pain, and dysuria	DM	Blood and bone byopsia	*S. enterica*	Spondilodiscitis and an epidural abscess	Yes	Following meropenem, Fuscidic acid, and ertapenem for 8 weeks	Cured
Bhosale and Sanjay[26]	59/M	Abdominal pain	HT	Abscess	*S. parathyphi* A	None	Yes	No information	Cured
Peker et al.[27]	55/M	Hip pain, restriction of movements	Chronic renal failure	Abscess	*S.* spp.	Septic arthritis of the hip	Yes	Ciprofloxacin 6 weeks	Cured
Lucia et al.[4]	77/M	Hip pain	Prostate cancer	Blood	*S. enterica*	Lumbar osteomyelitis	No (It was denied by the patient)	Ceftriaxone (10 days), levofloxacin (8 weeks)	Cured
Ghazanfar et al.[28]	22/F	Back pain	None	Urine	*S. enterica*	Urine, septic arthritis	No	Ceftriaxone and levofloxacin 6 weeks	Cured
Ng and Heng[29]	80/M	Fever	History of intra-abdominal surgery (cholecystectomy)	Blood	*S. enteritidis*	None	Yes	No information	Cured
Mousselli et al.[30]	50/M	Fever, back pain, and hip pain	None	Blood	*S. enterica*	Epidural phlegmon	No	Ceftriaxone and levofloxacin (6 weeks)	Cured
Kumar et al.[31]	18/M	Fever and right hip pain	None	Blood	*S. typhi*	Sacroiliitis	No	Following ceftriaxone, ciprofloxacin*	Cured
Present case	65/F	Fever, nausea, and vomiting	Multiple myeloma	Blood and abscess	*S.* spp.	None	Yes	Ciprofloxacine (2 weeks), ceftriaxone (4 weeks)	Death

*Clear information is not given about the duration of treatment. **Antibiotic type not specified. M: Male, F: Female, DM: Diabetes mellitus, HT: Hypertension, HIV: Human Immunodeficiency Virus, TMP/SMX: Trimethoprim sulfamethoxazole, ITP: Immune thrombocytopenic purpura, MG: Myasthenia graves

The second occurred in a 71-year-old male with gastric cancer; treatment failure was likely influenced by inadequate drainage, a short antibiotic course, and immunosuppression[24]. In our patient, multiple myeloma-related immunosuppression, the emergence of ciprofloxacin resistance, and progressive clinical decline despite appropriate interventions likely contributed to the fatal outcome. Collectively, these cases emphasize the importance of timely diagnosis, effective drainage, and careful consideration of host factors and antimicrobial resistance in determining prognosis.

This report has certain limitations. First, the *Salmonella* strain was not serotyped, which restricted comparisons with previously published cases. Second, ciprofloxacin resistance could not be assessed at the molecular level, which limited our understanding of underlying resistance mechanisms in this context.

Conclusion

Salmonella-induced psoas abscess is an uncommon but clinically significant condition, and it has been reported in both immunocompetent and immunocompromised individuals. Although most patients achieve favorable outcomes with timely antibiotics and drainage, prognosis worsens with delayed diagnosis, antimicrobial resistance, or underlying immunosuppression. Clinicians should therefore maintain a high index of suspicion in cases of *Salmonella* bacteremia presenting with musculoskeletal symptoms to facilitate early recognition and optimal management.

Ethics

Informed Consent: In this case report, informed consent has been taken from the patient, and there is not any specific data in the manuscript identifying the patient.

Footnotes

Authorship Contributions

Surgical and Medical Practices: İ.Ö.K., H.T., Concept: Y.Ç.K., Design: Y.Ç.K., Data Collection or Processing: İ.Ö.K., H.T., Analysis or Interpretation: İ.Ö.K., H.T., Literature Search: Y.Ç.K., Writing: Y.Ç.K., İ.Ö.K., H.T.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

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