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Ruptured mycotic common iliac aneurysm due to *Capnocytophaga canimorsus*, acquired from dog saliva: A case report

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ABSTRACT

INTRODUCTION: Mycotic arterial aneurysm occurs secondary to infection of the arterial wall Dubois et al. (2010). It is a serious clinical condition associated with significant morbidity and mortality. Various pathogens can be responsible but the most commonly isolated causative organisms are *Staphylococcus* spp. and *Salmonella* spp. Brown et al. (1984). An extremely uncommon causative pathogen is *Capnocytophaga canimorsus*, a commensal bacterium found in the normal gingival flora of canines.

PRESENTATION OF CASE: We describe the case of a ruptured mycotic common iliac aneurysm presenting with acute haemodynamic instability and femoral nerve impairment due to compression secondary to extensive haematoma. Rupture was preceded by a four-week history of left hip/groin discomfort with an abrasion to the left upper limb exposed to dog saliva in the weeks prior to symptom onset. Open debridement, revascularisation, and aggressive antimicrobial therapy was utilised with microbiological culture revealing *Capnocytophaga canimorsus* as the causative pathogen.

DISCUSSION: Successful repair was achieved surgically with a prosthetic bypass, followed by a 6-week course of intravenous antibiotics. Lifelong oral suppressant antibiotic treatment was then commenced. At 6-month follow up, the patient was free from clinical or radiological recurrence of infection or aneurysm.

CONCLUSION: This case highlights an extremely rare aetiology for ruptured common iliac aneurysm in the form of *Capnocytophaga canimorsus*. It highlights the importance of a thorough history, including pet exposures, for patients with infected aneurysms and the need to ensure appropriate specimens are collected when a mycotic aneurysm is suspected.

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1. Introduction

Mycotic aneurysms were first described by Osler in a patient with multiple aneurysms of the aortic arch as a complication of endocarditis [1]. In vascular surgery, this term has been utilised for any aneurysm secondary to infection, regardless of the pathogenesis [2]. Several risk factors have been identified for the development of infected aneurysms including antecedent infection, impaired immunity, arterial injury, and atherosclerosis [3–5]. The organisms with the greatest affinity for the arterial wall are staphylococcus spp. and salmonella spp. [4]. An extremely rare entity for the development of a mycotic arterial aneurysm is *Capnocytophaga canimorsus*, a commensal organism found in the mouths of dogs and cats.

We present the first case report of a ruptured primary iliac mycotic aneurysm due to *C. canimorsus*. This work has been

reported in line with the Surgical Case Report (SCARE) guidelines [6].

2. Presentation of case

An 86-year-old female presented to a regional hospital complaining of progressively worsening left iliac fossa (LIF) pain over the preceding four weeks, with acute deterioration on the day of presentation. Her past medical history included previous aortic valve repair (AVR; porcine) as well as bilateral total hip joint replacements (THR) two years prior. She had no other significant comorbidities and maintained an active lifestyle involving daily walks. She denied fevers or rigors but complained of ongoing lethargy. In the weeks prior to symptom onset, her golden retriever had scratched her left forearm while the wound was exposed to canine saliva on several occasions. Similar events had also occurred in the past.

At the time of presentation, her hip pain had progressed to the point where she could no longer weight bear. She was tachycardic (110–120 beats per minute), hypotensive (systolic blood pressure

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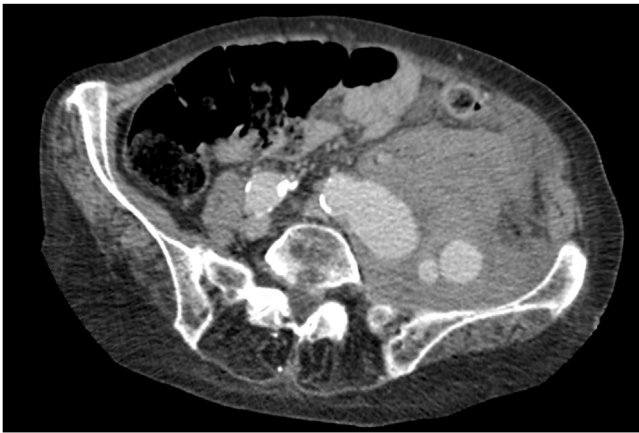


Fig. 1. Ruptured left common iliac artery aneurysm with active extravasation and a large retroperitoneal haematoma.

