

## CASE REPORT

# An atypical presentation of *Salmonella enterica* ser Dublin in an immunocompromised patient

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## Abstract

Mycotic aneurysms of the carotid artery are a rare entity that can be fatal if not diagnosed promptly. We present a 60-year-old man with a tender left-sided neck mass due to a ruptured aneurysm of the left internal carotid artery. Cultures taken intraoperatively grew *Salmonella enterica* ser Dublin.

## INTRODUCTION

Infection with *Salmonella enterica* usually results in a self-limited gastroenteritis characterized by fever, diarrhea, and less often nausea, vomiting and headache. However, according to CDC data, ~8% of laboratory confirmed cases are complicated by bacteremia, arteritis, meningitis and osteomyelitis [1]. Occasionally, extraintestinal infections result in infected or mycotic aneurysms. In the USA, *Staphylococcus* is the most common organism associated with mycotic aneurysms, whereas *Salmonella* is much more common in East Asian countries such as China [2]. Mycotic aneurysms associated with *Salmonella* infection rupture over 50% of the time and if untreated have a mortality ranging from 16 to 44% [2]. Thus, prompt recognition and treatment are key to improved patient outcomes. We report the first published case of a middle-aged man who developed a carotid mycotic aneurysm due *S. enterica* ser Dublin, a serovar that is usually associated with cattle (ground beef and unpasteurized milk).

## CASE REPORT

A 60-year-old man with a history of metastatic prostate cancer (treated with docetaxel ~2 weeks prior to presentation), hypertension, hyperlipidemia, paroxysmal atrial fibrillation (on rivaroxaban) and right knee osteoarthritis (status post total knee replacement) presented to the emergency room with left sided neck pain and swelling. He first noted left sided neck pain 1 to 2 weeks prior to presentation. Initially, he noted some discomfort and a small nodule on his left neck. However, the nodule grew over time and the pain progressed to the point where he noted discomfort with swallowing and breathing. Accordingly, he presented to our medical center for care. On the day of admission, he was febrile (38.7°C), tachycardic (122), hypertensive (152/94). Fortunately, despite the tender neck swelling, there was no airway compromise.

The physical exam revealed a tender non-pulsatile mass on the left neck extending to the angle of the mandible. A computed tomography (CT) scan of the neck with contrast

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Figure 1: CT scan (coronal) of neck with contrast showing thrombosed aneurysm of the left internal carotid artery (arrow)

revealed a focal outpouching of the left carotid artery (Fig. 1). There also appeared to be a mass encircling the left carotid artery (4.3 cm × 2.5 cm × 3 cm) with lateral displacement and compression of the left jugular vein.

A vascular surgery consultation was obtained and given concern for a contained ruptured aneurysm, the patient was taken to the operating room (OR). During the surgery, an aneurysm with a posterior perforation and contained rupture was noted (Fig. 2). Pathological specimens from the surgical site were notable for significant atherosclerotic disease. Also, purulence was noted along with extravasated blood and cultures taken from intraoperative specimens revealed pan sensitive *S. enterica* ser Dublin. The affected and ulcerated portion of the carotid artery was excised and replaced via end-to-end anastomoses with a bovine mesenteric vein graft. Interestingly, all peripheral blood cultures were negative for bacterial growth. He was treated with ceftriaxone 2 grams IV daily for at least 6 weeks.

## DISCUSSION

We report the case of a middle-aged man who presented with a subacute painful neck swelling that was due to a ruptured mycotic aneurysm of the left carotid artery. Given his history of cancer, a malignant metastasis was among the differential diagnoses. However, CT imaging helped us to quickly narrow the list of possibilities.

The concern for a ruptured aneurysm prompted a vascular surgery consultation and ultimately surgical exploration. The aneurysm was found to be infected with *Salmonella*. Mycotic aneurysms of the carotid artery are relatively rare and those due to *Salmonella* spp. are even rarer. Our review of the literature revealed ~22 published cases of a carotid mycotic aneurysm due to *Salmonella* spp. Mycotic aneurysms tend to involve the aorta causing aortitis with or without aneurysm formation [3]. Only ~5% of mycotic aneurysms involve the carotid artery. In

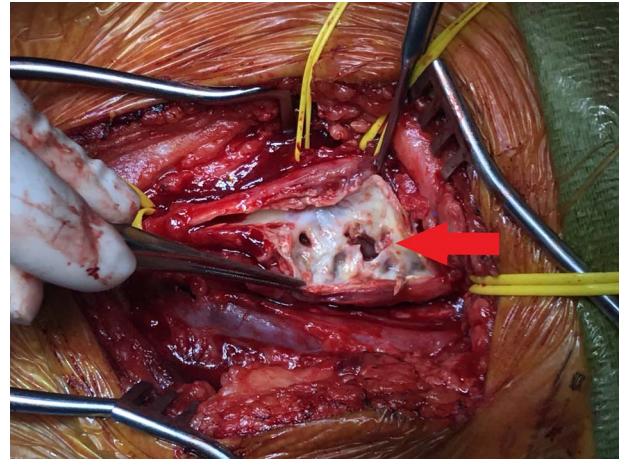


Figure 2: Perforated posterior wall of the left internal carotid artery seen intraoperatively (arrow)

general, male gender is a risk factor for development of mycotic aneurysm [4]. Other risk factors include age >50, diabetes, hypertension and atherosclerosis [2, 4]. Our patient had many of the traditional risk factors. He was also fully anticoagulated while the aneurysm was developing and had recently been treated with chemotherapy. We suspect that these factors likely contributed to his presentation as well.

