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CASE REPORT

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Lemierre syndrome causing empyema and pulmonary embolism: A reemerging disease from a bygone era?

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Key Clinical Message

Long considered a "forgotten disease" of a bygone era, the apparent reemergence of Lemierre syndrome highlights the need for awareness of this rare condition to ensure timely diagnosis and treatment. Lemierre syndrome should be suspected in young adults presenting with a chest or neck infection and requires prolonged antibiotic therapy, surgical drainage of collections, and often anticoagulation.

KEYWORDS

bacterial infections, fusobacterium infections, *Fusobacterium necrophorum*, Lemierre syndrome, nasopharyngeal diseases, post-anginal sepsis

1 | CASE

An 18-year-old female with no significant past medical or surgical history presented to the emergency department of an Australian metropolitan hospital with 12 h of acute-onset right-sided pleuritic chest pain, dyspnoea, and subjective fevers. Pertinently, her presentation was preceded by mild coryzal symptoms 4 days prior, but other significant symptoms were denied. On examination, the patient appeared distressed and pale and was tachycardic (150 beats per minute), tachypneic (44 breaths per minute), and hypoxic (oxygen saturations at 96% on two liters of supplemental oxygen), but was afebrile and normotensive. She was otherwise peripherally warm and well-perfused, with auscultation demonstrating a clear chest with dual heart sounds and no murmurs. Her abdomen was soft and non-tender. No other pertinent examination features were appreciated at the time of assessment.

Biochemistry demonstrated a leukocytosis (18.2×10^9/L) with an associated neutrophilia (16×10^9/L) and elevated C-reactive protein (196.8 mg/L), and severe thrombocytopenia (47×10^9/L). Renal function was significantly impaired, with creatinine (198 micromol/L) and eGFR (31) both strongly suggestive of an acute kidney injury. Her venous blood gas was unremarkable. D-dimer was elevated at 7.31 mg/L, and a ventilation-perfusion (V/Q) scan was subsequently performed, which interestingly revealed a small subsegmental pulmonary embolism in the superior segment of the left lower lung lobe. This was very likely a non-septic pulmonary embolus given its identification on V/Q scanning. A Doppler ultrasound revealed a 2.9-cm nonocclusive thrombus in the left popliteal vein. Serial chest X-rays were consistent with an expanding right-sided pleural effusion, although subsequent computed tomography (CT) pulmonary angiogram demonstrated a large right-sided pleural effusion with difficulty appreciating pulmonary emboli due to bibasal atelectasis and poor pulmonary vessel opacification (Figure 1). The patient was admitted to the high-dependency unit for close observation, with empirical antibiotics (piperacillin-tazobactam and azithromycin for potential pneumosepsis and atypical microorganism coverage, upgraded to meropenem and metronidazole for broader coverage) and therapeutic anticoagulation (Enoxaparin) commenced once her thrombocytopenia resolved. Within 10 h of presentation, the patient developed fevers to 39.3°C.

Blood cultures cultivated an anaerobic Gram-negative bacillus with appearances consistent with *Fusobacterium necrophorum*, prompting a contrast-enhanced CT brain and neck to be performed to investigate for a potential source. Numerous dental caries of the sixteenth molar tooth were visualized, extending to involve the pulp chamber, and hence were a suspected source of hematogenous bacteria. Importantly, no internal jugular vein (IJV) thrombosis or cerebral infarcts were appreciated on CT. An intercostal catheter (ICC) was inserted in the intensive care unit for drainage and sampling of the right-sided empyema, which similarly cultured *Fusobacterium necrophorum*. Repeat CT chest demonstrated multiple septic emboli throughout both lung fields and an enlarging right-sided pleural effusion. As such, the patient underwent a video-assisted thoracoscopic decortication, intraoperatively uncovering two pus-filled pockets in the right lung base.

With persistent fevers, repeat CT chest 1 week postoperatively demonstrated a persistent 60 × 96 × 65mm complex right-sided pleural effusion (Figure 2). Hence, a right anterolateral muscle-sparing thoracotomy and decortication were performed, with an empyema once again drained. The patient began to improve, with conversion to tracheostomy and sedation weaning tolerated well by the patient day one post-thoracotomy and decortication. On postoperative day two, meropenem was ceased and metronidazole was maintained as a single agent against *Fusobacterium necrophorum*. On postoperative day five, her ICCs were successfully removed. Repeat CT chest on post-operative day 10 demonstrated a vast improvement of her pleural collections and parenchymal consolidation, and she was transferred to the ward following a successful tracheostomy decannulation. With resolution of her inflammatory markers and ongoing stability of her now small right-sided pleural effusion, the patient was discharged home on amoxicillin-clavulanate. Sensitivities for anaerobes are not routinely performed at our institution, and with presumed sensitivity to amoxicillin-clavulanate, the decision was made to downgrade to oral amoxicillin-clavulanate on discharge. Outpatient follow-up every three to 4 weeks over the course of almost 3 months found her clinically well with near-complete resolution of her pleural effusions radiographically 1 month following discharge (Figure 3).

