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An Uncommon Case of Streptococcus constellatus Associated Lemierre's Syndrome

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Abstract

Lemierre's syndrome is a rare but life-threatening complication of oropharyngeal infection characterized by the spread of infection from the pharynx to the internal jugular vein, leading to septic thrombophlebitis, bacteremia, and metastatic septic emboli, most commonly affecting the lungs. Early recognition and prompt antibiotic treatment are essential to reduce complications such as lung abscesses and systemic spread, which remain significant causes of morbidity. We present the case of a 27-year-old woman who developed Lemierre's syndrome with *Streptococcus constellatus*, highlighting an uncommon pathogen in this clinical syndrome. This patient's presentation was also atypical due to initial clinical improvement that interrupted diagnosis, leading to the development and dissemination of septic thromboembolism and underlining the importance of early recognition. After appropriate diagnosis, she recovered well with outpatient IV antibiotics and without need for surgical intervention.

Categories: Internal Medicine
Keywords: bacteremia, fusobacterium, lemierre, pharyngitis, streptococcus, thrombophlebitis

Introduction

Lemierre's syndrome, also referred to as post-anginal septicemia or necrobacillosis, is a rare but life-threatening complication of an oropharyngeal infection [1,2]. First described by André Lemierre in 1936, it is characterized by the spread of infection from the pharynx to the internal jugular vein, resulting in septic thrombophlebitis, bacteremia, and metastatic septic embolization [3]. Before the antibiotic era, reported mortality exceeded 90%; however, the widespread use of penicillin led to a marked decline in incidence [4].

More recently, Lemierre's syndrome has been increasingly recognized in clinical practice, particularly in adolescents and young adults, and it is seen equally in both men and women [5,6]. This renewed awareness is thought to be related to improved diagnostic imaging, increased clinical suspicion, and more selective antibiotic use for routine pharyngitis. The infection is most often caused by *Fusobacterium necrophorum*, an anaerobic organism that promotes tissue invasion, necrosis, and thrombosis via secreting virulence factors.

Less commonly, polymicrobial infections including streptococci and staphylococci can occur. *Streptococcus constellatus* is known to cause and contribute to suppurative and deep tissue infections [7]. This study also showed that polymicrobial infections with *S. constellatus* are of particular concern due to an elevated 30-day mortality rate. Monomicrobial infections are highly susceptible to multiple antibiotics, but the risks associated with polymicrobial infection necessitate early recognition and proper therapy.

The illness often begins with symptoms that resemble an uncomplicated sore throat, which can make early diagnosis difficult. As the disease progresses, patients may develop persistent fever, neck pain, and signs of systemic infection, with septic emboli commonly affecting the lungs. Because of its rapid progression and potential for severe complications, including Lemierre's syndrome in the early differential is critical.

Case Presentation

A 27-year-old woman with no significant past medical history presented to the emergency department (ED) with two days of nausea, vomiting, and diarrhea. She described the vomitus as having flecks of blood and reported 10-15 episodes of vomiting and diarrhea each day. She also reported fevers up to 103°F, sore throat, chills, myalgias, and cough for four days prior to presentation. She denied recent sick contacts, chest pain, shortness of breath, abdominal pain, dysuria, urinary frequency, urgency, or hematuria.

On initial evaluation, the patient was febrile to 103.4 degrees Fahrenheit, with a heart rate of 140 beats per minute, respiratory rate of 20 breaths per minute, and blood pressure of 104/66 mmHg. Oxygen saturation on room air was 99%. Physical examination revealed active vomiting, swelling to the right side of the neck, right cervical lymphadenopathy, and bilateral tonsillar swelling and purulence. The patient was alert, oriented, and cooperative with normal mood and affect. Initial laboratory results are summarized in Table *1*,

along with trends throughout the patient's course. Urinalysis was positive for protein, blood, nitrites, leukocyte esterase, and bacteria, consistent with urinary tract infection. Testing for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), influenza, and respiratory syncytial virus was negative. Electrocardiogram demonstrated sinus tachycardia. Chest radiograph, computed tomography (CT) of the chest, and CT of the abdomen and pelvis all revealed no acute abnormalities.

