Fatal *Pasteurella dagmatis* peritonitis and septicaemia in a patient with cirrhosis: a case report and review of the literature

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Pasturella species cause zoonotic infections in humans. Human pasturella infections usually manifest as local skin or soft tissue infection following an animal bite or scratch. Systemic infections are less common and are limited to patients at the extremes of age or those who have serious underlying disorders, including cirrhosis. Most human pasturella infections are caused by the multocida species. We report a case of *Pasteurella dagmatis* peritonitis and septicaemia in a patient with cirrhosis. The infection followed a scratch inflicted by a pet dog. Despite appropriate antibiotic treatment the infection proved fatal. Spontaneous bacterial peritonitis caused by *P dagmatis* has not been reported previously. *Pasteurella dagmatis* is a relatively recently described species, which is rarely reported as a human pathogen. This species may be misidentified unless commercial identification systems are supplemented by additional biochemical tests.

A 56 year old woman with biopsy confirmed alcoholic cirrhosis and known portal hypertension with ascites was admitted to hospital complaining of worsening ankle swelling and abdominal distension, abdominal pain, and spontaneous bruising over the previous week. She was at that time drinking one third of a bottle of sherry (seven to eight units of alcohol) each day. She reported having been scratched on her left arm by her dog one week previously. She was found to be febrile (37°C) and jaundiced with eight units of alcohol) each day. She reported having been scratched on her left arm by her dog one week previously. She was found to be febrile (37°C) and jaundiced with her pulse rate was 95 beats/minute, her blood pressure was 115/45 mm Hg, and she had a tender abdomen distended with ascites and covered in ecchymoses. Her left arm was erythematous and warm and the overlying skin was indurated.

Laboratory tests showed a normal white blood cell count (8.2 x 10^9/litre; normal range, 4.0–10.0), deranged liver function tests (bilirubin, 357 μmol/litre; normal range, 0–17; alkaline phosphatase, 153 U/litre; normal range, 40–130; aspartate aminotransferase, 48 U/litre; normal value, > 30), and abnormal synthetic liver function (albumin, 31 g/litre; normal range, 35–50 g/litre; prothrombin time, 32 seconds; normal range, 10–14.5).

Abdominal paracentesis yielded blood stained fluid. The ascitic fluid protein was 6.2 g/litre (indicating an exudate), albumin was 45 g/litre, and the red cell count was > 2160/μl. The sample contained no white blood cells and the Gram stain revealed no organisms.

Treatment was begun with intravenous benzylpenicillin, ciprofloxacin, and metronidazole.

Over the course of the next few hours the patient’s condition worsened with a high fever, tachycardia, and hypotension, and despite vigorous attempts at resuscitation she deteriorated very rapidly and died 24 hours after admission.

**MICROBIOLOGY**

Specimens of blood were inoculated into aerobic (vented) and anaerobic (unvented) media (BacT-Alert; Cambridge, UK). Gram negative coccobacilli were isolated from both aerobic and anaerobic bottles after nine and 12 hours, respectively. Ascitic fluid was inoculated into blood culture media as above and also cultured directly on to MacConkey agar, 5% horse blood in Columbia agar (Oxoid, Basingstoke, UK), and chocolate blood agar incubated at 37°C in air and 5% CO2, in addition to Anaerobe Agar (BioConnections, Shipley, UK) incubated at 37°C in an anaerobic cabinet (Don Whitley, Shipley, UK). Direct culture and enrichment cultures of ascitic fluid also grew a Gram negative coccobacillus. These isolates were identified using API 20 NE (Bio-Merieux UK Ltd, Basingstoke, UK). A presumptive identification of *Pasteurella multocida* was made and the isolate was referred to the laboratory of health care associated infection, Health Protection Agency, Colindale, London, UK. Analysis was carried out using the Sherlock microbial identification system (MIDI Inc, Newark, Delaware, USA), with additional biochemical tests, and the isolate identified as *Pasteurella dagmatis*. The organism was sensitive in vitro to penicillin, gentamicin, and ciprofloxacin (VITEK system; Bio-Merieux UK Ltd).

