

Severe Course of Morbus Lemierre Necessitating Extracorporeal Life Support

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Abstract

Lemierre's disease, also known as Post-Angina-Sepsis, describes an acute oropharyngeal infection caused by *Fusobacterium necrophorum* that is complicated by thrombophlebitis of the *V. jugularis interna* and septic pulmonary emboli. Sepsis and pulmonary embolism may result in life-threatening hemodynamic instability affording interdisciplinary intensive care. Here we report about the life-threatening course of *M. lemierre* in a young female patient with successful surgical and anti-infective treatment supported by veno-arterial ECMO therapy.

Definition

Lemierre's disease, also known as Post-Angina-Sepsis, has first been described in 1936 by the microbiologist André Lemierre and mainly has been diagnosed in otherwise healthy and young persons [1]. Morbus Lemierre is defined as an acute oropharyngeal infection associated with thrombophlebitis of the *V. jugularis interna* and septic pulmonary emboli [2]. Most cases are caused by the obligatory anaerobe *Fusobacterium necrophorum*. After the introduction of antibiotic treatment, it has become a rare condition, but mortality still averages 5% [3].

Here we report about the life-threatening course of *M. lemierre* in a young female patient with successful surgical and anti-infective treatment supported by veno-arterial ECMO therapy.

History

An otherwise healthy 27 years old female patient presented to the emergency department of a local hospital because of angina tonsillaris and Dyspnea. Two weeks before the patient had been treated with amoxicillin because of angina tonsillaris by her General Practitioner [4,5]. A CT scan was performed and thrombosis of the left *V. jugularis interna* with a septic pulmonary embolism and left side pleural emphysema was diagnosed (Figure 1). The patient was admitted to the ICU. One day after admission the patient had to be endotracheally intubated and mechanical ventilated because of respiratory failure [4]. At 03:48 a.m. on the second day the ECMO team of the University Hospital of Regensburg (UKR) was contacted to decide about the indication for veno-venous ECMO therapy because of progressive hypoxia and hypercapnia under intensive conventional mechanical ventilation and consecutive cardiovascular instability (Table 1).

The team agreed on the indication of extracorporeal lung support. Since the admitting hospital was only a few kilometers away from the UKR, it was decided to save time and not to transfer the ECMO team to the admitting hospital, but to transfer the patient to the UKR under conservative therapy and to simultaneously prepare staff and material for immediate ECMO implantation after the patient's arrival at the UKR.

At admission to the ICU of the UKR the patient's cardiovascular function had further deteriorated. During the transport, 4.6 mg/h noradrenalin and 2.0 U/h vasopressin were administered to maintain a mean arterial blood pressure of 60 mmHg (Table 2). One hundred mg hydrocortisone and 150 mg methylene blue were administered i.v. immediately after admission for hemodynamic stabilization. A F_{iO_2} of 100 % and high airway pressure was necessary to maintain acceptable oxygenation and decarboxylation (Table 1). Empiric anti-infective therapy with meropenem, clindamycin, vancomycin and caspofungin was initiated and CT of the head, neck, thorax and abdomen was performed.

Table 1: Blood gas analysis and ventilation.

	Prior to admission	At admission	After ECMO
F _i O ₂	1.0	1.0	1.0
pH	7.1	7.21	7.38
pO ₂	78 mmHg	81 mmHg	87 mmHg
pCO ₂	56 mmHg	48 mmHg	37 mmHg
Lactate	28 mol/l	14 mol/l	20 mmol/l
HCO ₃	18 mmol/l	18.7 mmol/l	24 mmol/l
BE	-10	-8.7	-3
SPO ₂	90%	94%	97%
Hb	9.5 mg/dl	9.5 mg/dl	8.7 mg/dl
PIP/PEEP	36/15 cm H ₂ O	34/15 cm H ₂ O	32/15 cm H ₂ O
RR	30	30	28
MV	11.3 lit/min	12.8 lit/min	6.3 lit/min

PIP: Peak Inspiratory Pressure; PEEP: Positive End Expiratory Pressure; RR: Respiratory Rate; MV: Minute Ventilation.