	Day 0	Day 7	Day 8	Day 14
Complete blood count				
WBC	13.59 (H)	17.53 (H)	20.86 (H)	7.08
RBC	4.02 (L)	3.14 (L)	3.52 (L)	3.28 (L)
Hgb	12.3	9.7 (L)	10.7 (L)	9.9 (L)
Hct	36.8 (L)	28.3 (L)	32.0 (L)	31.0 (L)
MCV	91.5	90.1	90.9	94.5
MCH	30.6	30.9	30.4	30.2
MCHC	33.4	34.3	33.4	31.9 (L)
RDW Std. Dev.	12.8	12.4	12.6	14
Platelet count	196	322	419 (H)	377
MPV	10.7 (H)	10.1	9.7	9.3
Coagulation studies				
PT	19.9 (H)	–	–	15.4
INR	1.61	–	–	1.17
PTT (actin FS)	36.8	–	–	–
Comprehensive metabolic panel				
Sodium	130 (L)	136	134 (L)	138
Potassium	3.6	3.9	3.7	3.9
Chloride	94 (L)	104	99	104
Carbon dioxide	20 (L)	22 (L)	21 (L)	23 (L)
Anion gap	17	10	14	11
BUN	26 (H)	9	4 (L)	11
Creatinine	2.1 (H)	0.6	0.7	0.7
Estimated GFR/1.73 m^2	28	–	–	–
BUN/creatinine ratio	12	15	6	16
Glucose	160 (H)	112 (H)	108 (H)	147 (H)
Calculated osmolality	269	271	266	278
Calcium	9.1	8.1 (L)	8.7 (L)	9.2
Total bilirubin	3.90 (H)	–	0.68	0.25
AST	58 (H)	–	21	46 (H)
ALT	36	–	23	83 (H)
Alkaline phosphatase	150 (H)	–	66	92
Total protein	8.3	–	7.8	7.8
Other laboratory studies				

C-reactive protein	354.76 (H)	20.43	102.24	6.12 (H)
Lipase	8 (L)	–	–	–
Plasma lactate	3.9 (H)	–	–	–

TABLE 1: Serial Lab Value Trends

Day 0 marks the patient's first presentation to the ED and subsequent admission to the hospital. Day 8 represents her second presentation and admission.

WBC: White blood cell count; RBC: red blood cell count; Hgb: hemoglobin; Hct: hematocrit; MCV: mean corpuscular volume; MCH: mean corpuscular hemoglobin; MCHC: mean corpuscular hemoglobin concentration; MPV: mean platelet volume; PT: prothrombin time; INR: international normalized ratio; PTT: partial thromboplastin time; BUN: blood urea nitrogen; AST: aspartate aminotransferase; ALT: alanine aminotransferase.

In the emergency department (ED), she developed worsening hypotension with systolic blood pressure dropping to 80 mmHg. The patient was admitted to the intensive care unit for management of septic shock, intractable nausea and vomiting, diarrhea, possible urinary tract infection, and transaminitis/hyperbilirubinemia. Resuscitation with intravenous (IV) ceftriaxone, piperacillin/tazobactam, vancomycin, and norepinephrine was initiated. Blood, urine, stool, and throat cultures were obtained for further evaluation.

On day 2 of her hospital stay, the patient developed worsening odynophagia. Physical examination revealed a tender, enlarged right anterior cervical lymph node and right-sided costovertebral angle tenderness. Oral examination was limited due to significant pain. Given progression of oropharyngeal symptoms, systemic corticosteroids to prevent further inflammation were initiated as well as supportive treatment with topical oral anesthetics. Infectious Disease consultation recommended evaluation for cytomegalovirus and Epstein-Barr virus infection which ultimately came back negative.

Over the subsequent two days, the patient demonstrated minimal clinical improvement. Blood and urine cultures obtained during the initial hospitalization grew gram-positive cocci, while throat culture yielded normal oropharyngeal flora and stool cultures were negative. Urinary tract infection as a primary source was considered; however, the sample showed contamination. Antibiotic therapy with vancomycin and piperacillin/tazobactam was continued, along with methylprednisolone and supportive care. On hospital day 5, the patient’s symptoms and laboratory abnormalities began to improve. Vasopressors were stopped given stable blood pressure, her fever resolved, and she was able to open her mouth for oral intake. By hospital day 7, her symptoms had largely resolved; she reported feeling better and was discharged home on oral ampicillin and acetaminophen.

One day following discharge, the patient returned to the ED with new-onset left-sided abdominal and worsening flank pain that began the previous evening. Upon evaluation, she had a temperature of 100.8°F, her heart rate was 88 beats per minute, respiratory rate 24 breaths per minute, blood pressure 102/59 mmHg, and oxygen saturation 96% on room air. Repeat urinalysis did not detect any abnormalities, although the patient had been on antibiotics. Chest radiograph demonstrated mild bibasilar opacities with possible small effusions. CT of the chest revealed multiple new bilateral pulmonary nodules, several of which were cavitary, suggesting septic emboli. CT of the abdomen and pelvis demonstrated left perinephric fat stranding. The patient was readmitted with sepsis secondary to acute pyelonephritis, bibasilar pneumonia, and concern for septic emboli. Physical examination upon second admission was notable for exquisite tenderness to palpation of the left costovertebral angle. Intravenous (IV) vancomycin and cefepime were reinitiated, along with intravenous fluids and analgesia. Blood cultures from the first admission and repeat cultures during the second admission both ultimately speciated as *S. constellatus*.

