



Case report

Successful treatment of postoperative massive pulmonary embolism with paradoxical arterial embolism through extracorporeal life support and thrombolysis

Konstantinos Grapatsas^{a,b}, Vasileios Leivaditis^a, Paul Zarogoulidis^{c,*}, Zoi Tsiligianni^d, Sotirios Kotoulas^b, Christophoros Kotoulas^b, Efstratios Koletsis^e, Ilias Stylianos Iliadis^b, Konstantinos Spiliotopoulos^f, Georgia Trakada^c, Lemonia Veletza^c, Anastasios Kallianos^c, Theodora Tsiouda^c, Christoforos Kosmidis^g, Wolfgang Hohenforst-Schmidt^h, Haidong Huangⁱ, Rainer Haussmann^j, Erich Haussmann^j, Manfred Dahm^j

^a Department of Cardiothoracic and Vascular Surgery, Westfalz Klinikum, Academic Educational Hospital of Mainz University, Kaiserslautern, Germany

^b Department of Cardiothoracic Surgery, Iaso General, Athens, Greece

^c Pulmonary-Oncology Department, "Theageneio" Cancer Hospital, Thessaloniki, Greece

^d Department of Pulmonology, 401 General Military Hospital, Athens, Greece

^e Department of Cardiothoracic Surgery, Medical School, University Hospital of Patras, Patras, Greece

^f Cardiothoracic Services, The Newcastle upon Tyne Hospitals NHS Foundation Trust, UK

^g Surgery Department, "Interbalkan European Medical Center", Thessaloniki, Greece

^h Sana Clinic Group Franken, Department of Cardiology/Pulmonology/Intensive Care/Nephrology, "Hof" Clinics, University of Erlangen, Hof, Germany

ⁱ Department of Respiratory and Critical Care Medicine, Changhai Hospital, Second Military Medical University, Shanghai, China

^j Department of Anesthesiology, Emergency Care Medicine and Intensive Care Medicine, Westfalz Klinikum, Academic Educational Hospital of Mainz University, Kaiserslautern, Germany

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ABSTRACT

Pulmonary embolism is a common clinical entity related to high mortality. About 200,000 to 300,000 patients die every year due to pulmonary embolism. The purpose of this article is to describe a case of a patient who on the second postoperative day after undergoing thromboembolectomy of the left femoral artery, manifested a massive pulmonary embolism. Due to cardiorespiratory collapse a combined treatment via extracorporeal life support (ECLS) and parallel catheter thrombolysis was decided and performed. By cardiorespiratory improvement and final stabilization the patient was successfully weaned from ECLS and the system was successfully removed. After a reasonable postoperative time the patient was dismissed in good overall condition.

1. Introduction

Massive pulmonary embolism (MPE) is a common disease with a various symptomatology spectrum. MPE is a possible postoperative complication that should always be taken into consideration after most kinds of operations. The clinical consequences of a postoperative MPE can be disastrous and fatal. Every year about 200,000 to 300,000 patients pass away due to pulmonary embolism. The signs and symptoms are: a) dyspnoea, b) pleuritic chest pain, c) cough, d) Substernal, e) chest pain, f) fever, g) haemoptysis, h) syncope, i) unilateral leg pain, and signs of Deep Venous Thrombosis DVT (unilateral extremity swelling). The most common therapy of pulmonary embolism (PE) is a conservative approach through thrombolysis [1] (see Figs. 1–3)

We here describe the case of a 58-year-old patient who presented a postoperative cardiorespiratory collapse because of MPE and therefore a therapy with extracorporeal membrane oxygenation (ECMO) and thrombolysis catheter was induced.

2. Case report

A 58-year-old patient was transferred in the Department in the Cardiothoracic and Vascular Surgery of Kaiserslautern with an acute arterial embolism of the left femoral artery. An emergency thromboembolectomy was performed followed by a full anticoagulation. It should be mentioned that in the patient's medical history there was no cardiological dysrhythmia. On the second postoperative day the patient

* Corresponding author.

E-mail address: pzarog@hotmail.com (P. Zarogoulidis).

