



Uncut Gemella Haemolysans: A Case of Bacteremia with No Clear Entry Site

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Abstract

Background: *Gemella haemolysans* is a gram-positive coccus that colonizes the genitourinary system, gastrointestinal system, and upper respiratory tract as an opportunistic pathogen. Berge et al. found that the frequency of *Gemella* species bacteremia was 4.5 and infective endocarditis was 0.31 per 1,000,000 inhabitants yearly. We report the first case of *G. haemolysans* bacteremia presenting as new-onset atrial fibrillation with rapid ventricular response (RVR) and acute respiratory failure and present a case series on *G. haemolysans* bacteremia and infective endocarditis.

Case Presentation: A 58-year-old male with a past medical history including aortic valve bioprosthetic replacement, type 2 diabetes, hypertension, and coronary artery stenting and bypass surgery presented with shortness of breath and confusion. Examination and testing revealed a 40.4°C fever, acute respiratory failure, atrial fibrillation with RVR, congestive heart failure, lactic acidosis, and acute renal failure, with no drug use, dental wounds, or pneumonia. Diltiazem, metoprolol, aspirin, atorvastatin, insulin, heparin, and ceftriaxone were started. TTE and TEE revealed no clear vegetations. Blood cultures revealed *Gemella haemolysans*. He became stable after 4 days, was electrically cardioverted to sinus rhythm with first-degree AV block, progressed to complete heart block, then had a temporary pacemaker placed. A repeat TEE demonstrated an aortic root abscess. He underwent redo sternotomy and homograft placement with no complications and was discharged with instructions to complete a six-week course of ceftriaxone.

Discussion: Our patient presented with multiple comorbidities at a younger age compared to the mean (66) and median (70) age of the 4 bacteremia cases in our 8-case series. Preemptive antibiotic treatment may be warranted for prosthetic heart valve patients, with the possibility of urgent valve replacement surgery. Several antibiotics were previously reported in case studies with varying results. The shortest course was 16 days, with most courses lasting 4 to 7 weeks. With no standard treatment, this case series suggests *G. haemolysans* tends to be susceptible to beta-lactam agents.

Conclusion: Our case highlights the importance of a multidisciplinary approach in the diagnosis and management of *Gemella haemolysans* bacteremia, particularly in patients with complex medical histories and prosthetic heart valves.

Keywords

Gemella, Bacteremia, Infective Endocarditis, Gram Positive Cocci

Introduction

Gemella haemolysans, a gram-positive coccus, is typically known to colonize the oropharynx, genitourinary system, gastrointestinal system, and upper respiratory tract as an opportunistic pathogen [1]. It presents as a typical gram-positive bacterium but can become easily decolorized in the Gram staining process and thus appear gram-variable. It is best detected via specialized 16S rRNA gene sequencing, which presents a clinical challenge and can lead to an underreported prevalence [2].

Multiple case reports link the bacterium to invasive infections such as infective endocarditis, meningitis, spondylodiscitis, and eye infections [1]. It commonly presents in patients with poor dental hygiene, heart disease, and immunocompromised conditions [2,3]. Of the *Gemella* species infective endocarditis cases, *G. haemolysans* causes around 26% of cases [4]. A retrospective study by Berge et al. found the frequency of *Gemella* species bacteremia to be 4.5 and infective endocarditis to be 0.31 per 1,000,000 inhabitants yearly [5]. While a handful of bacteremia cases have been reported, to the best of our knowledge, we report the first case of *G. haemolysans* bacteremia presenting as acute respiratory failure with rapid new-onset atrial fibrillation. Further, unlike most cases of *Gemella* bacteremia, our patient had no clear entry site for infection, dental disease, immunocompromised status, or drug use.

Case Summary

Our patient is a 58-year-old male with a past medical history of aortic valve stenosis treated with a bioprosthetic valve replacement 4 years ago, poorly controlled type 2 diabetes mellitus, coronary artery bypass surgery, coronary arterial stenting, hypertension, and medication noncompliance who presented to the ED via ambulance with shortness of breath for three days, altered mental status, and fever.

Initial exam and testing revealed a fever of 40.4°C, acute hypoxemic respiratory failure, atrial fibrillation with rapid ventricular response, congestive heart

failure, lactic acidosis, and acute renal failure. He was started on diltiazem, metoprolol, aspirin, atorvastatin, insulin, heparin, and ceftriaxone. Transthoracic echocardiogram (TTE) and transesophageal echocardiogram (TEE) revealed no clear vegetations. Preliminary blood cultures showed Gram positive cocci in clusters. Vancomycin was started. Blood cultures later resulted as *Gemella haemolysans*, and vancomycin was discontinued while continuing ceftriaxone. The patient had no clear entry site for infection, immunocompromised status or drug use, and denied dental disease. The patient became stable after 4 days and was cardioverted to sinus rhythm with 1st degree AV block. He was transferred to an external hospital with a plan of ceftriaxone 2g daily for six weeks.