<95 mmHg) and had a low grade pyrexia. Examination revealed significant tenderness to the left iliac fossa without features of peritonitis while a significant left femoral nerve impairment was identified.

Laboratory investigations indicated an inflammatory picture with a white cell count (WCC) of $19 \times 10^9/L$ and a c-reactive protein (CRP) of 160 mg/L. Computed tomography (CT) of the abdomen and pelvis revealed a ruptured left common iliac artery aneurysm with active extravasation and a large retroperitoneal haematoma (Fig. 1). A tortuous arterial tree was identified with heavy atherosclerotic burden of the distal aorta and bilateral iliac arteries.

The patient was resuscitated and transferred 700 km by air to a tertiary centre with the plan for urgent operative intervention.

Endovascular aneurysm repair (EVAR) was considered but the tortuosity and heavy atherosclerotic burden of her vasculature aligned to the query regarding an infective aetiology led to open intervention. Pre-operative broad spectrum antibiotics were prescribed in the form of Ceftriaxone 1 g IV and Metronidazole 500 mg IV. Under a general anaesthetic, in a supine position, a mid-line laparotomy was performed with left common iliac exposure and control obtained utilising an infra renal clamp. Features of inflammation related to the site of aneurysm rupture were present raising a high level of suspicion for an infective aetiology. Samples were sent for microscopy, culture, and sensitivity (MCS) with extensive washout and debridement performed. She subsequently underwent poly-tetra-fluoro-ethylene (PTFE) graft repair from the common iliac artery origin to the iliac bifurcation. Autologous graft was considered but the patient's condition and age were felt to be contraindications. She was extubated following completion of intervention and transferred to the ICU for ongoing care.

Culture of the intraoperative sample revealed abundant *C. canimorsus* for which the infectious disease team was consulted. The organism was susceptible to a third generation cephalosporin in the form of ceftriaxone. A six week course of intravenous ceftriaxone was commenced, followed by lifelong oral suppressive therapy with amoxicillin/clavulanic acid 875/125 mg daily. In light of the confirmed diagnosis of a mycotic aneurysm, consideration was given to explantation of the PTFE graft with utilisation of autologous vein. However, given the risks associated with a redo laparotomy and lower limb deep vein harvest, this was not deemed to be appropriate in this case. Additional investigations were performed including a trans-thoracic echocardiogram. This did not highlight any vegetation's to either the native or porcine valves. Furthermore, a positron emission tomography CT (PET-CT) was performed with a heterogeneous density mass of the left pelvis and left flank identified. This had generally low moderate intensity fludeoxyglucose

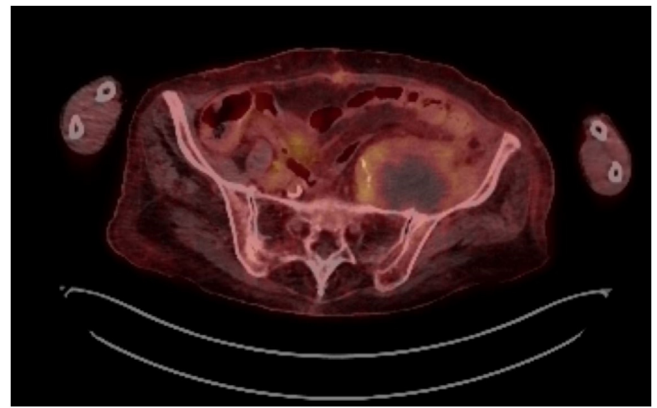


Fig. 2. Positron emission tomography CT (PET-CT) was performed with a heterogeneous density mass of the left pelvis and left flank identified.