We did not identify a discrete episode of gastroenteritis or bacteremia. He had been taking chemotherapy ~2 weeks prior to presentation so typical symptoms such as diarrhea, nausea and vomiting might have been misattributed to medication side effects. There are a few published case reports of mycotic aneurysms due to *Salmonella* with negative blood cultures [5–7]. This may reflect the fact that gram negative bacteremia is frequently transient.

The standard management of mycotic aneurysms is open surgical repair. There are multiple case reports describing an endovascular approach, but studies comparing endovascular versus open repairs are lacking [4]. A minimum of 6 weeks of antibiotic therapy is often recommended although there are no data to support a specific duration of treatment [6].

The Maryland State Health Department performed the microbiological testing in this case and confirmed the Dublin serotype, which usually causes gastroenteritis in both cattle and humans [8]. There are very few case reports of mycotic abdominal aneurysms due to the Dublin serotype [2]. To our knowledge, this is the first published case of carotid mycotic aneurysm associated with the Dublin serotype. Although most *Salmonella* spp outbreaks have been linked to eggs, poultry and occasionally pet reptiles, outbreaks due to *S. enterica* ser Dublin have been linked to the consumption of contaminated ground beef and raw or unpasteurized milk. The Centers for Disease Control reported an outbreak of the Dublin serotype in 2019 that involved eight states. The outbreak was linked to ground beef [9].

This case report brings into focus several important clinical and epidemiological points. First, an infected aneurysm should be considered in the differential diagnosis for a patient who is febrile and presents with a tender neck mass. Second, since mycotic aneurysms frequently rupture, prompt referral to a vascular surgeon is paramount. Finally, since our patient likely contracted *S. enterica* ser Dublin from ground beef or milk, it is imperative that we continue surveillance for this organism in our environment.

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**ETHICAL APPROVAL**

This Case Report does not require IRB approval as it is not considered research and does not contain any of the 18 HIPAA identifiers.

**CONSENT**

A signed written consent was obtained from the patient for this case report.

**GUARANTOR**

Adrien L. Janvier.

**REFERENCES**

1. CDC. *Salmonella: Information for Healthcare Professionals*. <https://www.cdc.gov/salmonella/general/technical.html> (22 December 2020, date last accessed).
2. Guo Y, Bai Y, Yang C, Wang P, Gu L. Mycotic aneurysm due to salmonella species: clinical experiences and review of the literature. *Braz J Med Biol Res* 2018;51:e6864. <https://doi.org/10.1590/1414-431x20186864>.
3. Valentine RJ, Chung J. Primary vascular infection. *Curr Probl Surg* 2012;49:128–82. <https://doi.org/10.1067/j.cpsurg.2011.11.004>.
4. Ho CL, Lam JH, McAdory LE. Carotid Mycotic aneurysm associated with persistent primitive hypoglossal artery. Case report and literature review. *J Radiol Case Rep* 2019;13:1–7. <https://doi.org/10.3941/jrcr.v13i3.3588>.
5. Hauet T, Bures E, Bauwens M, Burucoa C, Barbier J, Pourrat O et al. Aneurysme infectieux salmonella typhimurium de la carotide interne. A propos d'un cas et revue de la litterature. *Med Mal Infect* 1995;25:881–7.
6. Pirvu A, Bouchet C, Garibotti FM, Hauptert S, Sessa C. Mycotic aneurysm of the internal carotid artery. *Ann Vasc Surg* 2013;27:826–30. <https://doi.org/10.1016/j.avsg.2012.10.025>.
7. Lloret MD, Escudero JR, Hospedales J, Viver E. Mycotic aneurysm of the carotid artery due to salmonella enteritidis associated with multiple brain abscesses. *Eur J Vasc Endovasc Surg* 1996;12:250–2. [https://doi.org/10.1016/s1078-5884\(96\)80116-x](https://doi.org/10.1016/s1078-5884(96)80116-x).
8. McDonough PL, Fogelman D, Shin SJ, Brunner MA, Lein DH. Salmonella enterica serotype Dublin infection: an emerging infectious disease for the northeastern United States. *J Clin Microbiol* 1999;37:2418–27. <https://doi.org/10.1128/JCM.37.8.2418-2427.1999>.
9. CDC: *Outbreak of Salmonella Infections Linked to Ground Beef*. <https://www.cdc.gov/salmonella/dublin-11-19/index.html> (22 December 2020, date last accessed).