Duke criteria classification for infective endocarditis showed positivity for the three minor criteria of fever, positive blood culture that does not meet major criteria, and a predisposing heart condition. Since three minor criteria were met, a possible case of infective endocarditis was noted. One possible major criteria, blood culture positivity, was not definitive as *G. haemolysans* represents an atypical microorganism for infective endocarditis.

After being transferred, the patient developed progressive to complete heart block. A repeat TEE performed 7 days after the initial TEE demonstrated an aortic root abscess, and coronary angiogram demonstrated no significant coronary artery disease. For his complete heart block, the patient had a temporary pacer placed. The patient was transferred back to the original hospital for redo sternotomy and homograft placement. Surgery was performed with no intraoperative or postoperative complications, and the patient was discharged with instructions to complete the six week course of ceftriaxone 2g daily.

Discussion:

Gemella haemolysans represents an extremely rare and difficult to identify cause of bacteremia with only a handful of cases reported in the literature. Several of

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them are highlighted in **Table-1** while the majority of *G. haemolysans* cases reported are of infective endocarditis [6-9]. In these patients, utilizing the Duke criteria is critical as there is a high risk of infective endocarditis and complications from IE. Of note, bacteremia cases of embolic stroke secondary to infective endocarditis, liver abscess, occult bacteremia, duodenal ulcer perforation secondary to peritonitis, and automated implantable cardioverter defibrillator (AICD) lead infection have been described [1,10-13]. To the best of our knowledge this is the first *G. haemolysans* bacteremia presentation of acute respiratory failure with rapid new onset atrial fibrillation.

Our patient, a 58-year-old male, presents with multiple pre-existing conditions at a younger age

compared to most other cases of bacteremia (**Table-1**). The mean and median age of bacteremia cases reported in **Table-1** is 66 and 70, respectively. The *Gemella* species represents an emerging pathogen for bacteremia among the elderly and should be given consideration by clinicians. This case stands out as one of the few reported cases of *Gemella* species bacteremia that did not present in an elderly patient, representing a possibly growing younger population susceptible to this rare microorganism.

Gemella species is commonly associated with infective endocarditis and our patient's initial transesophageal echocardiogram showed thickening of the aortic valve with no vegetations. This was surprising given the patient's history of valve replacement and preliminary positive blood cultures.

Table-1: Case Report Series on *Gemella* Haemolysans Bacteremia and Selective Cases of *Gemella* Haemolysans Infective Endocarditis

Authors	Year	Patient Demographics	Presenting Complaint and Diagnosis	Treatment/Progression
Hadano et al. ¹	2018	75 year old Japanese male	Bacteremia due to duodenal ulcer perforation and secondary peritonitis	Initial work-up: intravenous meropenem, 1 g every 12 h empirically based on the diagnosis of secondary peritonitis with an upper gastrointestinal tract ulcer perforation. Day 7: intravenous ampicillin/sulbactam, 3 g every 12 h based on the findings of the susceptibility test for a 16-day course.
Kodaka et al. ¹⁰	2021	82 year old female	Occult bacteremia	Piperacillin/tazobactam 4.5 g every 6 hours started on the basis of provisional urinary tract infection diagnosis. Day 9, antibiotics changed to continuous intravenous penicillin G (24 × 106 U/day) for 20 days. Discharged on day 47 of hospitalization.
Malik et al. ¹¹	2010	42 year old male	Bacteremia in a patient with liver abscess	Initial treatment with intravenous ceftriaxone for 10 days and initial percutaneous aspiration, but failed to improve. Abscess was then drained via ultrasound guidance (Seldinger technique). Antibiotics were continued for 6 weeks via peripherally inserted central catheter line.
Kriege et al. ¹³	2022	65 year old male	Bacteremia: automated implantable cardioverter defibrillator (AICD) lead infection	Treated with intravenous vancomycin and ceftriaxone while awaiting AICD removal. Continued antibiotic regimen 2 week post AICD removal.
Ando et al. ⁶	2016	24 year old otherwise healthy male	Native bivalvular infective endocarditis	Treated with intravenous penicillin G and vancomycin. Underwent valve replacement. Discharged with intravenous ceftriaxone for 7 weeks.
Quaes eat et al. ⁷	2015	39 year old male	Endocarditis in a patient with a bioprosthetic aortic valve	Treated with 7 days of dual antibiotic therapy: amoxicillin 2.5g IV every 4 hours and rifampicin orally 900mg every 12 hours. Antibiotic regimen continued for 45 days.
Kovaleva et al. ⁸	2012	85 year old female	Infective endocarditis	Treated with amoxicillin and gentamicin intravenously. Patient died after stroke occurred during antibiotic treatment.
Eslinger et al. ⁹	2022	63 year old male	Infective endocarditis in a patient with febrile neutropenia	Treatment initiated with chemotherapy. Started on intravenous vancomycin and cefepime, and later switched to intravenous penicillin G with gentamicin for a total of four weeks.