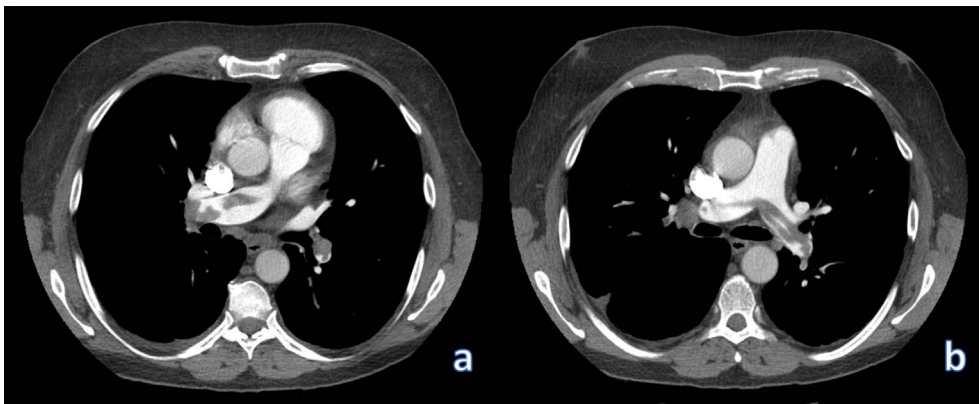


Fig. 1. Cross section CTA showing the presence of thrombotic material in the right (1a) and the left (1b) pulmonary artery.

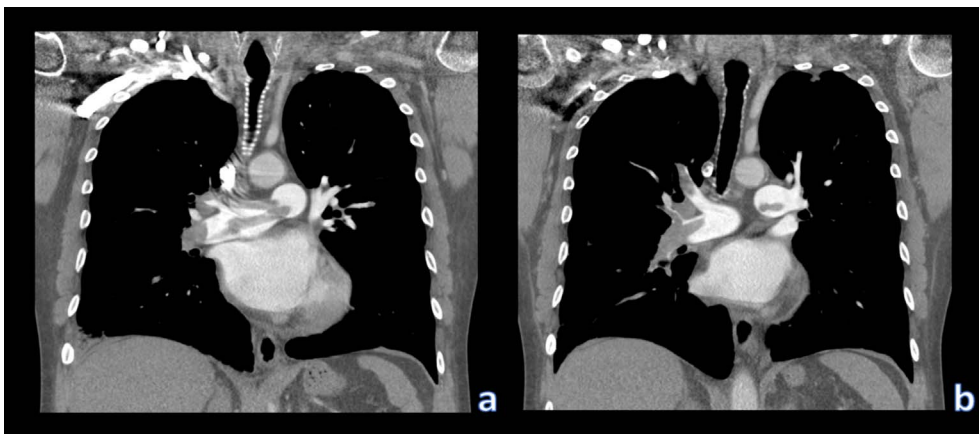


Fig. 2. Sagittal section CTA showing thrombus in the right (2a) and the left (2b) pulmonary artery.

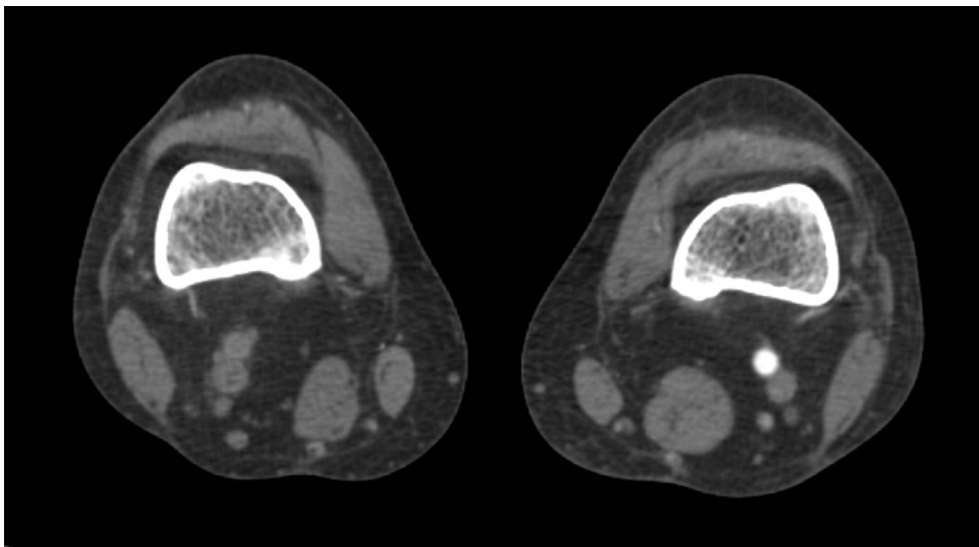


Fig. 3. Cross section CTA showing the occlusion of the right femoral artery due to paradoxal arterial embolism.

