The Long CoN(S): A Case of Staphylococcus lugdunensis Endocarditis With Cerebral and Coronary Embolism

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Abstract

Staphylococcus lugdunensis is a coagulase-negative staphylococcus, which in humans can cause virulent infections frequently attributable to Staphylococcus aureus including superficial skin/soft tissue infections, infective endocarditis, osteomyelitis and endophthalmitis. A 61-year-old male with history of recent fixation of C1-C2 neck fracture, presented with sudden onset of right-sided weakness and fever. Examination revealed dense hemiplegia with UMN facial palsy of right side, and a pan-systolic murmur in the mitral area, radiating to the axilla. He had an elevated troponin-I of 18.8 ng/mL with right bundle branch block on EKG. Echocardiogram revealed mobile vegetation on the anterior leaflet of the mitral valve with ejection fraction of 55% and no regional wall motion abnormality. He continued to have persistent high-grade fevers in spite of appropriate antibiotic therapy and blood cultures were persistently positive for S. lugdunensis for 5 days. He developed weakness of his left side after 2 weeks of hospital admission and MRA revealed left carotid dissection and complete occlusion of the right middle cerebral artery distal to the M1 segment which was embolic in nature. The frequency of S. lugdunensis infection is underappreciated and biofilm formation plays a major role in the pathogenesis. This is the first reported case of S. lugdunensis endocarditis complicated by NSTEMI from coronary embolism and simultaneous stroke from cerebral embolism. Due to the early, frequent and fatal complications from S. lugdunensis bacteremia, we might have to consider early surgical intervention in the absence of class I or IIa recommendation.

Keywords: Endocarditis; Staphylococcus lugdunensis; Vegetation; Stroke; Myocardial infarction

Introduction

Staphylococcus lugdunensis is a coagulase-negative staphylococcus (CoNS), which in humans ranges from a harmless skin commensal to a life threatening pathogen which was first described by Freney et al in 1988 on the basis of the analysis of 11 strains collected in Lyon, France. It can cause severe disease akin to the virulent infections frequently attributable to Staphylococcus aureus including osteomyelitis [1], prosthetic device infections [1], superficial skin/soft tissue infections [2], endocarditis [1, 2], intravascular catheter related bacteremia [3], central nervous system infections, peritonitis and endophthalmitis [4]. They also tend to colonize and cause infection below the waist [5]. S. lugdunensis is unique among CoNS because of its propensity for causing aggressive native valve infective endocarditis (IE). The frequency of S. lugdunensis infection is probably underappreciated, since many clinical laboratories do not routinely speciate CoNS [6, 7].

Case Report

A 61-year-old male with history of hyperparathyroidism, coronary artery disease, polysubstance abuse and recent fixation of C1-C2 neck fracture (3 months ago), presented with sudden onset of right upper and lower extremity weakness and fever. Examination revealed dense hemiplegia with UMN facial palsy of right side, and a pan-systolic murmur in the mitral area, radiating to the axilla. He had an elevated troponin-I of 18.8 ng/mL with right atrial enlargement and right bundle branch block on EKG. Echocardiogram revealed large, spherical, mobile vegetation measuring 15.5 × 11 mm on the anterior leaflet of the mitral valve (Fig. 1) with ejection fraction of 55% and no regional wall motion abnormality.

CT angiogram of the brain revealed dissection of the cervical, petrous, cavernous and supraclinoid portions of the left internal carotid artery with complete occlusion of the left middle cerebral artery (Fig. 2). He continued to have persistent high-grade fevers for 1 week in spite of appropriate antibiotic therapy and blood cultures were persistently positive for S. lugdunensis for 5 days. He developed weakness of his left side after 2 weeks of hospital admission and MRA revealed complete occlusion of the right middle cerebral artery distal to the M1 segment likely embolic in nature (Fig. 2).
He was not considered a surgical candidate due to his co-morbidities, bad prognosis and high intraoperative and perioperative mortality. Hence we treated him medically (oxacillin based on susceptibility for 6 weeks) for IE; however, his hospital course was complicated by aspiration pneumonia, ventilator support for respiratory distress, failed extubation and tracheostomy tube placement.

