

Case Report

Septic Shock Secondary to Spontaneous Bacterial Peritonitis Caused by *Pasteurella multocida*: A Case Report and Review of the Literature

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Abstract: Spontaneous bacterial peritonitis (SBP) is a bacterial infection in the peritoneum commonly seen in the setting of cirrhosis and ascites. SBP is typically caused by gram-negative bacteria. *Pasteurella* is an organism typically associated with skin and soft tissue infections secondary to bites or scratches from domestic animals. We performed a literature review of all cases of *Pasteurella*-associated SBP to date. Due to the rarity of this clinical finding, there are a limited number of reported SBP cases due to *Pasteurella*. Our review showed that most associated cases are secondary to an animal wound and often present with hemodynamic instability. Furthermore, *Pasteurella* SBP has a high mortality rate when compared to the typical causative organisms. Herein, we present a case of septic shock secondary to spontaneous bacterial peritonitis caused by *Pasteurella multocida* in a patient with no evidence of dog or cat wounds. The patient was treated with antibiotics, but unfortunately required multiple pressors while in the hospital and he ultimately succumbed to his disease. This case not only demonstrates the importance of avoiding risk factors associated with *Pasteurella* SBP due to its high mortality rate, but also to maintain a high clinical suspicion for the infection in patients with seemingly no risk factors to initiate prompt treatment.

Keywords: Spontaneous Bacterial Peritonitis, Cirrhosis, Ascites, *Pasteurella*, Shock

1. Introduction

Spontaneous bacterial peritonitis (SBP) is an infection commonly seen in patients with cirrhosis with a prevalence of 12%. The most common causative organisms are gram-negative bacteria such as *Escherichia coli* and *Klebsiella pneumoniae*. To the best of our knowledge, there have only been 18 reported cases of peritonitis due to *Pasteurella* from 1975-2020. We performed a literature review of all *Pasteurella*-associated SBP cases to date to evaluate patient demographics, clinical course, and outcomes. The review demonstrated that nearly all documented cases of *Pasteurella*

SBP are caused by an inciting skin wound from a cat or dog bite or scratch. Additionally, *Pasteurella* SBP has a significant mortality rate. Here, we present a rare case of septic shock secondary to SBP caused by *Pasteurella multocida* in a patient with no evidence of skin wounds.

2. Case Description

A 55-year-old male with a past medical history significant for alcohol abuse was transferred to our hospital due to altered mental status and shortness of breath. At the outside hospital, he was found to be hypoglycemic and was intubated for airway protection before being transferred to our facility. On

presentation the patient was afebrile, tachycardic with a heart rate of 130 beats/minute, tachypneic with a respiratory rate of 30 breaths/minute, and hypotensive with a blood pressure of 107/67mmHg. Physical examination was significant for abdominal distension, dullness to percussion, and caput medusae. He also had scleral icterus and telangiectasias. There were no skin wounds to suggest any dog or cat bite.

Initial bloodwork revealed a normal white count of 4.3/uL, thrombocytopenia with a platelet count of 33K/uL, elevated bilirubin of 8.0mg/dL, low albumin of 2.6g/dl, and an elevated aspartate aminotransferase and alanine aminotransferase of 361U/L and 106U/L, respectively, consistent with decompensated liver cirrhosis. Lactic acid was elevated to 12.5mmol/L. Computed tomography (CT) of the abdomen and pelvis demonstrated possible shock bowel (hypoperfusion complex) with superimposed ileus, cirrhotic liver morphology with ascites, and a small right pleural effusion with bilateral airspace opacities.

The patient underwent diagnostic paracentesis which revealed a cell count of 8,347 polymorphonuclear leukocytes/mm³, consistent with spontaneous bacterial peritonitis (SBP). He subsequently received empiric antibiotic treatment with vancomycin, ceftriaxone, and metronidazole. Two out of two blood cultures grew *Pasteurella multocida* and the patient was continued on ceftriaxone. Unfortunately, his hospital course was complicated with septic shock requiring multiple pressors. Despite medical management, the patient expired.

3. Discussion

Spontaneous bacterial peritonitis (SBP) is an infection commonly seen in the setting of cirrhosis and ascites. It is diagnosed by a finding of ≥ 250 polymorphonuclear leukocytes/mm³ on paracentesis [1]. Common presenting

symptoms include abdominal pain, fever, and chills. Confusion, hypotension, and deteriorating renal function can also be signs of decompensated cirrhosis. Alternatively, patients with SBP may be asymptomatic [2]. As such, it is important to have a high clinical suspicion for the infection so that treatment can be initiated promptly.