**DISCUSSION**

Spontaneous bacterial peritonitis occurs in approximately 15% of patients with cirrhotic liver disease and ascites. The causative organisms are usually enteric Gram negative bacilli or streptococci.1,3 We report the first case of spontaneous bacterial peritonitis and septicaemia caused by an unusual organism, *P dagmatis*, following a scratch from a domestic animal.

*Pasteurella* species are Gram negative coccobacilli that commonly colonise the oropharynx of healthy domestic animals—especially cats (90%) and dogs (66%).4,5 They are well recognised as veterinary pathogens, and over recent years, increasingly commonly as a cause of human infection. *Pasteurella multocida* is the most frequently reported species.

In 1985, members of the genus *pasteurella* were reclassified into 11 species including *P multocida* and *P dagmatis*. Pasteurella multocida and *P dagmatis* cannot be distinguished morphologically and the API 20 NE system, like most commercially available identification systems, cannot distinguish between the two because *P dagmatis* is not in its current database. This explains why the organism in our patient was not immediately recognised as *P dagmatis*. It may also explain the low frequency of reports of *P dagmatis* infection. A positive urease test distinguishes *P dagmatis* from *P multocida*, but...
The most common complication is abscess formation or soft tissue infection following an animal bite or scratch. In a small number of cases, infection occurs in individuals who have apparently had no animal exposure and develop a variety of systemic infections such as bacteremia, meningitis, brain abscesses, spontaneous bacterial peritonitis, or intra-abdominal abscesses. Even without a history of animal exposure it is thought that an animal reservoir is the major source of pasteurella infections.9–11

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“Pasteurella infection usually manifests as a local skin or soft tissue infection following an animal bite or scratch. The most common complication is abscess formation or tenosynovitis.”11

Pasteurella infection is usually easily identified in patients who have had only casual exposure to farm animals or pets, with the most common site of the infection in these cases being the respiratory tract.9–11 In a small number of cases, infection occurs in individuals who have apparently had no animal exposure and develop a variety of systemic infections such as bacteremia, meningitis, brain abscesses, spontaneous bacterial peritonitis, or intra-abdominal abscesses. Even without a history of animal exposure it is thought that an animal reservoir is the major source of pasteurella infections.9–11

Life threatening systemic infection is uncommon and usually only occurs in the immunocompromised,12 including patients with cirrhosis, and those at the extremes of age.

Penicillin is the drug of choice for P multocida infections. The organism is sensitive in vitro to chloramphenicol, tetracycline, and the fluoroquinolones, which may be suitable alternatives in the case of penicillin allergy. Pasteurella dagmatis appears to have a similar antibiotic susceptibility pattern, but information in the literature is scanty. Even with appropriate treatment, P multocida bacteraemia carries an overall mortality rate of 31%.13

In our patient, P dagmatis caused spontaneous bacterial peritonitis, septicemia, and ultimately death. In patients with cirrhosis and ascites, only one third of cases of spontaneous bacterial peritonitis are caused by non-enteric organisms.14 Pasteurella multocida as a causative organism is particularly rare, with only 15 documented cases.15–18 There are no previous reports of P dagmatis in this setting.

Pasteurella infection should be suspected as a cause of spontaneous bacterial peritonitis and septicemia in patients immunocompromised by cirrhosis, especially if there is a history of exposure to domestic animals. In view of the high mortality, appropriate antibiotic treatment should be instituted as soon as possible, and first line antibiotic treatment should include a β lactam agent. Speciation may not influence clinical management, but accurate identification of pasteurella to species level will help characterise the prevalence, antibiotic susceptibilities, and pathogenic potential of P dagmatis.

**REFERENCES**


