

Deadly case of *Pasteurella multocida* aortitis and mycotic aneurysm following a cat bite

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Abstract

Animal bites are frequently encountered in the emergency department (ED). Aortitis leading to mycotic abdominal aortic aneurysm is a rare and potentially deadly complication of *Pasteurella multocida* (*P. multocida*) following an animal bite. We present the case of a 68-year-old male who presented to the ED after falling at home. He complained of weakness and abdominal pain. He was in septic shock and was treated empirically with broad-spectrum antibiotics and intravenous fluids. He reported previous antibiotic treatment of a cellulitis secondary to a cat bite injury to his right thumb four weeks prior. Abdominal ultrasound and subsequent computed tomography scan revealed a leaking mycotic abdominal aneurysm that was surgically repaired. Blood cultures and aortic wall tissue cultures grew *P. multocida*. Given how common animal bite presentations are in the ED, this case highlights the need to consider aortitis and mycotic abdominal aortic aneurysm in an unwell patient with an animal bite.

Key words: Mycotic aneurysm; Emergency department; Cat bite; *Pasteurella multocida*; Aortitis

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Core tip: Mammalian bites are common and represent a large number of emergency department visits. Emergency physicians are well versed in identifying and treating early cellulosic complications of animal bites. The delayed sequelae of cat bites, aortitis and mycotic

abdominal aneurysm, are important to consider when assessing sick patients with a recent bite injury. Early recognition of this pathology could expedite optimal care for these patients.

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INTRODUCTION

Animal bites are very common injuries representing 330000 emergency department (ED) visits per year in the United States resulting in 10000 hospitalizations and twenty deaths^[1]. Among all animal bites, cat bites (3%-15%) are less common than dog bites, but are more likely to become infected (28%-80% vs 3%-18%, respectively)^[2,3]. Emergency physicians are acutely aware of the skin and soft tissue infections that can arise from mammalian bites. However, aortitis and mycotic aneurysm as a delayed sequelae of cat bite injuries caused by *Pasteurella multocida* (*P. multocida*) has not been well described in the emergency medicine literature. *P. multocida* is highly virulent^[4] and can seed the aorta causing aortitis—an inflammation of the aortic wall.

CASE REPORT

A 68-year-old male presented to an ED after falling at home. He complained of weakness and generalized abdominal pain. Additional history revealed weight loss of nearly ten kilograms in two weeks and chills without documented fevers. His medical history was unremarkable except for heavy alcohol use. He reported taking no medications. Four weeks prior, he was treated with an antibiotic for a cellulitis secondary to a cat bite to his right thumb with apparent resolution.

Physical exam revealed an unwell-appearing man. Upon arrival at triage, his blood pressure was 80/60 mmHg, heart rate of 120, temperature 36.4 °C, with an oxygen saturation of 86%. He was wheezy on auscultation. His abdomen was soft and diffusely tender without peritoneal signs. His cardiac and neurological exams were normal. There was no sign of residual infection from his cat bite on his extremity. He was resuscitated with two liters of normal saline.

Pertinent laboratory investigations revealed a white blood cell count of $19.0 \times 10^9/L$, hemoglobin of 105 g/L and platelets of 60 g/L. His lactate was markedly elevated at 8.5 mmol/L. He had renal failure with a creatinine of 197 µg/L with an elevated urea of 31 mmol/L. He had a transaminitis with an alanine transaminase of 53 U/L, aspartate transaminase of 84 U/L, and a direct bilirubin

of 23 µmol/L. His chest X-ray was normal. Bedside ultrasound was not performed.

The patient was presumed to be septic and intravenous piperacillin-tazobactam (4.5 g) was initiated. He required additional fluid boluses for a total of four liters due to hypotension. The patient was admitted under the critical care service and an abdominal ultrasound was ordered to assess for the etiology of his transaminitis and weight loss.

The ultrasound revealed a large abdominal aortic aneurysm measuring 15.0 cm × 10.0 cm × 8.6 cm. A non-contrast computed tomography was obtained which suggested rupture of the aortic aneurysm. The patient was taken to the operating room where the aortic wall was noted to be inflamed and friable. It was repaired with a tube graft. The aortic wall was sent to microbiology and grew *P. multocida*. Two blood cultures taken on initial presentation grew the same organism.

The patient was treated post operatively with a course of Penicillin G. On post-operative day 13 his condition deteriorated and he developed septic shock and died in the intensive care unit.

DISCUSSION

This case highlights a rare and deadly complication from a cat bite-aortitis and resultant mycotic aneurysm. Aortitis can be divided into non-infectious and infectious etiologies. Non-infectious causes predominate and are associated with rheumatologic conditions such as large vessel vasculitides and systemic lupus erythematosus^[5]. Infectious aortitis is most commonly associated with *Salmonella* and *Streptococcal* species^[5]. A study of microbial isolates from cat and dog bites found that *Pasteurella* species were most prevalent in cat (75%) and dog (50%) bites^[3]. In particular, the *P. multocida* subspecies predominated in cats and is an important potential cause of infectious aortitis due to bite injuries.