Discussion

*S. lugdunensis* is a Gram-positive, catalase-positive, coagulase-negative coccus. It is a non-motile, facultative anaerobe that may demonstrate hemolysis on blood agar [8]. The frequency of *S. lugdunensis* infection is probably underappreciated, since many clinical laboratories do not routinely speciate CoNS [6, 7]. The presence of clumping factor and variable performance characteristics of slide and rapid latex agglutination tests makes tube coagulation test important in distinguishing it from *S. aureus* [9-11]. Also phenotypic characteristics such as colony pleomorphism and β-hemolysis are useful when detecting *S. lugdunensis*, in contrast to clumping and synergistic hemolysis, which characterize several CoNS species.

Biofilm formation [12, 13] plays a major role in the pathogenesis of *S. lugdunensis* infection as it provides protection from antibiotics and host immunity and permits attachment of the organism on implantable devices. The biofilm of *S. lugdunensis* is composed of proteins rather than polysaccharide (which is a major component of biofilm produced by other organisms [13]).

When first described, *S. lugdunensis* was thought to be universally susceptible to penicillins and cephalosporins. But increased frequency of resistance to penicillin is being reported now. However resistance is increasing and some institutions report resistance to penicillin in about half of the isolates. It is important not only to identify *S. lugdunensis* in view of its clinical course, which is more aggressive than those of commonly isolated CoNS, but also to determine its susceptibility to oxacillin by detecting the mecA gene or its product, PBP2', since resistance has been reported [14]. Biofilm formation was increased in the presence of nafcillin, while it was decreased in the presence of tetracycline and linezolid. Moxifloxacin was
the only antibiotic with activity against the *S. lugdunensis* organisms in biofilm; 73% of the biofilm isolates were susceptible [15].

Clinical infections due to *S. lugdunensis* include soft tissue infections, endocarditis, bacteremia, prosthetic device infections, central nervous system infections, peritonitis, endophtalmitis and osteomyelitis. *S. lugdunensis* endocarditis is an aggressive infection that affects native valves with greater frequency than prosthetic valves. It is found that prognosis of patients with IE and elevated troponins is very poor. Bacteremia without endocarditis (often related to an intravascular catheter) has a good prognosis.

Even though cases of *S. lugdunensis* endocarditis have been reported, no cases were reported in literature on *S. lugdunensis* endocarditis complicated by NSTEMI (trend in troponins with no evidence of myocarditis) and stroke from embolic phenomenon. Treatment of infection due to *S. lugdunensis* should be guided by the results of antibiotic susceptibility testing.

Surgical management for IE (class I) is indicated in Valve stenosis or regurgitation leading to heart failure, aortic or mitral regurgitation with elevation of left ventricular diastolic or atrial pressures, IE due to fungal or other resistant organisms, complications such as heart block, annular or aortic abscess, destructive penetrating lesions such as fistula from the sinus of Valsalva to the right or left atrium or right ventricle, mitral leaflet perforation with IE of the aortic valve, or infection in annulus fibrosis. Surgical management (class II b) can be considered for mobile vegetations larger than 10 mm with or without emboli [16].

**Conclusion**

*S. lugdunensis* is a skin commensal CoNS in humans that can become a life-threatening pathogen. It can cause severe disease similar to those attributable to *S. aureus*. The frequency of *S. lugdunensis* infection is probably underappreciated. This case demonstrates the importance of early identification and treatment of this virulent commensal. This is also the first reported case of *S. lugdunensis* endocarditis complicated by NSTEMI from coronary embolism and simultaneous cerebral embolism resulting in stroke. Even though surgical management in the absence of complication or persistent bacteremia is only class Ib recommendation based on American and European Heart Association guidelines, early surgical management should be considered in *S. lugdunensis* endocarditis, should no overwhelming class I indication exist, due to high rates of reported mortality.

**References**