Management of massive pulmonary embolism using recombinant activated Factor VII

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Abstract
Massive pulmonary embolism with concomitant intracranial haemorrhage is a condition associated with high mortality. Emergency embolectomy is indicated in those cases in which medical treatment is not possible. The case of a 65-year-old woman with massive pulmonary embolism after cranial trauma with intracranial haemorrhage and two cardiac arrests prior to surgery is described. The patient suffered a right ventricular failure requiring 6 h of extracorporeal circulation. After surgery a bleeding disorder happened despite conventional treatment. The patient was transferred to the ICU with packing. Despite the recent thrombotic event recombinant activated Factor VII (70 μg/kg) was used and the bleeding controlled. No other complications occurred and she was discharged 1 month later. As far as we know this is the first time that recombinant activated Factor VII has been used after a massive pulmonary embolism.

Keywords: Pulmonary embolism; Recombinant activated Factor VII; Bleeding

1. Case report

The case of a 65-year-old woman with no previous medical history admitted to the Psychiatric Department for a major depression is described. During her stay, she fell and hit her head. A cranial CT scan was performed showing a small subarachnoid haemorrhage of the convexity. The next day she suffered a sudden cardiopulmonary arrest from which she recovered. A new cranial CT scan showed no changes with respect to the previous one. The patient presented severe haemodynamic instability. A transoesophageal echocardiography showed a dilatation and severe hypokinesia of the right ventricle with images suggesting thrombi in the outflow tract. Emergency surgery was planned.

In the operating room and during the anaesthetic induction a new cardiac arrest occurred so a sternotomy and a direct massage were performed emergently while the patient was subjected to extracorporeal circulation. A longitudinal arteriotomy was performed on the pulmonary artery and large thrombi were extracted (Fig. 1). The patient needed 325 min of assistance to come out of the extracorporeal circulation. High doses of vasoactive and inotropic drugs due to a right ventricle (RV) failure were needed. She also presented an important coagulation disorder. The patient required a transfusion of six plasma concentrates, four red blood cells concentrates and two platelet pools but the bleeding did not stop. The patient was transferred to the ICU with packing where she presented a 700 cc bleeding in the first 45 min and 1360 cc in the first hour and a half. Therefore, and despite the recent thrombotic event, it was decided that a dose of 70 μg/kg of rFVIIa would be used. After that the bleeding decreased and only 140 cc were drained in the next 2 h. The patient subsequently improved haemodynamically and the dose of inotropic agents could be reduced. The sternotomy was closed on the third day. The patient suffered no neurological damage and treatment with heparin sodium was started immediately. The patient could be extubated 10 days after surgery. After needing some rehabilitation she was discharged 2 weeks later.

2. Discussion

Fibrinolytics are currently considered to be the treatment of choice even in cases of massive PTE (defined by the presence of shock/hypotension), leaving a very limited role for acute pulmonary embolectomy [1]. However, the cases of acute massive pulmonary thromboembolism (PTE) treated successfully by means of surgery especially in patients with intracranial haemorrhage have increased [2]. In one review, Gulba et al. [3] found a similar mortality between the medically and surgically treated groups (25%
vs 23% respectively). However, the percentage of recurrence was much lower in the surgical group (21% vs 7.7%). Goldhaber’s group has presented a series of 47 patients who were operated on for acute massive PTE with a surgical mortality of 6% [4]. As commented by these authors, the presence of a cardiac arrest prior to the operation is the highest surgical mortality marker in these patients.

It is important to remember that the surgical procedure can be very long, not because of the technical complexity but because the RV may require a long assistance to recover. In this patient, the thrombus was extracted in only 20 min of cross-clamping but more than 5 h of assistance were necessary for the RV to recover slightly. Sadeghi et al. support the use of right ventricular assistance if necessary until the RV recovers [5]. Sometimes, as in our case, delayed sternal closure is necessary until greater recovery of the RV is attained.

These conditions can lead to haemodynamic instability and excessive bleeding in the first hours after the surgery. Despite the fact that the patient presented a massive PTE, it was decided that rFVIIa would be used. The application of this drug is only approved as a treatment and prophylaxis in the surgery of haemorrhagic events in patients with congenital haemophilia with inhibitors, acquired haemophilia, Glanzmann’s thrombasthenia refractory to platelet transfusion and congenital FVII deficiency. However, there are many publications on its use in other situations accompanied by haemorrhages that are difficult to treat with conventional measures [6]. The use of this drug was vital for controlling the haemorrhage without the occurrence of any adverse effect. rFVIIa has shown to be very useful in excessive bleeding after cardiac surgery [7] but to our knowledge this is the first time it has been used after a case of massive PTE. The current quoted risk of thrombotic episode with its use is about 5%. This risk is much lower than the risk of death the patient was having at the time. The dose used in this case is somewhat lower than the recommended dose (90 μg/kg) achieving its effect without side effects. The most suitable dose for achieving the greatest benefit with the lowest possible risk is currently under debate [8].

In conclusion, an emergency embolectomy was successfully performed in a patient with massive PTE and two prior cardiac arrests. The recovery of the RV may require a very aggressive treatment in the ICU until haemodynamic stability and coagulation control is achieved. The use of rFVIIa was the determining factor for stopping the haemorrhage without any side effect being observed.

References