Cluck of the Draw: A Case of *Streptococcus gallinaceus* Infective Endocarditis

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Introduction

The bacterial genus *Streptococcus* comprises cocci-shaped organisms in pairs or chains that are Gram-positive, non-motile, non-spore forming, mostly oxidase-negative and catalase-negative[1]. Various species such as *Streptococcus pyogenes, Streptococcus pneumoniae* and *Streptococcus agalactiae* have been well-known to be part of normal microbial flora or to cause infections such as infective endocarditis and spondylodiscitis in humans[1].

Streptococcus gallinaceus is a lesser-known species of *Streptococcus* that was first isolated and identified from broiler chickens in 2002 following an outbreak of septicaemia, with its species name originating from the Latin word '*gallinaceus*' which pertains to domestic fowl[2]. It is an opportunistic infection within the poultry industry, causing septicaemia and endocarditis in birds[3]. It has also been seen in infections affecting other animals such as bears[4].

Infections of *S. gallinaceus* in humans are rare, with just three cases of invasive infections having been reported thus far. The index case described was a case of isolated *S. gallinaceus* bacteraemia[5], while the other two reported cases had evidence of spondylodiscitis and infective endocarditis[6,7]. All cases were strongly associated with prolonged exposure to animals or poultry[5,6,7].

We report a case of *S. gallinaceus* bacteraemia with infective endocarditis in a relatively immunocompromised patient with systemic lupus erythematosus (SLE) that was subsequently complicated by Libman-Sacks endocarditis and a left ventricular thrombus.

Case Details

The patient is a 37-year-old female with a history of SLE that was diagnosed in 2011. At the time of her presentation, she had been on tapering doses of prednisolone (10mg/day), hydroxychloroquine 200mg once daily and mycophenolate mofetil 500mg twice daily for immunosuppression. Other co-morbidities include burnt-out Graves' Disease not on thyroid replacement, vitamin D deficiency and hydroxychloroquine-induced hyperpigmentation.

She presented with a one-month history of intermittent fevers, lethargy and loss of appetite. She also reported right index and ring finger pain and discolouration over a week. Clinical examination yielded embolic features on her right 2nd and 4th digits. Two sets of aerobic and anaerobic blood culture bottles flagged positive after 17 hours of incubation. Gram stain revealed Gram positive cocci in chains (Figure 1). Small, translucent, non-haemolytic colonies were isolated on primary plates (Figure 2) and identified by MALDI-TOF (Bruker Daltonics, USA) to be *S. gallinaceus* with a score of 2.22. Phenotypic susceptibilities were performed and interpreted as per CLSI M100 S35[8]. The isolate was susceptible to penicillin, ceftriaxone, tetracycline, clindamycin and vancomycin. The patient handled raw chickens during routine food preparation but there was otherwise no prolonged occupational or recreational exposure to fowl or other animals. There was no reported trauma or direct inoculation of bacteria during cooking.

Transthoracic echocardiography revealed a 4mm lesion on the anterior mitral leaflet and a 1cm lesion over the posterior mitral leaflet, which were confirmed on transoesophageal echocardiography (Figure 3). A 0.5cm x 1cm left ventricular thrombus was also observed (Figure 3). There was trivial mitral regurgitation. No dissemination to other sites or organs was observed. She was successfully treated with a six-week course of ceftriaxone and discharged well.

Post-treatment transthoracic echocardiography showed worsening mitral regurgitation and a new 2mm aortic valve lesion. Repeat transoesophageal echocardiography was performed which confirmed Libman-Sacks endocarditis of the mitral and aortic valves. She was started on anticoagulation for the identified thrombus. Repeat blood cultures upon detection of worsening mitral regurgitation after completion of ceftriaxone were obtained and were negative for *S. gallinaceus* or other pathogenic organisms. She remains well and afebrile off antibiotics.