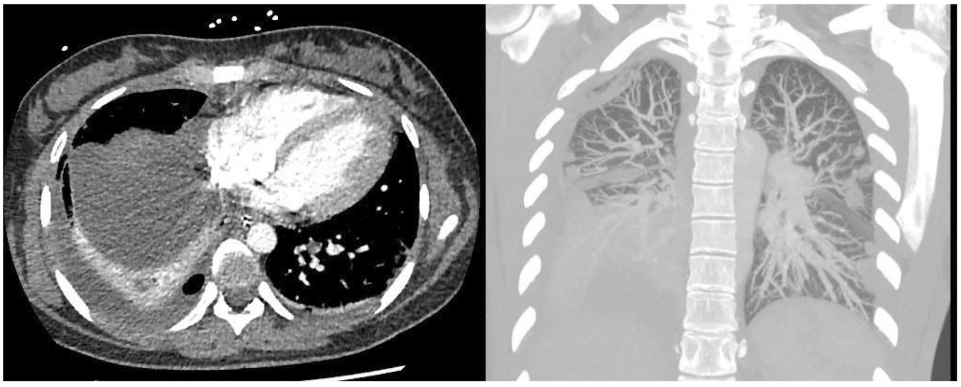

FIGURE 1 Computed tomography chest axial (left) and coronal (right) sections demonstrating a large right-sided pleural effusion.

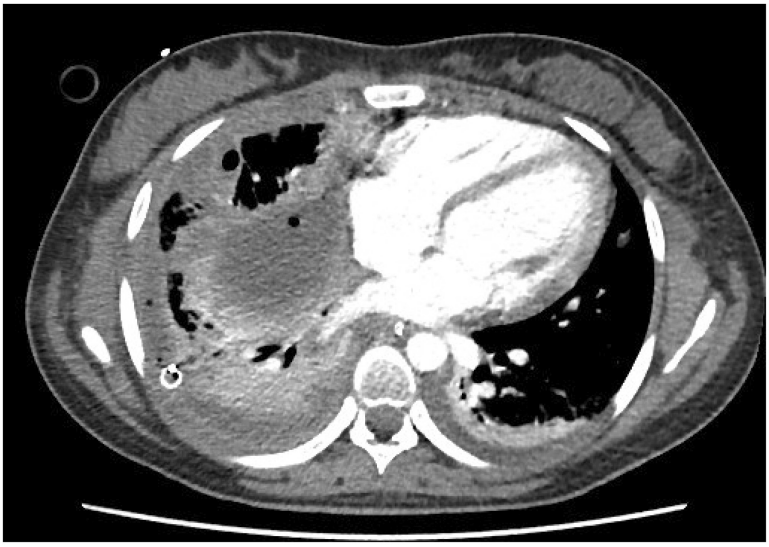

FIGURE 2 Repeat CT chest (axial section) demonstrating a persisting right-sided pleural effusion 1 week post video-assisted thoracoscopic decortication.

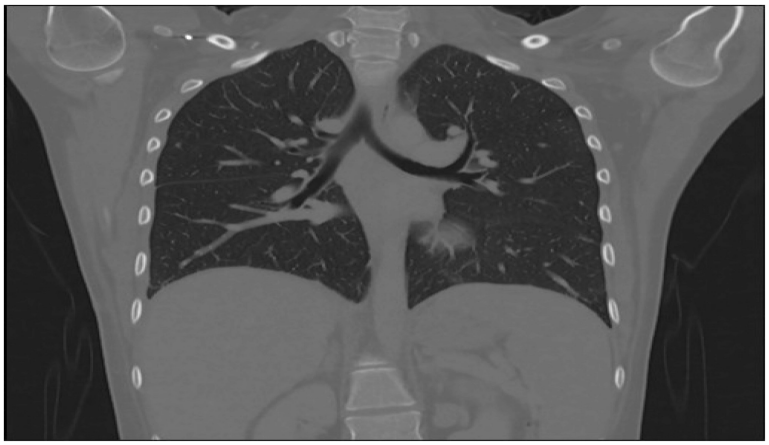

FIGURE 3 CT chest (coronal section) demonstrating virtually complete resolution of the patient's previously noted right-sided pleural effusion one month post-discharge from hospital.