The most common causative organisms of SBP are gram-negative bacteria such as *Escherichia coli* and *Klebsiella pneumoniae*. Gram-positive bacteria, especially the streptococcal species, are becoming more commonly implicated in SBP [1, 3]. *Pasteurella multocida* is classically associated with skin and soft tissue infections due to dog and cat bites and scratches. There is limited data regarding *P. multocida* as a causative agent for SBP. A literature review revealed that only one of fourteen cases of SBP due to *P. multocida* did not report significant animal contact [4]. Most cases of *Pasteurella* SBP are caused by bites or scratches from domestic animals [5]. Interestingly, our patient had no evidence of a wound from an animal that could have been the primary source of infection.

Overall, *Pasteurella* SBP has been rarely reported in literature. A PubMed search using the keywords “spontaneous + bacterial + peritonitis + Pasteurella” yielded a total of 18 cases of *Pasteurella*-associated peritonitis to date. (Papers were excluded from literature review if they were not specific to peritonitis or were not printed in English.) A review of the remaining 15 cases demonstrated that, as previously mentioned, they are most frequently associated with skin infections from dogs and cats (table 1). Furthermore, including our case, 4/16 patients died from complications due to this infection. Therefore, due to the unique increased risk of *Pasteurella* infections in cirrhotic patients’ secondary to dog and cat bites/scratches, it is important that these patients are cautious to avoid sources of infection [6].

Table 1. Literature review: patient characteristics and outcomes for *Pasteurella* SBP.

Reference	Patient age	Sex	Animals	Inciting wound	Hemodynamic instability on presentation	Ascites fluid cultures	Blood cultures	Outcome
Tamaskar [8]	48	Male	N/A	No	No	N/A	<i>Pasteurella multocida</i>	Full recovery
Lutz [9]	50	Female	Yes	No	N/A	<i>Pasteurella multocida</i>	N/A	Full recovery
Samarkos [10]	55	Male	Yes	No	No		<i>Pasteurella multocida</i>	Full recovery
Correia [11]	58	N/A	N/A	N/A	Yes	<i>Pasteurella multocida</i>	<i>Pasteurella multocida</i>	N/A
Wallace [12]	58	Male	Yes	Yes	Yes	N/A	<i>Pasteurella multocida</i>	Stable. Listed for liver transplant
Antony [13]	48	Female	Yes	Yes	No	<i>Pasteurella multocida</i>	N/A	Full recovery
Hey [5]	47	Male	Yes	Yes	Yes	<i>Pasteurella multocida</i>	<i>Pasteurella multocida</i>	Stable
Gunathilake [14]	49	Female	No	Yes	Yes	<i>Pasteurella multocida</i>	Negative	Death
Ashley [15]	56	Female	Yes	Yes	Yes	<i>Pasteurella dagmatis</i>	<i>Pasteurella dagmatis</i>	Death
Beales [16]	43	Male	No	No	No	<i>Pasteurella multocida</i>	Sterile	Full recovery
Honberg [17]	12	Male	N/A	N/A	Yes	<i>Pasteurella multocida</i>	Negative	Recovery
Koch [7]	66	Female	Yes?	Yes	No	<i>Pasteurella multocida</i>	N/A	Full recovery, but malignancy found
Noble [18]	44	Male	No	N/A	N/A	N/A	<i>Pasteurella ureae</i>	Full recovery
Jacobson [19]	61	Male	No	Yes	No	Negative	<i>Pasteurella multocida</i>	Full recovery
Vakil [20]	43	Man	No	Yes	Yes	<i>Pasteurella multocida</i>	<i>Pasteurella multocida</i>	Death



Figure 1. CT of the abdomen and pelvis showing shock bowel.

Due to the high mortality rate of SBP, specifically cases caused by *P. multocida*, it is crucial to initiate prompt treatment [6, 7]. Rifaximin is an antibiotic commonly used for hepatic encephalopathy prophylaxis in cirrhotic patients. Studies have also shown that it can effectively prevent SBP. However, one study by Lutz et al. described a patient under treatment with rifaximin who subsequently developed *Pasteurella* SBP [8]. As such, it is important to maintain a high clinical suspicion for SBP in patients already on prophylactic medication.

Common treatment options for *Pasteurella* include penicillin, amoxicillin, cephalosporins, and fluoroquinolones [3]. Our patient, received immediate treatment with ceftriaxone; however, due to growing antibiotic resistance, it is important to evaluate medical management on a case-by-case basis so appropriate treatment can be started to reduce morbidity and mortality associated with SBP.

4. Conclusions

Spontaneous bacterial peritonitis is a highly lethal infection commonly seen in cirrhotic patients. There are few reports in the literature documenting SBP caused by *Pasteurella multocida*, an organism most commonly associated with skin and soft tissue infections due to animal wounds. As such, cirrhotic patients should be surveyed for evidence of skin wounds when presenting with abdominal pain or nonspecific signs of infection. Furthermore, this case demonstrates the importance of a high clinical suspicion for *Pasteurella* SBP even in the absence of an inciting wound. Due to the high mortality rate of SBP in patients with cirrhosis, it is important to promptly diagnose the infection and begin the appropriate treatment.

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