Successful administration of alteplase in a venous thromboembolism crossing through a patent foramen ovale

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Abstract

We describe a case report observed via an echocardiography of a venous thromboembolism (VTE) that crosses through the patent foramen ovale to the left atrium and is successfully treated with alteplase. This is a case report of a tertiary care hospital without cardiac surgery facilities. An 81-year-old female seeking medical attention for dyspnoea, arriving at hospital with hypoxaemia, hypotension and prerenal failure. A computed tomographic (CT) pulmonary angiography was carried out, revealing a VTE. A transesophageal echocardiography (TEE) was carried out, exposing emboli in the right cavities, said thrombus crossing through the patent foramen ovale to the left atrium. A systemic thrombolysis is carried out using alteplase which improves the patient’s condition and results in the disappearance of thrombotic images in the various cardiac cavities. The evolution is positive and there is no evidence of embolic or haemorrhagic complications. When a paradoxical embolism is present, in the context of a serious VTE, carrying out thrombolysis could be a therapeutic option.

Keywords: Patent oval foramen; Alteplase; Paradoxical embolism; Fibrinolysis; Venous thromboembolism

1. Introduction

Paradoxical embolisms are rare complications of venous thromboembolism (VTE) though they could be underdiagnosed. Although a VTE with shock is a clear indication for fibrinolysis, a thrombus in left cavities is considered a contraindication. Carrying out thrombolysis in view of VTE could be reason for dispute in cases of shock and when a paradoxical embolism is present. We describe a case of paradoxical embolism in VTE treated with thrombolysis.

2. Case report

An 81-year-old female with a history of diabetes mellitus, transient cerebrovascular accident, and hypertension, three days prior to hospital arrival experienced signs of sudden dyspnoea and pain in lower right extremity. She arrived at emergency department with overt hypoxaemia, tachypnoea and intense respiratory effort. Laboratory results: 13,580 leukocytes, D-dimer 754, creatinine 2.7 mg/dl, urea 68 and troponin I 1.32 ng/ml. ECG showed a sinusal rhythm of 115 bpm with S1Q3T3 pattern, a 2–3 mm descense in ST-segment in leads V4-6. Patient demonstrated haemodynamic instability, blood pressure was 78/42 mmHg, and poor peripheral perfusion. EuroSCORE = 19 points. Chest X-ray showed no abnormalities. A computed tomo-
graphic (CT) pulmonary angiography was performed which uncovered thrombi in both pulmonary arteries. A transtho-
racic echocardiography was performed showing a dilated right ventricle, with severe systolic pulmonary artery pres-
sure (90 mmHg), severe right ventricular dysfunction, severe tricuspid insufficiency, with tricuspid annular plane systolic excusion (TAPSE) of 13 mm, in addition to mobile mass in the right atrium which protruded towards the right ventricle. In order to have a differential diagnosis of myxoma vs. VTE, a transesophageal echocardiography (TEE) was performed revealing that the right atrium was full of a mobile, serpiginous mass that was not adhering to any cavity (Fig. 1) and prolapsed towards the right ventricle, crossing the intra-auricular septum (patent foramen ovale) and entering into the left atrium (1.5 cm). Mobile mass was present in the pulmonary arterial trunk and both pulmonary arteries. During the TEE the patient required 2 l of saline and noradrenaline.

In view of the clinical status and the non-existence of cardiac surgery in our hospital, alteplase was administrated (100 mg in 120 min). The patient progressed favourably, sooner than expected, improving haemodynamic and oxygenation, leaving the intensive care unit after 24 h. A new TEE was performed 72 h later revealing that thrombotic images had disappeared, pulmonary artery systolic pressure decreased to 65 mmHg and TAPSE increased to 20 mm.
were observed. A follow-up one month later indicated a favourable and she was released after five days on enoxaparin. No haemorrhagic or embolic complications was observed where mobile mass can be observed in retractable right atrium, with an estimated maximum length of 15 cm (total), which retracts into the right atrium, prolapses towards the right ventricle and crosses towards the left atrium through the patent foramen ovale. The said paradoxical embolism stretches about 2 cm towards the left atrium.

A stable thrombus was identified in the lower right limb with echo-Doppler. The subsequent evolution of the patient was favourable and she was released after five days on enoxaparin. No haemorrhagic or embolic complications were observed. A follow-up one month later indicated a NYHA class II, creatinine 1.4 mg/dl, echocardiography with a systolic pulmonary artery pressure of 70 mmHg.