complained of dyspnea and right leg pain. By the suspicion of a new thromboembolic episode an emergency computed tomography angiography (CTA) was performed and showed massive bilateral pulmonary embolism (PE) and an arterial occlusion of the right leg. A catheter thrombolysis was decided and performed. During the initiation of the thrombolysis the patient's symptomatology was significantly improved. However, by the interruption of the catheter thrombolytic therapy the patient's clinical condition deteriorated dramatically and the patient collapsed cardiopulmonary. An emergency intubation and cardiopulmonary resuscitation (CPR) followed and an implantation of a venoarterial (VA) ECLS was decided. Parallel with the ECLS implantation

a right leg thrombectomy was performed. Transesophageal echocardiography (TEE) showed a patent foramen ovale (PFO), which was the cause of the paradoxal arterial embolism in the right leg. Postoperatively the patient was transferred to the intensive care unit under high dosed catecholamine therapy. By low cardiac output levosimendan and milrinone were also added. An improvement of the cardio-respiratory function was gradually reached and the patient could be successfully weaned from ECLS. The renal function remained intact and hemodialysis was not necessary. After a short respiratory weaning the patient was extubated and transferred to the normal ward. After intensive physical therapy the patient was discharged in a good

condition. A lifelong oral anticoagulant with phenprocoumon was advised. A readmission for interventional closure of the PFO was also planned.

3. Discussion

PE is a common respiratory disease that concerns the clinicians worldwide. However, by patients whose clinical condition gradually deteriorates the final outcome has a poor prognosis [1]. According to the American Heart Association (2011) and the European Society of Cardiology (2014) massive PE is acute PE with sustained hypotension (systolic blood pressure < 90 mmHg or systolic pressure drop > 40 mmHg for at least 15 min or requiring inotropic support) [2]. As in our case the main diagnostic procedure of the PE is the CTA [3]. Therapeutic options include open embolectomy, thrombolytic therapy, intravenous heparin and catheter-based techniques and may be applied separately or in combination based on individual patient's characteristics and condition severity [4]. Thrombolysis remains however the most common therapy of the PE [1]. Surgical treatment may also be indicated in some cases [1]. However, perioperative mortality for hemodynamically collapsed PE ranges from 43% to 84%.5 and the outcome of surgical therapy and thrombolysis is similar [5]. In our case the patient's condition improved after induction of the thrombolysis, but after the end of this therapy the patient's respiratory and hemodynamic condition dramatically deteriorated.

In our case MPE led to a cardiogenic shock due to right ventricular failure. ECLS can be a bridge-solution until the patient's cardiopulmonary condition recovers and becomes stable [4]. After CPR the ECLS implantation led to the improvement of the right ventricular function and the better oxygenation of the patient [3,6]. Especially in our case the application of an AV-ECLS reduced the right ventricle afterload and by improving the patient's hemodynamic stability and the tissue oxygenation [7].

The ECLS use occurred as an evolution of the cardiopulmonary bypass and in the emergency of the circulation collapse as in our case ECLS can be used. In addition, Munakata et al. have proposed that under the suspicion of a PE by patients with a circulatory collapse and ECLS can be performed [3]. ECLS plays an important role in managing cardiogenic shock including MPE [5]. The number of cases of this parallel therapy of ECLS and catheter thrombolysis for MPE after cardiorespiratory collapse are rising in the literature as many centers adopt this parallel therapy by this life threatening condition [8]. As compared

to the combination of ECLS and anticoagulation therapy, the combination of ECLS and thrombolytic therapy should have an advantage to reduce thrombotic burden, but it would have a greater risk of bleeding complications [5].

4. Conclusion

In conclusion, we suggest that in a life threatening MPE with cardiopulmonary collapse an ECLS combined with thrombolysis can offer an effective therapeutical modality.

Conflict of interest

None to declare.

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