After interdisciplinary review of the clinical presentation as well as the radiographs and laboratory parameters (Table 3) it was decided to transfer the patient to the OR for abscess drainage, tonsillectomy and tracheotomy, for evacuation of a left side pleural emphysema and for left side atypical lung resection and decortication requiring single lung ventilation. Single lung ventilation combined with right lateral positioning was anticipated to provoke further severe deterioration not only of the pulmonary, but especially of the cardiovascular function including the risk for intraoperative cardiac arrest. Thus, it was decided to initiate veno-arterial ECMO (vaECMO) therapy prior to surgical treatment. The left *A. femoralis* was cannulated with a 13 F / 15 cm cannula, and right femoral vein with a 19 F / 38 cm cannula, respectively. For distal perfusion of the left leg a 7 F cannula was inserted antegrade into the left *A. femoralis* [6].

For the percutaneous insertion the patient received a dosage of 5000 IE Heparin. Further on, the anticoagulation was performed with intravenous heparin to reach a target pTT of 50 seconds.

Immediately minutes after starting the ECMO (blood flow 2,8 lit/min, Sweep gas flow 4 lit/min with 60% oxygen), BGA parameters returned to normal and the dosage of catecholamines as well as F_iO₂ and airway pressure could be reduced rapidly (Tables 1 and 2). After implementation of vaECMO therapy, the patient was transferred to the OR.

Table 2: Hemodynamics.

	Prior to admission	At admission	After ECMO
BP _{SYS}	80 mmHg	70 mmHg	80 mmHg
BP _{DIA}	50 mmHg	40 mmHg	50 mmHg
HR	140 / min	140 / min	120 / min
Noradrenalin	3.5 mg/h	4.6 mg/h	2.3 mg/h
Vasopressin	-	2 mg/h	-
Hydrocortisone	-	100 mg	10 mg/h
Methylene blue	-	150 mg	-

BP: Blood Pressure (systolic/diastolic); HR: Heart Rate.

Under vaECMO therapy, tonsillectomy of a bilateral peritonsillar abscess more prominent on the right side was performed using dissection technique. Due to the impaired coagulation during the vaECMO therapy repeated bipolar coagulation was necessary. After tracheotomy, the patient was positioned in right lateral position, the left lung was separated from ventilation, and after left thoracotomy 1 liter pleural emphysema was drained, a destroyed part of the left lung was resected, and the left pleura was decorticated. Hereafter, the patient was transferred to the ICU.

In the specimen harvested during surgery *S. anginosus* and *F. necroforum* were detected, and benzyl penicillin was added to the anti-infective therapy. As the laboratory values indicated an immunoglobulin deficit, the patient received infusion of immunoglobulin G. In the following days, the cardiopulmonary function improved rapidly and markedly. The patient could be weaned successfully from vaECMO on postoperative day 3 and from the respirator at day 6. The anti-infective therapy was deescalated to metronidazole, vancomycin and meropenem and stopped completely at postoperative day 11 [7,8]. Acute renal failure was treated with one single SLED dialysis and with diuretics. Radiologic investigations demonstrated clearing of the bib pulmonary consolidations as well

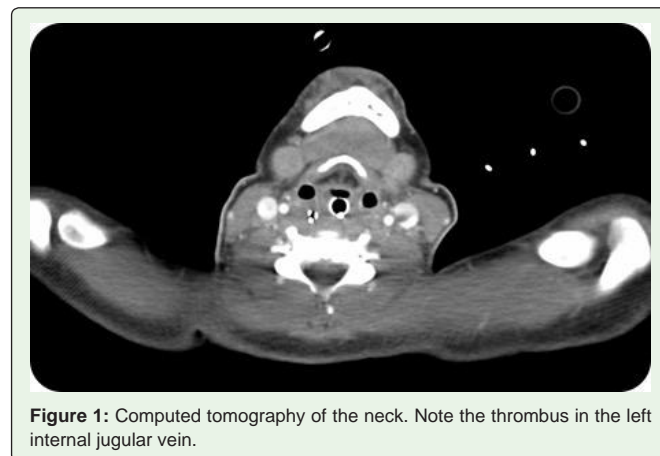


Figure 1: Computed tomography of the neck. Note the thrombus in the left internal jugular vein.