3. Discussion

It is known, particularly with necropsy studies, that at least one-third of the general population has a permeable foramen ovale [1]. So, it could be suspected that, although the estimated number of paradoxical embolisms within VTE is low, the actual figures could be higher. Detection of paradoxical embolisms echocardiographically or through a CT is exceptional [2–7], and will likely increase with the more widespread use of the new multidetector CT and the TEE. The few cases reported where the embolus was observed crossing through the patent foramen ovale were considered surgical emergencies and surgical successes [2, 3]. Nonetheless, the results of surgical embolectomy could be worse than suggested by these figures, since many of these patients could be in shock and have a high comorbidity. On the other hand, a thrombolysis is a clear indication in patients with shock caused by VTE, or with masses in right cardiac cavities. In the case of thrombi that affect the left side (auricular or ventricular), thrombolysis is considered to be a contraindication given the high risk of systemic embolisms.

We have presented a case with a thrombus in the right atrium which expands to the right ventricle and penetrates the patent foramen ovale, positioning itself in the left atrium. The selected therapeutic option could have been surgical thrombectomy with or without the closure of the patent foramen ovale; however, the patient was in shock, renal failure, onset of multiorgan failure and had a surgical mortality of 78%. Moreover, our hospital does not provide cardiac surgery, requiring interhospital transfer. Notwithstanding the haemorrhagic and embolic risks of thrombolysis, this case was treated with alteplase. The thrombolysis had immediate benefits, improving oxygenation in a few minutes after being administered, avoiding intubation, and immediate haemodynamic improvements. This fast onset of action has been observed in other cases. Madani and Ransom [3] found 20 s after infusion in a case of VTE an embolization in the left common iliac and femoral arteries. The absence of haemorrhagic and embolic complications in this case does not exclude this possibility. However, this solution could be considered for patients with similar profiles, accepting the haemorrhagic and embolic risks. We understand that the patient’s high risk for haemorrhage and embolisms could have resulted in considering alteplase use unacceptable. However, we feel that its potential efficacy and safety outweighed the risks, as in the Pavesi et al. case [5] where the successful use of alteplase for a VTE led to a stroke. Furthermore, these risks are accepted and less often considered in patients with prosthetic valve thrombosis, which could be similar in respect to morbimortality, haemorrhagic and embolic risks.

Another point to consider is the possibility of surgery without mobilization of the patient. In our case, given the poor conditions of the patient and the high surgical risk, we initially decided to use alteplase, and if failing that then opted for surgery. Another possibility is when the thrombus can be seen crossing the fossa ovalis but the patient is stable or asymptomatic, surgery could be an option or the option chosen by Willes et al. [2], who started anticoagulation with the resulting disappearance of the thrombus.

4. Conclusions

Thrombolysis could be a therapeutic option in the presence of a paradoxical embolism in the context of a serious VTE when surgery is not feasible.

References

eComment: Systemic thrombolysis with alteplase in impending paradoxical embolism

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We read with great interest the case report of Ruiz-Bailen et al. regarding the successful treatment of an impending paradoxical embolism through a patent foramen ovale [1]. They were able to treat an 81-year-old female with severe impaired clinical status with alteplase successfully.

In cases of impending paradoxical embolism, therapeutic options include anticoagulation, surgical embolectomy and systemic thrombolysis. All options have the potential risk of embolisation. Due to the clinical status and the fact that no cardiac surgical facilities were present in this hospital, the colleagues decided to use systemic thrombolysis with beneficial outcome.

Recently, Myers et al. showed, in a systemic literature review, that in cases of impending paradoxical embolism surgical thrombectomy showed a trend towards improved survival, although statistically not significant, and significantly reduced systemic embolism compared to thrombolysis [2]. However, in the real clinical setting the case presented here may represent the situation colleagues are more often confronted with: the next cardiac surgical department is far away and the patient is in severely impaired clinical status. Therefore, this case report may represent an alternative therapeutic option to treat these patients before deciding to transfer them to a cardiac surgical unit with the potential risk of embolisation during transport.

One aspect requires further discussion. Mandani and Ransom recently described the successful administration of alteplase in a case of paradoxical embolus [3]. They initially gave a bolus of 40 mg of alteplase followed by an infusion of 60 mg over 1 h in contrast to the treatment with 100 mg of alteplase given over 2 h in this case report. These different regimes need further clarification and should be considered when patients with these pathologies are treated with systemic thrombolysis.

References