2 | DISCUSSION

André Lemierre, a French bacteriologist, first described in 1936 the condition of an "anaerobic post-anginal sepsis", now termed Lemierre syndrome. He described an anaerobic septicaemia preceded by oropharyngeal infection, typically by *Fusobacterium necrophorum* (previously known as *Bacillus funduliformis*), an anaerobic gram-negative rod. This is accompanied by dissemination and metastatic spread of septic emboli via the IJV, producing distant metastatic abscesses.[1]

Recent times have seen a relative increase in the number of cases of Lemierre syndrome published in the literature.[2] While this may be a consequence of publishing bias, some attribute this apparent reemergence to more judicious antibiotic prescription. Upper respiratory tract infections, such as pharyngitis, were previously treated with antibiotics as first-line management. However, changes in prescribing habits may indeed be contributing to the increased prevalence of Lemierre syndrome.[2]

Valerio et al.'s (2021)[3] meta-analysis of 712 cases of Lemierre syndrome between 2000 and 2017 represents the largest performed study of Lemierre disease. The study identified *Fusobacterium spp*. as the most commonly implicated genus (58%), with *necrophorum* (87%) and *nucleatum* (7%) being the most common species. The median age of presentation was 21 years, with the majority of cases originating from oropharyngeal (73%), lower respiratory tract (46%), and neck infective sources (40%). Internal jugular vein thrombosis was identified in 75% of cases at diagnosis, while 82% had septic emboli, most frequently pulmonary (71%). Pleural empyema was very common, with 17% of cases requiring drainage and 2% requiring decortication.[3]

The mainstay of treatment consists of aggressive antibiotic therapy and surgical drainage of collections. No controlled trials have been conducted identifying the most effective antibiotic regimen, so targeted therapy is directed by in vitro sensitivities and anecdotal clinical experience.[4] Some have previously advised against metronidazole monotherapy given the potential for the coexistence of oral flora, but these oral flora are typically susceptible to penicillin and clindamycin.[5] Therefore, broad-spectrum combination antibiotics may be appropriate in the initial setting until culture and sensitivities facilitate directed therapy. Antibiotic duration is usually prolonged by 3–6 weeks to allow for fibrin clot and abscess penetration. Limited recommendations pertaining to anticoagulation commencement have been made owing to the rarity of anecdotal case observations.[6] While greater than half (56%) of patients received therapeutic anticoagulation in Valerio et al.'s (2021)[3,7] meta-analysis, some suggest commencement depending upon the extension of the thrombus and overall clot burden. The duration of anticoagulation administration is highly variable, ranging from 1–8 weeks, although cases receiving anticoagulation achieved imaging-confirmed resolution of IJV thromboses more rapidly.[8] Our case, however, highlights the need for clinical consideration prior to anticoagulation commencement given the possibility of sepsis-related thrombocytopenia.

Our case highlights an atypical presentation of Lemierre syndrome without IJV thrombosis, a rare and possibly re-emerging condition with considerable risk of clinically severe complications. Prolonged and early antibiotic commencement targeted according to in vitro sensitivities and clinical state, as well as drainage of collections (most commonly pulmonary), present the mainstay of management. Empyema, although a well-known complication of this condition, can indeed be life threatening, with this case highlighting the need for operative intervention and the potential for significant deterioration even in a young and previously well patient. While this condition still remains relatively rare, the pooling of global case reports or collaborative case series is paramount to enhancing our understanding and management approaches for this rare condition.

AUTHOR CONTRIBUTIONS

Shalvin Singh Jassal: Conceptualization; methodology; visualization; writing – original draft; writing – review and editing. **Christopher Steen:** Conceptualization; supervision; visualization; writing – review and editing. **Enoch Wong:** Supervision; validation; writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

The listed authors declare that they have no conflicts of interest to disclose.

DATA AVAILABILITY STATEMENT

All data available has been presented within this manuscript.

CONSENT

Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

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REFERENCES

1. Lemierre A. On certain septicemias due to anaerobic organisms. *Lancet*. 1936;1:701-703.
2. Love WE, Zaccheo MV. Lemierre's syndrome: more judicious antibiotic prescribing habits may lead to the clinical reappearance of this often forgotten disease. *Am J Med*. 2006;119(3):7-9.
3. Valerio L, Zane F, Sacco C, et al. Patients with Lemierre syndrome have a high risk of new thromboembolic complications, clinical sequelae and death: an analysis of 712 cases. *J Intern Med*. 2020;289(3):325-339.
4. Eilbert W, Singla N. Lemierre's syndrome. *Int J Emerg Med*. 2013;6(1):40.
5. Riordan T, Wilson M. Lemierre's syndrome: more than a historical curiosa. *Postgrad Med J*. 2004;80(944):328-334.
6. Kuppalli K, Livorsi D, Talati NJ, Osborn M. Lemierre's syndrome due to *Fusobacterium necrophorum*. *Lancet Infect Dis*. 2012;12(10):808-815.
7. Dalen CT, Mekhail A. Lemierre syndrome: early recognition and management. *Can Med Assoc J*. 2015;187(16):1229-1231.
8. Adedeji A, Chukwura O, Obafemi T, et al. Anticoagulation strategies in the management of Lemierre syndrome: a systematic review of the literature. *Ann Pharmacother*. 2021;55(5):325-339.

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