The presence of cavitary pulmonary nodules in the setting of recent oropharyngeal infection raised concern for Lemierre's syndrome. Duplex ultrasonography of the neck revealed thrombosis of the right internal jugular vein, confirming the diagnosis of Lemierre's syndrome. Vascular surgery was consulted and recommended systemic anticoagulation with apixaban, with surgical intervention reserved for evidence of persistent intravascular infection. CT of the neck confirmed the presence of thrombus without radiographic signs of abscess or suppurative thrombophlebitis, and surgical intervention was not required. The sagittal (Figure *1A*) and transverse (Figure *1B*) views are presented in Figure *1*. The patient’s clinical condition improved with continued antimicrobial therapy and anticoagulation. She was discharged on hospital day 6 of her second admission with a planned six-week course of outpatient IV ceftriaxone and metronidazole. The patient was compliant with this plan, tolerated the treatment well, and her condition resolved with no further complications.

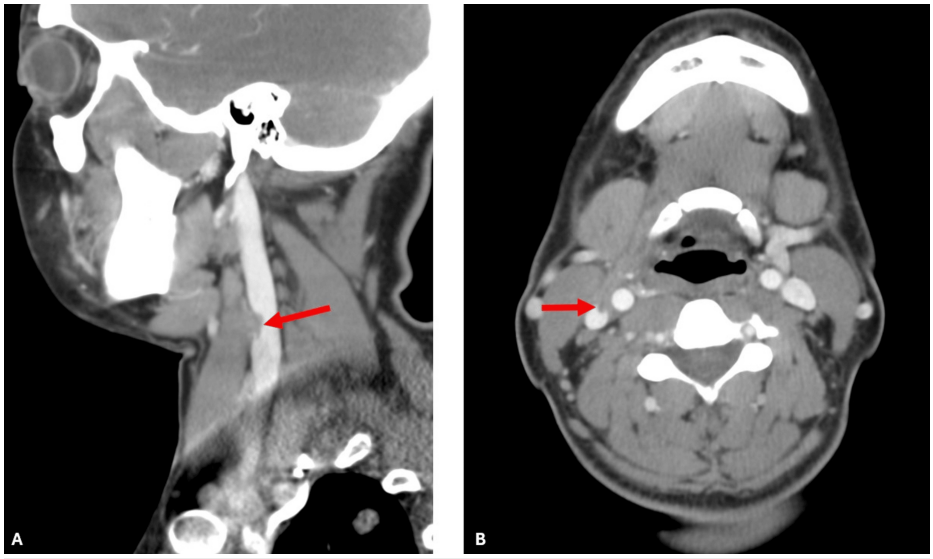


FIGURE 1: CT of the Neck Showing Right Internal Jugular Vein Thrombosis

The red arrows highlight a small thrombus in the right internal jugular vein (IJV).

Discussion

Lemierre's syndrome is a rare but serious complication occurring most frequently in healthy adolescents and young adults, with population-based estimates suggesting an incidence of well under five cases per million people per year, and it is seen equally in both males and females [6]. The principal pathogen associated with this condition is *F. necrophorum*, an obligate anaerobic, gram-negative, non-spore-forming bacillus that is part of the normal oropharyngeal flora but can cause invasive disease [8]. The organism produces several virulence factors, including leukotoxins, endotoxins, hemolysins, and proteolytic enzymes, which facilitate tissue necrosis, immune evasion, and thrombosis, allowing infection to spread from the tonsillar region into the deep neck spaces and internal jugular vein. Many cases have polymicrobial origins, mainly involving streptococci, staphylococci, and facultative anaerobes such as the *Streptococcus anginosus* group, including *S. constellatus* [9]. Blood culture yield may be reduced by prior antibiotic exposure and the technical challenges of anaerobic culture, which can delay microbiologic confirmation despite active systemic infection.

Fusobacterium is responsible for 70%-80% of Lemierre's syndrome cases. *Streptococcus*, by contrast, causes approximately 2%-5% of cases [10]. *S. constellatus* is a gram-positive, non-sporing, non-motile, catalase-negative coccus that is part of the oral cavity, urogenital region, and intestinal tract flora. It is an emerging pathogen in Lemierre's syndrome [11]. It can cause septic thrombophlebitis of the internal jugular vein and metastatic complications, similar to those caused by *F. necrophorum*.