Table 3: Blood values.

Phosphate	2.32 mmol/l
Creatinine	2.58 mg/dl
Urea	257 mg/dl
GFR	25
CK	766 U/l
CK-MB	2.9 U/l
GOT	60 U/l
GPT	36 U/l
AP	73 U/l
CHE	2997 U/l
LDH	243 U/l
Lipase	59 U/l
Bilirubin total	2.12 mg/dl
Bilirubin direct	1.6 mg/dl
Albumin	22 g/dl
CRP	139 mg/dl
PCT	71.07 g/ml
Q	66%
INR	1.3
pTT	49.4
Fibrinogen	395.2 mg/dl
D-Dimer	0.018 mg/dl
AT III	58.7%
Leukocytes	10.88 /nl
Erythrocytes	2.92 /nl
Hemoglobin	8.7g/dl
HK	24.6%
Thrombocytes	45 /nl

as pleural emphysema. Follow-up sonography of the left internal *V. jugularis* showed a small residual thrombosis with uncompromised blood flow. Magnet resonance tomography revealed a Posterior Reversible Encephalopathy-Syndrome (PRES) [9].

Two weeks after surgery the patient could be transferred to neurological rehabilitation. After 28 days and full recovery she was discharged to home and was meanwhile able to return to her job.

Discussion

Here we report on a severe course of *M. lemierre* caused by *S. anginosus* and *F. necrophorum* in a young and otherwise healthy female patient. Usually *M. lemierre* starts with an oropharyngeal infection, e.g. angina tonsillaris. Initially the patient suffers from high temperature, lymphadenitis and lethargy. Venous thrombosis of the neck veins caused by septic emboli may complicate the disease. Up to 60% of patients with *M. lemierre* develop severe sepsis and are admitted to ICU [10,11]. Typically anaerobic pathogens like *Fusobacterium necrophorum* and various types of Streptococcus are found in the specimens. A targeted anti-infective therapy should then follow the initial broad spectrum therapy [10]. The thrombosis

needs to be treated with anticoagulation for several months. In case of repeated septic episodes or development of pulmonary emboli a ligation of the jugular vein can be considered.

In this case, the disease was aggravated by severe deterioration of the cardiopulmonary function due to sepsis and pulmonary embolism. Causal therapy was focus control surgery by tonsillectomy, drainage of bilateral peritonsillar abscesses, drainage of the pleural emphysema and resection of infarcted lung tissue paralleled by immediate anti-infective and supportive sepsis therapy. Surgery had been facilitated by veno-arterial ECMO therapy.

Extracorporeal assist was primarily thought of as veno-venous lung assist to treat respiratory acidosis refractory to conventional ventilation unaware of the necessity of one-lung ventilation in a cardiovascular unstable patient. It proved beneficial that no veno-venous ECMO was implanted in the admitting hospital and that the patient received new CT diagnostic with interdisciplinary review of all signs, symptoms and findings. The new CT diagnostic confirmed the results of the initial report.

Thus, based on the indication for thoracotomy and single-lung-ventilation in a hemodynamic unstable patient with impaired cardiac function due to sepsis and pulmonary embolism the primary idea of mere veno-venous lung support was banned since the indication for combined heart and lung support by a veno-arterial cannulation was now evident.

Albeit this patient was admitted to our hospital at 04:15 a.m., the staff and equipment of a multidisciplinary team of intensivists, ECMO specialists, otolaryngologists, thoracic surgeons and radiologists were immediately available. In our opinion the favorable outcome of the case reported is based on the immediate interdisciplinary comprehensive therapy consisting of complete radiology diagnostics, conservative intensive case sepsis therapy, ECMO heart and lung support and surgical focus control. The course of the presented case may support the necessity for high-level interdisciplinary institutions providing all diagnostic, medical and surgical disciplines in a 24/7 service. If indicated and provided by highly experienced ECMO centers, extracorporeal heart and lung support might help to further reduce the mortality of *M. lemierre*.

Ethical Statement

The patient reported in this manuscript has given informed consent to the publication of this manuscript.

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