Mycotic aneurysms are rare, comprising approximately 3% of all abdominal aortic aneurysms at autopsy^[6]. Infectious aortitis, if left untreated, often progresses to mycotic aneurysm^[7]. Mycotic aneurysms can also arise from non-aneurysmal vessels^[7]. Bacterial seeding most often occurs *via* the vasa vasorum in vessels with pre-existing pathology such as an atherosclerotic plaque or aneurysm^[5].

The patient's pathology confirmed the presence of atherosclerosis, though it is unknown whether he had a pre-existing aneurysm. Given the duration of his symptoms, we speculate that he developed infectious aortitis through bacterial seeding and subsequently developed a mycotic aneurysm.

Clinical manifestations of mycotic aneurysms are often non-specific. The most common features are fever, chest, back, or abdominal pain, palpable abdominal mass, and leukocytosis^[8]. The patient complained of vague abdominal pain and was systemically unwell. Early diagnosis and management is essential^[5]. Even

with aggressive treatment including empiric antibiotics and surgical intervention, mortality remains high due to frequent aortic rupture^[9]. At the time of his surgery, the patient's aneurysm had ruptured into the retroperitoneum. He succumbed to severe sepsis nearly two weeks post-operatively likely attributable to an infected aortic bed and insufficient source control. This highlights the fastidiousness and virulence of *P. multocida*.

Emergency physicians must also be cognizant of patients who may be particularly vulnerable to complications of animal bites. The patient's self-reported "heavy" alcohol use may have predisposed him to such severe illness. One review found that all patients who died as a result of infections such as bacteremia, meningitis, or necrotizing fasciitis secondary to *P. multocida* were relatively immunosuppressed (e.g., had a history of alcohol abuse or malignancy)^[10]. All patients in the three published case reports of mycotic aneurysms secondary to *P. multocida* had a history of alcohol use and/or liver cirrhosis^[11,12]. Inquiring about risk factors for immunosuppression is essential when assessing the risk for severe complications after a cat bite injury.

This case describes infectious aortitis and resulting mycotic aneurysm secondary to an exposure to *P. multocida* from a cat bite. We suspect that the non-dermal complications of cat bites are underappreciated in the ED. Aortitis is a rare and delayed complication of pasteurellosis and should be considered in a septic patient with a history of a bite injury in an immunocompromised host. A high index of suspicion is necessary to facilitate early imaging, antibiotics, and surgical management. Given how frequently animal bites are encountered in the ED, emergency physicians should be aware of aortitis and mycotic aneurysm as a delayed sequelae of cat bites.

COMMENTS

Case characteristics

A 68-year-old man with a history of heavy alcohol use presents after sustaining a fall with weakness and generalized abdominal pain increasing over a two-week period. He had a history of a cat-bite injury to his finger four weeks prior to his presentation.

Clinical diagnosis

Vitals consistent with systemic inflammatory response syndrome and a diffusely tender abdomen with no signs of peritonitis.

Differential diagnosis

Intra-abdominal infection (e.g., appendicitis, cholecystitis), ischemic colitis, ischemic bowel, abdominal aortic aneurysm rupture.

Laboratory diagnosis

White blood cell count of $19.0 \times 10^9/L$, hemoglobin of 105 g/L and platelets of 60 g/L. Lactate at 8.5 mmol/L. Creatinine of 197 $\mu g/L$ with an elevated urea of 31 mmol/L. He had a transaminitis with an alanine transaminase of 53 U/L, aspartate transaminase of 84 U/L, and a direct bilirubin of 23 $\mu mol/L$.

Imaging diagnosis

Ultrasound revealed a large abdominal aortic aneurysm measuring 15.0 cm \times

10.0 cm \times 8.6 cm. A non-contrast computed tomography was obtained which suggested rupture of the aortic aneurysm.

Pathological diagnosis

Ruptured mycotic abdominal aortic aneurysm secondary to *Pasteurella multocida* (*P. multocida*).

Treatment

Surgical washout of the aortic bed, tube grafting, and intravenous antibiotics.

Related reports

Aortitis represents a spectrum of disease that can arise as a result of infectious and non-infectious causes. At its extreme, infectious aortitis can lead to a mycotic aneurysm which has a high propensity to rupture.

Term explanation

Mycotic aneurysm refer to an abnormal dilation of a vessel secondary to infectious and non-infectious causes.

Experiences and lessons

Mycotic aneurysm as a consequence to exposure to *P. multocida* is a rare, potentially deadly, and delayed consequence of mammalian bites. The delayed sequelae of bites should be considered when managing patients with an unspecified source of sepsis.

Peer-review

The authors reported a rare case, apparently to be the third case in emergency medicine literature of mycotic abdominal aortic aneurysm. This article is very interesting and useful for the reader.

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