Several cases report *S. constellatus* as the pathologic organism causing Lemierre's syndrome. We compared our case with three others in which *S. constellatus* was the etiologic agent. The first case describes a 70-year-old Japanese woman with Parkinson's disease and polymyalgia rheumatica, managed with prednisolone, resulting in secondary immunosuppression [12]. She presented with fever, occipital headache, and bilateral shoulder pain. The patient was treated with ceftriaxone for 31 days, followed by oral amoxicillin. The patient recovered successfully and was discharged. In contrast, our case is unique since the patient developed Lemierre's syndrome despite being young and immunocompetent. We highlight this to emphasize the importance of considering this sequela regardless of the patient's past medical history. Because many pathogens that cause Lemierre's syndrome are part of the normal oral flora, any of them are susceptible to overgrowth and deep tissue infection in anyone.

The second case involved an 11-year-old healthy girl whose illness was complicated by multiple pulmonary pseudoaneurysms, one of which ruptured and required intervention with an embolization procedure [13]. The patient received prolonged antibiotic therapy and made a full recovery after one month. Our patient also had pulmonary vascular involvement, as evidenced by the presence of multiple bilateral cavitary pulmonary nodules on CT during her second hospital stay. However, despite a similarly prolonged course, our patient did not experience any complications that required surgical intervention. Our patient did not experience symptoms of septic emboli until her second presentation to the ED. This may be due to early administration of broad-spectrum antibiotics and steroids that kept the septic thrombus stable during her first hospitalization [14].

The third case describes a 51-year-old woman presenting with high fever, occipital pain, blepharoptosis, and trismus [15]. This case used fluorodeoxyglucose positron emission tomography/computed tomography (^{18}F-FDG PET/CT) imaging to detect the extent of the infection. The patient's symptoms and thrombi completely resolved following antibiotic therapy. This case presents *S. constellatus* as a cause of atypical presentation of Lemierre's syndrome with facial involvement. Our patient had a more typical presentation despite an atypical causative organism. The Yamaguchi et al. case also suggests ^{18}F-FDG PET/CT imaging as a useful tool to determine the extent of infection to guide proper therapy.

Our case highlights the importance of early recognition and the benefits of early aggressive treatment. Any patient with oropharyngeal infection, regardless of prior health status, is susceptible to developing Lemierre's syndrome. It should be on the differential with any chief complaint of throat pain or similar symptoms. Worsening pain, intolerance of oral intake, and inability to tolerate oral exam are more concerning signs for deep neck space infection and life-threatening sequelae; neck imaging should be considered at this stage, if not earlier. Our patient may have had fewer metastatic complications if Lemierre's syndrome was recognized during her first hospital stay when she developed these symptoms. However, the antibiotics and steroids she was given at that time likely contributed to an uncomplicated recovery after the diagnosis was made and appropriate therapy was initiated. The IV antibiotics given during her first stay were likely not continued long enough to resolve the infection, and the oral antibiotics she was discharged with were likely insufficient to address the deep tissue infection she had developed. The steroids she received early on may have promoted a procoagulant state, but may have also prevented further inflammation and possibly contributed to stabilizing the developing clot [14].

Conclusions

Lemierre's syndrome is a potentially fatal sequela of bacterial pharyngitis, tonsillitis, or peritonsillar abscess. Early diagnosis of this disease is vital due to several life-threatening complications that can arise if missed, such as septic emboli, septic arthritis, osteomyelitis, meningitis, septic cavernous sinus thrombosis, and CVA. It is important for clinicians to recognize the signs and symptoms that indicate progression towards infectious thrombophlebitis, obtain relevant neck imaging, and initiate treatment early if Lemierre's syndrome is suspected. Lemierre's syndrome should remain in the differential even when less typical causative organisms are identified, particularly when signs of deep tissue infection are present. Early intervention may prevent life-threatening complications and support uncomplicated recovery.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Acquisition, analysis, or interpretation of data: Lysine E. Varghese, Abulhasan F. Alkhafaji, Siddharth Patel, Dev N. Lotia

Drafting of the manuscript: Lysine E. Varghese, Abulhasan F. Alkhafaji, Siddharth Patel, Dev N. Lotia

Concept and design: Siddharth Patel

Critical review of the manuscript for important intellectual content: Siddharth Patel

Supervision: Siddharth Patel

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. Shane Warren issued approval n/a. Good afternoon, The Office of Research has reviewed your training records and student research registration form. Your project, Lemierre's Syndrome, has been approved. Given the research has been identified as a case study, it does not meet the definition of human subjects research and does not need to be reviewed by ACOM IRB for approval prior to the onset of the project. It is important to maintain a copy of the consent form from all patients with whom case studies are conducted. Shane Warren, PhD Director of Research and Grant Development Assistant Professor of Medical Education Division of Institutional Effectiveness 334.305.1043 acom.edu. **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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