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Despite initially medically stabilizing and cardioversion, the patient redeveloped fever and eventually developed complete heart block. The subsequent TEE revealed an aortic root abscess, despite prophylactic treatment for infective endocarditis when there was no evidence of abscess.

Risk factors of *Gemella* species infection include dental disease, colorectal disease, or immunocompromised status. The three most common causes of *Gemella* species infective endocarditis are dental (73%), intravenous drug abuse (13%), and colonic disease (13%) while the source of bacteremia is not commonly identified [1,4,10-13]. Our patient did not present with a clear source of infection and had no pre-existing or known dental disease. However, he was noted to periodically have dental problems and stated he fails to appropriately take care of his teeth.

Almost 94% of *Gemella* infective endocarditis cases have heart valve involvement and about 24% of patients affected on the aortic valve [4]. Our patient had a history of aortic valve stenosis treated with a bioprosthetic valve replacement in 2019 and coronary artery disease treated with a coronary artery bypass graft and coronary arterial stenting. His initial TEE showed thickening on the aortic valve but no formation of vegetations. With Raja et al. also describing a case of *G. haemolysans* endocarditis in a patient with prosthetic mitral and aortic valves, pre-emptively treating for infective endocarditis in *G. haemolysans* infected patients with prosthetic heart valves may be warranted [14]. Treating prophylactically for prosthetic heart valve patients may be an appropriate recommendation for cases of *Gemella* bacteremia. Past literature suggests *Gemella haemolysans* is susceptible to β -lactams, vancomycin, clindamycin, and meropenem [1,2,4,6-10].

However, as seen in this case, a high index of suspicion for infective endocarditis and prosthetic valve involvement should be maintained despite a patient's initial testing and imaging. Even with an initial response to antibiotics and symptomatic improvement, a patient with *Gemella Haemolysans* bacteremia may be susceptible to quick clinical deterioration, especially with a history of a prosthetic valve. Therefore, surgeons should be prepared to

operate and replace the valve as if treating any other Gram-positive cocci.

When antibiotic therapy fails to alleviate symptoms and produce negative blood cultures in IE patients, surgical therapy is required to remove infected and necrotic tissue with subsequent repair or replacement of the damaged valve [15]. As outlined by the 2016 American Association for Thoracic Surgery Consensus Guidelines: Surgical Treatment of Infective Endocarditis, the aortic root abscess seen on the followup TEE in our patient and the patient's bioprosthetic aortic valve indicates a Class IIa indication for surgery [16]. Musci et al. found that homograft aortic root replacement with periannular abscess formation showed better survival with both early and long-term results in native valve endocarditis compared to prosthetic valve endocarditis [17].

Based on this case, following traditional management and protocols to treat bacteremia and suspected infective endocarditis while awaiting for cultures and sensitivities to return appears to be appropriate in the management of *Gemella* bacteremia. Especially in cases with a high risk of infective endocarditis based on patient factors, clinicians should have a low threshold to obtain repeat imaging to assess prosthetic valve involvement in the setting of *Gemella* bacteremia. Transferring the patient to a different facility only to return for operative management should be avoided when there is a high risk of valvular involvement requiring surgery. More research must be conducted on *Gemella* species bacteremia regarding antibiotic sensitivity in the community to determine appropriate and effective coverage to help prevent progression to infective endocarditis.

Conclusion

Gemella haemolysans bacteremia presents a complex diagnostic challenge. Obtaining early blood cultures and treating patients with a bioprosthetic valve prophylactically with ceftriaxone or other historically effective antibiotics may represent an avenue for treatment. A high index of suspicion should be maintained for prosthetic valve involvement despite initial testing and imaging, and treatment teams should be prepared for cardiac interventions and valve

replacement. Our case underscores the importance of a multidisciplinary approach involving infectious disease specialists, cardiologists, and surgeons in the diagnosis and management of *Gemella haemolysans* bacteremia, particularly in patients with complex medical histories and prosthetic heart valves. Further research is warranted to better understand the optimal management strategies for this rare but potentially life-threatening infection.

Ethics Statement

Human subjects: Consent was obtained or waived by all participants in this study. Written informed consent has been obtained from the patient and family to publish this paper. This case report is IRB-exempt, and all patient information is de-identified.

Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following:

Payment/services info: All authors have declared that no financial support was received from any organization for the submitted work.

Financial relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work.

Other relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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