Microbiological and Echocardiography Images

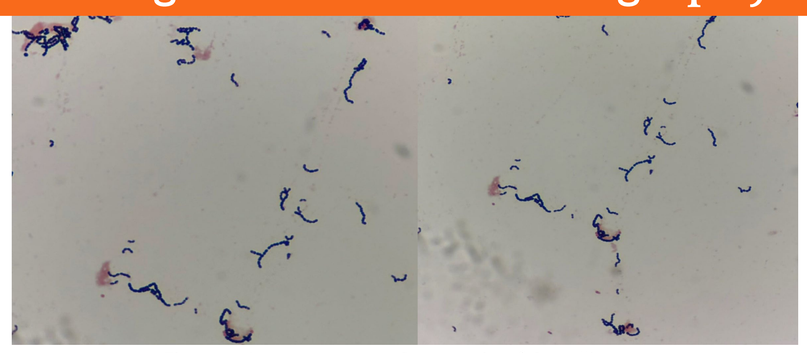

Figure 1. Appearance on Gram stain of *S. gallinaceus*

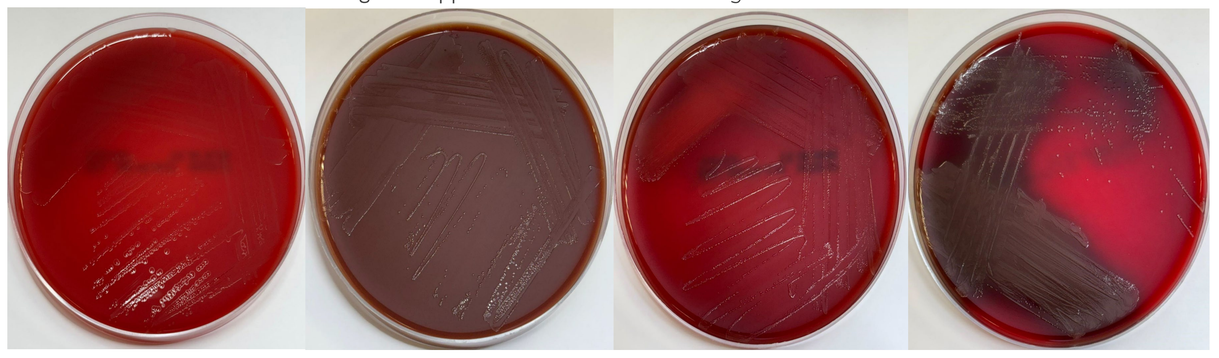

Figure 2. *S. gallinaceus* colony appearance on (from left to right) blood, chocolate, phenylethyl alcohol and Schaedler agar

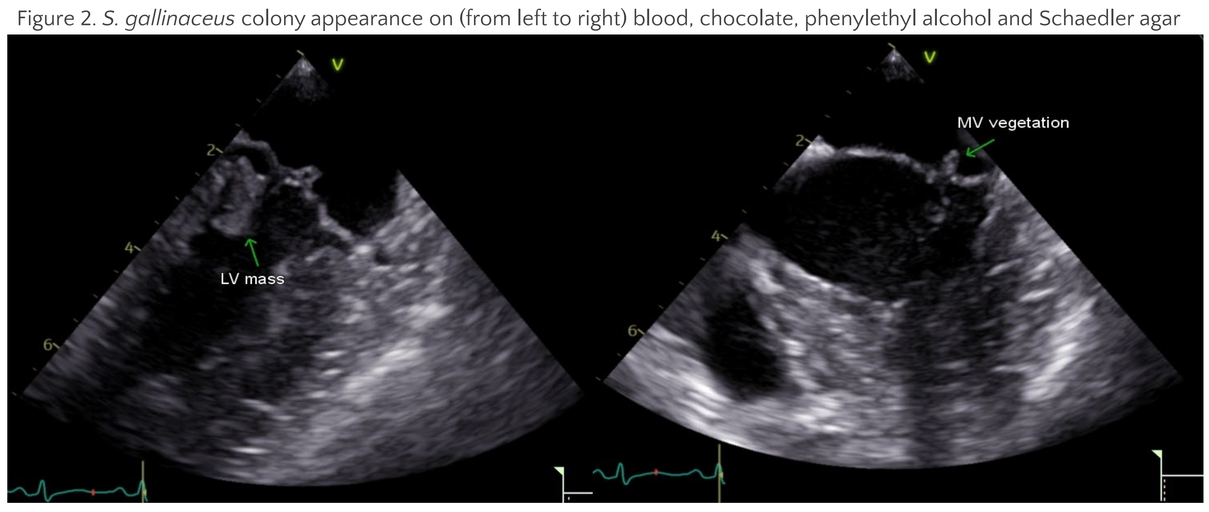

Figure 3. Transoesophageal echocardiography findings of left ventricular mass/thrombus and mitral valve vegetation

Discussion and Conclusion

Further investigations of *S. gallinaceus* upon its initial identification in chickens in 2002 has identified its presence in other poultry and swine. It has been linked to complications such as bacteraemia, organ infarction and infective endocarditis in host animals. A study by Chadfield *et al.* found that upon injecting young chickens with *S. gallinaceus*, 75% of chickens had bacteria seeding to the heart, with 84% of chickens having valvular lesions, suggesting a propensity for *S. gallinaceus* to infect heart valves[9]. There is a hypothesis that *S. gallinaceus* is a commensal organism in the digestive tract of poultry that results in infection during episodes of gut translocation[9], similar to *S. gallolyticus* in humans[10].

This case is only the third or fourth case of *S. gallinaceus* infection reported globally and the first in Asia. The first case of *S. gallinaceus* was identified in New Zealand in 2006 in a 60-year-old abattoir worker who presented with bacteraemia; he was treated with a 2-week course of antibiotics including ceftriaxone, amoxicillin, and gentamicin[5]. Another case of *S. gallinaceus* infection, this time causing infective endocarditis and spondylodiscitis, was described in 2022 in Tennessee, USA, in a 75-year-old recreational chicken farmer with myasthenia gravis and previous hardware fusion of his 4th and 5th lumbar vertebrae; he was treated with 8 weeks of ceftriaxone[6]. The last reported case in 2023 of *S. gallinaceus* infection was also observed in Tennessee, USA, in a 75-year-old with myasthenia gravis with a similar clinical presentation[7], which could possibly represent the same case reported before[6]. Our case of *S. gallinaceus* infection is unique in that the patient did not otherwise have significant exposure to poultry aside from handling food. Her relatively immunocompromised state could have predisposed her to contracting this rare infection.

Poultry aside, given that *S. gallinaceus* has also been observed in other animals, it would be important to ensure that a thorough history, including social and occupational exposure, is taken in cases of community-acquired infective endocarditis. While currently rare, increasing rates of zoonoses would likely result in more cases in future, and it would be beneficial for clinicians to be aware of this possible emergent cause of community-acquired infective endocarditis.

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