(FDG) uptake with central photopenia consistent with organising haematoma while low grade infection could not be excluded (Fig. 2).

Aside from extensive investigations and antibiotic therapy, the primary limiting factor in recovery was a femoral nerve neuropraxia due to compression from the large retroperitoneal haematoma. This required significant assistance in the activities of daily living. In light of this, she required further care in geriatrics rehabilitation in the metropolitan area. During this time, she underwent surveillance via a further CT of the abdomen and pelvis which highlighted satisfactory graft appearance with ongoing reduction in haematoma size (Fig. 3). She was deemed suitable for transfer to a step down care facility near her primary domicile approximately six weeks post-operatively.

At six month follow up, the patient was free from clinical or radiological recurrence of infection or aneurysm but is still recuperating from femoral nerve neuropraxia.

3. Discussion

Mycotic aneurysms are uncommon with complex diagnostic and treatment strategies required [2]. An extremely rare causative pathogen is *C. canimorsus*, a commensal bacterium found in the normal gingival flora of dogs. It is a fastidious, slow-growing, facultatively anaerobic, gram-negative bacillus. Infections by the organism usually occur through breaches in the skin or the mucosal barrier. It generally affects patients who are immunocompromised. However, as highlighted in this case, occasionally immunocompetent people may become infected. Previously, it has been identified as the causative organism in cases of infective endocarditis as well as cerebral and sacral abscesses [7]. However, mycotic aneurysm to the arterial system due to *C. canimorsus* has been rarely reported with Chu et al. (2005) reporting the first case of a contained rupture of an aortic aneurysm due to canine saliva exposure [8].

Zoonotic mycotic aneurysms are not just limited to *C. canimorsus*. Laohapensang et al. [9] highlighted the case of a mycotic abdominal aortic aneurysm secondary to *Streptococcus suis* (a recognised pathogen in pigs) which was transmitted via the consumption of unprocessed pork [9]. *Pasteurella multocida*, part of the normal oral flora of many animals including cats and dogs, has also been identified as the responsible pathogen for mycotic abdominal aortic aneurysms [10]. Hadou et al. [11] also reported on zoonosis resulting in a mycotic aneurysm in the form of *Yersinia pseudotuberculosis*, acquired via the consumption of non-pasteurised milk [11]. Found in numerous wild and domestic animals, transmission occurs via the gastrointestinal tract while it typically results in mesenteric lymphadenitis. This case, aligned to

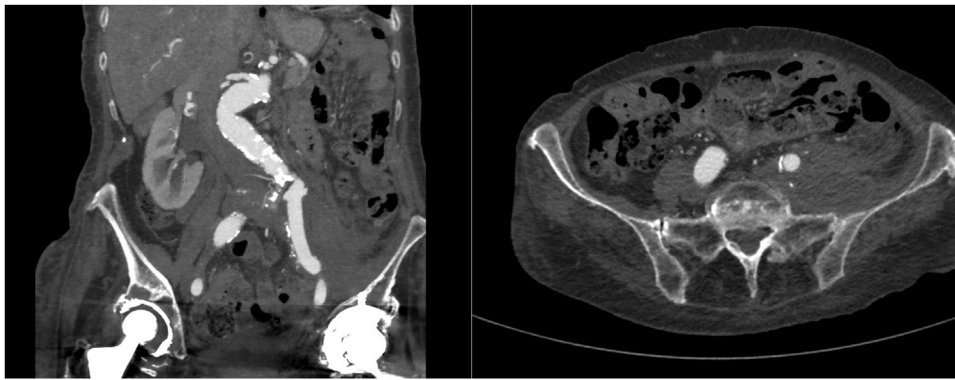


Fig. 3. Satisfactory graft appearance with ongoing reduction in haematoma size.

those aforementioned examples, highlights the necessity for consideration of animal/pet exposures when formulating a complete history for a patient with a suspected infected aneurysm.

The management of infected aneurysms is extremely complex with hospital mortality rates varying from 16 to 44% [12]. Much of the literature is based on case reports and case series while a randomised controlled trial has not been performed on this patient group to delineate optimal treatment strategies. Traditionally, they have been treated via open debridement and repair although endovascular management is being increasingly proposed. The avoidance of an extensive peri-aortic/iliac dissection, with a likely reduced duration, that endovascular intervention provides has resulted in the increasing utilisation of EVAR for mycotic aneurysms. However, this does not resolve the localised infectious burden with antibiotics relied upon. Hsu et al. [13] described 46 patients with infected mycotic aortic aneurysms (without rupture) whereby 35 underwent open debridement with in-situ revascularisation while 11 were managed solely via antibiotic therapy. This highlighted a significantly higher 12-month mortality rate in those managed without operative intervention (59% vs. 29%) while 30-day mortality was also identified as being significantly higher in those who underwent emergency surgery as compared to elective (36% vs. 0%) [13].

In-situ revascularisation with prosthetic graft material such as PTFE creates a significant concern regarding the potential for the development of a prosthetic graft infection despite the utilisation of copious volumes of irrigation. The development of a prosthetic graft infection is a negative predictor for patient outcomes with a mortality rate of up to 70% [12]. This was highlighted by Hsu et al. [13] who identified that in those who developed a prosthetic graft infection following intervention for a mycotic aneurysm, mortality was 100% at 12 months [13]. In the acknowledgement of such a significant risk, the utilisation of autologous vein for revascularisation in an infected field has been promoted. Ehsan et al. [14] investigated autologous deep vein reconstruction for arterial and prosthetic graft infection and concluded that it was an excellent conduit in the presence of infection. It both reduced recurrent infection as well as the risk of graft rupture with a subsequent reduction in mortality [14]. In this case, while it was a consideration following the identification of *C. canimorsus*, the significant risk of further operative intervention aligned to the patient's wishes for nil further major operative interventions led to the PTFE graft remaining in situ with lifelong antibiotics prescribed.

The outcome of mycotic aneurysms is influenced by several variables. Patient co-morbidity, presentation of the disease, treatment choice and organism type are among the most important. Explantation surgery is potentially curative but highly morbid. Conservative therapy alone, or endovascular exclusion and antibiotic therapy may give long term results in some, but others rapidly deteriorate

using this approach. Furthermore, once a conservative route has been decided upon, if it is not effective, the patient's condition may deteriorate past the point where they are able to survive a more aggressive approach. Predicting who is likely to do well with each approach would aid management of these complex patients. It is likely that the causative organism plays an important role but with most units only experiencing small numbers of affected patients and uncommon pathogens being isolated quite regularly, it is difficult to build a good knowledge of the virulence of each pathogen. The formation of a national registry to observe the progress of all mycotic aneurysms is indicated. This case is reported in line with the SCARE guideline [15].

4. Conclusion

This case highlights the need for a high index of suspicion for a zoonotic pathogen when a mycotic aneurysm is diagnosed. It is important to obtain a thorough history while intra-operative specimens for microbiological testing are essential to ensure appropriate post-operative therapy and management. Furthermore, autologous vein should be considered in contaminated surgical fields to avoid the significant risk of prosthetic graft infection.

Declaration of Competing Interest

The authors report no declarations of interest.

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Ethical approval

This study is exempt from the requirement for ethical approval at my institution.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

Ian Barry was responsible for the study concept, methodology, data collection, data curation, and writing the paper - Original Draft.

Rick Bond and Kishore Sieunarine were responsible for reviewing/editing the original draft, project supervision, and project administration.

Registration of research studies

Not applicable.

Guarantor

The guarantor is the corresponding author, Dr Ian Patrick Barry. I accept full responsibility for the work and/or the conduct of the study, had access to the data, and controlled the decision to publish.

Provenance and peer review

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